



Building and Painting SCALE FIGURES

BY SHEPERD PAINE



**SCRATCHBUILDING, CONVERTING, AND DETAILING • SHADING
AND FACE PAINTING • PAINTING WITH OILS • VIGNETTES AND
GROUNDWORK • MORE THAN 30 DETAILED DIAGRAMMS**

SCALE MODELING HANDBOOK NO. 13

Contents

1. Getting Started.....	4
2. Setting Up to Paint.....	8
3. Basic Shading	14
4. Painting the Face	25
5. Painting Detail	34
6. Bases and Groundwork	39
7. Painting Special Uniforms, Accessories, and Nudes	46
8. Painting Horses	54
9. Painting Small Scale Figures and Flats.....	64
10. Minor Conversions for Metal Figures	69
11. Assembling and Converting Plastic Figures	76
12. Major Conversions.....	90
13. Scratchbuilding Figures	100
14. Display, Care, and Transportation of Figures.....	110
Index	112

GETTING STARTED



Fig. 1-1. Even the most skilled painter can't save a badly proportioned figure. This figure will always have oversized hands — there is no way to paint them any smaller.



Fig. 1-2. Distortion occurs when the rubber mold is compressed, flattening the cavity into which the metal is poured. It affects 54mm and 90mm figures. Again, no amount of skill in painting can rescue a figure suffering from this malady. The simplest cure is just not to paint it in the first place.

Whenever I look at models of any kind—in museums, collections, or wherever they catch my eye—my attention is always drawn to the figures, however small they may be. I'm usually less than optimistic. Most modelers, however proficient they may be in their area of expertise, don't do figures very well, and I try not to let the quality of the figures affect my appreciation of the rest of the work. But every so often I am delightfully surprised, and I realize that I have found a modeler with a special touch.

I'm certain I'm not alone in this practice. It's a natural human reaction. Unless we are well acquainted with the subject, we all look at the figures first, because that is the one part

of the model that we all know something about. We may not be able to criticize the improper angle of the wings or the poorly modeled exhaust manifolds, but we all know immediately if a face is badly painted—after all, we look at real ones every day.

Figure painting is not a difficult manual skill. If you can do neat work on your other models, you can do the same on your figures. What you need to learn is the mental process behind it. There are logical rules of light and shadow, and once you learn to apply these, you'll be surprised how quickly everything drops into place.

The same is true of conversion and sculpture. There are logical rules to follow, and as you learn them, your

ability to do things you never thought possible will be a source of constant delight.

This book is slanted toward the modeler of military and historical figures. This is only fair, because for them figures are the "main event" of modeling, not a sideline. Still, the technique is the same whatever kind of figures you are doing, be it a 90mm Napoleonic grenadier standing on his own, or a 1/72nd scale pilot in the shadow of his aircraft.

The teaching methods used here were developed over 20 years of figure painting classes, during which I learned as much (and perhaps more) from my students as they did from me.

This book can carry you from the



Fig. 1-3. For assembling figures you will need the standard modeling tools: files, an X-Acto knife with No. 11 blade, sandpaper (try the cosmetic emery boards shown here — they are ideal for model work), and a pin vise with small drills.



Fig. 1-4. A cordless power drill like the one shown here is ideal for drilling metal figures. It has low speed, so the friction won't melt the metal, and high torque so it won't jam in the soft material.

first painted figure to sculpting your own original pieces. Not everyone is a born sculptor, and there is no reason to think yourself a failure if you can't do it, or don't even want to try. Work at whatever level you feel comfortable with, allow your skills to develop naturally, and enjoy it. After all, it's just a hobby!

Years ago almost all figures were made of metal. Today, however, figures also are available in plastic, resin, and vinyl. I devote most of this book to metal figures, though, because the variety of scales and subjects is still the greatest. Plus, the fundamentals of painting metal figures can be transferred easily to all other materials. I have included a separate chapter on assembling and converting plastics, since most modelers prefer this material when performing conversions.

There are numerous scales for figures — 20 millimeter, 30mm, 54mm, 65mm, 75mm, 90mm, 120mm, 1/48, 1/35, 1/32, and so on. The most popular are 54mm and 90mm, although the techniques you'll learn in this book

can be applied to any scale. Smaller scales, such as 20mm, require a few special techniques and those are covered in chapter 9.

BUYING A GOOD FIGURE

Some figure painting projects are doomed from the start. The old adage that you can't make a silk purse out of a sow's ear holds equally true for figures. No amount of painting skill will make a masterpiece out of a lousy figure. Yet time after time even experienced painters fall into the trap. Seduced by a favorite subject or an attractive pose, they ignore the obvious shortcomings of the casting and buy a figure that will never look right, no matter how well it is painted. Developing a critical eye in the hobby shop can save you a lot of grief later.

How can you tell if a figure will look good after it's been painted? After all, not all faults can be hidden with paint.

First look at proportioning. Unless you are prepared to perform radical surgery, anatomical errors cannot be

corrected. In fig 1-1 is the head too big or too small in relation to the rest of the body? No amount of paint can change the distortion — you'll merely turn an unpainted gargoyle into a painted gargoyle.

Watch for flaws caused by the casting process. Distortion caused by excess pressure on the rubber mold in which the figure is cast is the most common problem. The effect is a noticeable flattening of the entire figure from front to back. Distortion is particularly evident in the head, especially when it faces the side, fig. 1-2. There is no practical way to correct distortion, either with paint or with body putty. Keep an eye out for it, and don't let your enthusiasm for a subject push you into making a purchase you'll regret.

Other common casting flaws are air bubbles in the resin and pitting on the surface of the casting. Light porosity is almost unavoidable and won't affect the painting, but too much can require a lot of work to correct.

Detail is the most overrated aspect



Fig. 1-5. Take care in removing the parting line from the figure. It is sometimes hard to see, but it will come back to haunt you later if you don't erase it now. Find a place where it is clearly visible, and then follow it all the way around the figure.

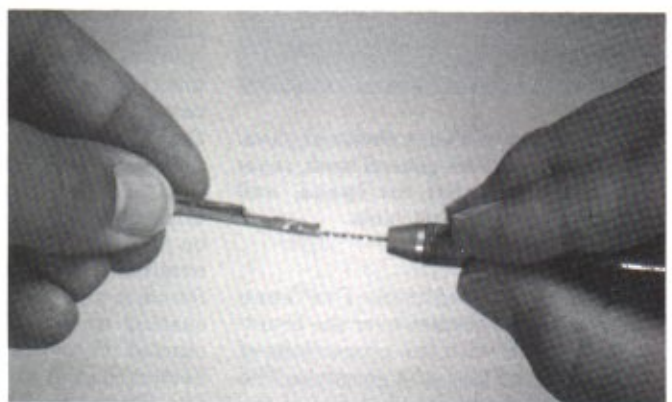


Fig. 1-6. Drilling out the end of the gun barrel is a little job that makes the figure more realistic.



Fig. 1-7. Drilling and pinning the feet all the way up past the ankle ensures the casting will not accidentally break in this weak area. Leave about 1 1/2" of the pin projecting from the bottom of the feet to firmly secure the figure to both the painting and display base.



Fig. 1-8. You have a wide choice of glues: five-minute epoxy for general work, super glue and Zip Kicker for speed, and Walthers Goo for flexible joints.

of commercial figures. I've seen painters go into ecstasy over the braiding on a figure with the proportions of an ape and the face of a gargoyle. The irony is that fuzzy detail is one of the few flaws in a figure that can be corrected with paint. Sharp detail is always nice and makes painting easier,

but the lack of it should not cause you to pass up a figure.

TOOLS YOU'LL NEED TO PREPARE THE METAL CASTING

You will need several basic tools to prepare the casting for painting. The most important is an X-Acto knife with a No. 11 blade. The blades get dull quickly, so keep a supply of spares on hand. I usually keep two knives in my box, one with a slightly dull blade for general work and another with a fresh, sharp blade for special tasks.

A set of needle files is helpful, because for certain jobs a file is better than a knife. With practice, you'll do neat work with the files, and certain shapes will become favorites. The biggest drawback of files is that they get clogged with soft metal, so they must be cleaned out frequently with a brass wire brush, fig. 1-3.

Another inexpensive addition to your toolbox is a set of cosmetic emery boards (for fingernails), which make excellent sanding sticks for all kinds of miniature work.

You'll want a drill of some sort. A pin vise will suffice in the beginning, but soon you'll want a power tool. A Dremel tool can save you time, and when coupled with a speed control it offers a versatility and convenience you won't want to be without. The variety of bits available for it makes the Dremel tool an all-purpose time-saver. I prefer the desk model speed control because it allows slower speeds than the built-in control.

Nothing beats a household cordless power drill for drilling metal figures. Its slow speed and high torque are ideal for cutting soft, dense metal, because the drill won't jam in the casting; the metal shavings just spiral neatly out of the hole, fig. 1-4. This is one tool I wouldn't be without.

REMOVING THE PARTING LINES

When you get your figure home, examine the parts carefully to see that nothing is missing and that everything is fully formed. Look for the "parting line" (where the mold halves meet) on each piece; on especially good castings it may be hard to find, but it's there, and if you don't find it now it will come back to haunt you later.

Scrape backward with an X-Acto knife to gently smooth the parting line on each piece. It runs continuously all around the figure, and once you've found it you can follow it around the casting until you're back where you started. For some jobs a file may work better than a knife, but smooth out any file marks left on the surface, fig. 1-5. It's usually a good idea to wash the figure with soap and water to remove any remaining lubricants from

the casting process. This is particularly important with resin castings.

With experience you'll occasionally use a knife and files to sharpen details or to hollow out a feature that has been cast solid. A good example of the latter, and one that you can do right away, is to hollow out the end of a rifle or pistol with a knife. On most figures there is little more than a dimple at the end of the barrel, but by inserting the tip of a sharp blade into that dimple and carefully rotating it, you can gradually deepen and enlarge the hole to its proper configuration, fig. 1-6. Check your progress periodically to make sure the hole is centered; if it isn't, rotate the blade more frequently toward the thicker edge to even out the hole.

PINNING THE FIGURE

Most figures come with a metal base already attached or with small metal plugs that fit into a separate base. You can leave smaller figures on their metal bases, but for figures 70mm and larger, you should replace the metal base with 1/16" brass rods.

This is not difficult. In most cases, the first step is to remove the base plugs with a razor saw or flush-cutting clippers. In the odd instance where the base is cast as part of the figure, you will have to saw the base off at the figure's feet. Smooth the soles of the boots with a file if necessary, fig. 1-7. Then use a 3/32" drill in a motor tool, power drill, or pin vise to create a hole through the sole of each foot; pull the drill out frequently to clear the chips. If your power drill becomes stuck, turn it off immediately and free it by hand. Otherwise the spinning drill will grab the figure, break the bit, and throw the whole lot violently across the room. Drill up into the leg well past the ankle; this way the pin will reinforce the ankle, the weakest part of the figure.

After you've drilled the holes, use wire cutters to cut sections of brass rod long enough to stick out at least 1 inch when inserted in the holes. Glue the pins in place with five-minute epoxy (this is why the hole is larger than the pin — there is plenty of room for the glue, providing a strong joint).

ASSEMBLING THE FIGURE

There are many glues suitable for figures. Each has strengths and weaknesses, so I use them for different purposes.

Five-minute epoxy is the old standby for figures, and still the most effective glue overall. The setting time can be awkward, but the joints are strong and seem to get stronger with age. You will have to hold the parts in place while the glue sets; five minutes can be a long time when you are hold-

ing a piece in place with your figures. Clothespin clamps and rubber bands work well for some things, and a "third-hand" device will usually work when the other two won't. An advantage of epoxy is that it neatly fills gaps between parts. Any excess can be wiped away with a finger, so further filling often is unnecessary.

Super glue, sold in all sorts of brand names, is popular in modeling circles. It bonds almost on contact, and the short setting time can be accelerated with "zip-kicker" sprays. The bond is remarkably strong, especially in small areas, making this super glue ideal for attaching small parts, fig. 1-8. The only disadvantage of super glues for figure work is that they tend to weaken with time; the bond is rigid, and the minute expansion and contraction of the metal in summer and winter is enough to gradually loosen the joint. Nevertheless, the convenience is so irresistible that I often fall back on super glues in spite of my better judgment.

Walther's Goo has long been a favorite of model railroaders, but is almost unknown among figure painters. It provides a strong yet flexible joint that actually grows stronger with the years. This flexibility makes it ill-suited for general assembly work (that arm will still wiggle a bit after two days), but it's ideal for securing plumes and other parts likely to be bumped or jostled in handling. "Goo" will hold when other glues won't, and is a valuable addition to your toolbox.

Filler putties. Few figures fit together perfectly, and you will often have to add filler to hide a joint. The easiest way is with plastic body putty (such as Squadron's "Green Stuff") sold for plastic models. This putty is soluble in plastic cement, so you can squeeze a bit of putty onto a card, trowel it in place with an X-Acto knife, and smooth it over with a brush full of cement. Trim it with a file if necessary when it has set. Epoxy cement, paste, and putty can also be used for this

purpose.

There are varying opinions about how much of the figure to assemble before painting. My rule of thumb is to assemble the parts before painting whenever the seam is clearly visible and must be filled and smoothed over before painting. A common example of this type of joint is where the arms attach to the body. Hidden joints, on the other hand, leave no visible seam and can be safely left until later. Examples of hidden joints are the hand that plugs into the sleeve and the knapsack that fits onto the back.

In general, assemble as much of the figure as you can before painting, and add the other parts as soon as practical.

THE PAINTING BASE

After you've assembled the figure, mount it on a temporary base for ease of handling during painting. Don't use the base on which the figure will be displayed, since it will get dirty. I generally use a 2" x 2" lumber about 3" high; other painters use sections of a broom handle. I find 3" is a good height — it is about the width of your hand, making it comfortable to hold, yet not so high that the figure is top heavy sitting on the table, fig. 1-9. That's a serious problem, because soft metal figures are easily damaged if dropped, and a flattened nose or bent visor on a cap can be difficult to fix. Painters who prefer a tall base often devise a special stand to keep the piece from falling over when they are not working on it.

Fasten the figure to the painting base so it's secure but not permanent. If you have pinned the figure's feet, drill corresponding holes in the top of the base. This time, make the holes $\frac{1}{16}$ " rather than $\frac{3}{32}$ ", so the pins fit snugly into the holes; this way, you won't have to glue the figure in place, and it will be easy to remove. If your figure still has an attached base, simply glue it to the top of the base. Don't use too much glue, or it will be difficult to remove the figure later. A neat



Fig. 1-9. The figure on the painting base, ready to be painted.

trick is to glue a white index card to the base, and then glue the figure to that; when the time comes to remove the figure, you can peel the paper away easily.

The final step before painting is to coat the figure with a primer, a specially formulated undercoat. Its stronger bonding properties make it grip the metal better than ordinary paint, and its thicker consistency fills tiny pits and other minor casting flaws. It comes in various brands and colors, in bottles and aerosol cans. Floquil's aerosol Figure Primer is convenient, but buy whatever you prefer.

Examine the figure again after you've primed it. Mistakes such as missed seam lines are often easier to see on a primed figure, and this is your last chance to correct them before you start painting.

SETTING UP TO PAINT

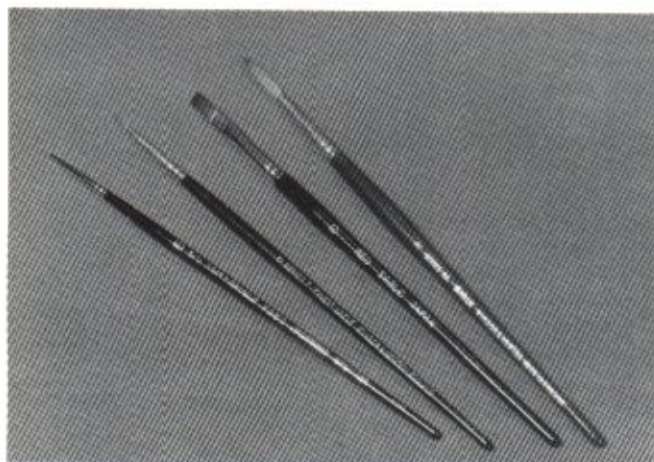


Fig. 2-1. Brushes are your most important assets, and the only tools that by themselves can “make or break” your work. Always buy the best you can; good brushes spring naturally to a sharp point. Even the best painter will struggle with a badly pointed brush.



Fig. 2-2. The most frequent question a good painter is asked is “what kind of paint do you use?” as if there were some magic formula that makes it all so easy. The fact is that paint is strictly a matter of personal choice. Enamels, acrylics, artist’s oils, caseins, sign painters enamels, Cel vinyl cartoonists paint, and even watercolors, have all been used successfully. Experiment until you find something you feel comfortable with.

As with any modeling project, a comfortable place to work is essential. One nice thing about painting figures is that you don’t need much room or an elaborate, permanent working station; a corner of the kitchen table is sufficient. You’ll want a comfortable chair for long painting sessions, and a sturdy table to keep your hands steady as you work.

LIGHTING

The general rule of thumb is to paint under light that shows most clearly the flaws in your work. After all, you have to be able to see your mistakes if you hope to correct them. And once you’re used to seeing your figures at their worst, anything else will be an improvement!

You want bright light, but brightness alone is not enough. A single direct light source will cast heavy shadows across the figure and make it difficult to see what you are doing. A more diffuse, indirect light will cast softer shadows and make flaws in your work easier to spot.

The color of the light is important, too. A “warm” light, such as an incandescent bulb, will make the reds and yellows on your figure appear brighter than they are, and dim the intensity of the blues. At the other end of the spec-

trum, a “cool” light (most fluorescents, for example) will dull the reds and yellows and brighten the blues.

Any artist will tell you that sunlight is the best light for painting. The brightness makes errors easy to spot, and the color balance is perfect. If you do most of your painting in the daytime, try working next to a window or even outside. In fact, if you live in an area with lots of sunshine, painting can be an enjoyable outdoor activity. You should, however, work in the shade (under an umbrella or awning, for example) to reduce the glare and diffuse the shadows.

Unfortunately, most of us paint in the evening, and we must look for a suitable indoor substitute. The closest thing I’ve found to an outdoor setup is the fluorescent lighting in offices. The multiple fixtures, hidden behind diffusing screens, yield a bright, diffuse light similar to working on a patio on a cloudy day. If the bulbs are “daylight” fluorescent tubes, the color balance is not bad, either.

However effective it may be for an office, this is not a particularly attractive light for day-to-day living. If your modeling area is not permanent, look for the room that best approximates these conditions. Fortunately, the brightest room in the house is usually

the kitchen, and that’s where many hobbyists end up working anyway.

If you have a permanent work station, set up a combination of lights to provide an effect similar to office light. Rather than positioning all the fluorescent fixtures over your work area, causing heavy shadows, spread out the fixtures and illuminate the room evenly. If you must restrict the lights to the work area, keep them as close to the ceiling as possible for greater diffusion and softer shadows.

Use only daylight fluorescent tubes; cool blue or green fluorescents will play tricks with your colors. Supplementing the overhead fluorescent fixtures with one or two flexible incandescent lights on the worktable itself will help restore the color balance and allow you to see the shadows better. Art stores sell a color-balanced light featuring a fluorescent ring with an incandescent bulb in the center. I’ve used one for years and find it most satisfactory.

Avoid painting under a single strong light. The cumulative effect of several lights will be brighter, and by positioning them around your work area you can adjust the shadows to your satisfaction.

Test your lighting arrangement by examining several painted figures

under different conditions. Take them outside and into other rooms of the house. You'll be surprised at how different they look. If they generally appear a bit better, it means your work light is good. If you discover mistakes you didn't notice when you were painting, change your lighting. Few painters are ever satisfied with their lighting system, so experiment until you're happy with an arrangement.

BRUSHES

Always buy the best brushes you can find. While good brushes will not automatically turn you into a great painter, poor-quality brushes will yield poor-quality work, even in skilled hands.

The ideal brush for miniature work has a natural point, fairly short bristles, and springs back to shape quickly. While it is sharply pointed, it should still be large enough to hold paint for striping. You'll find that a well-pointed 0 can produce amazingly fine lines, while the much-ballyhooed 0000 and 00000 hold so little paint they're practically worthless.

The point of the brush is its most important feature. Licking the tip is not a good test of its point — even the worst brushes can be brought to an impressive point this way. To test a brush, dip it in water and tap the ferrule (the metal part) against the edge of your hand. A well-made brush will form a perfect point every time. If you bring your own bottle of water, a good art store should let you do this before you buy (from their standpoint, it's a more sanitary alternative to having customers lick brushes they're not going to buy).

Although some painters get good results with other brands, I recommend Winsor & Newton Series 7. This top-of-the-line series was created at the request of Queen Victoria, an avid watercolorist, as the best brushes money could buy. Each brush is individually hand-shaped with the finest red sable bristles. Such quality does not come cheap, of course, but who are you to argue with Queen Victoria?

A good assortment of sizes will include a 000, 00, 0, 1, and 2. Feel free to buy less expensive brushes for the larger sizes. The sharp, resilient point distinguishes expensive brushes from cheaper ones, and since you will be using larger brushes strictly for broad area work, there is no sense in paying for a point you don't need.

Also useful is a flat, soft-bristle brush, size 2 to 4, for final blending. This need not be a high-quality brush as long as the bristles are fine and soft.

Good brushes are expensive, but will last a long time if you take care of them. Rinse them thoroughly in thin-

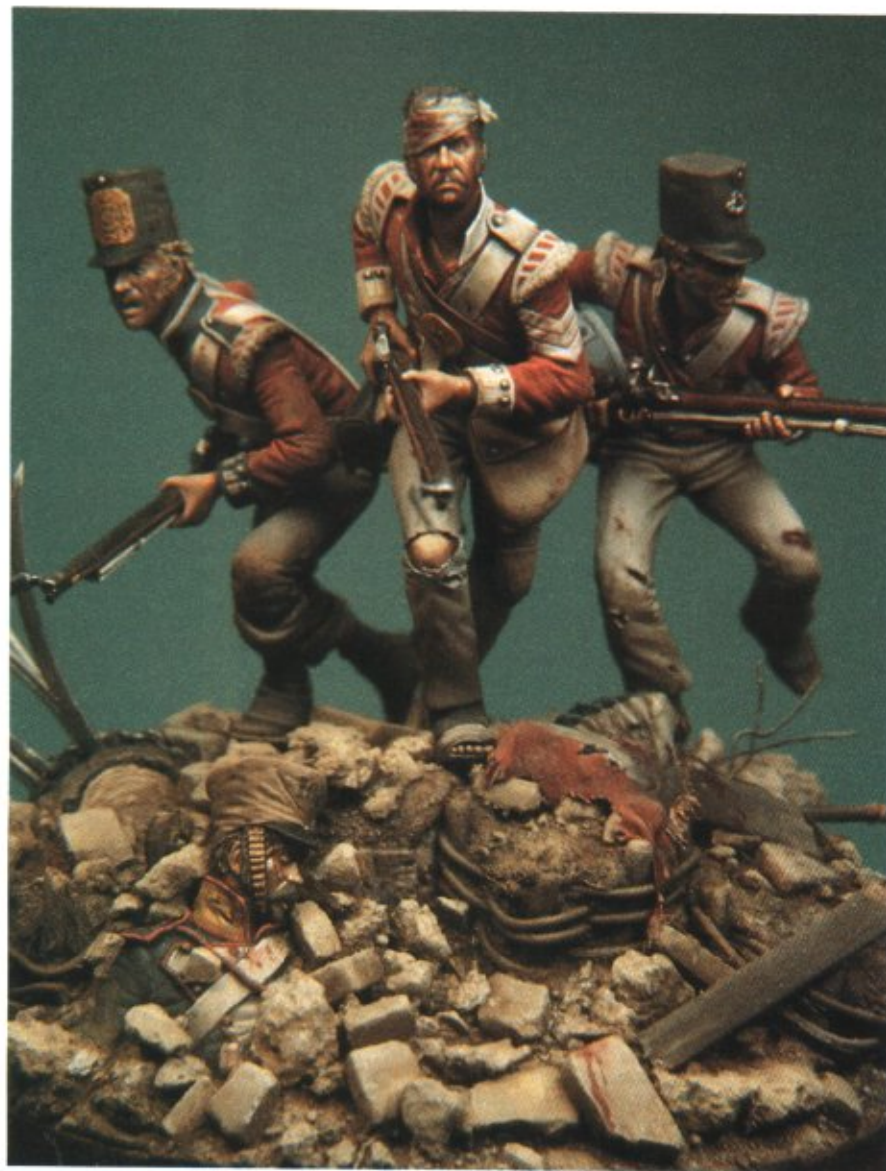


Fig. 2-3. Bill Horan paints in Humbrol enamels. Bill uses a glazing technique he developed himself, and while others have had difficulty adapting his techniques to their own use, you certainly can't argue with the results Bill gets with it (this 54mm scene is a British storming party at the siege of Badajoz in 1812).

ner after each use, and then wash them gently in soapy water. Finally, lick the bristles to a point, being careful not to twist them (or you could wet your fingers with saliva and make a point with the wet fingers), and store the brushes where they won't be damaged.

PAINT

The question most frequently asked by beginners is "what kind of paint do you use?" as if there were a magic ingredient.

Sad to say, there is no such magic ingredient, and the type of paint you use is entirely a matter of preference. I have seen beautiful work done with everything from hobby acrylics to silk-screen printing ink. Each type has advantages and drawbacks, and what

works beautifully for one painter may not work at all for another. Experiment, find something that works, and stick with it, fig. 2-2. Here are the paints most commonly used for miniature figures:

Hobby enamels (Testor's, Pactra, Humbrol, I/R). These flat-finish hobby paints thinned with mineral spirits are often used by beginners. They are readily available, inexpensive, and dry fairly quickly, but most have a working time of 24 hours before they set. Because blending is done after the paint is dry, effective results require a delicate touch, fig. 2-3.

Water-based acrylics (Polly S, Tamiya, Pelikan Plaka). A fairly recent development on the modeling scene, their popularity for other models has spilled over into the figure



Fig. 2-4. Pete Kailus also uses a glazing technique, but in this case with Pelikan Plaka acrylics. They offer a good flat finish, but set as they dry, and then can't be blended. You can't argue with the results (80mm David Grieve casting of a Cameron Highlander in the Sudan in 1882). For a discussion of glazing, see Chapter 3.

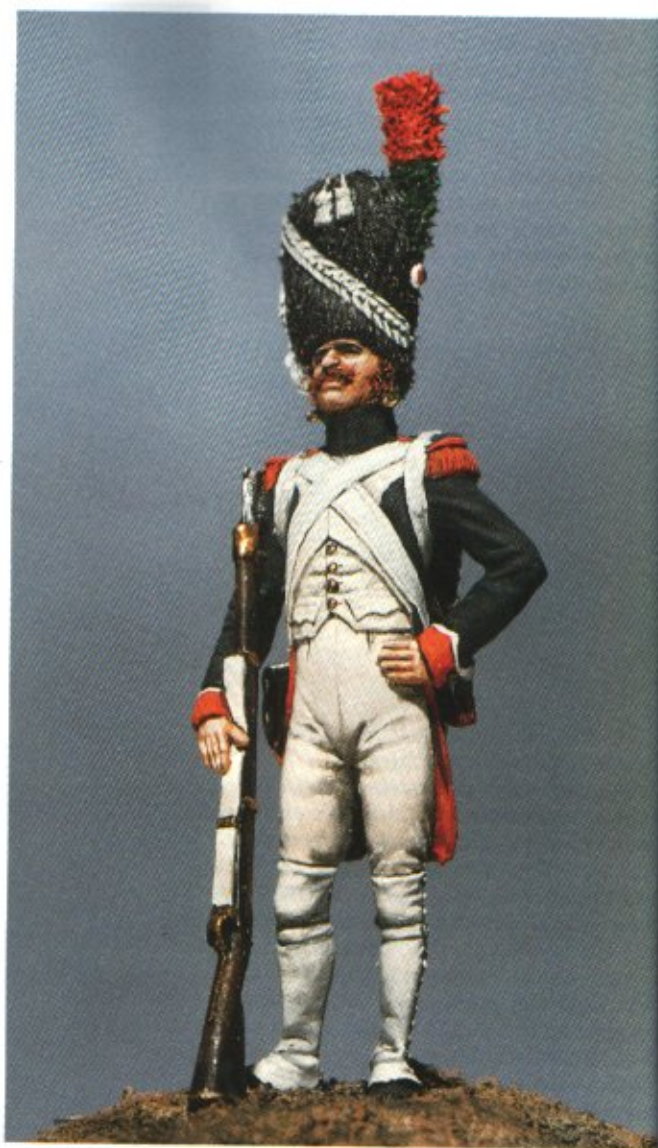


Fig. 2-5. Roy Andersen (not to be confused with Ray Anderson) has not painted figures in years, but was one of the finest miniaturists in the world. An illustrator (several *Time* magazine covers to his credit), Roy painted his figures with artist's caseins, an easily-blended water base paint (54mm Rose Guard Chasseur).

world. They are convenient, thin, clean up with water, cover well, and give a good, flat finish. Their primary disadvantage for figure work is that they set up as soon as they are dry, which makes blending difficult, fig. 2-5.

Sign painter's paint. This is similar to hobby enamel, with a smooth, flat finish, good blending properties, and nice bright colors. The larger cans make them economical to use. They can be found in most art-supply stores; the most common brand is One-Shot.

Silk-screen printing ink. This is undoubtedly the most bizarre and least known paint for figures. I started using it many years ago, attracted by the cheap price (a pint lasts a lifetime), bright colors, and flat finish. The ink is difficult to find, and only a

few art-supply stores handle the smaller one-pint cans. Their blending properties are similar to hobby enamels, but the colors, particularly reds and scarlets, are brighter, fig. 2-6.

Artists oil color. This is the paint most commonly used by experienced figure painters, and I recommend it for my students. Once you get over the horror of using something prepared for so-called artists you will probably find them the easiest colors to use. The great advantage of artist's oils, especially for the beginner, is the ease of blending afforded by the longer drying time. The range of colors is infinite. Another advantage is that in the long run they are the cheapest paints to use; a starter set of small tubes can last several years, and a set of standard tubes can last a lifetime. For this

reason, it pays to go first class. Buy the best oil colors you can find — they cost only a few cents extra per tube, and the quality will be reflected in your work.

My preference for oils is the result of experience. Over the years I've taught classes with different types of paint, and students invariably achieve the best results with artist's oils. While I will not ignore other types of paint in the next few chapters, my discussion will be weighted toward working in oils.

The oil color of choice is Winsor & Newton. I don't normally endorse a brand, but in this case there is a significant difference. Winsor & Newton oil colors seem to be ground more finely, and they have a slightly firmer consistency. These are qualities which are



Fig. 2-6. I painted this Historex 54mm figure of General Colbert of the Dutch Lancers of the Guard in silk screen ink, a medium I discovered in my starving student days. It is cheap and offers bright colors, is easy blending, and dries to a smooth flat finish. I don't use it anymore, but it's still a good choice.



Fig. 2-7. I recommend artist's oils for my students, not because they are "artsy," but because they blend more easily than any other paint. This is a scratchbuilt 90mm Chasseur trumpeter by Pete Twist, painted in oils.

particularly desirable for painting miniatures.

COLOR SELECTION

You don't need a lot of colors. I'm always amused to note that painters with the most impressive collections of colors seem to get the least impressive results.

My own working palette consists of 10 Winsor & Newton colors: titanium white, blue black, Winsor blue, chrome yellow, bright red, gold ochre, burnt sienna, raw umber, permanent magenta, and cadmium scarlet (fig. 2-8). This assortment lets me mix virtually any color I need.

OTHER MATERIALS

To thin the paint and clean up, you will need a thinner. You can spend \$3

for a 2-ounce bottle of rectified artist's turpentine at an art store, the same amount for half a gallon of mineral spirits at a hardware store; mineral spirits work just as well.

Also include in your painting kit a small bottle of artists refined linseed oil. You can add this to the paint in small doses to prolong its working time.

You will need a palette on which to mix your colors. The palette can be anything, as long as it doesn't absorb oil from the paint. Many painters use white enameled metal or glass. Being lazy, I prefer something disposable that doesn't have to be cleaned after each use. Paper palettes sold in art stores are fine (although I find a smaller size more convenient; you might try cutting the tablet in half).

Another option is freezer paper sold at supermarkets; cut sheets the appropriate size, and take the curl out by heating them for a few moments in the oven, or by ironing. Be sure to use them with the glossy (nonabsorbent) side up. My preference (mostly because I have a large supply on hand) is for clear plastic bags with a white index card inside.

SETTING UP YOUR WORK AREA

Once your work space and lighting are set up, you can begin.

There are, of course, no hard-and-fast rules on laying out your work area. The arrangement shown here is simply what I find most convenient. Adapt it to your tastes.

If you are working with turpentine-based paints, either oil or hobby



Fig. 2-8. I choose from Chrome yellow, Winsor Blue, Bright red, Titanium white, Blue black, Gold ochre, Burnt sienna, Raw umber, Permanent magenta, and Cadmium scarlet to mix all my colors.

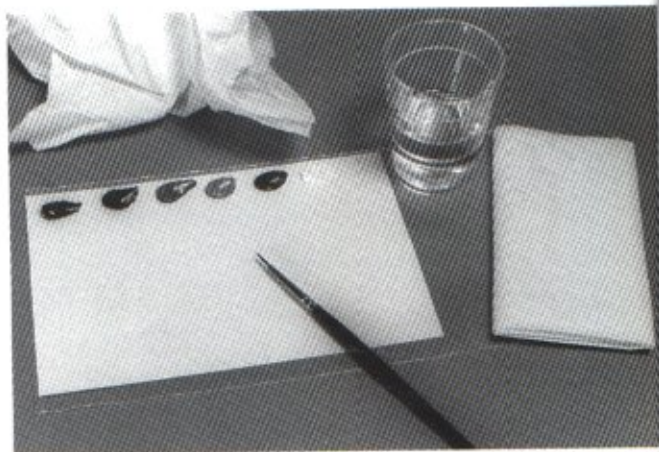


Fig. 2-9. How you arrange your work area is strictly a matter of taste. Here's mine: next to the polybag-covered palette, the thinner is kept in a bottom-heavy shot glass, sitting on a folded tissue that allows me to wipe my brush without putting the figure down.

paints, pour out only enough thinner for your immediate needs, and throw it away at the end of the day's painting. A whiskey shot glass is an ideal container. Decanting your thinner this way keeps your main supply of thinner clean, and ensures that the turps you use at each session are fresh and unevaporated. Gummy turpentine can make hobby paints turn glossy. Don't worry if this small supply of thinner gets dirty — it has to get pretty badly polluted before it has any effect on your colors, and you are unlikely to manage that in just one painting session.

I lay out the palette with a folded tissue and the shot glass of thinner on top to keep it from slipping, fig. 2-9. The tissue is there so I can wipe the brush clean after I dip it in thinner, and the glass holds it down so that I can do this one-handed without putting down the figure. Keeping your materials close together makes it easy to work and leaves less chance for accidental spills.

There is no correct order in which to lay the colors out on the palette, nor do you need to lay out all the colors every time. Just squeeze out the colors you know you are going to need — a dollop the size of your little fingernail should be more than enough.

Although oil paints take longer to dry than hobby enamels, they will usually dry on your palette overnight. If you want to save the palette for the next day, put it in the freezer.

LEARNING TO MIX COLORS

The first lesson in all my painting courses is in mixing colors. It's surprising how many people are afraid to strike out on their own. Yet you will never learn to paint until you can manage colors with confidence; no one ever painted fine figures directly out of

a bottle.

To mix your colors you'll need a basic working knowledge of the color wheel. Resist the temptation to buy a color wheel at an art store; it will tell you more than you need to know and will only confuse the issue.

What you need to know is simple. The basic practical assumption behind the color wheel is that three colors cannot be made by mixing anything else: red, yellow, and blue. These are the primary colors, and all other colors are achieved by mixing these three. The primary colors form the center segments of the color wheel, and each of the second ring of colors, called secondary colors, is created by mixing two primary colors (fig. 2-10). Blue and yellow make green, red and yellow make orange, and red and blue make purple. The third ring of colors, called tertiary colors, includes all shades of brown and gray, made by combining different proportions of all three primary colors.

In theory, if you have all three primary colors on your shelf you can combine them to mix any color you want. In practice, you will need two more, black and white (black is very intense color, white almost total absence of color). When mixing, treat black as a dark brown (most black paints are) and white as an all-purpose bleaching and lightening agent. Art teachers tend to frown on using black, but it's useful for our purposes.

For many years I used only these five basic colors — red, yellow, blue, black, and white — and rarely had to call on any others. The variety of possible colors available using these five pigments is far beyond even the most extensive line of bottled paints.

Practice mixing colors and you'll find the color wheel actually works. Start by fooling around with the colors

on the palette, just to get the feel of things. Take a bit of red and add yellow to make orange. Add white to red and see how it makes pink. Mix blue and yellow to make green. To one side of the puddle add more yellow to produce a grass green; on the other side add white and note the "bleaching-out" effect. If you are using oils, notice the strength and richness of the Winsor blue. Although it is not really a primary blue, it's useful for military subjects because it bleaches out when necessary to a brilliant powder blue, yet retains its lushness in the darker tones.

Now try mixing some of these:

- * Brown — 1 part black, 1 red, 1 yellow
- * Tan — 2 black, 2 yellow, 1 red, 8 white
- * Khaki — 3 black, 2 yellow, 1 red, 8 white
- * Field gray — 3 black, 1 blue, 1 yellow, 6 white
- * Olive green — 2 black, 1 yellow
- * Olive drab — 3 black, 1 red, 1 yellow

While recipes like these are helpful in the beginning, don't rely on them in the long run. Don't bother writing color formulas down, even in the beginning. You can learn to mix colors by eye in less time than it takes to experiment and write up even a handful of formulas. Color mixing takes practice. You should be able to master the basics in less than half an hour and as your eye becomes more attuned, you will soon be able to look at a color and tell in an instant whether, for example, it has too much red, or not enough yellow.

You may have noticed that the formulas given above all specify black instead of blue. In general, black is more effective than blue for mixing browns and grays; in fact, I rarely put

blue on my palette at all, except when I'm mixing shades of blue or green.

DIFFICULT COLORS

With practice, you should have no difficulty mixing the tertiary grays and browns, but you may run into trouble mixing some secondary shades, particularly purple and violet. This is because the primary colors you buy are never pure. If your red has even a little yellow in it, mixing it with blue is just like adding green and the result is a tertiary brown, not a secondary purple. You won't need purples and crimsons very often, but when you do you will probably have to buy them (that's why permanent magenta is included in my basic palette).

Aside from saving you the money and bother of having to buy a bottle or tube of every color you need, a knowledge of color mixing can also solve problems that arise in the course of painting. For example, if a face turns gray during blending, you will know that the likely cause is the accidental mixing of the black in your shading color with the white in your highlight, and you can adjust the blending to compensate for it.

CONTROLLING THE CONSISTENCY OF THE PAINT

As you practice mixing colors, pay attention to the consistency of the paint and work at it until it becomes second nature to you. Without controlling the consistency, you can't control the paint. If the paint is too thick, it will be reluctant to leave the brush, and if it is too thin it will run all over the place. If it is just right, it will flow smoothly from the brush like ink from a pen. Never use paint direct from the bottle or tube; transfer a small amount to your palette and, if necessary, add a bit of thinner or set it aside to evaporate a bit until it is just right. When you have achieved the proper consistency, you can maintain it by occasionally adding a bit of thinner to compensate for evaporation. The proper consistency for hobby and water-based paints is quite liquid, while artist's

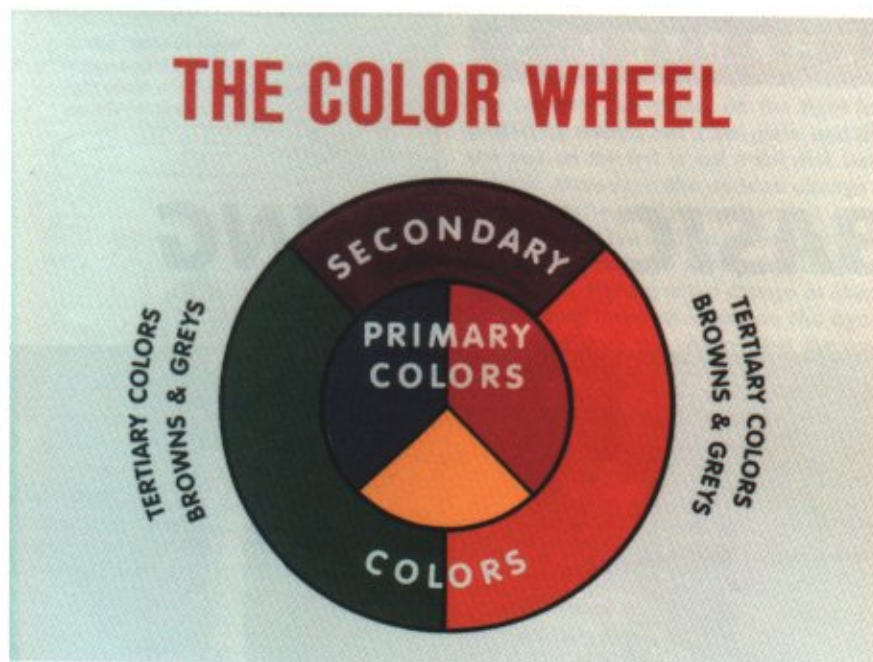


Fig. 2-10. The color wheel is the basis of all color theory. There are more complicated versions, but this is all you really have to know to mix colors successfully.

oils should be thinner than they come from the tube, but not as thin as hobby paints. A good comparison might be the consistency of warm butter.

A final word about color mixing: Don't clean your brush each time you dip from one color to another. This isn't necessary. The amount of foreign color left by a dipping paintbrush is miniscule compared to the amount in the bottle, and the bottle will long since have been used up before this practice has any ill effect. Dip swiftly from one color to the next, and don't worry about the consequences.

When switching from mixing red to mixing white, you can avoid the otherwise inevitable pinkish tone by taking a quick side trip into blue; the blue kills the red, leaving your white clean. A similar detour through red works well when switching over from blue to yellow.

For your first few figures, force yourself to work with only the five

basic colors. Experiment to see what happens if you add a splash of red, or a bit more white. The idea is to develop an instinctive understanding of how colors work together so you can predict what will happen when you mix different shades.

Once you understand this, feel free to use colors like gold ochre and burnt sienna to save time. For example, flesh is a mixture of white, yellow, and red, with a dash of black to tone it down. Getting the right touch of black can be a nuisance. Since yellow ochre already contains the right amount of black, using it in place of yellow saves time. Similarly, olive green is a mixture of yellow, blue, and red. Black is essentially a dark brown and already has some red in it, so you can mix black and yellow directly to obtain the same result. It's important to use these extra colors because you understand how they work. They should be a shortcut, not a crutch.

BASIC SHADING



Figs. 3-1 and 3-2. Directly cast shadows, or "sunny day" shadows, are caused by single light source coming from a specific direction, and have hard edges (left). Indirect, or "cloudy day" shadows, are created by a general illumination from above, and have soft indis-

tinct edges (right). In painting figures, we ignore the hard-edged direct shadows, first because the room light will create these shadows well enough on its own, and second because the room shadows will often conflict with the ones we paint on the figure.

A famous art teacher used to tell his frustrated students, "Painting is easy. It's just a matter of putting the right colors in the right places." What he meant, of course, is that the physical process of putting the colors on canvas isn't difficult. The difficulty lies in figuring out where they should go. This two-part process applies to figures as well. The first part, deciding what the colors should be and where to put them, is critical. The second part, actually putting them there, is something of a post-script.

Let's start our discussion of shading and highlighting with the most basic question of all: why bother? Why paint in supplementary shadows and highlights if it takes so much time and effort? Won't the room light cast its own shadows and take care of that for

us? Unfortunately, the answer is no.

If you look at a miniature figure painted in solid colors under normal lighting, it will appear flat, uninteresting, and unrealistic. The room light is not intense enough to pick out the tiny shadows, and much of the detail is lost. This is because the figure is scaled down, but the light source is not. In other words, the figure may be 1/32 scale, but the light is still 1/1. Unless we can develop a special "scale" light source that accompanies the figure wherever it goes, we must supplement the existing light with painted shadows and highlights.

DIFFERENT SHADOWS

How do we determine where these painted shadows and highlights go? We can start by observing that there are two kinds of shadows: direct and

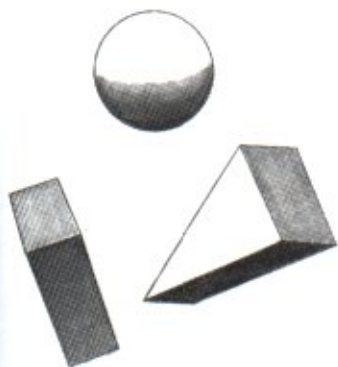
indirect.

Direct or "cast" shadows are caused by light coming from a single source from a specific direction, fig. 3-1. An example is a lamp casting your shadow on the wall. Indirect shadows, on the other hand, are caused by no single source, but a general illumination from above. The difference between these shadows is essentially the difference between a sunny and a cloudy day. On a sunny day, a car will cast a distinct, sharp-edged shadow on the street. When the sun goes behind a cloud, there is usually nothing more than a general darkness under the car.

In painting figures, we are not really interested in the hard-edged, direct shadows. The room light will create these shadows well enough on its own, and the room shadows will often con-

A. Light reveals shape

In the example below, see how the shadow reveals the shape.



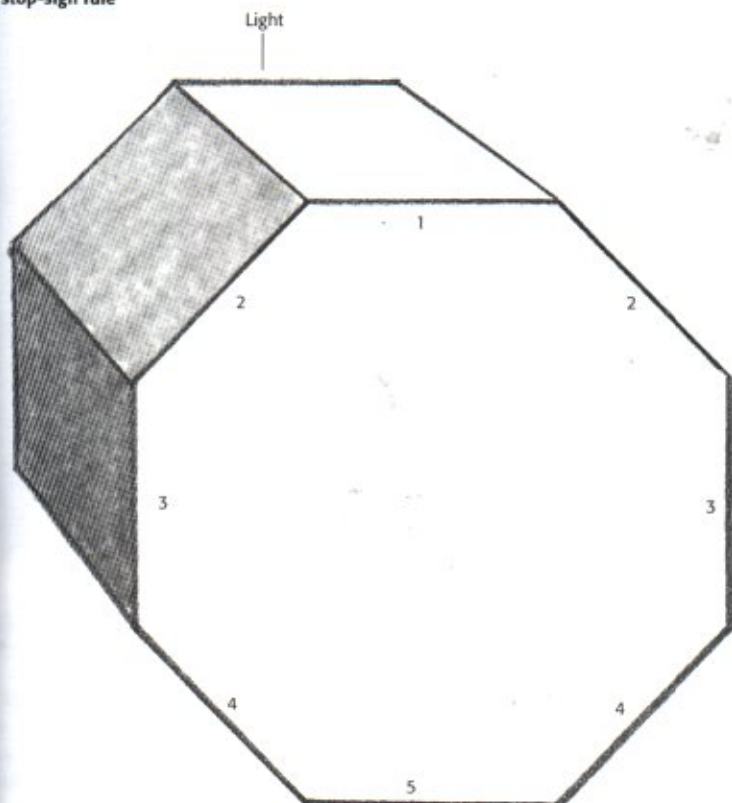
B. The "Halo of Light"

Imagine your figure with a halo of light above it, striking the figure equally on all sides.



Fig. 3-3A. Our eye automatically translates the patterns of light that it sees into shapes and forms. Even from the front, we can tell that the object on the right is a projecting wedge, not a flat plate, and that the one on the left is not a flat disk but a sphere. Moreover, the sudden change in tones on the wedge indicates a corresponding sudden shift in planes, while the smoother change in tones on the sphere indicates a more gradual change in shape. By painting these shadows on the figure, you can restore the shapes that the room light fails to reveal. Fig. 3-3B. When we look at a figure, there is generally a light source above and behind our head as we rotate the figure before us. The effect would be the same if the figure were stationary and we moved around it, with the light moving with us. Or, you can imagine a halo of light about 12" above a figure, with the light shining down on it at an angle of about 60 degrees. This is the light in which the figure is seen, and this is the light we want to paint.

The stop-sign rule



By comparing any part of your figure with this drawing, you can assign a numerical color value to it, corresponding to the values in chart.

Fig. 3-4. If we were to place an octagonal cylinder under the halo of light, each surface would have its degree of darkness. We can even assign numbers to each surface: the top, being the brightest, is 1, the upper slope 2, the vertical side 3, the reverse slope 4, and the bottom 5. By arranging these numbers around an end-view of the octagon, we have a simple diagram that expresses the color change of the cylinder from top to bottom, from the lightest surface to the darkest. This is the stop-sign rule. It is the magic formula, the fountainhead of all figure painting knowledge. If you understand the stop sign, you understand shading and highlighting. If you are confused, don't go any further until you understand it. Whenever you are having trouble shading a figure, come back to the stop sign and figure out what you are doing wrong.

The stop sign and the figure.

Use the stop sign to assign color values to the surface of the figure below.



Fig. 3-5. We can use the stop-sign rule to assign numbers to every part of the figure. The top of the cap and the top of the lower left arm are horizontal, like the top of the stop sign, and thus will carry a color value of 1; the area across the upper back is a 2; the stomach and vertical part of the leg are a 3, and so on. We can assign numerical values to any surface we see. This "paint by numbers" approach may seem a bit silly and tedious, but it works. As you get used to it, the process will become so instinctive you won't even be aware that you are doing it.

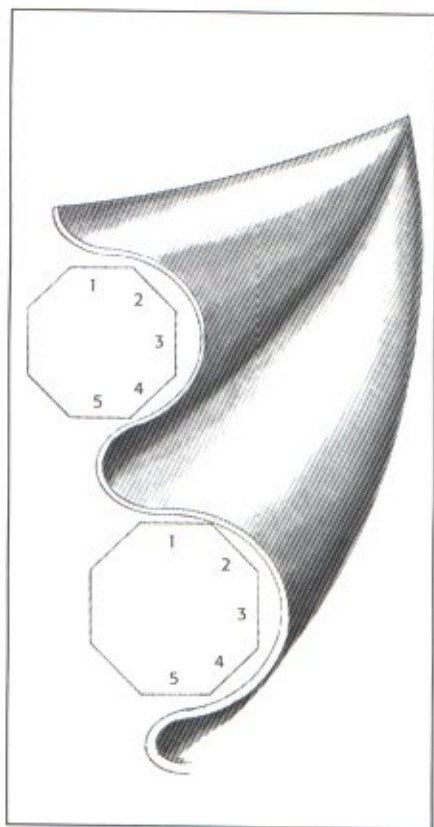


Fig. 3-6. Clothing folds and wrinkles follow the same rule. In cross section, each fold is a small stop sign with a light top and a dark underside. Don't highlight the outer or projecting part of the fold and shade the depressions. According to the stop-sign rule it is the upper surface of the fold that is highlighted and the underside that is in shadow.

Fig. 3-7. The stop-sign rule expresses in an easy-to-understand form what good painters know instinctively. Bill Horan never learned to paint by the stop sign, but he draws on it unconsciously every time he picks up a brush.



flict with the ones we paint on the figure, causing the confusion of shadows going opposite directions. It is better to allow the room light to take care of the direct shadows and concentrate our painting efforts on the indirect ones.

Indirect or "generic" shadows may be soft at the edges, but they are strong enough to indicate an object's shape. Our eye automatically translates the patterns of light that it sees into shapes and forms, fig. 3-2. Even if we cannot see an object's profile, the shadows are enough to tell us if its surface is curved, bent, or straight. By painting these shadows on the figure we can restore the shapes that the room light fails to reveal.

Painted shadows are there to supplement the room light, not contradict

it. If a conflict appears, your shadows are in the wrong place.

UNDERSTANDING THE SHADOWS

Consider the simple examples in fig. 3-3A. You can immediately tell the difference between the wedge viewed from the front and the view from the side, because your eye instinctively knows that the shift from the light tone on the top of the wedge to the darker tone underneath indicates a shift in plane, and that the suddenness of the shift indicates a sharp edge. With the sphere, the color change is similar (light at the top, darker at the bottom), but in this case the change in tone is gradual, which means that the change in plane is gradual, not abrupt.

Figure 3-3B shows how these rules

apply to the human figure. Imagine a halo of light about 12" above a figure with the light shining down at an angle of about 60 degrees. This effect would be the same if a light source was above and behind your head, and you rotated the figure as you looked at it.

Examine the shaded figure in Fig. 3-38. Notice that even without wrinkles, the shadows on the body indicate its shape. One leg is all the same shade, but the lower portion of the other one is darker than the upper surface, clearly indicating that it is bent at the knee. The opposite is true of the back of the leg. Without the shadows, when looking from in front or behind both legs would appear to be straight. These shadows and highlights, the ones that reveal an object

SHADING COLORS

1	2	3	4	5
HIGH HIGHLIGHT	HIGHLIGHT	BASE	SHADOW	DARK SHADOW
		DARK BLUE 		
		DARK GREEN 		
		BROWN 		
		BLACK 		
		WHITE 		
		RED 		
		YELLOW 		
		FLESH 		
		TAN 		

Fig. 3-8. Having assigned numbers to the areas of the figure, it makes sense to assign colors to these numbers. Members of my painting class make up a reference chart like this one before they ever touch a brush to a figure. Prepare one up for yourself, making the highlight shades somewhat lighter and the dark shades somewhat darker than they appear here.

shape, are what we are concerned with in painting figures.

THE "STOP-SIGN" RULE

Let's take one more theoretical example, the octagonal cylinder in fig. 3-4. The graduated shift in value (darkness) is similar to the sphere, but here the changes in shape are abrupt, and each surface has its degree of darkness. It is even possible to assign numbers to each side, indicating their relative darkness: The top, being the brightest, is 1; the upper slope is 2; the vertical side is 3; the reverse slope is 4; and the bottom is 5. By arranging these numbers around an endview of the octagon, we have a simple diagram that expresses the color change of the cylinder from top to bottom, from the lightest surface to the darkest.

This drawing applies to any object with a curved or faceted surface. It is the basis for what I call the "stop-sign" rule.

The stop-sign rule reduces the entire theoretical basis for shading and highlighting figures to a simple practical diagram. It is the guideline we use to determine how dark any part of a figure should be. The way the diagram translates into reality is this: ANY SURFACES OF A FIGURE THAT ARE THE SAME COLOR AND ARE AT THE SAME ANGLE TO THE LIGHT SOURCE WILL BE THE SAME VALUE. SURFACES AT DIFFERENT ANGLES WILL BE LIGHTER OR DARKER, DEPENDING UPON THE ANGLE. By comparing the angles and values of the stop sign drawing to the figure, we can

assign a specific numerical value to any surface on it.

Let's start by comparing the stop sign to the figure in fig. 3-5. We can see that the top of the cap and the top of the lower left arm are horizontal, like the top of the stop sign, and thus will carry a color value of 1. The vertical right leg matches the vertical side of the stop sign, giving it a color value of 3. The front of the upper left arm and front of the left thigh are somewhat less than vertical, and will thus carry a value of about $2\frac{1}{2}$. Notice, however, that the side of the upper arm (the surface facing us in the drawing) is vertical, and would therefore carry a value of 3. The small of the back is darker than the area across the shoulders and buttocks, indicating the curvature of the spine. Moving around the figure in this manner, we can assign numerical values to virtually any surface we see.

A tricky part of assigning numbers is the area between the arm and the body. As a vertical surface, it would seem to call for a value of 3, which doesn't make much sense. Instinct tells us this should be a dark area, and indeed it should. The reason is that the light in this area is blocked off, from one side by the body and from the other side by the arm, making it darker than a vertical surface would ordinarily be.

Fine, you say, this is all well and good for shading the parts of the body, but what about all those wrinkles and folds in the clothing? The answer is that the stop sign rule still applies. As shown in fig. 3-6, we can use it to assign numerical values to each part of each fold of clothing: 2 to upper slopes, 3 to verticals, 4 to reverse slopes, and 5 to undercuts. A common mistake is to highlight the outer, or projecting part of the fold and shade the depressions. Yet the stop sign rule (and simple logic, too, when you think about it) clearly calls for the upper surface of the fold to be highlighted and the underside to be in shadow.

Vertically hanging folds operate under the same "blocked light" rule as the inner arm; the outer folds block light from reaching the inner ones, making them darker.

This paint-by-numbers approach is admittedly an over-simplification, but it makes a complicated subject easy to understand and work with. On a blue coat, for example, the No. 2 area on the top of a wrinkle will be the same shade of blue and as the No. 2 area across the upper chest. Go back to fig. 3-5 and examine the figure closely; you will see how the whole system ties together.

The concept is so simple that it bears repeating: the stop-sign rule is the entire basis of shading and high-



Fig. 3-9. The first step is to underpaint the figure in the basic colors only in areas where you will be blending. Don't bother with fine detail areas that will be painted over anyway. Use water base paint which won't be lifted by blending the oil paints over it.



Fig. 3-10. Before laying on the color, analyze the figure, assigning stop-sign numbers to each area you are going to paint.

lighting figures. It expresses in practical terms what good painters do instinctively, even if they have never heard of the stop-sign rule, fig. 3-7.

If you understand the stop sign, shading and highlighting will come so naturally that you'll forget you are even using it. And when you have trouble painting a certain area, it is probably because you haven't understood how the stop sign applies in that particular situation. Stop for a moment and visualize the stop sign. If you are still confused, come back and read this section again.

Until you fully understand the stop sign, you'll never really come to grips with what you are trying to accomplish.

PREPARING A SHADING CHART

Your experience with your first few figures will be a lot easier if you spend the time to make up a basic color chart like the one shown in fig. 3-8. Notice there are five values for each color.

These five values correspond to the five numerical values on the stop-sign: light highlight (1), medium highlight (2), base color (3), medium shadow (4), and dark shadow (5).

It would be a mistake to rely entirely on the chart in this book, since the printing process tends to alter the tonal quality and contrast of the colors. Instead, use it as a guide to make your own chart. In each case, start with the base color, lighten it for the highlights and darken it for the shadows. Place a small amount of each color in the appropriate square. In the beginning it is better to err on the side of too much contrast than too little, so when in doubt make the highlights distinctly lighter and the shadows distinctly darker than those shown here.

With your new-found expertise in mixing colors, few of the ones shown here should cause you any difficulty. Most of the colors, particularly the browns and grays, are pretty straight forward. Add white to the base color to

lighten it and black to darken it. There are, however, some important exceptions.

Two obvious exceptions are black and white. When white is the base color, there is nothing you can do to make it any lighter; the highlight shades will also have to be white. Similarly, there is nothing you can do to darken black, so the shadow colors will have to be black, too.

The same situation applies to red, but for a different reason. Bleaching red with white destroys its brilliance. Lightening it with yellow leaves no room for a distinction between pure red and scarlet, which is an orangy red. The best solution is to use red for the highlights as well as the base color. While we are on the subject of red, it is worthwhile to note that while the famous red coats of the British army are indeed red for the troops, the coats worn by officers and senior NCO's are traditionally a brilliant scarlet, a difference that is noticeable



Fig. 3-11. Limit your work to what you can comfortably do in a session: the back of a coat, the trousers, etc. Start by laying in a No. 2 highlight in all the No. 1 and No. 2 areas, and a No. 4 shadow into the No. 4 and No. 5 areas. These highlight and shadow colors should overlap into the No. 3 areas so all the surface is covered with highlight or shadow. Spread the paint as far as you can to avoid excessive build-up.

at quite a distance.

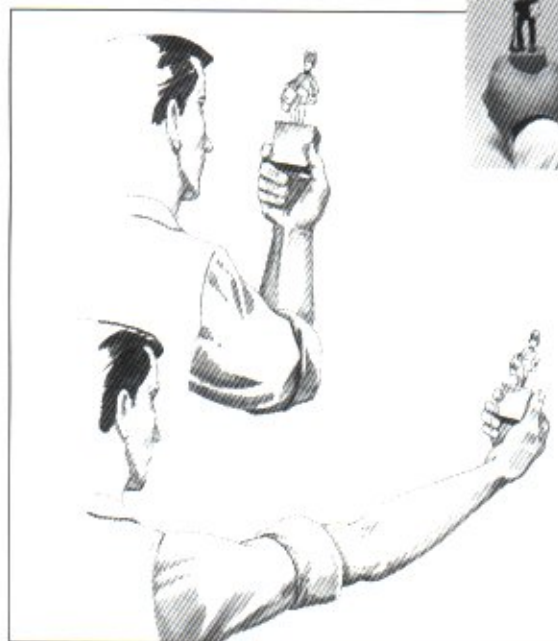
Since these exceptions give you fewer shades to worry about, one might think that these would be the easiest colors to paint. That is not necessarily true. Black, because of the low degree of contrast between the different shades, is the easiest color of all, but white and red, because of their much greater range of contrast, are among the hardest to paint successfully.

One other problem color is yellow. While yellow is easily lightened with white, darkening it with black turns it green. Instead, create the darker shades by adding orange and later brown.

UNDERPAINTING THE BASIC COLORS

Some painters prefer a simple white undercoat, claiming that the white makes the reds and yellows applied over it appear brighter. Personally, I prefer to underpaint the figure in the basic uniform colors, fig 3-9. The tones are just as bright, and this way there is no chance of accidentally blending through the oils to reveal the white underneath; if the

Fig. 3-12. Hold the figure at arm's length and check your work to see that the colors are in the right place before blending. The contrast should be evident at this distance.



Check your work constantly

1. Up close, for smoothness of blending

2. At arm's length, for contrast. Painted highlights and shadows should be clearly visible at this distance. If you have blended them away, restore the colors and try again.

underpainting does show through, it is the same color, and hence will not be noticeable.

Since you will be blending over the underpainted areas, it is important to use a paint that will not be lifted or disturbed by the subsequent blending process. If you use hobby enamels, you will have to wait at least 24 hours for them to set. Water-base paints are the most convenient to use, but the acrylics (Pactra, Polly-S, Tamiya), surprisingly, are not totally resistant to mineral spirits, and also require 24 hours to set. Pelikan Plaka (a casein poster paint that is difficult to obtain in this country), is the only paint I know of that can be painted over immediately without danger of lifting, and I use it fairly frequently. It does, however, have a chalky, dead-flat finish that can be awkward to paint over, and for that reason I often prefer to underpaint with the smoother acrylics, even if I have to wait before I can paint over them.

Keep the underpainting simple, and limit it to those areas where you know you will be doing a lot of blending, such as the uniform and the face. There is no reason not to underpaint the detail areas if you want to, of course, but in the long run it is a waste of time. Just paint over the detail areas with the base color next to them. When underpainting lighter colors, it often helps to lay in the darker shadow areas as well. This not only allows you to test where the shadows

go, but it also ensures that if you blend through the oils later on, the color underneath will be a closer match.

ANALYZING THE FIGURE

Once the figure is primed and underpainted, you are ready to start shading. The first step, even before you pick up a paint brush, is to completely analyze the figure.

Each figure is different. Pick it up and turn it around slowly. Study the shapes, and mentally assign numerical color values to the various surfaces, according to the stop-sign rule. Make a simple diagram if it helps. Do this twice, once for the body shadows and a second time for the clothing folds and wrinkles. The more thoroughly you think out the problems now, the fewer difficulties you will have once you start painting. Think constantly in terms of the halo of light and the stop-sign rule. If it helps, position a light above and behind your head, and slowly rotate the figure, observing where the shadows and highlights fall.

This preliminary analysis, more than any other factor, is the key to success in painting figures. The first few times, you may have to spend as much as an hour analyzing the figure before you begin to paint. As you gain experience it will become second nature, and you'll scarcely be aware you're doing it. Now who said you can't paint a figure by the numbers!

ORDER OF PAINTING

Unless you are working on very small figures, (30mm or less), you shouldn't expect to complete the figure in one session. Instead, do one section of the figure at a time, and don't attempt more than you can do in any one session. You might do the figure's coat one night, the face the next, the knapsack and belt the third. An experienced painter can spend anywhere from 6 to 24 hours painting a 54mm figure; he will generally take twice as long for a 90mm.

Although you can paint the various parts of the figure in whatever order you wish, the traditional method is to paint the figure from the skin out, concentrating on the face and hands first and the successive layers of clothing in order. There are two reasons that make this approach practical. First, the face and hands are the parts that cause the most difficulty; by doing them first, if you have to strip the paint and start over, you won't have wasted any effort on the rest of the figure. Second, the outer layers of clothing form the outer surfaces of the casting, and it makes sense to paint the deeper areas first.

That said, however, for your first figure it makes better sense to start by painting the uniform, and then turning your attention to the face. With this order, you can practice your blending technique on the wide areas of the uniform, before moving on to the smaller and more difficult areas of the face.

LAYING IN THE COLORS

Lay out the oil colors you will need on your palette, and mix up the basic uniform color. Mix plenty of color; a puddle about 1" across should be about right. Darken one side of this puddle for the medium shadow, and lighten the other side for the medium highlight. Keep the contrasts strong, even if you have to exaggerate them the first few times. You'll soon learn that blending, not the colors, gives figure shading its subtle effect. You won't actually apply much of the base color; most of it will appear on the figure naturally when you start blending.

Mix all five stop-sign colors, and transfer a sizable sample of each to a separate reference card, which you can compare to colors on the figure.

To start, you will apply only two colors to the figure: the medium highlight (No. 2) and medium shadow (No. 4). The base color (No. 3) will appear in the proper places on the figure when you blend these two together. Add thinner until the paint is at the right consistency (warm butter for oils, opaque liquid for enamels), and begin to carefully lay the colors onto your figure. Now is when your preliminary

- Blend the border only.
- Sweeping the brush from side to side blends all the colors together.
- Keep the colors separate
- Use a vertical, stabbing, snapping motion of the brush to blur the border between colors.

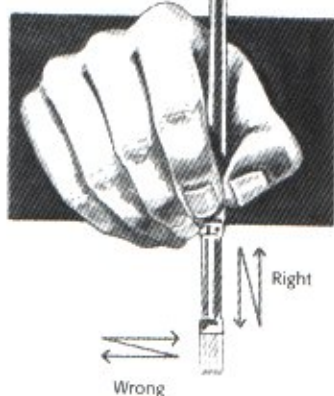


Fig. 3-13. When blending, pay attention to the consistency of the paint. If it is too liquid it is hard to control; wipe it off and try again. If it is too dry, add a drop of linseed oil to revitalize it. Go back and add the high highlights (No. 1) and dark shadows (No. 5). Remember that the stop sign numbers refer to the final color in each area on the figure, not to puddles of paint on the palette. To compensate for color already on the figure you will have to increase the contrast of colors you add, and the numbered puddles are soon forgotten. Add whatever is necessary to do the job. **Fig. 3-14.** This figure shows the proper degree of contrast. The biggest mistake beginners make is to reduce the contrast to a point where it is no longer visible. It is the transition from one color to another, not the difference between the colors themselves, that should be subtle.



shading analysis pays off. Take your time, work carefully, and THINK. Each time you touch the brush to the figure, ask yourself why you are putting it there. Is this area in light or shadow? Why? This process may be tedious at first, but it will soon become automatic.

Lay in the medium shadow first, covering both the medium and dark shadow areas. Next, lay in the medium highlight, covering all the highlight areas. In No. 3 base color areas, allow the highlight and shadow colors to meet in the middle; when you blend them together, the base color will appear. In most cases the highlight and shadow colors will be so close there wouldn't be room to lay in the base color between them anyway. The trick is to lay the colors in next to each other. Try to avoid overlapping as much as possible. Spread the paint out as thinly as you can to avoid buildup. If you were impatient and rushed the preliminary analysis, you're going to have trouble, but if you've thought things out thoroughly ahead of time, the colors will seem to fall into place naturally.

When all highlights and shadows are applied, the area should be com-

pletely covered by one color or the other. Hold the figure at arm's length and examine your work critically. At this distance the harsh borders between the colors are less distracting, and you should be able to judge the overall effect pretty accurately; squint a bit if necessary. Examine each part of the figure in turn (fig. 3-12). Are the shadows and highlights in the right places? Is there enough contrast between the colors? It is better to make corrections now than later. Small adjustments can be made with a dab of paint. Larger errors will have to be wiped off with a cotton swab and repainted. When you are satisfied with the color placement, you are ready to start blending.

BLENDING WITH OILS

Artist's oils are easy to blend because they do not dry for a day or so, giving you plenty of time to manipulate them. Use a clean, dry brush and gently blend the border between the two colors, lifting the brush away from the surface at the end of each stroke. For larger surfaces, a criss-cross stroking pattern gives the smoothest results, but in most areas there is not really enough room to move the brush

back and forth. In such cases, what is needed is not really brushing at all, but more of a vertical stabbing motion, Fig. 3-13. This action may feel uncomfortable at first but practice until it becomes second-nature. In many areas you only need to lightly tickle the border area with the tip of the brush for the hard edge to disappear. Wipe the brush clean occasionally on a folded tissue. You may sometimes have to dip it in the thinner and wipe it clean and dry before continuing.

As soon as the edge disappears, STOP, or you'll blend away all your contrast. If you brush all the way across, you will blend everything together into a single color, and the gradual transition you have worked so hard to achieve will be lost. Over-blending is probably the most common mistake beginners make. Avoid it.

Using too large a brush for blending makes it easy to blend all the colors together. The brush should be large enough to cover the border area, but no more. That said, always blend with the largest brush you can get away with for the job. A wider brush means fewer strokes, and fewer strokes means a smoother transition. Again, concentrate on blending only the border area between the two colors. The subtle gradations of color you can achieve with oils are astonishing, and you'll be surprised at the delicate results you can achieve with only a little practice.

One characteristic of oils that takes a bit of getting used to is the heavier consistency of the paint. As you layer colors one over the other, the paint will gradually build up on the figure and you can find yourself struggling with a thick, gooey mass of intractable pigment, heavily textured with brush marks. The only solution to this predicament is to wipe the area clean and start over again. Thinning the paint is not the answer; the thinned out paint doesn't cover as well and dries faster, making it more difficult to blend. The answer is to concentrate on applying a thin layer of the proper consistency and spreading the paint out further across the surface. In other words, DON'T THIN IT OUT, SPREAD IT OUT.

If in spite of your best efforts the paint is drying out too fast, making it difficult to blend, a small drop of refined linseed oil added to the mix will greatly lengthen its working time. You can even rescue an awkward situation by adding a bit of oil to the paint already on the figure.

As you work, hold the figure at arms length every so often to check your progress. Good painters do this constantly, checking for smoothness of blending up close, and color contrast at a distance. Refer back to Fig. 3-12.



Figs. 3-15 and 3-16 The technique may vary, but the principles are the same. Pete Kailus and Bill Horan both build up their shadows with transparent glazes, the former with Pelikan Plaka and the latter with Humbrol. Effective glazes take practice and can be difficult to master, but if it works for you, go for it. Horan's figure is a 54mm officer of the Gordon Highlanders at Dargai (right), while Kailus's is a 54mm drummer of the British Foot Guards in 1795 (left).

If the contrast between highlight and shadow is not distinctly visible at arm's length, then you have blended too much of it away. If the general impression at a distance is too dark or light, remember that the overall effect of a given color is the average of all the values used to shade it. If it seems too dark, there are probably too many dark areas; if too light, too many light areas. Compare the highlight and shadow areas to the reference card you made up at the beginning. Darken or lighten the colors on the figure as necessary, blend, and check at arms length again. Repeat this process until the results are satisfactory.

Don't expect perfect results the first time. Blending is one of the most difficult aspects of figure painting, and a good technique is the result of practice. In the beginning, just settle for doing the best you can; you'll improve rapidly with experience.

Adding highlights and other shadows. When the basic highlights and shadows are blended, you are ready to lay in the high highlights and dark shadows. This is the point at which the figure really starts to come to life.

Your reference card shows the proper values for the No. 1 and No. 5 shades. These are, however, the end result you want to see on the figure, not the color to mix. Because you will be laying the color over the still-wet

highlight and shadow colors already on the figure, you will have to compensate by mixing a lighter highlight and darker shadow than those on your card. In some cases, this will mean using a straight white for the highlight (on light colors) and straight black for the shadow (darker colors).

Lay these colors in place according to the stop-sign rule and blend them in as you did the others. Again, step back and examine your work from a distance. A certain amount of contrast is always lost in blending. Have you lost too much?

To restore lost contrast, you'll have to go back and add more color, but remember that each additional layer will increase the buildup of paint on the surface. If the accumulation becomes too great, you'll have to wipe off the excess with a cotton swab or rolled tissue and start again.

Repeat this "touch up and blend" cycle until you are satisfied. This is often the longest part of painting a figure, but also the most rewarding, because you can see the figure coming to life under your brush.

Final blending check. When you think you're finished, hold the figure at arm's length and examine your work yet again. Is there still enough contrast between the colors or have you blended too much away? Do the folds look natural? Have you highlighted the tops of the folds and not

TEN STEPS FOR PAINTING AND BLENDING

1. Analyze the figure according to the stop-sign rule first.
2. Mix all five shading colors and transfer them to a reference card.
3. Lay in the medium shadow and highlight colors only, covering the entire area. If you're working in oils, spread the color as thinly as you can.
4. Blend the border between the colors.
5. Check for smoothness of blending close up, and for contrast at arm's length.
6. Adjust the colors as necessary, and check again. Repeat until results are satisfactory.
7. Add the light highlights and dark shadows, and blend them in.
8. Check again at arm's length, and make adjustments. Repeat until the results are to your liking.
9. Remember that the highlight and shadow colors shown on the shading chart are not merely the colors you start out with, but also the colors you should see on the figure when blending is completed. If they are not, make adjustments until they are.
10. Gently smooth over the entire area with a soft, dry brush to remove brush strokes.

just the outer edge? Have you shaded the body shape as well as the folds? Bring the figure back in for a closer look. Is the blending smooth, with a gradual shift of color, or are there rough spots? Do the brush strokes show? Correct any flaws you've noticed.

Analyze your results in terms of the stop sign, comparing each color area to your reference card. Are the No. 1 (high highlight) areas actually No. 1 highlight color, or have you blended away too much? Ask yourself this question for each of the five colors. Remember, the stop sign assigns color values to areas on the figure, not to puddles of paint on the palette. If a No. 1 highlight area is not actually No. 1 highlight color, correct it. Ignore the five puddles of paint on your palette



Fig. 3-17. Dark colors (and military dark uniforms are nearly always VERY dark) need the least contrast, and are therefore the easiest to paint. Take the easy way out: don't over-highlight your dark uniforms (a 90mm Stadden officer of Light Dragoons, c. 1810 by Roy Andersen).

and add as much super-dark or super-light color as you need to bring the colors already on the figure up or down to the right value.

The finishing touch is to brush over the entire painted area gently with a large, clean, soft-bristled brush. This will smooth out the texture of the brush marks and add subtlety to the blending.

BLENDING WITH HOBBY PAINTS

With enamels, most blending work will be done when the paint is already dry to the touch, but before it has set.

Moisten a clean, soft-bristled brush with thinner and stroke it across a folded tissue to remove the excess. There should be only enough thinner left on the brush to soften the paint on the figure. Gently stroke back and forth across the border between the two colors until the thinner "revitalizes" the paint and the border becomes indistinct. As with oils, it's really more of a stabbing, tickling motion. For a smoother effect, take an occasional stroke lengthwise along the border, too. Return your brush to the thinner occasionally to clean it out. If the difference between adjacent colors is radical, you may have to work in stages, blending the border first, then in turn blending the edges with the colors on either side. Again, blend just the border area; don't go too far and blend the

whole thing into one solid color.

When blending hobby enamels, you may find the paint drying to a glossy or mottled finish in the blended areas, particularly if you've used a lot of brushwork. You can correct this easily later with an overspray of matte varnish, so don't worry about it.

BLENDING WITH WATER-BASED PAINTS

Water-based paints tend to set as soon as they dry to the touch, making blending impossible with either of the two methods described above. The only two solutions are to blend while the paint is still wet, which calls for a quick, experienced hand, or to shade with a series of glazes (see below). Acrylic glazes can be difficult to control and call for an experienced hand. Good results are possible, but unless you really know what you're doing, I don't recommend water-based paints for figures.

SHADING WITH GLAZES

Glazing is a practical alternative for shading with hobby enamels and acrylics. A glaze is a transparent layer of color applied in a carefully controlled manner (as opposed to a wash, where the color is allowed to run free). When working with glazes, you have a choice of undercoats: The more common approach is to lay in the basic uniform colors and work over them, but you also can start with an all-white figure and build up your tones gradually. This second technique is not easy, but an experienced hand can produce subtle, stunning results, with great brilliance and depth of color. Either approach requires practice before you achieve a smooth transition of color without a blotchy look.

Essentially, you'll brush a series of glazes over a base color, first in the dark shadow areas and subsequently spreading across into the lighter shadow areas. Brush each glaze across the surface, and then feather the edge away into the color underneath. Wait for each glaze to dry before applying the next one. Each layer adds depth to the one underneath it. In some cases, a good appearance may require four or five glazes; the more layers you have, the subtler the effect will be.

Certain types (and even certain brands) of paint lend themselves better to glazes; this is a matter of personal taste and preference. Bill Horan works almost exclusively with Humbrol and does a lot of his shading with glazes; you certainly can't fault his results. But, as I've mentioned before, the paint someone else swears by may not work for you; the only answer is to experiment until you find something you like.

If you are working in oils, transpar-



Fig. 3-18. Light colors, on the other hand, need the widest range of contrast, and are the hardest to blend smoothly. White is the most difficult of all (a Segom 54mm Napoleon).



Fig. 3-19. Don't make the mistake of highlighting a red coat with pink: it will look bleached and faded. Instead, shade as usual and highlight sparingly with scarlet. It helps to paint and blend the red No. 3 areas into the shadows one day and the same areas into the scarlet highlights the next. That way the blue in the shadows never contacts the yellow in the highlights, mixing green into your red coat. I really enjoyed painting this boozy old British Colonel of Bengal Lancers designed in 90mm some years ago by Sid Horton of Chota Sahib.

ent mediums make glazes easier. Their clear, jelly-like consistency allows you to brush on a smooth, transparent layer of color without flooding the area. The problem is that transparent mediums, like oils, dry overnight, and you have wait for each layer to dry before applying the next layer over it.

SHADING DARK AND LIGHT COLORS

Dark colors are the easiest to shade, because of the low contrast. The trick is to avoid over-highlighting them. The base color is already dark, so it won't look too different from the shadow (usually jet black), and blending is easy. Remember that military dark colors are intentionally dark to contrast with the bright facing colors. Keep them dark; be sparing in your highlights to avoid lightening the overall impression. One modest high-light shade should be enough, because

dark colors also tend to pick up sufficient highlight from the room lighting, fig. 3-17. Black is the easiest color to shade because there are no shadows and only the faintest of highlights (a good rule of thumb is to put in just enough so people won't think you forgot). In short, if you want easy uniforms to paint, stick to panzer troops!

Generally speaking, lighter colors are harder to shade. The reason is that the range of colors from high highlight to deep shadow is broad, in many cases running the gamut from a pale khaki to dark brown. Blending these from one to the next without making a mess is challenging. The task is best accomplished in stages, starting with the border area and blending out to the colors on either side. It takes time; be patient and work on a small area at a time.

White clothing is the most difficult because the shadow colors inevitably

blend over into the highlights, turning snow white to dingy gray. The solution to painting white clothing is twofold: avoid overshading it and go back and touch up the highlights after the paint from the first session has dried. Remember the "average value" principle I mentioned above; although the shadow colors will range all the way to a dark gray, 90% of your areas should be white. If the arm's-length impression is gray, not white, you need to cut down on the amount (but not the darkness) of the shadow. Even the best painters often have to paint white in two stages, first blending in the light and dark shadows, and coming back the next day to restore the white highlights and light shadows.

Remember, too, that white is just a light version of another color. You can take advantage of this when painting all-white uniforms by varying the shadow color for different materials,

such as using a brownish gray for wool or a bluish gray for cotton. This subtle effect relieves the monotony of the single color and is quite striking.

Red and scarlet also benefit from a two-stage approach. With red, as with white, the shadows tend to creep across the figure as you blend, muddying the highlights. Lay in and blend the base color and shadows the first day, and the base color and highlights the second. This way the dark shadows never come in contact with the highlights, and the brilliance of the red (or scarlet) is preserved.

Crimson is another problem; finding a good one is a challenge. I like Winsor Newton's permanent magenta, but other painters have their own favorites. Crimson is most effective when they're transparent; adding white, even the tiniest amount, makes them opaque and the highlights turn a dingy gray. First shade and blend the area as if it were a dark pink or pale red. After this has dried, glaze over the entire area with a wash of thinned crimson. It will darken the highlights just enough, while the light color behind it gives the crimson a brilliant rosy glow.

KNOWING WHEN TO STOP

There are times, particularly when shading difficult areas, when it makes sense to do the work in two stages. I've already discussed how a two-stage approach can be helpful with light colors. Otherwise, you generally don't plan this, but there are occasions when you reach a point where you're no longer making much progress; not only are things not improving, but they seem to be getting worse. In such situations nothing is to be gained by flogging a dead horse, and it's best to just tidy up the blending, set the figure aside, and pick up the next day where you left off. By that time the paint will be dry, and you can get a fresh start without the colors already on the figure getting in your way. The color contrast is easier to improve, and a fresh perspective often makes the work go more smoothly.

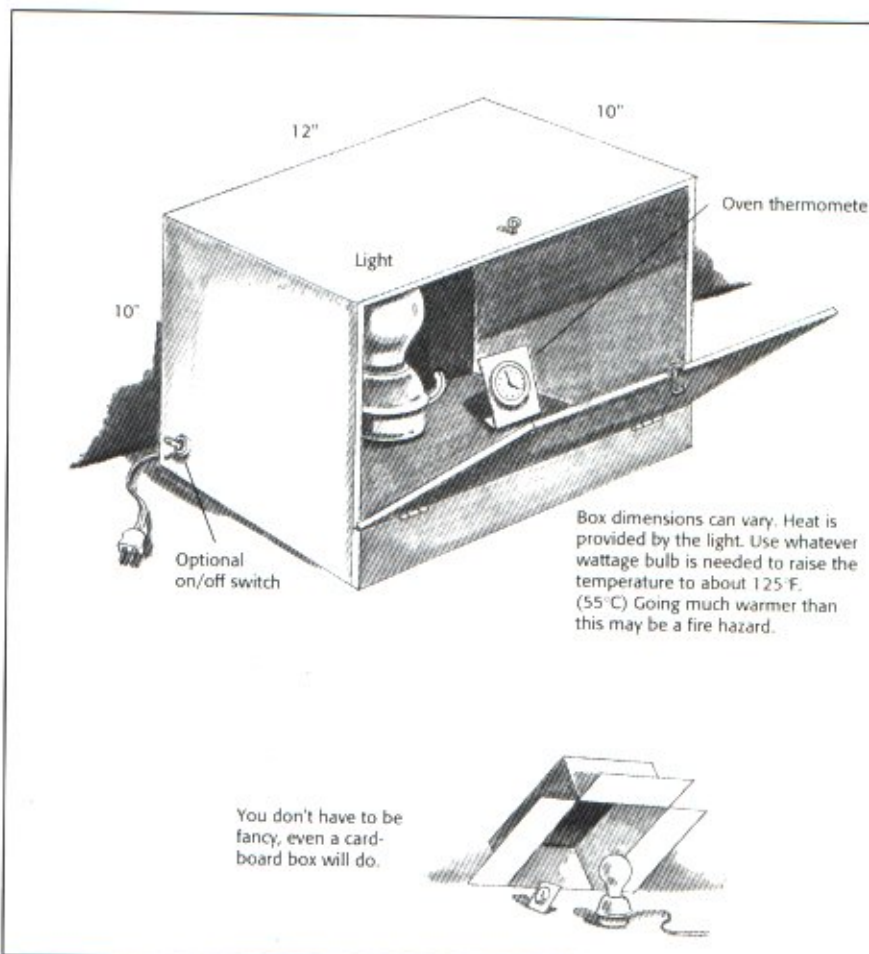


Fig. 3-20. A simple drying oven can be made with a wooden box and a light bulb. Use cheap oven thermometer to read the temperature, and control it by changing to a high or lower wattage bulb. A temperature of 100-120° is about right. Leaving the figure in the drying oven overnight ensures that the paint will be dry and flat the next day.

OVEN-CURING OILS

Artist's oils will almost always dry in 24 hours, but you can hasten drying by leaving the figure in a low-temperature oven overnight, (fig. 3-20). The heat (no more than 140° Fahrenheit) will dry the oils and help ensure that they dry flat as well. A Crockpot or even a simple cardboard box with a light bulb also works. I swear by my light box, and use it all the time.

Whites tend to yellow in the oven.

This can be a happy accident if you anticipate it, nicely mellowing wo uniforms, for example. If you want to restore the white later, just touch up the highlights and let the paint dry at room temperature overnight.

If your paints are still drying glossy (either with oils or enamels), don't worry, a matte varnish will cure the problem (see chapter 6).

PAINTING THE FACE

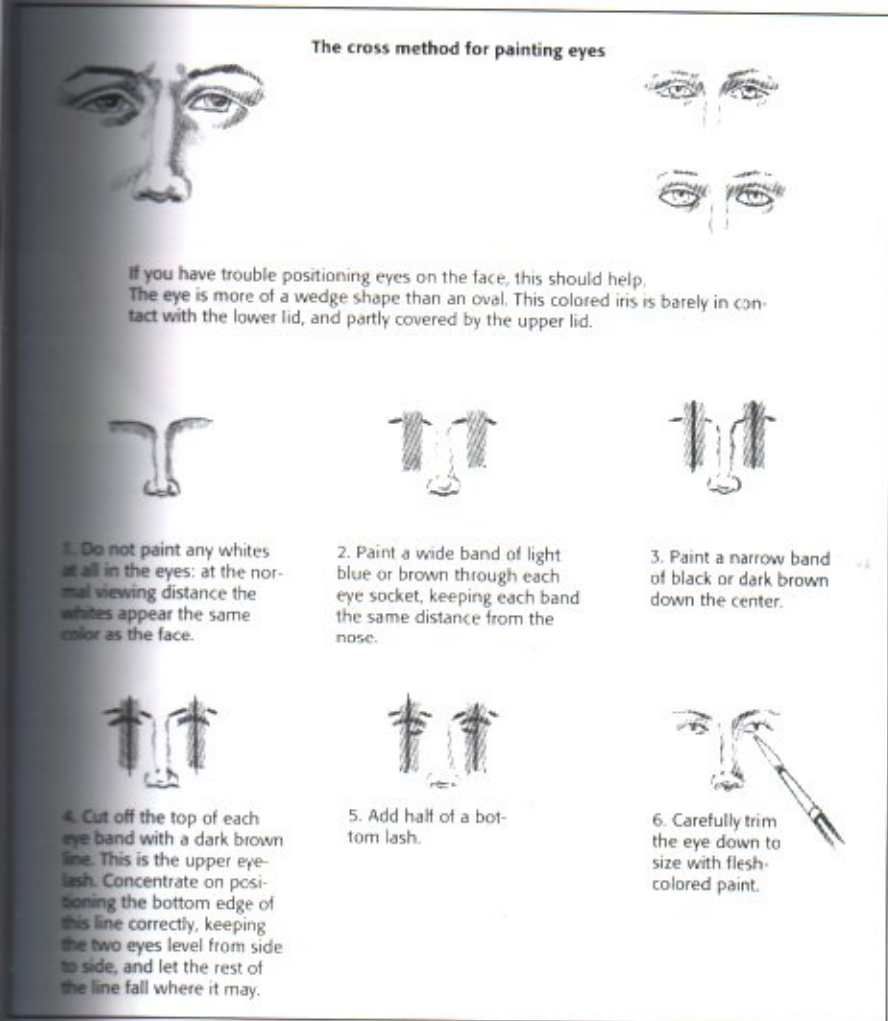


Fig. 4-1. To locate the eyes accurately when none are sculpted on the figure (or if the sculpted eyes are in the wrong place), this "cross" method works well.

The face is the most challenging, most frustrating, and most satisfying part of painting a figure. The quality of your faces, more than any other factor, will determine your ability as a figure painter.

THE EYES

Some painters leave the eyes for last but I recommend painting them first, especially when you're just starting out. That way if you blotch them (as everyone tends to do in the beginning) you can start over without wasting any effort. I usually paint the eyes at the same time and with the same

paint as the underpainting. This way the eyes won't accidentally get blended into the rest of the face later.

Eyes need to be straight, the same size, and symmetrically located in the face. Eyes that are already sculpted into the face can serve as a useful guide, but should not be followed automatically. Even sculptors can make mistakes, and an error that passes unnoticed in its sculpted form can become more obvious when it is painted. Don't be afraid to make adjustments when this occurs; you may have to fill the sculpted detail with a dab of white glue before painting over it.



Fig. 4-2. If you are right handed, the eye on your left is the hardest, because the nose keeps getting in the way. Paint this harder eye first, and then match it with the easier one. If the head is separate, you may find it easier to mount it on a pin for painting.

People outdoors tend to squint in the sunlight, so in 54mm the eyes may appear as little more than slits. Also, even in larger scales the whites of the eyes are essentially the same color as the rest of the face. This is because at all but the closest distances the tiny blood vessels blend with the white of the eye to make it appear pink. Painting pure white in the eyes is the major cause of the notorious "pop-eyed" look. Go with an off-white if you insist, but the easiest and most natural effect is to use the base color of the face.

If you have trouble painting and positioning the eyes, fig. 4-1 shows a technique that should help. This "cross" technique allows you to concentrate on one problem at a time. The last drawing is the finished eye. Notice that the lower edge of the eye cuts straight across and that the lower eyelashes extend only half-way across. Contrary to popular belief, eyes are not almond shaped, and the sparser hair and different angle of the lower lashes make them far less visible than the upper ones (the upper lashes have denser hair, which, combined with the shadow under the eyelid, make for a stronger line). Overemphasizing the lower lashes makes the soldier look like he's wearing mascara.

Painting the most difficult eye first will help get the eyes to match. If you are right-handed, this is the figure's left eye, because the nose keeps get-

Fig. 4-3. The planes of the face follow (no surprise by now) the stop-sign rule. You can assign color values 1 to 5 to the face, just as you did the uniform, although a bit of overhighlighting on the forehead, nose, and cheekbones doesn't hurt.

Shading and highlighting the face

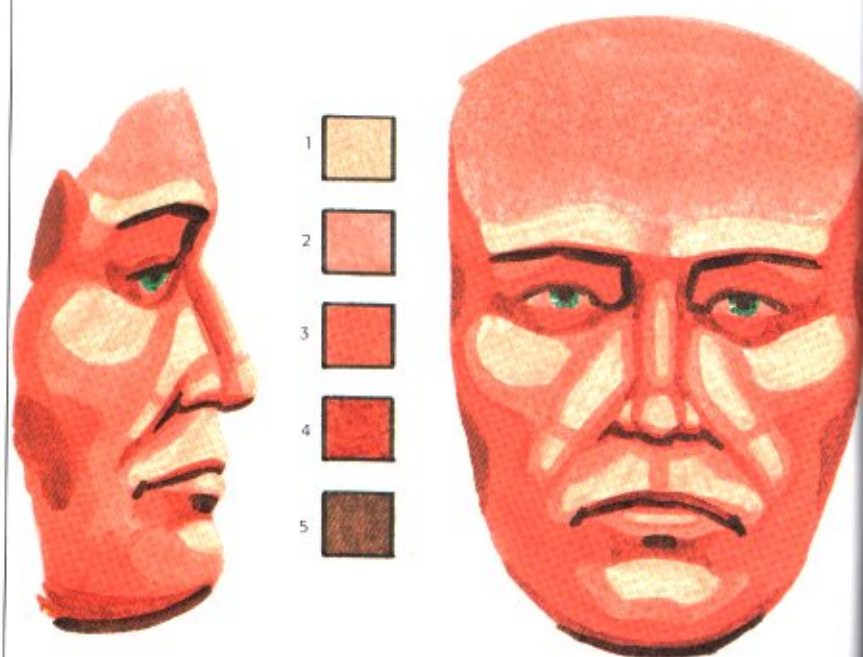
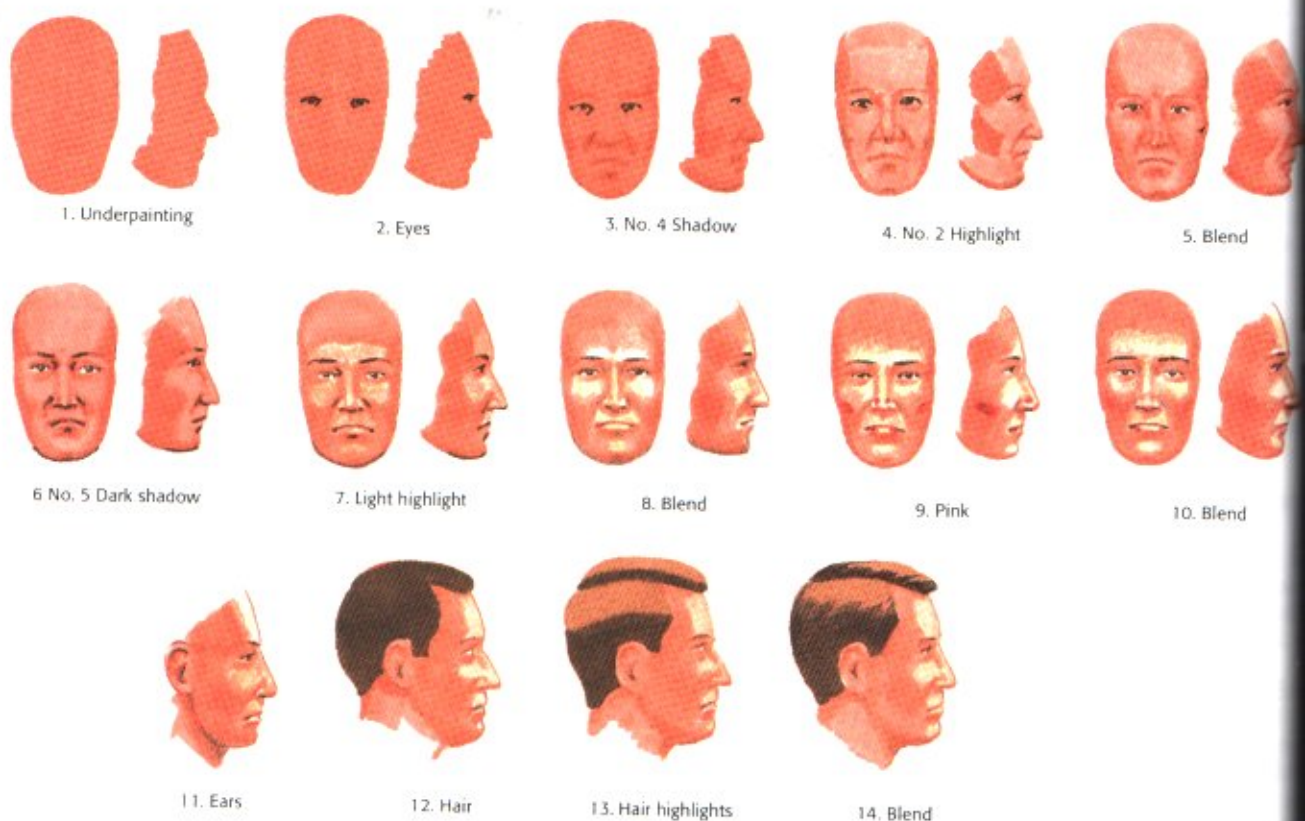


Fig. 4-4. The shading colors for the face. Facial colors are mixed with white, red, and yellow, with just a touch of black to tone it down. I recommend using white, gold ochre, and burnt sienna because the latter two colors already have just the right amount of black in them, eliminating the possibility of your face accidentally turning gray or green. Remember that these are the colors you start with on your palette, but they are also the ones you want to end up with on the figure. Final highlighting is usually done by adding pure white for the highlights and straight burnt sienna for the shadows.

Painting the face, step-by-step



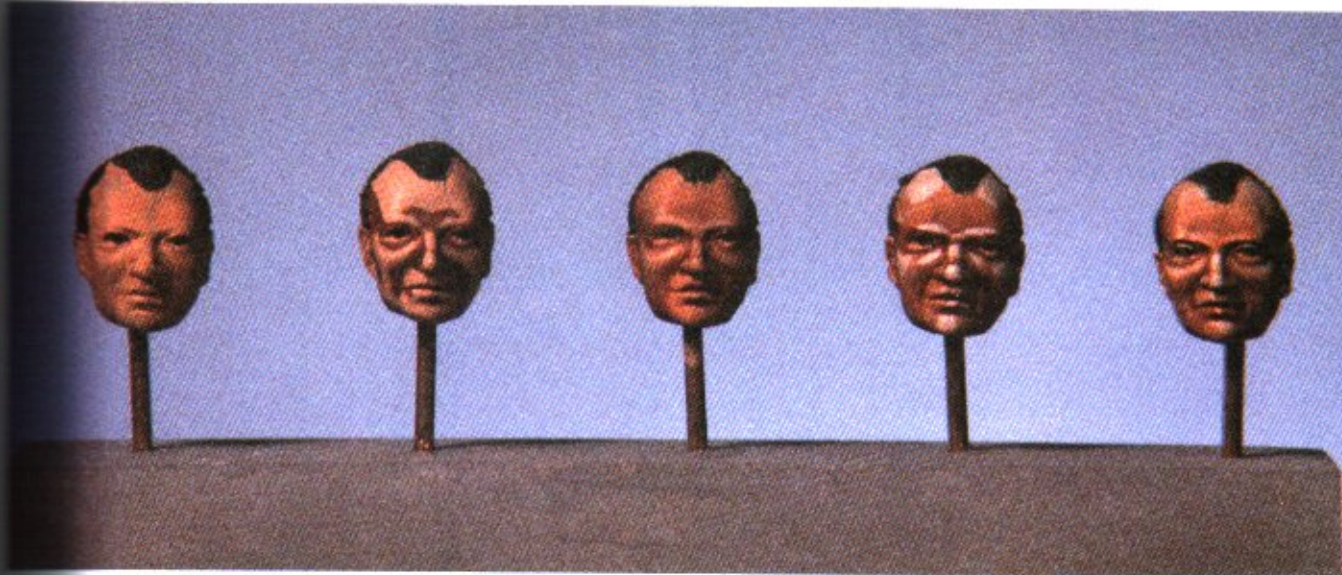


Fig. 4-5. A face step-by-step. 1. The eyes laid in with water based paint. 2. The No. 2 and No. 4 colors laid in. 3. These colors blended. 4. The high highlights and dark shadows laid in. Note the high

degree of contrast. 5. The contrast softened by blending. Repeat steps 4 and 5 as often as necessary until you are satisfied with the results.



(Top row from left) Fig. 4-6. Laying in the eyes with water-base paint. Fig. 4-7. The face colors laid in before blending. Fig. 4-8. One side blended, the other not. In blending the face, use the same delicate stabbing and tickling motion you used on the uniform. It is hard, because you are working with so many colors in such a small area, but be patient. (Bottom row from left) Fig. 4-9. Both sides blended. Fig. 4-10. The finished face.



Fig. 4-11. Rosy color in the cheeks also brings life to the figure. Just add a touch of red under the cheekbone, and blend it into the surrounding colors. Do the same for the tip of the nose and ears (scratchbuilt 100mm British officer of light infantry, 1776).



Fig. 4-12. A tiny sparkle of white (called a "catch light") in the eye adds a lot of life to your figure, but don't overdo it (General Duroc, a figure from the "Eve of Essling" diorama).

ting in the way whenever you try to get the brush into the eye socket; if you are left-handed, the same problem arises with the right eye, fig. 4-2. Hold the figure upside down if necessary to get a good angle — no law says you have to paint right side up. With the difficult eye safely finished, you can now paint the easier eye to match it.

I usually underpaint the hair and moustache at this time, too. Not much blending is needed in the moustache area, but when it is already there in the proper color I can relate the rest of the face more easily to it.

THE SHAPES OF THE FACE

Now turn to the face itself. Let's analyze it in terms of the 60° halo of light and the stop-sign rule. Looking at fig. 4-3, you can see how easy it is to assign numerical color values to the various planes:

- 2 — Top of the cheekbones, nose, forehead, lower lip, and chin
- 3 — Sides of the nose and lower cheeks
- 4 — Under the eyebrows, cheekbones, and upper lip

5 — Deep recesses: the eye sockets next to the nose, under the tip of the nose, and under the chin

The "major reference points," major shadow and highlight areas that establish the planes and shape of the face, are the forehead, top of the cheekbones and nose, lower lip and point of the chin (all highlight areas), and the eye sockets next to the nose (dark shadow). This last feature is the most important, because the sharp undercuts around the bridge of the nose form the deepest part of the face and impart much of its character. Pay close attention to each of these areas, and renew them as often as necessary in the course of painting the face.

The sides of the nose are essentially vertical surfaces and have been listed above as a 3, but it is worth noting that the light is blocked from one side, making this area more of a 3½.

PAINTING AND BLENDING THE FLESH TONES

Faces are hard to paint because so much work is required in such a small area. Even with a 90mm figure your

entire working area is not much larger than a pea. Nevertheless, the technique is the same as you've used for the uniform. Lay in the medium highlight and medium shadow first. Create the base color by blending these two and then go on to the lighter highlights and deeper shadows in a second and separate operation.

The first step is mixing the basic values. Stay away from commercially available "flesh" colors. These are invariably too pink. Remember that soldiers are out in the sun a lot, and their skin is tanned and weather-beaten. You're looking for a pinkish tan, usually achieved by mixing red, yellow, and white, with a dash of black to tone it down. In practice, it is more convenient to use gold ochre (yellow brown), burnt sienna (red brown), and white. Be sure to use gold ochre, not yellow ochre, which has too much black in it and yields muddy flesh tones. Mix the gold ochre and burnt sienna for the medium shadow and add white for the basic and highlight tones. Straight burnt sienna (with an occasional dash of raw umber if it appears too red) works well for the



Fig. 4-13. A "five o'clock shadow" is almost a must for figures on campaign. The secret is to add a touch of raw umber to the shadow areas of the beard. Blending these into the highlights gives just the right subtle touch of gray (a Rose 54mm Roustam, painted by Roy Andersen).



Fig. 4-14. Shade hair as a single mass, not individual strands. Analyze the overall shape according to the stop sign, and brighten the highlights a bit to indicate a soft sheen (a 54mm Rose officer of Light Dragoons, by Pete Kailus).



Fig. 4-15. As you can see with this sailor from the "Turret of the Monitor," the trick with blond hair is to add a touch of olive green to a few of the shadow areas. Needless to say, don't overdo it.

dark shadows. With this particular color selection the gold ochre and burnt sienna already contain just the right amount of black, eliminating the possibility that you'll accidentally add too much and turn the face gray.

The balance between the gold ochre and burnt sienna is important; you don't want the face to be too yellow or too red. A mix of two parts burnt sienna to one part gold ochre is about right, but trust your eye.

Start by laying the medium shadows and highlights onto the face. Remember to spread the colors out, applying only a thin skin of paint; buildup is a problem when working in such a small area. If your brush has a good point, you shouldn't need anything smaller than a 0 or 00. Following fig. 4-5, lay in the medium shadow color first, not only in the medium shadow areas (4), but in the base color (3) and dark shadow areas (5) as well. Next, lay in the medium highlights, overlapping this time into the high highlights, so that the entire



Fig. 4-16. Hands are shaded like the face, but again, analyze the hand, and its position relative to the light, according to the stop sign. The fingers across the knuckles are a natural stop sign and should be shaded accordingly ("Marching through Georgia," a Series 77 conversion).



Fig. 4-17. A woman's or child's face is generally paler than a man's and the surfaces much smoother. Keep the overall tone correspondingly lighter, and don't overdo the shadows. (150mm scratchbuilt Las Vegas showgirl by Philip Stearns, those are real feathers!)



Figs. 4-18 and 4-19. Racial color differences are often subtle. Orientals are just slightly yellower, and Native Americans just slightly redder than Caucasians. Blacks are often much darker; be careful in highlighting with white, or you'll turn him gray! (Attila the Hun, a 100mm scratchbuilt by Mike Good, and large scale scratchbuilt Sioux warrior by Ron Tunison).



facial area is covered with paint. When you've finished, step back and examine your work at arm's length.

Now clean your brush thoroughly and start to blend. Work carefully, using short, delicate strokes. With so many colors in such a small area, be especially careful to blend only the border between colors. It's too easy to blend too wide an area, and this is where problems are likely to set in. Work the brush along the border areas, using a stabbing, stippling motion to avoid disturbing other colors nearby. Work carefully and take your time. Hold the figure at arm's length to see what has been lost. Pay particular attention to the major reference points: the forehead, eye sockets, cheekbones, nose, lower lip, and chin. The contrast in these areas has probably been weakened by blending. Add fresh color where necessary and blend again. Repeat this cycle until you are satisfied. Add a bit of linseed oil if the paint starts to dry out too much. If the paint starts to build up, scrape the excess off with the side of the bristles and paint that area again.

If you accidentally paint over the eyes (it happens to the best of us), resist the temptation to paint them in again. Scrape off the excess paint with the brush, clear the socket with a brush lightly moistened with turps, and try again. Don't try to touch up the eye with black — it may start to blend into the rest of the face, turning the whole thing gray.

Now mix the deep shadow and light highlight. The deep shadow should be darker than usual (a fairly dark brown), and the light highlight almost white. The increased contrast is necessary to compensate for the color already on the figure, which will be mixed in during blending. Again, lay in the shadows first, paying particular attention to the bridge of the nose, under the nose, and under the upper and lower lips. Check your work at a distance, and blend the shadows in carefully. You are now working with tiny areas of color, so blending calls for an exceptionally delicate touch. After the deep shadows are blended in, lay on the high highlights, the most important of which are the upper cheekbones, top of the nose, lower lip, and chin, figs. 4-6 to 4-10. Again, check the effect at arm's length, and start blending the edges. When blending, be particularly careful that your high highlight and deep shadow colors never actually come in contact. The shadow contains a lot of black and the highlight a lot of white, and if these two mix the whole face can turn gray in an instant.

Now that you've devoted so much attention to the face itself, don't forget the ears and neck. These are painted

in same manner as the rest of the face; analyzing the shapes and laying in the colors. Avoid shading the neck as a simple cylinder. Think of it instead as a sophisticated column of muscles supporting the head, the most prominent being the two cords that form the "V" on either side of the Adam's apple. Although people's ears vary in the details, the overall shape is similar. Follow the forms sculpted into the figure, consulting the diagram when you are uncertain, and you shouldn't have much trouble.

With the face, as with the uniform, I often reach a point when I seem to be spinning my wheels, and conclude the best course is to call it a day. The natural cycle of painting is from progress to no progress to negative progress. When you reach the no-progress stage, stop before you ruin the figure. A fresh look the next day will give you a different perspective, and often you'll only need a few minutes of touch-up.

ROSY CHEEKS, CATCH LIGHTS, AND FIVE O'CLOCK SHADOW

An important final touch is adding a dash of pink to the cheeks and lips. Apply a dash of reddish pink below each cheekbone, and in each corner of the lower lip, fig. 4-11. Blend this color in until just a subtle hint of pink remains.

Also effective is to paint a tiny "catch light," or white reflection, in each eye. In reality, the catch light only occurs indoors when there is a single nearby light source to reflect on the surface of the eyeball, but the sparkle and character it brings to a figure makes it irresistible. The catch light should be small — if you don't have a brush with a needle point, don't attempt it. It is also useful for directing the figure's gaze in a certain direction; by positioning the highlight to a given side of the iris in each eye, you can shift the model's glance to the opposite side (fig. 4-12).

A common touch for veterans in the field is a five o'clock shadow. This is not difficult to achieve (if you've made it this far, you're ready for anything!). Mix a medium gray and apply it only in the shadow areas of the beard, fig. 4-13. Blend it in, feathering it lightly across the highlights. This will turn the highlight areas slightly gray without changing their essential color. The trick is to keep it subtle and not overdo it.

MOUSTACHES AND HAIR

Paint moustaches and hair last. The trick to painting and shading hair is to treat it not as a group of individual strands but as a solid mass of interweaving locks. Analyze the hair as a single shape or group of shapes in terms of the 60° halo of light and the



Fig. 4-20. Our sample figure in its completed form: a 90mm Poste Militaire hussar.

stop-sign rule, and paint it accordingly. Highlight the upper surfaces of locks and waves, and shadow the undersides. Avoid highlighting brown hair with a rich reddish brown, since human hair rarely grows that color. Instead use burnt umber for the shadows, and add white for the highlights; the highlights may look gray, but the overall impression is still brown (fig. 4-14). By exaggerating your highest highlights, making them lighter than usual, you can suggest the subtle sheen characteristic of human hair without resorting to an unrealistic gloss finish.

Blond hair is more complicated, because it's really more of a tan or straw color, even in its paler forms. The shadow color often has a slightly greenish cast, but this can be a dangerous effect to achieve — if you overdo it even slightly, your friends will never let you forget that funny-looking figure with the green hair! You can avoid this embarrassment by carefully balancing the greenish shadows with some brownish ones, fig. 4-15. Check the effect at arm's length, and if it still seems too green, add more brown or ochre shadows.

PAINTING THE HANDS

Paint hands with the same tones as faces. The darker shadows go between the fingers; feather them lightly to either side to suggest roundness. Use

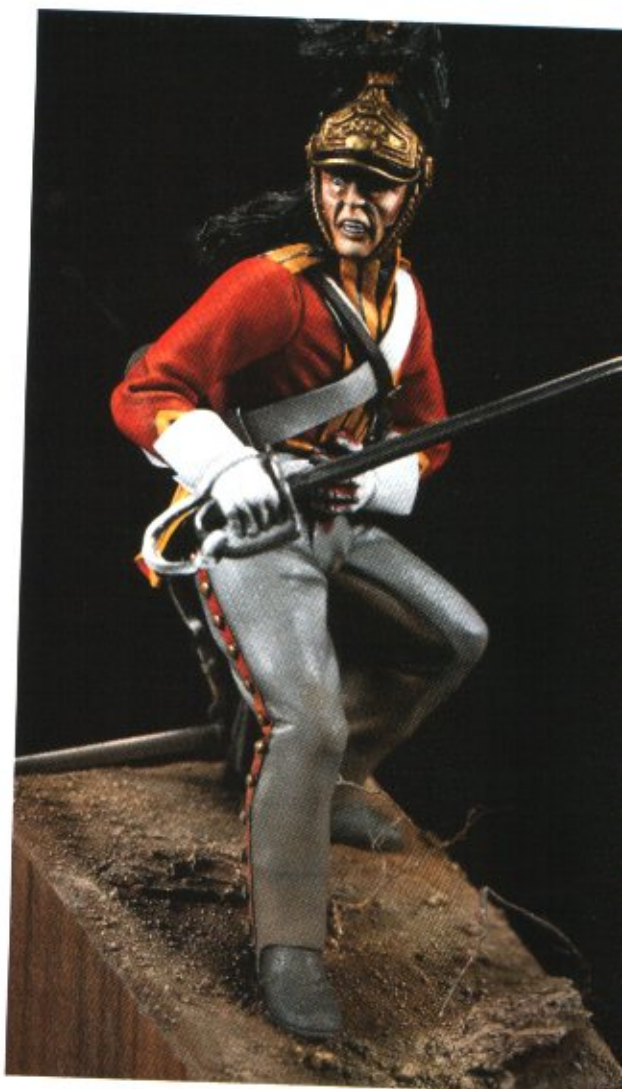
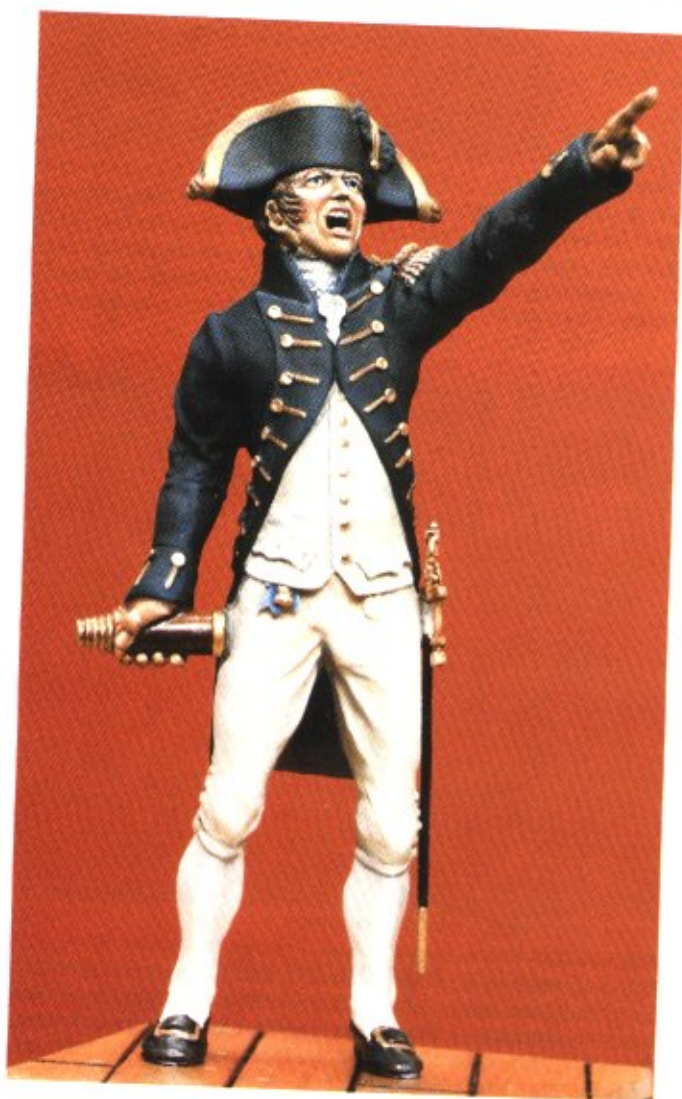


medium shadow on the under the hand (depending upon which is up) and across the finger each set of knuckles. Add finger with a drop of light highlight at of each finger, left unblended. your figure's hands are not too muscular, with veins showing nently on the backs (fig. 4-16). essary, vary the color of the the hand to suggest the muscle paint in the veins with the hi color.

The techniques for painting human complexion don't change the colors vary. Women's faces a softer and more delicate touch men's faces (fig. 4-17). The skin should be paler and pinker a features more rounded and shadowed.

With orientals, use the usual ture of gold ochre and burnt si but increase the proportion of ochre (fig. 4-18).

With blacks, the basic palette should include burnt sienna, umber, black and gold ochre, with a dash of white. The trick



to overhighlight; shade it as you would any other dark color, and keep the contrast low. Use white sparingly to avoid turning the complexion gray. Paint the eyes a darker shade and the lips the same color as the rest of the face. Finally, the palms of the hands and soles of the feet should be lighter than their top sides.

Indians and other people of the subcontinent, as well as Polynesians, have an olive skin tone. Slightly reduce the red in your color mixture, and use more raw umber in the shadow colors. Keep the overall color balance one or two shades darker and the overall effect subtle.

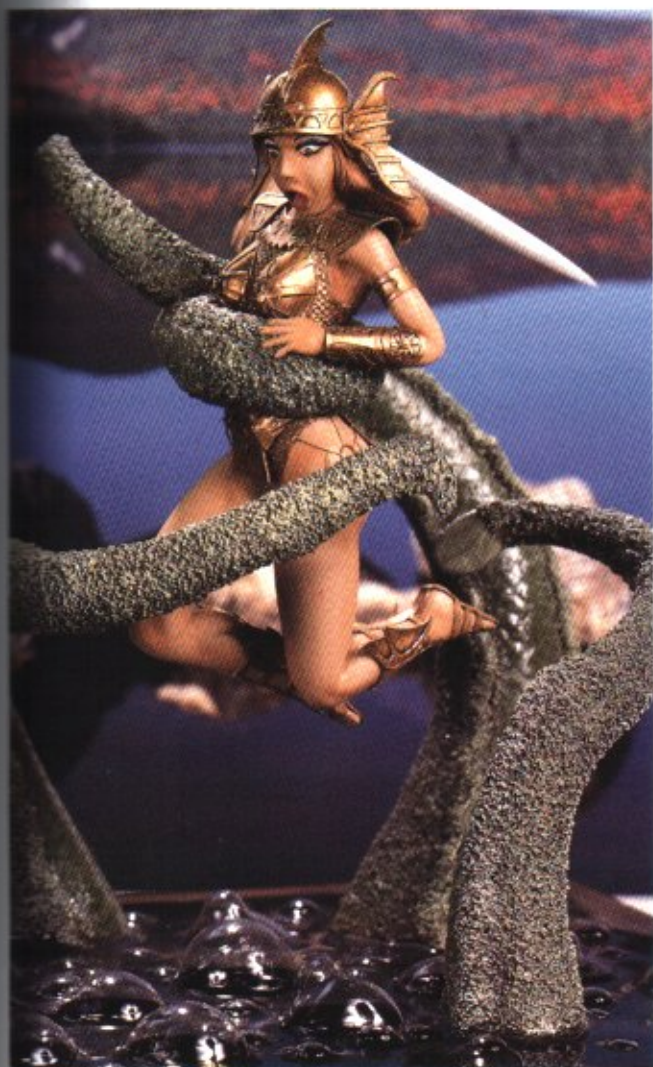
With Native Americans the reddish tone is easily perceived, but is hardly of sunburn proportions. Most Native Americans, particularly on the Plains and in the Southwest, spent much of

their lives out in the sun, which accounts for much of their darker coloring. A good palette for Native Americans would include more than the usual amount of burnt sienna, but no red. The whites of the eyes should be a bit darker, and the lips should be the same color as the rest of the face.

Exercise discretion with scars and other disfigurements. Even a small scar is a cliché, while a large one merely draws attention to the painter's failure to instill character by more conventional means. Another corny touch to avoid is an eye patch. It may have sold a lot of Hathaway shirts in its day, but on a figure it usually indicates that the painter botched one of the eyes and has tried unsuccessfully to hide the mistake. And even if you didn't, people will think you did!



Figs. 4-21 to 4-26. A series of interesting faces and expressions (counterclockwise from top left): a smiling 150mm Civil War Union sailor; another scratchbuilt, a shouting naval officer from the Barbary Wars; a 100mm scratchbuilt wounded British dragoon grimacing by Peter Twist; a 150mm scratchbuilt fantasy female warrior by Mike McCowen, in the "Marvel comics" style; a beautiful Historex conversion 54mm Lord Nelson by Peter Twist; a Barton 100mm portrait of Lord Louis Mountbatten.



DETAIL

All of the shading principles we have discussed so far apply to painting detail, but on a smaller scale. Every item of detail has its own shape, and hence its own highlight and shadow.

THE PRINCIPLE OF SCALE DISTANCE

There is, however, one important additional factor to consider: the principle of scale distance. The closest distance the human eye can focus on an object is about five inches; anything closer is a blur. Viewing a 54mm (1/32 scale) figure five inches away is the same as looking at a real person 15 feet away (fig. 5-1). Even for a 90mm figure, the equivalent distance is still a good 12 feet away. To test this, hold a figure at your closest focusing distance, and back up until someone standing in the background appears

the same size as the figure. This is the closest viewing distance for that subject.

This experiment demonstrates two principles. First, you can safely ignore any detail that can't be seen at this distance, because if you can't see it in real life, you shouldn't be able to see it on the model either. Second, the detail that you do see often is not fully discernible in its true form, and appears instead as a pattern of highlights and shadows. Just as the eye is accustomed to reading the shape of large objects in terms of highlights and shadow, we quickly learn to interpret small objects the same way.

Many modelers try to paint detail that would never be visible at the scale distance they are working with. A forest may be made up of individual trees, but at a certain distance the

individual trees are no longer distinguishable. This concept applies to detail work on figures, too.

There is no reason to paint individual feathers on an eagle insignia so small that they would never be visible at the closest viewing distance. Concentrate instead on getting the head, chest, wings, and legs properly proportioned and readily identifiable.

If the figure has a complicated piece of embroidery, such as braided shoulder boards, don't try to paint each cord and twist. Instead, reduce the image of the knot to a simple pattern of light and dark, then paint that pattern on the figure. This is an old trick, copied from the masters of oil painting. Look closely at an elaborately detailed helmet in fig. 5-2 and you'll discover that it's really just a collection of carefully contrived squiggles of color, artfully

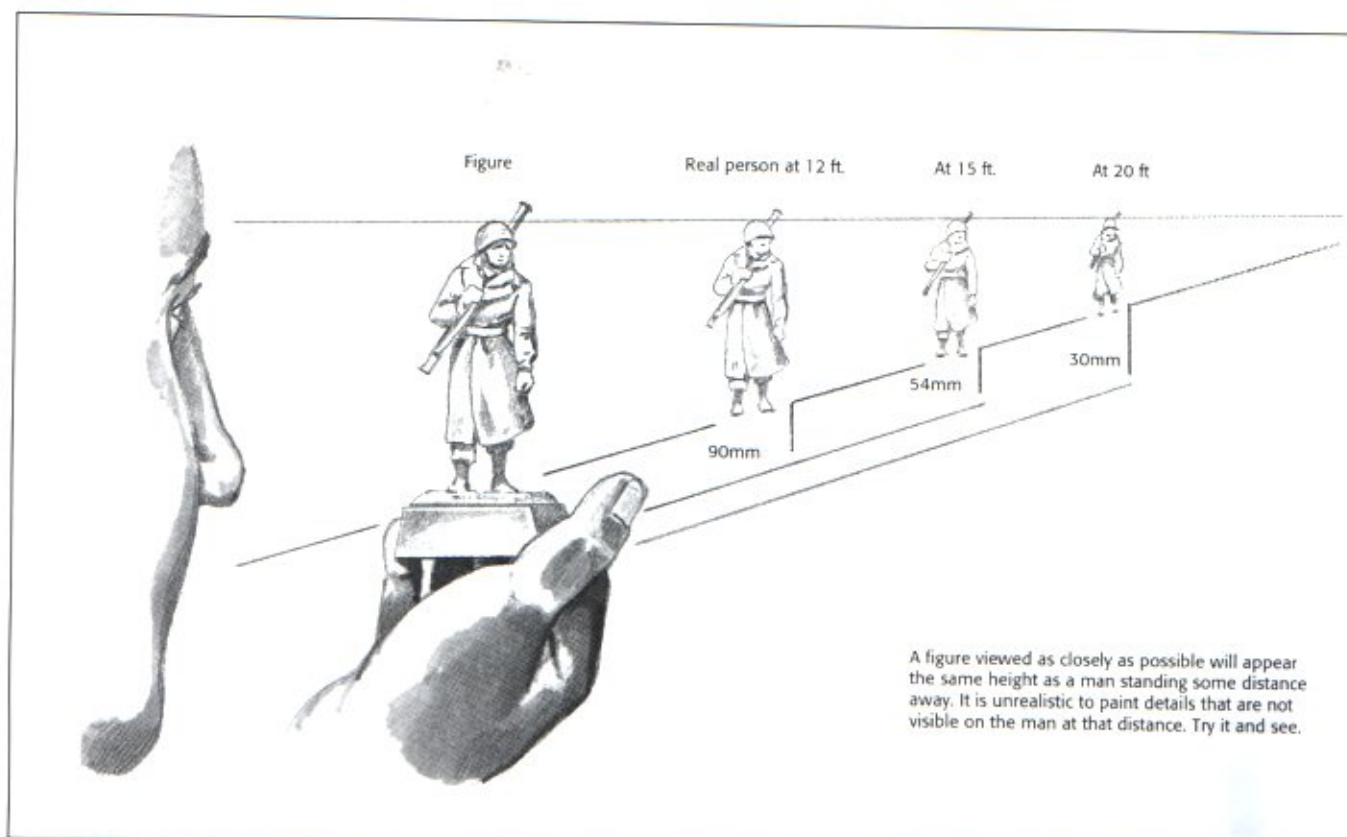


Fig. 5-1. The principle of scale distance. The closest distance you can focus on a figure is about 5". For a 90mm figure, that is the same as seeing a real person 9' away. Detail should be painted as it appears at that distance.



Fig. 5-2. The elaborate detail on the helmet in this famous painting is not really there; by carefully positioning highlights and shadows, the artist has tricked the viewer's eye, making it see detail that wasn't painted at all. What works for him on canvas can work for you on miniatures.



Fig. 5-3. Good detail calls for a steady grip on the figure. Brace the figure base against the table, and position your painting hand on the figure base. Only the fingers holding the brush are free to move, reducing shaking to a minimum.



Fig. 5-4. Controlling the consistency of the paint is particularly important in painting detail. Add thinner until the paint flows from the brush like ink from a pen. If too runny to control, set it aside for a few minutes until some of the thinner evaporates out.

arranged to give the impression of detail that is never fully rendered at all. In other words, you will get farther by suggesting detail than by trying to duplicate it point for point. There is an old artistic maxim that "to suggest is to create; to show all is to destroy."

SPECIAL TECHNIQUES FOR PAINTING DETAIL

From a technical standpoint the two secrets of good detail work are the consistency of the paint and a steady grip on the figure and the brush. Proper control of the paint and brush is 90 percent of fine detail work. With it, detailing is fun; without it, detailing is the height of frustration.

Set aside a couple well-pointed brushes specifically for fine detail work, and pamper them more than you do your other brushes. A sharply pointed brush can make detailing easier, while an unreliable one can make the whole experience miserable.

A good grip is as important in painting detail as it is for other precision tasks, such as sinking a putt in golf or firing a rifle. If your grip is not steady, your hand will shake and you won't be able to put the paint where you want it, fig. 5-3. Grasp the figure solidly with one hand, and brace that hand against the edge of the table. Brace your brush hand against the base, and you'll find the only parts left that can shake are the fingers holding the brush; that much you can usually manage to control.

As you work, adjust the consistency of the paint when necessary. If the consistency is off, the paint will flow too slowly or too freely, either of which can ruin fine detail. When it is right, the paint will flow smoothly from the brush like ink from a pen, and you can

paint anything you set your mind to, fig. 5-4.

You only use the tip of the brush for painting — the rest just serves as a reservoir for paint. Touch the tip to the surface and allow the paint to flow down the bristles onto the model. Excess pressure on the tip spreads the bristles, and the advantage of the fine point is lost.

BOOTS AND LEATHER GEAR

There are a few tricks to make your leatherwork look realistic. Don't use too high a gloss, even if the material being depicted is patent leather. Gloss decreases in intensity as it is miniaturized; parade ground polish in real life becomes merely semigloss in miniature, while the leather gear of troops in the field is rarely polished and has little or no shine.

You can achieve this subtle sheen by mixing glossy and matte paints together, or applying gloss or semigloss varnish over the matte colors. Polly S makes an excellent water-base gloss finish that won't disturb colors underneath it. One coat gives a soft, almost imperceptible sheen, while additional coats gradually build up to a high gloss. The precise control offered by this Polly S technique is well worth the little extra time it takes.

Some shading is still required for leather work; don't rely on the varnish to do all the work. In fact, leather work generally looks better if the highlights are exaggerated, with a painted shine backing up the real one imparted by the varnish, fig. 5-5.

In addition, I like to add a transition shade of brown between the black shadow and the gray highlight. Black boots are really a dark brown to begin with; the intermediate brown keeps the boots and belts from looking gray,

Highlighting black boots

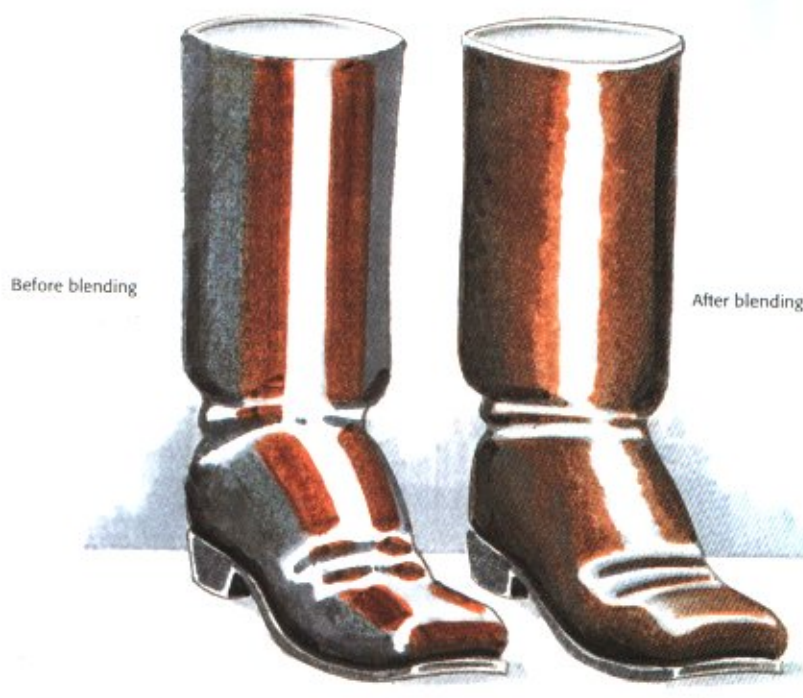


Fig. 5-5. The trick to painting black leather is to add a transitional brown between the black and the gray highlight. Blend until it is not immediately evident but still visible if you look for it.

and gives a richer, deeper coloring to the leather. Lay a line of burnt sienna between the gray highlight and black shadow. Blend across this area until the brown almost but not completely disappears.

MATTE VARNISH

After all the details are painted but before adding the metallics (or for that

matter the gloss to the leather), give the figure a coat of matte varnish. This kills any accidental glossy spots and evens out the surface finish.

Matte varnishes make the figure painter's life easier, but they can be tricky. There are many brands, but the manufacturers keep tinkering with the formulas and a brand that yielded a dead flat finish five years



Fig. 5-6. There are a lot of clear varnishes to choose from. I prefer a water-base acrylic gloss such as Polly S or Pactra. By thinning it out, the first coat gives a soft sheen, and by adding coats, I can build the gloss to the desired level. An overall coat of matte varnish on the figure covers any glossy spots in the oil color and evens out the overall matte finish. Apply it before doing the gloss and metallics. Matte varnishes are not always reliable, so always test it on scrap before applying it to the figure.



Fig. 5-7. Metallic paints come either pre-mixed or as separate liquid and powder. I prefer the separate, but you can use the pre-mixed just by keeping the powder at the bottom of the jar. Never mix it: just scoop out a bit of pigment from the bottom onto your palette, and add liquid until the consistency is right.



Figs. 5-8 and 5-9. Large metallic surfaces will have to be shaded. You can shade and blend the metallic paints themselves (as was done on this Historex figure of General Nansouty), but the glazing technique described in the text yields better results with fewer headaches.

ago may not work as well now. Over the years I've used Micro-flat, Final Finish, and Testor's Dullcoat with good results (the latter is handy because it is available in an aerosol can). For best results they should be sprayed on, because brushing can result in an uneven finish. In addition, matte varnishes tend to be temperamental, reacting unpredictably to age, temperature, and humidity. The golden rule of matte varnishes is this: never apply it to the model without testing it on a glossy surface.

Even with these precautions, you may occasionally have trouble. Sometimes the problem occurs when you don't let the oils dry thoroughly before you apply the varnish; other times the only explanation seems to be the phase of the moon that night. In any case, if your matte varnish dries glossy, all is not lost; let it dry overnight and brush over it the next day with a good water-based matte

varnish (such as Polly S). This acts as a barrier that seals off whatever was causing the problem, and a second spraying usually turns out dead flat.

METALLIC COLORS

Buttons, buckles, and metal fittings are the touches that add the final sparkle to your work, and there are a few things you should know about metallics. Metallic paints are nothing more than fine metallic powder suspended in a clear varnish. The finer the powder, the smoother the finish, and the better suited it is to model work.

There is one cardinal rule in working with bottled metallic paints: never stir the paint. To do so is to lose control of the consistency of the paint, which, as we all know by now, is fundamental to painting fine detail. Instead, transfer pigment from the bottom of the bottle to your palette,

and then add liquid or let it dry until the paint is the proper consistency. This will help you avoid the classic disaster of applying a neat drop of silver paint to a button only to have the paint suddenly run across the uniform.

Buttons and small badges present no problem, but you occasionally will run into metallic areas that require shading. Weapons are easy as long as the engraved detail is good and crisp — paint the metallic areas black and then dry-brush over them with gun-metal (a mixture of black and silver) and silver.

For large, smooth areas where this is not feasible, such as breastplates or helmets, shade and blend the metallics the same way you would for the uniform. Add black to your silver or brown to your gold for the shadow color, and use the straight metallic for the highlights. Lay in the colors on the figure and blend as usual. The slightly



Fig. 5-10. Gold braid is woven of fine gold wire, which breaks up the reflection, so that it is not as shiny as polished metal. To achieve this effect, paint the braid in golden or silver tones with your oils, and when it is dry give it a thin glaze with just a tiny amount of metallic powder, this will make it sparkle, but not as brightly as the buttons. Roy Andersen shows how well this technique can work with his 54mm Historex figure of Marshal Murat.

different characteristics of the metallics may cause you some initial difficulty, but you'll get used to them quickly, figs. 5-8 and 5-9.

Another method for subtle shading of large areas is to paint the area with a smooth, even coat of metallic, followed by a coat of Polly S gloss when it is dry. You can then add the shadows with a transparent layer of oil color straight from the tube (black for silver, burnt sienna for gold), carefully feathering the shadows out across the surface. The Polly S acts as a barrier coat, so you can blend the oils without disturbing the metallic paint underneath.

SHADING GOLD BRAID

Don't assume that everything on a uniform is bright silver and gold. Metallic braid and lace are woven from fine wire, which means they do not gleam and sparkle the same way as the buttons. On a hussar officer's jacket, for example, the bright rows of gilt buttons will stand out against the slightly duller gold frogging behind them (fig. 5-10). This duller tone can be achieved by mixing metallic pigment with your regular paint (enamel or oils) or by painting and shading the lace areas with the regular paint alone, and then applying a very thin wash of metallic paint across the sur-



Fig. 5-11. Another example of fine gold work, this time a 90mm Mike French figure of Colonel Douglas of the 11th Hussars by Bill Horan. Notice how the different patterns woven into the lace and braid catch the light.

face. The result is a dull gold or silver with metallic highlights that sparkle as the figure is rotated in the light.

CLEANING YOUR BRUSHES AFTER METALLICS

Finally, don't let metallic colors pollute the other colors on your palette. Even the smallest amount of metallic powder can cause serious problems if not caught in time. Never use thinner that has been used for metallics with any other paint, and clean your brushes especially carefully when you are finished. Many painters keep a separate set of brushes for metallics.

BASES AND GROUNDWORK

I find it strange that modelers who cheerfully spend hours painting a figure often seem reluctant to spend more than a few minutes on the base and groundwork that support it. Yet neither of these two elements requires a great deal of time or skill — all you need is an awareness of their importance and a few basic techniques.

The first important element is the base itself, since it forms the “frame” around your figure. Just as you would not put a Rembrandt in a dime-store frame, neither should you put your own masterpiece on a bit of scrap lumber. Good-quality wood bases are not

expensive, and the extra cost is well worth the money. Walnut has long been a traditional choice for figure bases, but there is nothing wrong with cherry, oak, or mahogany. If you cut your own, make sure it is square and sand it smooth.

The size of your base is largely a matter of taste. A good rule of thumb is 1½” to 2” square for 54mm figures and 2” to 3” for 90s. The height is also a matter of taste, but bear in mind that an important and often overlooked function of the base is to serve as a convenient and safe handle for picking up the finished piece. Low

bases are harder to hold and you may accidentally drop the figure. On the other hand, it's a bit pompous to mount a tiny figure on a newel post. In short, a little common sense and a modicum of good taste will go a long way.

If the base is unfinished, give it two or three coats of varnish before mounting the figure on it. Staining is rarely necessary, but sand the surface smooth between coats.

While the figure is still on the painting base, rotate it slowly and decide which viewing angle is best. If your figure is already attached to a

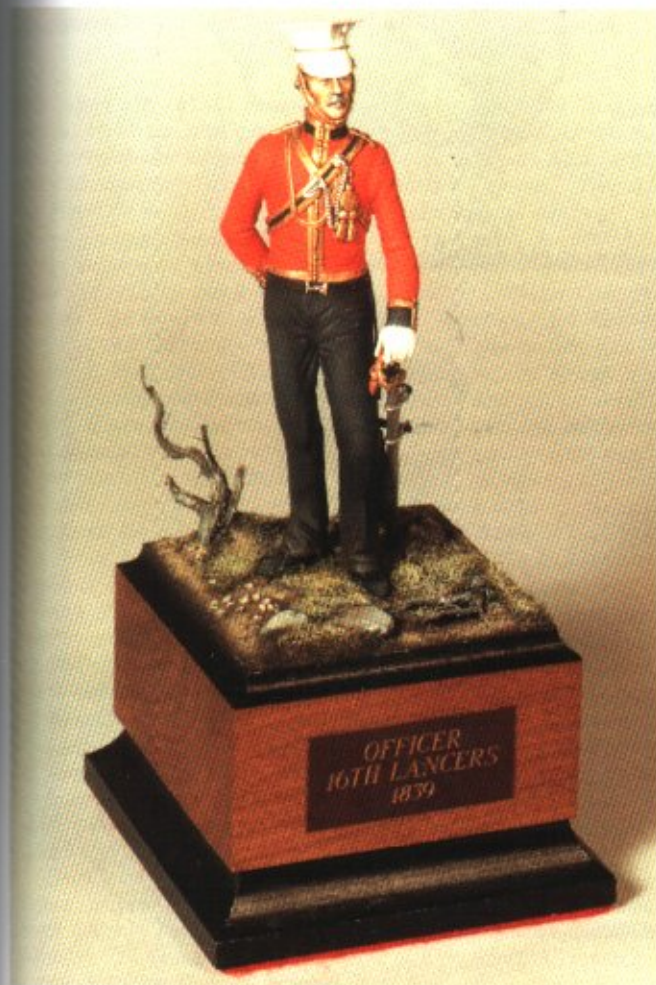


Fig. 6-1. The base is the frame for your “picture.” Jim Holt is a first-rate painter, and takes care to set his work off nicely with a neatly finished wooden block.



Fig. 6-2. Before drilling the holes to mount your figure on the base, take a moment to choose the best viewing angle (another 90mm scratchbuilt figure by Jim Holt).



Fig. 6-3. Avoid commercially packaged ground materials. The most realistic ground texture comes from sand scooped up from the gutter in front of your house. You can use a variety of materials for groundwork. I use these because they are convenient and nearly foolproof. The Celluclay needs white glue mixed with it to keep it from curling at the edges as it dries. From the lower left: unraveled hemp rope, static grass, an assortment of dried plants from the florist, sharp-edged stones, a piece of root, gutter gravel, baking soda and tiny glass beads for snow.

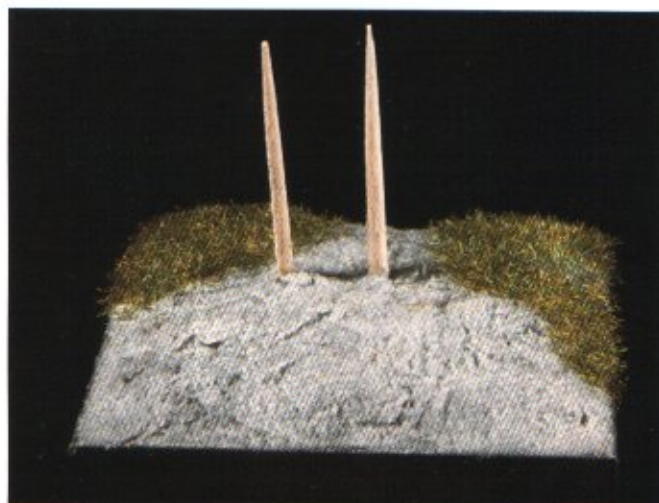


Fig. 6-4. When you apply the celluclay (or other basic ground material) carefully smooth the edges so it will appear the ground continues beyond the base. Otherwise, it will appear that your figure is standing on a cookie. Note the toothpicks marking the mounting holes for the figure.

metal base, you'll have to glue it to the display base and work the groundwork around the figure's feet, fig. 6-2. If the feet are pinned, the job is easier. Remove the figure from the painting base, position it over the display base (wrap the figure in tissue so that oils from your fingers don't spoil the flat finish), and mark the pin locations for the feet. Drill the holes larger than necessary ($3/16$ " for $1/8$ " pins, for example) so there will be room for the glue. Then set the figure aside and start the groundwork.

BASIC GROUNDWORK

There are many suitable choices for groundwork material. My own preference is Celluclay, a dry, commercial papier-mâché material that is easy to work with and has a realistic texture. DAS Pronto is similar in color and consistency and comes in moist, ready-to-use form. Some other suitable materials include acrylic spackling compound (often called Polyfilla), artist's acrylic modeling paste, and Durham's Water Putty, fig. 6-3. I don't recommend plaster of any kind because it tends to set too quickly, lacks realistic texture, and tends to chip and crack too easily.

Mix your ground material according to the instructions but don't mix more than you need. Add a generous dollop of white glue (Elmer's) to the mixture to keep the edges from curling up from the base as it dries. Adhesion also is improved if you score and roughen the surface of the wood with a knife or screwdriver. Insert toothpicks into the holes in the base so you can find them again after you've applied the groundwork.

Using a small screwdriver or simi-

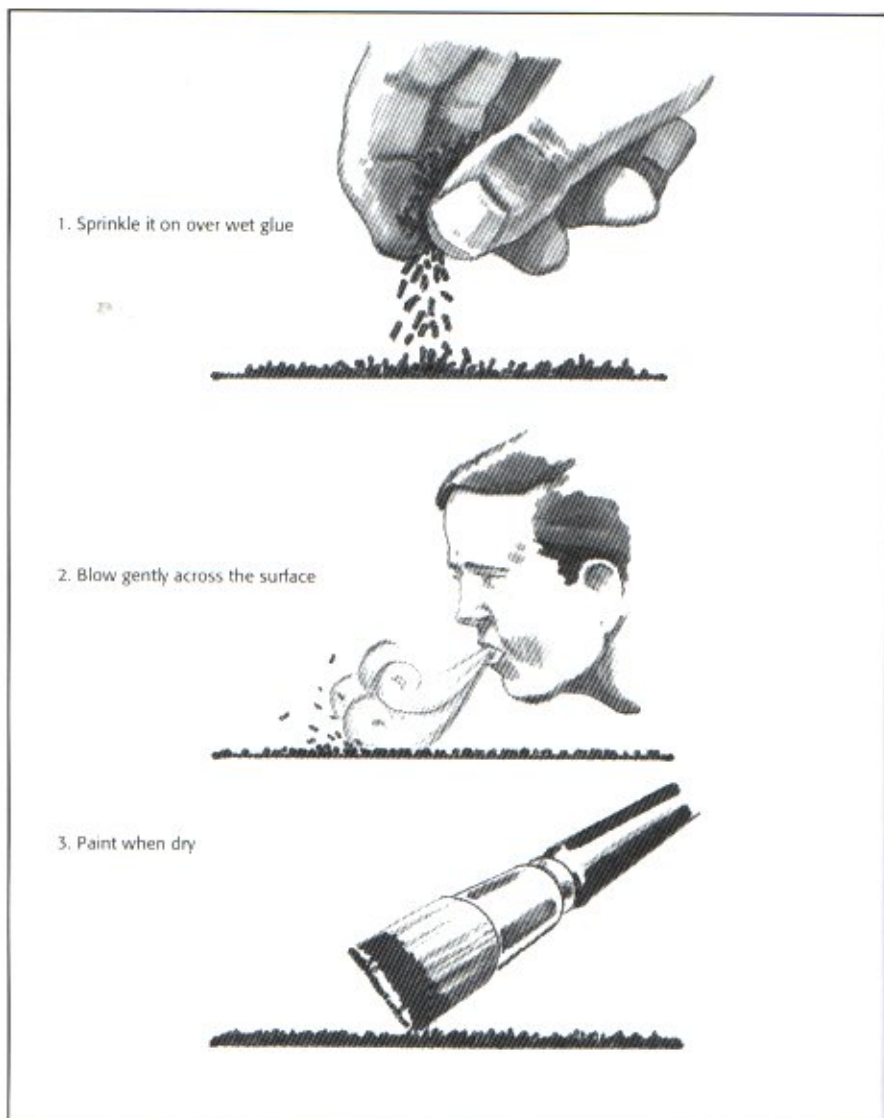


Fig. 6-5. Static grass is wonderful stuff: just drop it onto the wet Celluclay and blow gently across the surface. The excess disappears, and the grass that remains stands upright.



Fig. 6-6. Small twigs and shrubs can add a nice accent to your groundwork, but don't overdo it. Avoid commercial lichen or shredded foam, which may work well for HO model railroads but is unconvincing in larger scales.

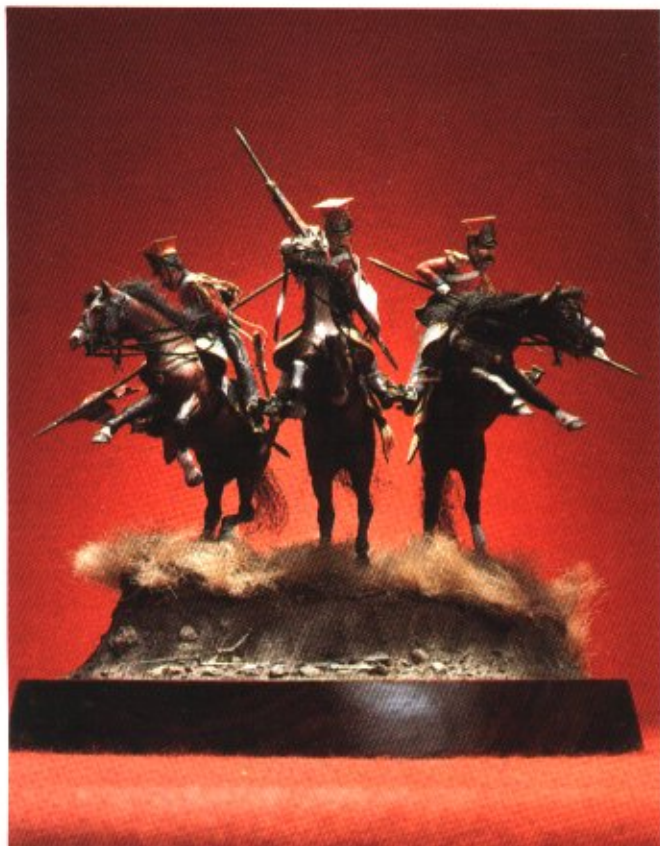


Fig. 6-7. For dramatic effect, I mounted this Historex vignette of rearing Dutch Lancers of the Guard at the edge of a dry gully. The additional height really sets off figure groupings like this one.

Lane Stewart

lar spatula, slather the material across the base and carefully smooth it out toward the edges. Get the surface, and particularly the edges, as smooth as possible — a rough surface merely looks sloppy, not realistic, fig. 6-4. If your figure is already glued to the base, carefully work the groundwork around the figure's feet.

Add the texture while the groundwork is still wet. The grass goes on first; several commercial products simulate grass, including dyed sawdust and shredded foam rubber. While the foam products are adequate for smaller scales such as HO and 1/72, in larger scales they look like what they are — shredded rubber foam. The best product I have found is "static grass," a form of loose fiber flocking made for model railroads. Static grass consists of millions of little blades of grass, each about 1/16" to 1/8" long.

Brush white glue onto the areas you want to cover and then sprinkle on a generous amount of static grass. Gently blow off the excess; this action also will make the remaining fibers stand upright, fig. 6-5.

Don't cover the entire base with grass unless you want a manicured lawn. Apply the glue in a sort of haphazard "Y" shape, leaving three odd-sized patches of bare ground. Try not to make any two bases the same, and keep the pattern random and irregular.

Dyed sawdust, while inferior to sta-

tic grass, is acceptable. Buy the brown type of sawdust sold as "earth" rather than the phosphorescent green "grass." You are going to paint the stuff anyway, but if you accidentally miss a spot the brown will not be as obvious as the green.

With the grass in place, you're ready for the sand. Stay away from the sand, gravel, and earth sold in hobby shops because these materials are too uniform to be realistic. Unless you are modeling a crushed-gravel driveway, you need a natural assortment of sizes and shapes, fig. 6-6. Check the gutter in front of your house. Mother Nature has conveniently deposited there a bonanza of sand, pebbles, and tiny rocks that are perfectly suited for figure bases, and it's free for the taking. Take a few moments to find the best spot. Look for sharp, irregular pebbles as opposed to smooth, rounded ones, and include a variety of sizes, from small pebbles down to fine dust. Just scoop it up with a dustpan and brush, ignore the skeptical looks of your neighbors, and store it in an old cigar box.

Shake the cigar box briefly from side to side to separate the sizes. Start by laying in the larger rocks, and gradually work your way down to the fine sand. Pay attention to the topography of the area in which your scene is set; rocks vary in size, shape and number from one part of the country to the next. Be wary of using large

rocks, and don't use too many small ones. In any case, be sure to push them down into the ground so they look like they've been revealed by erosion, not dropped from helicopters. With the rocks in position, sift the sand into place and tamp it lightly into the surface with your fingers.

ADDITIONAL VEGETATION

Because you're working in such a small area, avoid the temptation to overdo things. One or two carefully positioned shrubs are more than enough, and even these often are unnecessary. Commercial products such as shredded foam and lichen can work well for small bushes, especially in combination with other more natural materials. Mother Nature has a convenient way of miniaturizing herself, and some of the best miniature foliage can be found in the dried flower section of your local florist. If you use commercial lichen, eliminate the unrealistic "sugarloaf" shape by shredding it into irregular shapes. Combine different textures and materials into realistic groups, and attach them with white glue.

The final step before setting the groundwork aside to dry (usually overnight), is to remove the toothpicks and carefully press the figure gently down into the groundwork. Just push down far enough to give an illusion of weight. Remove the figure immediately after.



Figs. 6-8 and 6-9. The easiest way to make snow is just to paint the Celluclay, as was done by Britain's Martin Livingstone for his Russian officer (left), or you can follow Bill Horan's example with his "Last Stand at Gandamak," which was sprinkled with baking soda, and, to give it a subtle sparkle, a final very light dusting of tiny glass beads.

PAINTING THE GROUNDWORK

Paint the groundwork when it's dry. A standard rule of thumb is to paint everything, even if it looks good unpainted; the figure is painted, so anything nearby that is unpainted looks out of place. Enamels or lacquer-based paints won't soften the glue or the groundwork. The sand is easily painted with a brush, but an airbrush is better for static grass. Start by brushing a quick coat of thinner across the entire surface. This breaks the surface tension and ensures that the paint will run into all the little nooks and crannies in the ground cover. Mix a dark brown about the color of polished walnut, keeping the color slightly green. Avoid reddish browns unless red clay is a distinctive terrain feature, because the unusual color will attract attention. Apply a medium dusty tan for desert terrain. After you've applied the earth color, and while it is still wet, mix a dark green and paint the grassy areas. Don't worry if the green and brown blend together a bit where they meet: This is desirable.

HIGHLIGHTING THE GROUND TEXTURE

When the first coat of color has dried, preferably overnight, you're ready to highlight the ground texture. Highlighting is accomplished by a

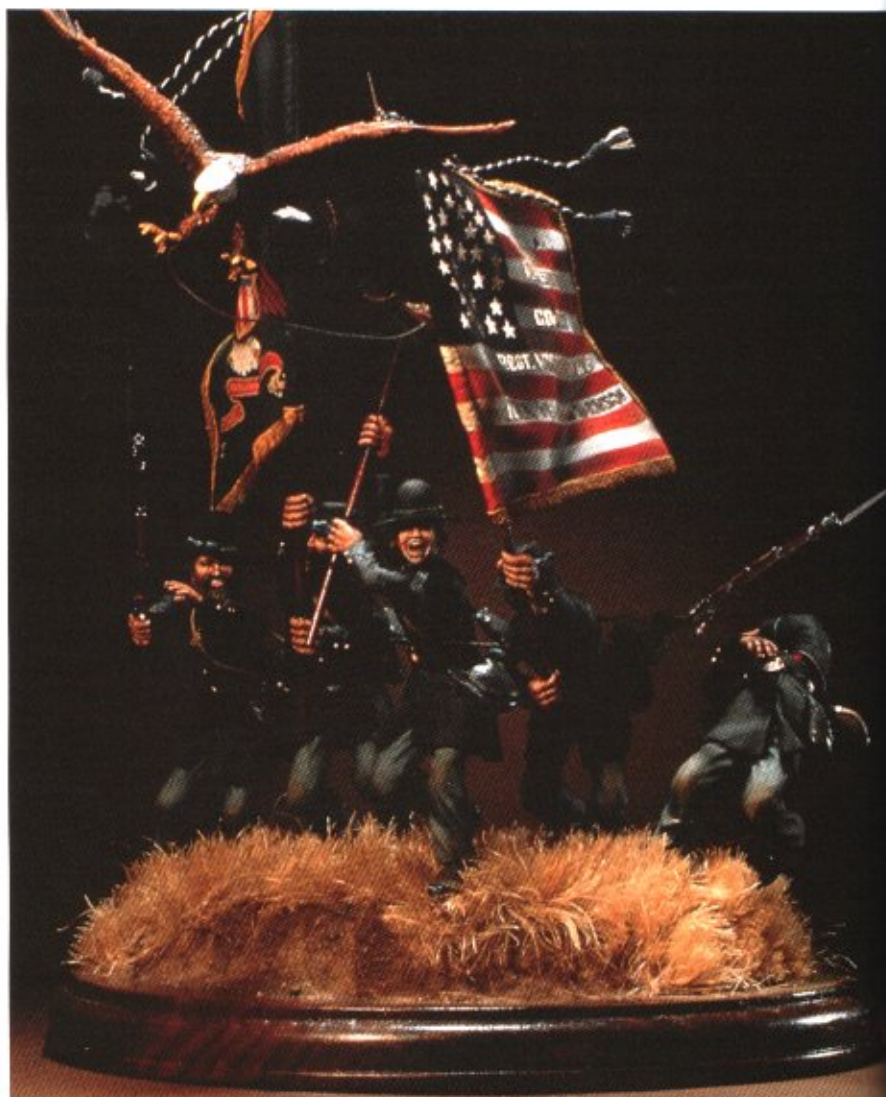


Fig. 6-10. Tall grass can be made with unraveled hemp rope for larger figures, and theatrical crepe hair for smaller ones.

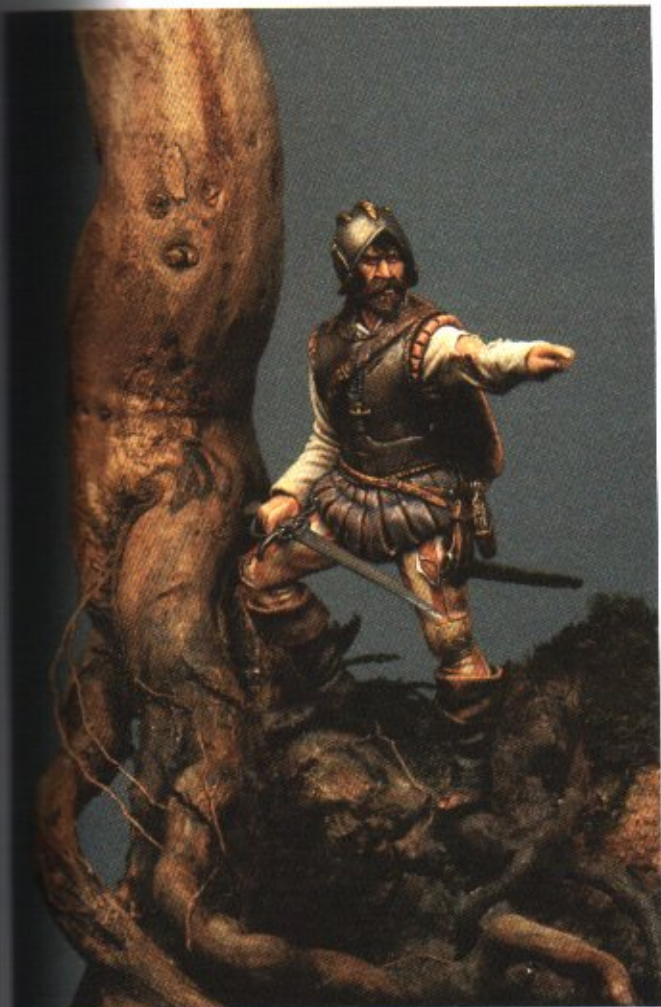


Fig. 6-11. Trees are easy, so long as you don't put leaves on them. This one is a root, unmodified and unpainted, except for a bit of dry-brushed color to make the trunk blend in with the groundwork. This conquistador is surrounded by a fine example of groundwork by the undisputed master of that particular art, Brian Stewart.

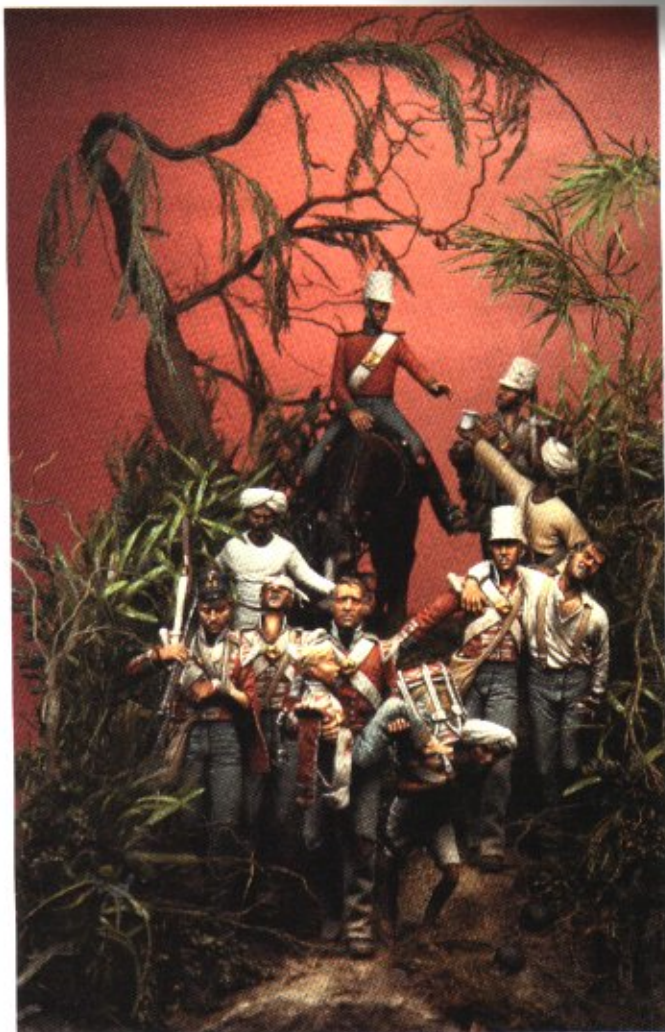


Fig. 6-12. Trees with foliage are a lot of work, since each leaf must be modeled separately. A tree will generally take as long to make as a figure of the same height. Bill Horan modified aquarium plants (among other things) for his "Return from Chillianwallah."

technique called "dry-brushing." The best brush for dry-brushing is a $\frac{1}{2}$ "-wide, white-bristle, artist's oil-painting brush. You can use red sable brushes, but they're more expensive and get worn down quickly by the rough ground texture. Mix a color distinctly lighter than the base color you applied before, and dip only the tip of the brush into it. Stroke the brush back and forth a few times on a scrap of paper towel to remove most of the paint, and then whisk it lightly across the surface of the ground, just touching the raised surfaces. There should be just enough paint on the brush to deposit color on the raised surfaces; no paint should run into the recesses. It may take several passes to deposit enough color, and you may have to use a scrubbing motion.

Mix a still lighter shade of the same color and repeat the process, brushing more gently to hit only the higher spots. Repeat with a lighter color if necessary.

The net effect of dry-brushing will be a light color on the higher surfaces, darker shades in the recesses. This gives your ground a three-dimensional quality. The highlight color needn't be derived from the base color, but it's usually easier that way. To lighten earth colors, add white but work toward tan rather than gray. If the color wanders toward gray, add tan. If necessary, start over with a fresh batch of color.

Dry-brush the grassy areas just as you did the earth, using yellowish green instead of tan. You want a lot of contrast, so don't hesitate to use almost a straight yellow. Dry-brush a little of your earth color onto the fringes of the grassy areas so your greens and browns fade into each other, leaving no distinct edge. This provides a subtle natural effect.

SPECIAL TERRAIN

The basic techniques we have covered so far are fine for level ground,

but what if you want something more dramatic? Provided it is no deeper than the thickness of your base, irregularity of ground contour presents no serious problems — simply cut away enough of your base to accommodate it. Use a saw, power drill, or hammer and wood chisel with a bit of muscle. You're going to cover these cuts with groundwork anyway, so you don't need to be neat.

Dry wash. A useful terrain feature created by this method is a dry wash. These are small gullies, created where rain water has washed away the earth because there is no vegetation to prevent erosion. A dry wash is usually a shallow depression, often quite wide, with small "cliffs" at the side (fig. 6-7). These "cliffs" allow us to place our figure on a dramatic rise of ground, and accomplish this on a small base. Small rises can be made with Cellucay alone, but it's usually best to build up underneath with a small block of wood

or styrofoam. Make the "cliff" area with Celluclay, and carry the grass across to the edge.

Rocky, mountainous terrain can be made in a number of ways. Certain types of rock (lumps of coal are ideal) make wonderful stratified rock, but pinning your figure into them can present problems. Durham's Water Putty (sold in hardware stores for patching plaster) can be carved when wet into realistic rock formations, too. Model railroaders have found ingenious ways to build large rock faces. Bill McClanahan's *SCENERY FOR MODEL RAILROADS* (Kalmbach) describes these methods, and includes other useful information on ground-work techniques.

Snow. Snow has a powdery surface that plaster alone fails to duplicate. One traditional method for simulating snow is to sprinkle the surface of wet plaster (or Durham's Water Putty, which has better adhesive qualities) with dry plaster or flour. Flour yellows with age; the dry plaster method works fairly well, although it can look lumpy. Marble dust, if you can find it, works best. As usual the best results often come from the simplest techniques, and simply smoothing out the Celluclay and painting it white is surprisingly effective. Small patches of sand sprinkled into the depressions and painted muddy brown simulate bare spots in the snow cover. Use the dry-brush technique to feather the border between the mud and the snow because a sharp edge there is not realistic.

Tall grass. Unraveled hemp rope makes excellent wild grass, particularly for larger scale figures. The best material I have found for smaller scales is crepe hair, used in the theater for false beards and moustaches. It comes in a braided rope and is available wherever theatrical makeup is sold. Several years ago I found a nice mousy blond color, ideally suited for grass. I've used it a lot, and still have more than half the rope left (fig. 6-10).

To straighten crepe hair and hemp rope, unravel a generous length, soak it in warm water, and stretch it out on the floor with a book or similar weight on each end to hold it taut until it dries. For short scrubby grass, you can use the rope without straightening it at all.

Tall grass can be installed when the groundwork is dry, but I prefer to work with it while the stuff is still wet. In either case, color the groundwork first. Otherwise there will be small patches of natural gray near the roots of your grass that are nearly impossible to cover with paint. Color wet Celluclay by adding a small amount of powdered cement coloring (available at your local hardware store). Add

powder to the Celluclay a little at a time until you achieve the desired color. The exact shade is not critical, since you will be painting over most of it anyway — the important thing is to eliminate the gray. A mixture of orange and green food coloring is an acceptable substitute for the dry pigment, but it may turn dark as the Celluclay dries. The final step before putting on the grass is to sprinkle sand on the earth surface.

I've never cared for the traditional method of installing tall grass, which is to drill a series of holes and to push the fiber into them. Unless a lot of holes are drilled, the effect is one of potted plants buried at irregular intervals.

Gluing the grass in place is easier and more effective. Spread a generous amount of white glue in irregular patches on the base. Using scissors, cut a tuft of hemp rope/crepe hair and press the end into the glue. Add more tufts until the patches of glue are covered. Try to keep your grass about the same overall length; you can go back after the glue has dried and trim it to irregular lengths with small scissors. While the glue is still wet, you may want to stir the grass strands with a pencil so they don't all appear to be growing in the same direction.

Trees. Single figures rarely call for trees, but even low bushes can present a problem. The difficulty with trees is that even in 54mm, the viewer can clearly make out individual leaves, and the traditional model railroad materials look too little like trees and too much like what they are — lichen and shredded foam.

Trunks and branches present no problem; small roots provide an excellent source for both. You can gather these anywhere the ground is soft. An afternoon spent with a small shovel and a shopping bag should provide enough roots to last a modeling career. Look for small shoots about 2 or 3 feet high. The quality of the roots will vary from one species to the next. Bushy roots are best, the more branches and little tendrils the better. Be careful not to damage the roots. Wash them off with a hose and let them dry thoroughly in the sun before storing them.

Foliage is the real problem with trees. Commercial lichen and shredded foam with fiber matting to hold it together can provide adequate but hardly spectacular foliage, and both must be used carefully. Hobby shop lichen is usually a dreadful color and must be dyed in a weak solution of orange or brown to tone down the green. Tear the lichen irregularly to break up its neat round shapes before gluing it to the branches. Foam is easier to work with, the colors are better, and you can pull and stretch the mat-



Fig. 6-13. A final and important touch is to visually anchor the figure to the base by carrying a bit of the ground color up onto his boots, as Jim Holt has done here. This can be done by dry-brushing or a light dusting with powdered pastel.

ting material into irregular and realistic shapes.

Florist's sheet moss is a better foliage material for larger scales. It, too, must be dyed, but its scraggly shape is suited for scrub and bushes.

Several companies offer flat sheets of photoetched brass leaves and branches. With work these can be made to look quite realistic, but even a small bush can take several hours. The branches must be turned to realistic angles, and each leaf must be carefully bent and twisted to give a rounded, realistic impression.

A simpler solution is to raid the kitchen spice rack and glue small leaves or even seeds to a lichen base. When painted, this can be effective even at close distances. In general, however, trees are rarely worth the trouble and should be avoided.

ATTACHING THE FIGURE

When the groundwork is completely painted, you're ready to glue the figure to the base. Five-minute epoxy is fine, and if your pins are long enough, the figure should be in no danger of ever coming loose. A good final touch is to mix a bit of the ground color and dry-brush dust onto the figure's boots. Powdered color also works well for this, but may come off on your fingers if you touch the figure. Carrying the ground color up onto the boots serves to visually tie the figure and base together, and adds a final note of realism to the finished figure.



Fig. 6-16. Two final examples from the hand of Brian Stewart, whose settings are so complete that they qualify as "single figure dioramas."



(Left) Fig. 6-14. Don't put all your figures on flat bases. Occasionally angling the terrain, as Bill Horan has done with the soldiers fleeing across a hillside, can be very effective. (Above) Fig. 6-15. Adding a background is also effective. Jim Kostakes set off this figure of Sergeant Bourne of Rorke's Drift fame with a wall of mealie bags and a discarded Zulu headdress. Notice the beans spilling from the bag at lower right — definitely a neat touch!

PAINTING SPECIAL UNIFORMS, ACCESSORIES, AND NUDES

Each figure you paint offers its own challenge, but if you keep in mind the basic principles outlined in Chapter 3, most problems can be worked out simply by thinking them through before picking up the paintbrush. There are still, however, unusual situations that call for special techniques.

PAINTING SCOTTISH TARTANS

Highlanders with their colorful kilts always make dramatic figures, but many painters shy away from them because painting the tartan is intimidating. Painting so many straight lines requires a steady hand, but if you approach the matter systematically the job is easier than it appears.

People think of tartan as a pattern of squares, but it is actually intersecting lines, with the horizontal and vertical stripes the same. The official record of a Scottish "sett" is traditionally preserved on a stick, around which are wound yarns of various colors; a particular tartan may consist of so many yarns of green, then so many blue, then two yellow, etc. In the fabric, the same pattern is woven horizontally and vertically against itself, which interweaves the colors and produces further variations. For example, the yellow stripes of the Gordon Highlanders, fig. 7-2, are for most of their length interwoven with green or blue, shifting the tone to a yellowish green. Only when they cross another yellow stripe do they produce a small square of bright yellow. Study fig. 7-2 to see how this works.

On a kilt, there are generally one and a half to two repetitions of the full pattern between the knee and waist, depending on the height of the wearer. The pleats on the back of civilian kilts are arranged so the pattern continues across them; the military style is to compress the design, accordion style, so the brightest stripe is visible on the top of each pleat.

If you plan to paint more than the occasional Highlander, invest in a good book on Scottish tartans. A sam-

ple of tartan material is even better. When working on a new tartan, plan your work on paper first, drawing a



Fig. 7-1. Highland figures with their intricate tartans are among the most interesting and challenging to paint (a 54mm Black Watch officer in the Crimea by Bill Horan).



Gordon
(Gordon Highlanders)



Mackenzie
(Seaforth Highlanders, Highland LI)



Royal Stewart
(Pipers of Black Watch and Scots Guards)

1. Add green over blue background

2. Outline with wide black stripes

3. Detail with narrow black stripes



(Top) Fig. 7-2. Britain's regular Highland regiments wear only a handful of tartan patterns, most being variations on the Black Watch or "government" pattern. (Above) Fig. 7-4. Painting a Black Watch kilt step-by-step. Lay in three wide dark green stripes horizontally; use the same spacing to lay in the vertical stripes. Paint a lighter green square at each intersection. Edge the green stripes with medium black stripes. Add the final narrow black stripes; if these are not quite straight, don't worry, because they don't show up very well anyway.



Fig. 7-3. Here's the back of a military kilt showing the way a stripe appears on each pleat.



Fig. 7-5. Royal Stewart tartan is the hardest to paint because of its lighter color and closely parallel stripes, particularly on a 75mm figure like this Pipe Major of the Scots Guards by Pete Kailus.



Fig. 7-5. Trews, or tartan trousers, are more complicated than a kilt, but the method for painting them is the same (an officer of the 72nd Highlanders in the Indian Mutiny by Bill Horan).

separate sketch for each color. Fortunately, most military tartans are variations on the Black Watch ("government") tartan, fairly simple to paint. And because it is so dark, mistakes don't show as much, making it an ideal tartan to start with.

Painting tartans calls for a lot of overpainting but no blending, so enamels or water-based paints are preferable to oils. Pelikan Plaka flows easily, covers well, and the colors are especially rich. Before painting, make sure the surface of the kilt is smooth. Some figure makers engrave tartan lines into the figure. These grooves are seldom accurate enough to serve as a reliable painting guide; instead, they get in the way and throw the brush off track. Remove these maddening lines before starting to paint.

Painting a Black Watch pattern. The simplest and most common military tartan is Black Watch, which originated with the Royal Highland Regiment bearing that nickname. The first step in painting Black Watch tartan is to paint the "background" color, dark blue. Next come the wide, dark green stripes. Use a pencil to lightly mark in the location and width of each

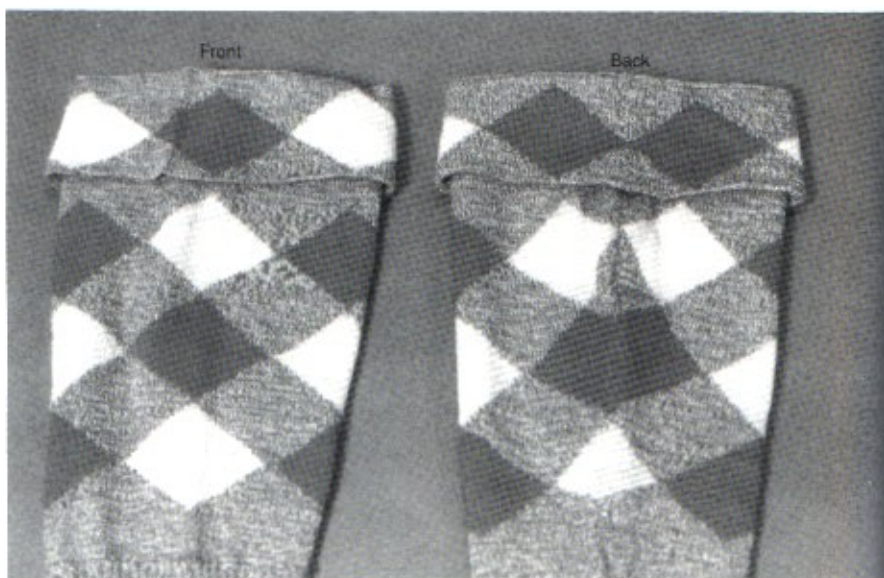


Fig. 7-7. Highland stockings are tailored so that the pattern matches up in back, as shown here. Paint the pink stripes first, starting at the top, and then add the red squares where the lines cross. Laying out the pattern with a red pencil often helps.

stripe. This first set of stripes establishes the scale of the pattern; remember that on kilts the pattern repeats

one and a half to two times between the knee and the waist.

Follow the example in fig. 7-4 for



(Above) Fig. 7-8. Camouflage uniforms, such as that worn by this 54mm SS trooper by Peter Jensen, are not as hard as they look. Paint the pattern in water base acrylics, then shade with glazes of artists oil or hobby enamels. (Right) Fig. 7-9. Flags are also a challenge, because of the precise designs. The best way is to paint them flat and then curl them, but with more complicated folds this is not always possible. Pete Kailus, who did this figure in that manner, is a master when it comes to painting flags.





Figs. 7-10 and 7-11. Knights are wonderful subjects because of their colorful heraldry, and Pete Kailus has made a specialty of these as well, in this case a delightful mounted knight and his



page, and a knight on foot with his helmet removed to show the padding worn underneath it.

spacing. Start just above the bottom edge of the kilt. Using the bottom edge as a guide, carefully lay in first the horizontal green stripes, then the vertical ones. Take particular care with these first stripes because they set the spacing for the rest of the pattern; double-check to make sure they are straight and square. Paint over and correct any errors before proceeding. The pleats at the back of the kilt are arranged with the vertical green stripe on each pleat, so the entire back of the kilt will be dark green.

Next, paint a square of noticeably lighter green where the green lines intersect; three wide horizontal stripes of this green will cross the pleats at the back. Now you are ready for the medium black stripes that border the green ones. Lay these in carefully, using the green stripes as a guide. Now start to work on the narrow black stripes. Good brushes are important at this stage; you needed a sharp point that will hold enough paint to draw an entire stripe in one pass. Some painters go so far as to make a special striping brush by shaving a large brush down to only three or four long hairs. Paint the black lines on the

front first, then work your way around to the back, where there will be a vertical black line on each pleat, with black "shadow" lines between the pleats. Work as carefully as you can, but don't worry if your lines waver; even the most skilled painter has to go back and touch up sometimes. Fortunately for the beginner, the dark shades of Black Watch tartan hide a lot of mistakes, and all but the most blatant errors will pass unnoticed.

Other tartan patterns. As mentioned, most other regimental tartans are variations on the "government" sett. The Gordon Highlanders wear the Black Watch tartan with a yellow stripe, visible on each pleat at the back; MacKenzie, used by the Seaforth Highlanders and Highland Light Infantry, adds a red and white stripe, with the vertical white stripe visible on the pleats. With both Gordon and MacKenzie, the effect is enhanced by keeping these "highlight" stripes dull, with bright highlights where they intersect.

Two other tartans are challenging. Cameron of Erracht, worn by the Cameron Highlanders, is a complicated sett of red, blue, black, and yellow

stripes on a dark green field. Although there are a lot of lines, except for the yellow overstripe the overall appearance is dark enough to hide a fair number of sins. The same cannot be said for Royal Stewart, worn by the pipers of many regiments. The background of this colorful tartan is red, with a complex overlay of white, yellow, pale blue, green, and black stripes (fig. 7-5). The contrast between the stripes and the background is sufficient that flaws are easily seen, and a pair of closely spaced parallel stripes will drive even the most experienced painter to distraction. Although these last stripes are close enough together that they can be combined into one on 54mm figures, they must be painted separately in larger scales.

Highland trews. Trousers of tartan material called "trews" were worn by a number of regiments. These are painted in much the same manner as the kilt. The scale of the pattern is the same, with one and a half to two repetitions between the waist and knee. Mark this part of the leg first, and lay out the rest of the pattern from there. There are vertical seams along the inside of the legs and the back and

front of the waist. The horizontal stripes should meet evenly at these seams, but the vertical pattern does not. This makes painting the vertical stripes easier; start the vertical pattern at the seam and work your way around the leg, letting the end of the pattern fall as it may when it returns to the inside of the the leg.

Highland stockings. Although the design varies slightly from one regiment to another, the traditional pattern for Scottish hose consists of a white background with pink diagonal stripes crossing to form red diamonds at the intersections. These are not woven in a tube like most socks, but have a seam running down the back, fig. 7-7. Lay out your pattern carefully with a pencil, starting at the front and wrapping around to the seam at the back. The stripes should be scaled and arranged so the diamonds meet at the seam. Paint the pink stripes first, then lay in the red diamonds at the intersections. A certain amount of touch-up will probably be necessary.

CAMOUFLAGE UNIFORMS

Painting and shading a camouflage pattern is like shading an irregular tartan.

Carefully paint the pattern onto the uniform with a water-base paint in the basic No. 3 colors. Check your references and follow the scale — camouflage patterns tend to grow when you paint them. Use thinned brown paint to glaze in the shadow areas, building up the color gradually and feathering the edges as you go. Finally, go in with some oil color and lay in highlights, again feathering the edges where necessary. Repeat these steps until the effect is as you want it.

It's a good idea to "weather" soldiers on campaign, but don't overdo it. Faded colors and a bit of dust here and there are enough. Fading is done by adding a bit of white to the uniform color. A dusty look can be achieved when the paint is still wet by painting a light tan over the appropriate places and blending it into the uniform underneath, or by applying a dusting of pastels over the dry surface as described in Chapter 6. And if you are doing a knight in combat armor, put a dent or two in it!

HERALDRY AND FLAGS

The pageantry of battle flags and coats of arms presents a tremendous challenge to the figure painter.

As with tartans, planning is the key. The time you invest in careful detailing is wasted if the design turns out crooked or off-center. Take careful measurements and establish the size and placement of each element of the design. Marking the outline of each element on the background color with

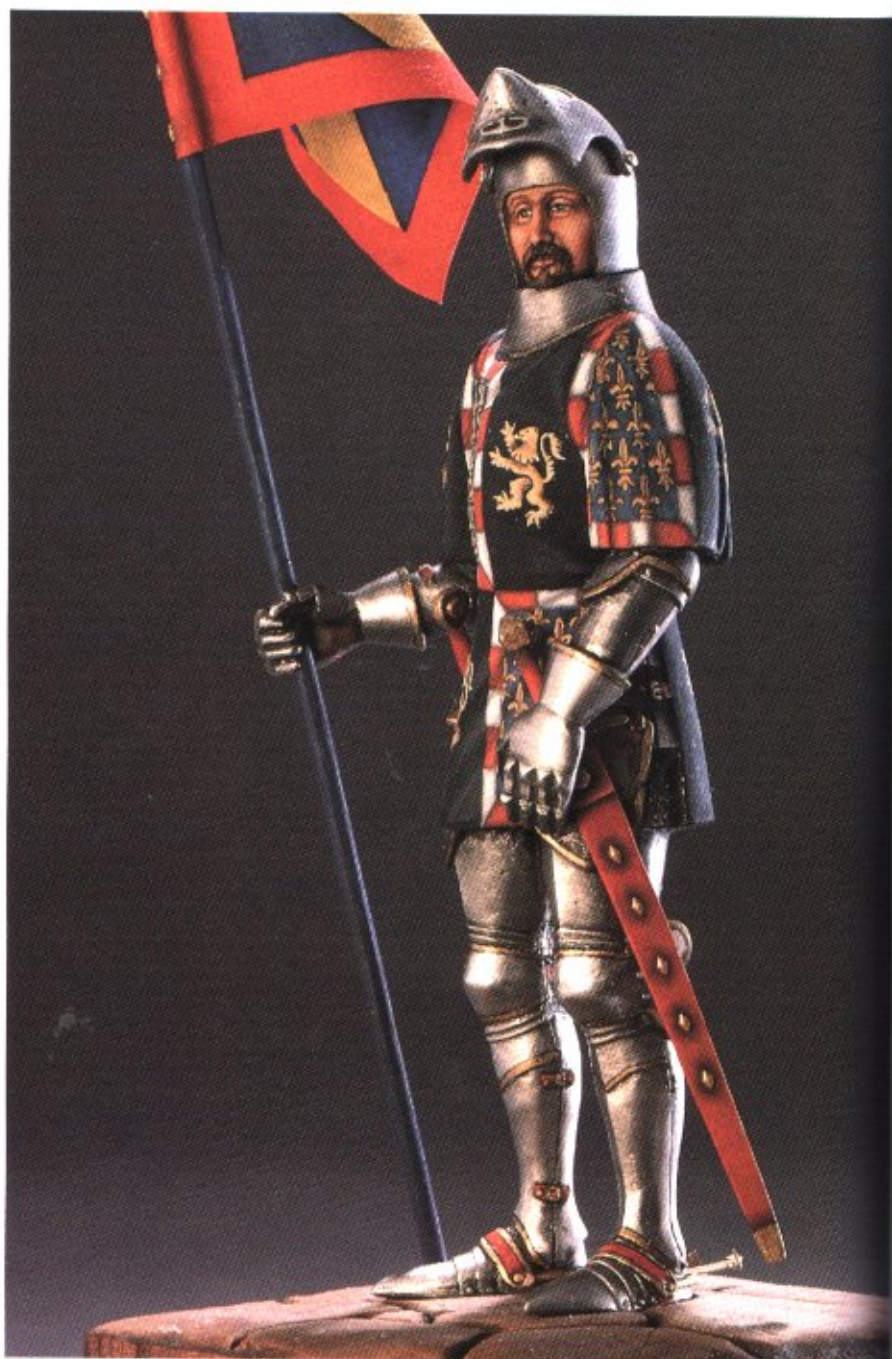


Fig. 7-12. To make the job of complex heraldry easier, Canadian Peter Twist, who has also made a specialty of knights, found a neat shortcut. To ensure accurate placement and proportions, he sometimes applies heraldic decals, and, once they are properly positioned, uses them as a guide in painting over them.

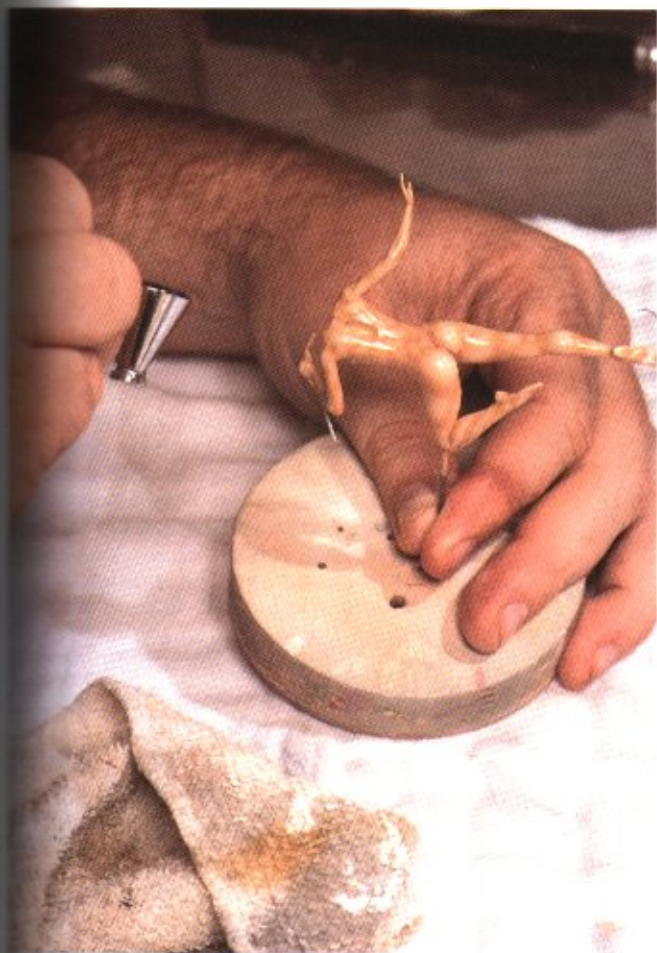
a pencil leaves you free to concentrate on detail without having to worry about the whole.

The paint is enamel or water-based, and as with the tartan, unless the engraved detail is well done you are better off working with a smooth surface. Use sandpaper and steel wool before you begin.

Freehand painting of heraldry and lettering on flags is clearly not for everybody. Fortunately there is a way to cheat. Many companies offer decals of heraldry and flags. While

these cannot be used effectively by themselves (decals invariably look like decals), they can be effective if you use them as guides and paint over them. Many of the best painters use this method. It is helpful with heraldic beasts such as lions and eagles, as well as stars and lettering on battle flags, fig. 7-12.

To make the flags, you can use silk or other fine fabric stiffened with white glue, or use the rolled epoxy putty method described in Chapter 12. The latter method is



Figs. 7-13 and 7-14. Mike McCowen paints his figures with an airbrush, feeling that is the only way he can get the smooth and subtle color transitions he needs. Results like this call for patience, practice, and an expensive turbine airbrush. Mike starts by under-painting in a basic flesh. Next, he uses a basic shadow color heav-

ily thinned and mists light shadows into place, passing over each area repeatedly, allowing the shadows to build up gradually. He then adds the highlights in the same manner. The figure is then given a coat of gloss varnish, and the final details are painted in with watercolors and topped with a final coat of matte varnish.

surprisingly effective, and allows you more freedom of drapery than the fabric technique.

PAINTING NUDES

Nude figures also require special painting techniques. Although the stop-sign rule applies as much to nudes as anything else, the shapes are more subtle and the blending requires a smoother, more delicate touch.

For this reason, artist's oils with their easy blending are an excellent choice. Another option is to use an airbrush. Although this technique takes practice, the results can be dazzling.

Someone once joked that he liked painting nudes because they required no research. Actually, the reverse is true. Any time you spend studying anatomy books will not be wasted, and a careful examination of paintings by the old masters can teach you much about coloring. In more rigorous times, students in life drawing classes would spend their first few months painting still-life studies of peaches and onions because the coloring of these objects

PAINTING FIGURES WITH AN AIRBRUSH

Modelers who have used an airbrush on other models often look at figures and wish they could get the same subtle shading on figures. You can, but good results call for patience, experience, and special equipment.

Don't expect adequate results with a standard single-action hobby brush, or even the more sophisticated double-action variety. For the tiny areas on figures, only a professional turbine action will do the job. These brushes are more temperamental than their rugged cousins. The paint must be thinner, and even the tiniest lump can cause a clog. The paint of choice is a fast-drying hobby enamel.

The first step is to paint the overall figure in the base color (No. 3). Then, using a thinned-out mixture of reddish brown (about 10 parts thinner to one part paint), work slowly, and allow the color to build up gradually on the figure. It is better to make a dozen passes with the airbrush and not have enough color on the figure than to make two and have too much. When you've finished the shadows, mix flesh (almost white) color, thin it out, and add the highlights.

The hair can also be airbrushed, but the eyes and other sharp-edged details will have to be painted in by hand. Mike McCowen, the acknowledged master of airbrushing figures, seals the airbrushed figure with a coat of gloss, and then adds the details with artist's watercolors. This way he can wipe off any mistakes and try again. A final coat of matte varnish seals the figure and keeps the watercolor from being wiped off, figs. 7-13 and 7-14.



Fig. 7-15. Armor can be painted and shaded (see the chapter on metallics), but it is a lot easier just to polish the metal, as was done on this superb 100mm mounted figure by Peter Twist.

was the same as the human figure. The peaches match the fleshy parts of the body where the blood flows freely beneath the surface, while the onion is similar to areas where the skin is stretched more tightly over the bone, with less blood passing underneath. If you'll examine the old masters' paintings, you can see how this theory was put into practice. The fleshy parts of the arm, for example, tend toward the peach, while the tighter skin across the elbow is more of an onion color.

Remember that even without exposure to the sun a woman's skin tends to be noticeably lighter than a man's.

PAINTING AND POLISHING ARMOR

There are two ways of treating large expanses of metal, such as a suit of armor or chain mail. The traditional method is to paint it.

Use the same painting techniques as for metallic detail, only on a larger scale. Lay in the highlights with pure metallic color, and the "low lights" a darker metallic color. Use a brush moistened in thinner to carefully feather the edge between the two, fig. 7-15. Blending broad metallic areas smoothly can be frustrating and calls for a skilled hand, but it can be done.

If the figure is a metal casting, an

easier and far more effective method is to simply polish the bare metal.

Polishing is done before any paint is applied to the figure, and can yield spectacular results. After removing the parting lines, rub down the armor with extra-fine steel wool. Watch for tiny bumps or flaws in the casting and take them down with a file or X-Acto knife (fig. 7-16). The steel wool gives the metal a smooth, soft shine that is often sufficient by itself, but for a mirror finish the surface must be burnished (figs 7-17).

You can buy metal burnishing tools in craft shops and art supply stores, but similar results can be achieved with just about any kind of smooth-pointed instrument. The best burnishers are bright polished steel, tapered like a pencil point, with the tip narrow enough to get into the smallest nooks and crannies but not sharp enough to scratch the surface of the casting. A small machinists scribe and a pointed sculpting tool are perfect for figure work. Use the smooth side of the tool to rub down the surface of the metal to a bright, shiny finish. Rub different directions to eliminate any sign of grain, and pay particular attention to the smaller areas. Little pressure is needed for the white metal, and one or two passes of the burnisher will give a mirror finish.

When the surface is polished to your satisfaction, spray it immediately with a quick-drying clear lacquer (such as Krylon) to preserve the shine. After the lacquer is thoroughly dry, add a wash of thinned black paint to darken the recesses. Use unthinned artist's oils for broad, flat areas, brushing it into the crevices and feathering the edge toward the areas you want to remain bright. Carefully wipe away any excess with a cotton swab and paintbrush. This method requires practice but can yield subtle shadings and color gradations.

ELECTROPLATING

This polishing technique can be extended to other metallic colors by electroplating. Although plating is not inexpensive, the results can be spectacular.

The equipment is simple enough — just a model railroad transformer, two wire leads with alligator clips, a hot plate, and a heat-resistant glass bowl (metal bowls short-circuit the electrical process). The expensive ingredient is the plating solution, available from a jewelry supply house. Two solutions, copper and gold, are sufficient for most modeling needs. The cost of the solution is determined by the metal, since the plating solution includes a significant amount of the metal being plated. Copper is cheap enough, but gold plating solution can run \$50-100 a quart,



Figs. 7-16 and 7-17. Start polishing with steel wool and fine emery paper. For the final shine you can use a paste metal polish like Flitz. You can also rub the metal smooth with a shiny metal tool. This is called burnishing and gives a mirror finish; it is particularly effective in hard to reach areas. Polished metal surfaces can be turned to brass, bronze, or copper by coating them with Gunze Sanyo transparent color. Orange is ideal for copper, yellow for brass, and a mixture of the two for bronze or gold.

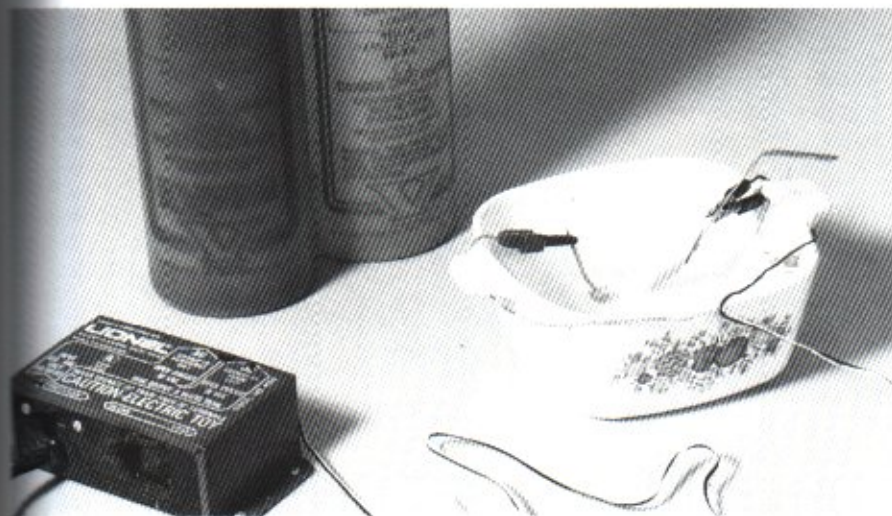


Fig. 7-18. Don't ignore the possibilities of home electroplating. Although you will have to get the plating solution from a jeweler's supply, the rest of the materials you probably already have: a hotplate or stove to heat the solution, a piece of gold or silver for the anode, and a model train transformer with wires running from the train's connections to two alligator clips. Heat the solution to about 120°. Clip the item to be plated to one wire and the anode to the other, turn the transformer on, and plunge the two pieces into the solution. If a color change is not immediately apparent on the target, the current is going the wrong way; flip the "train direction" switch on the transformer. Twenty seconds immersion is generally sufficient to color an object.

depending on the market price of gold. Brass is cheaper than gold but is generally not commercially available in small quantities. Gold does, however, offer other advantages: The color is noticeably richer than brass and it never tarnishes. You will also need an anode, a strip of the metal being plated. Again a gold anode costs about as much as a quart of solution. You can use stainless steel for an anode, but it will not replace the metal lost in plating, and the solution will wear out

more quickly.

Once you've cleared the financial hurdle, plating is simple. At 12 volts, the electrical current is low enough that you can't electrocute yourself. Even if you accidentally cause a short circuit by touching work and anode at once, you merely feel a slight tingling in your fingers, enough of a nuisance to make you let go, but not enough to cause pain or harm. The plating solution is a mild acid, so wear rubber gloves.

If the castings are freshly polished you can usually plate gold or silver directly on white metal. If the process fails to take, you will have to plate with copper as an intermediate step. The pieces to be plated must be polished to the desired finish, then washed in soapy water and rinsed thoroughly before plating. Warm the solution on the hot plate at low heat to about 120° (warm to the touch). Hook the wires to the "train" terminals of the transformer so you can adjust the amount of current with the throttle. Attach one of the wire leads to the anode, and the other to the work.

Test the circuit before using it on white metal. Clip a piece of brass to the "work" lead. Immerse both anode and work into the warm solution, being careful that they don't touch, and turn the current to full. Copper color should begin to appear on the piece almost immediately. If none has appeared in 15 seconds, turn off the current, reverse the "engine direction" switch on the transformer, and try again.

When the system successfully plates brass, you are ready to try it on white metal. To change the solution and anode to gold, twist a copper wire around the casting and clip the wire to the "work" lead. Immerse the anode and work into the solution, turn on the current, and swish it around for about 30 seconds. When sufficient color has been deposited or it appears that no further progress is being made, remove the plated piece and scrub it gently with baking soda to neutralize the acids in the plating solution. You may have to repeat this cleaning, plating, and neutralizing process several times before you see a clean gold coloring. This is important because any blemishes on the piece before it is plated will still be visible afterward. Plating hides no sins.

White metal is not a particularly good conductor of electricity, and your results will depend on the alloy used in the casting. Some white-metal alloys plate nicely, while others don't work at all, especially when plating with copper.

Water evaporates out of the solution every time you use it. You can replace it by adding distilled water from the supermarket. Don't use tap water; even a small amount will ruin the solution.

Gold and copper plated castings can be painted and shaded using the same methods as for polished white metal.

PAINTING HORSES

The horse has been a part of warfare almost from the beginning. The cavalier spirit that inspired awe and admiration in the foot soldier has the same fascination for the modeler, fig. 8-1. Sooner or later, almost every figure painter decides to test his or her skill on a mounted figure.

The cavalryman was traditionally taught that the horse was more important than the rider, and this maxim applies to the figure painter too, in that it is the painting of the horse, more than the rider, that determines the success of a mounted figure.

With horses, as with uniforms, it pays to conduct research. A good picture book on horses should be on every figure painter's bookshelf. Before starting to paint a mounted figure, study the pictures, noting the variety of colors and how they change on different parts of the animal, fig. 8-2. The best research, however, is to go out and watch horses. This is possible even in many cities, with mounted police and riding stables near parks, and you can develop a better feel for your subject in one afternoon around real horses that you can from months of looking at books.

Nearly every kind of horse has seen military service at one time or another. For centuries military horses were small. The ancients traditionally used smaller animals, and the long-haired ponies that carried the Mongols across the steppes were as small and wiry as their riders. In Europe, on the other hand, strong, powerful warhorses (the ancestors of today's Clydesdales and Percherons) were bred to carry heavily armored knights into battle. Large horses of this kind dominated European battlefields until the mid-18th century, when the Hungarian hussars on their swift light ponies swept across the plains of central Europe. By the end of the Napoleonic wars the traditional roles of light and heavy cavalry were firmly established, the light cavalry on smaller horses acting as scouts and skirmishers, while the heavy cavalry, big men on big horses, were used as shock troops on the battlefield. As the 19th century closed this distinction had largely disappeared, at least in practice, and all cavalry tended to be mounted on simi-



Fig. 8-1. Mounted figures have always been a favorite, partly because of the romance long associated with the cavalry, but also because of the color and drama of the horses themselves. This Segom 54mm figure of King Louis XIV of France was done by Roy Andersen.



Fig. 8-2. As with any other form of modeling, it pays to do your research. To paint horses well, you'll need a handful of books about horses and horse coloring.

Fig. 8-3A. Basic horse coloring

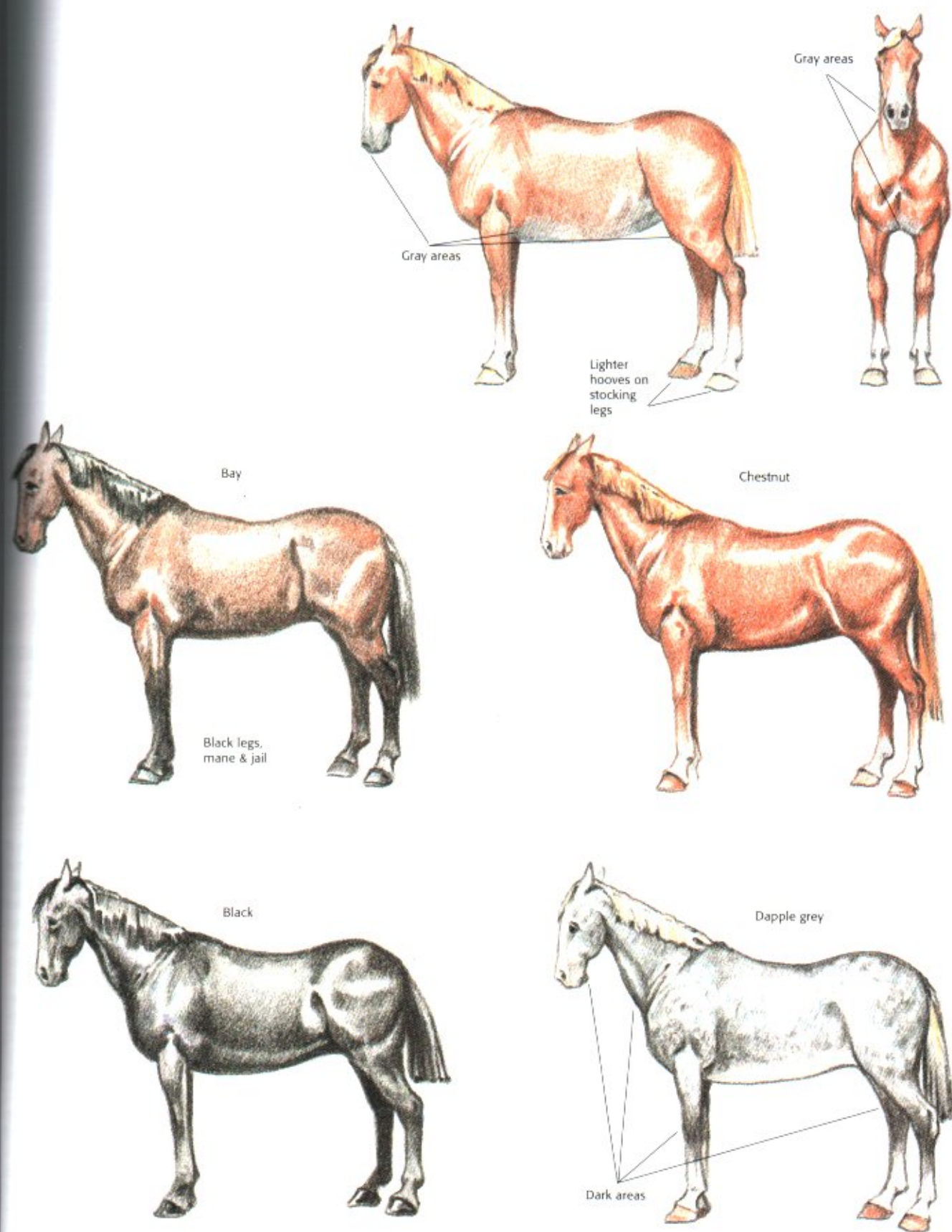
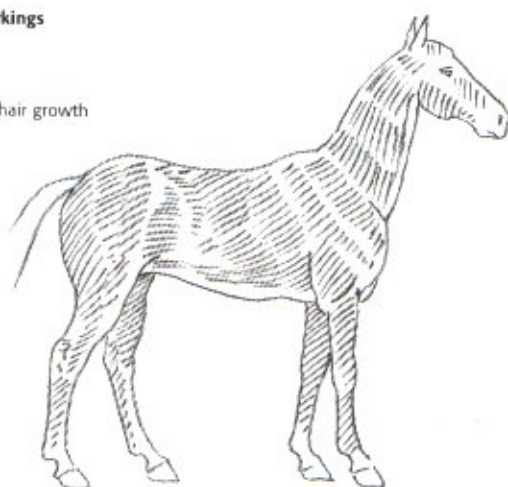


Fig. 8-3B. Basic horse markings

Direction of hair growth



Horse shoe



Hoof



Tuft



Bald



Blaze



Back view of hoof

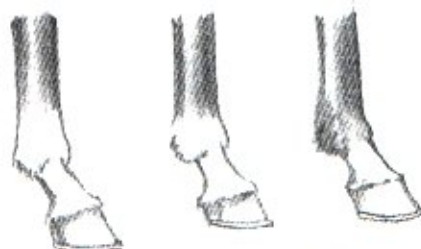
Star



Crescent



Socks and stockings



Dark stockings means a dark hoof



"Chestnut callous"



Dark areas on the leg





Fig. 8-4. If your figure is a personality, remember that his horse was a personality, too, and his color and markings are usually recorded somewhere. The charge of the Light Brigade was actually led by a spirited chestnut named Ronald; Lord Cardigan went along for the ride.



Fig. 8-5. Exaggerating the highlight on the horse's rump and flank gives the animal's coat a shine. A beautifully animated horse and rider by Bill Horan.

lar horses, regardless of designation.

COLORING OF HORSES

Breeders and artists have devoted lifetimes to the study of horses and their coloring, and interested modelers will undoubtedly want to explore the subject more deeply than we can here. I'll provide an introduction to the subject, giving you enough information to prevent embarrassing mistakes.

Let's divide horses into four groups by coloring: chestnuts, bays, blacks, and greys (the English spelling, "grey," is traditionally used for horses), fig. 8-3A. These are not necessarily the classifications a breeder would use, but they are effective for our purposes. Cavalry officers have long debated which types and colors of horses were best suited for service in the field, and different theories have prevailed in different countries and different periods, so check on the type of horses used by the unit you are portraying. For uniform appearance on parade, if no other reason, it has long been common practice to equip all riders in a given unit with horses of the same color. The French Carabiniers of the Napoleonic period rode blacks, a practice which continues in the British Household Cavalry to this day. In Custer's 7th cavalry each troop rode a different color; "I" troop, for example, rode greys.

The most common color for the military horse was chestnut. Chestnuts are some shade of brown, varying from golden yellow through myriad shades of russet to almost black. The coat is essentially uniform in color, although the manes and tails are often lighter or darker. The underlying pinkish gray skin can be seen in the sparse hair areas between the hind legs and around the eyes and muzzle.

Bays are similar in coloring to the chestnuts, but are distinguished by black manes, tails, and lower legs. The skin color is noticeably darker than the chestnuts, tending toward a pinkish charcoal. Black horses are simply dark bays; there is no such thing as a pure black horse.

Similarly, white horses are actually pale greys; the only pure white horse is an albino, a physical anomaly not likely to see military service. Greys vary considerably in color, from almost black to almost white; they are normally born dark, and grow progressively lighter with age. The face, neck, shoulders, knees, and hindquarters tend to be darker than the rest of the coat. Greys were the traditional mounts for trumpeters (so they would stand out against the troops, making them easier for officers to spot in the confusion of battle), but were occasionally used as troop horses as well. In Britain, the famous Royal Scots Greys

took their name from their mounts, while German light cavalry regiments often preferred greys. Purebred grey Arabians were prized by senior officers of hussars during the Napoleonic wars.

Most horses have white markings, although these vary in placement and shape. The face is often marked with a "blaze," a roughly symmetrical patch of white in the center of the forehead, varying from a small tuft between the eyes to a long white streak running from the top of the head to the nose. A "bald" face has the entire lower portion of the face white. See fig. 8-3B for examples. There are often, but not always, white markings or "stockings" on the lower legs. These markings can appear on one, two, three, or all four legs, and run the gamut from a small white crescent above the hoof to an extended patch of white climbing almost to the knee.

The hooves follow the color of the lower leg, dark ochre for chestnuts, charcoal for bays, and tan for legs with white stockings. Some Victorian horse buyers believed that lighter hooves were more prone to split and they refused to accept mounts with stockings, but contemporary illustrations show that stockings were common in military horses.

If you are painting a personality

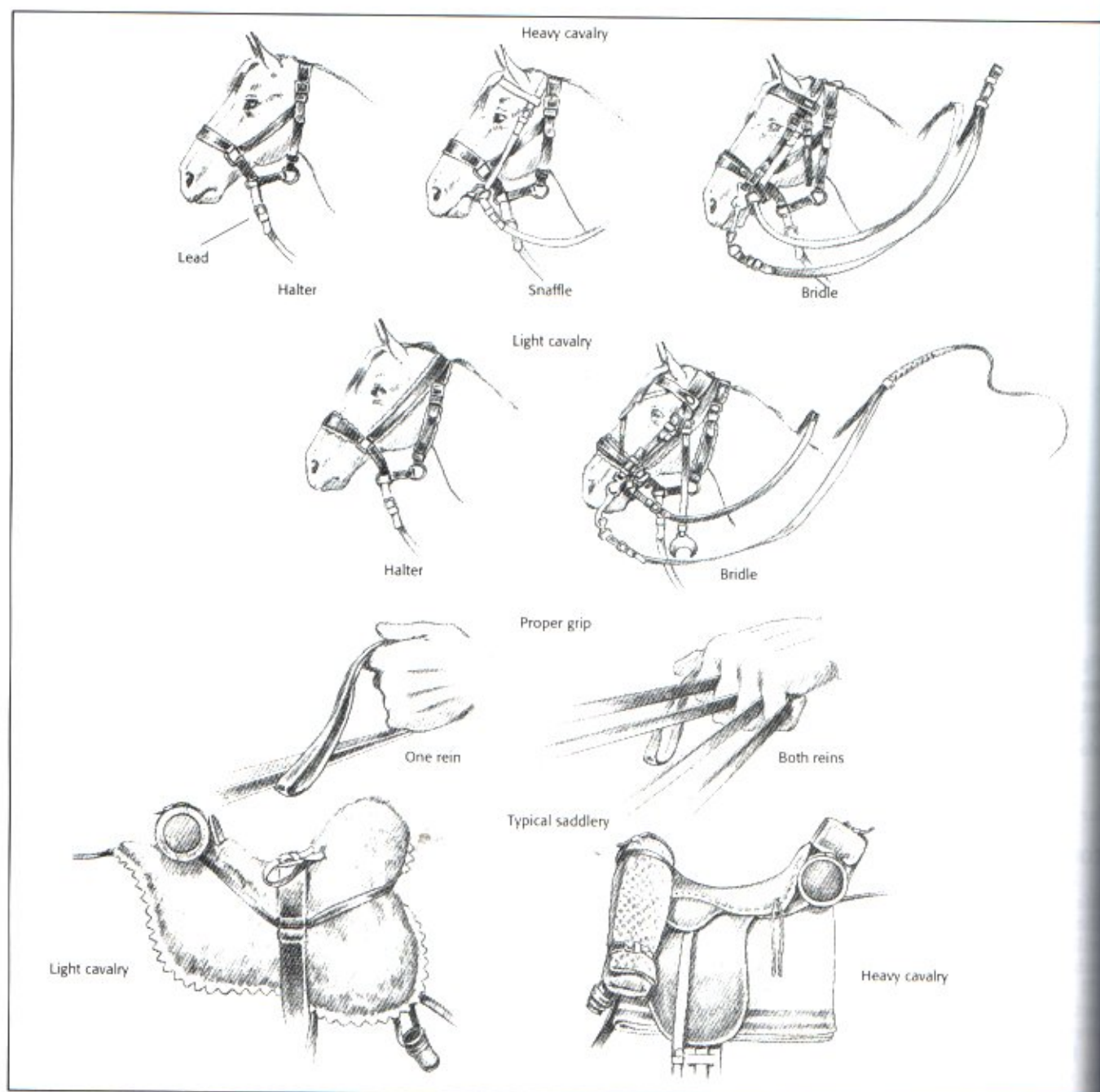


Fig. 8-6. Bridles and bits used by cavalry during the Napoleonic wars. Horse harnesses worn in other periods varied slightly. Do your research to find out where the differences lie.

figure, try to find a reliable picture of that officer mounted, since the horse is as much a portrait as the rider. Napoleon, for example, is usually depicted on a pale grey Arabian such as Vizir or Marengo, but he kept a string of 30 horses in the field and rode mounts of different colors at different times. Copenhagen, who carried the Duke of Wellington at Waterloo, was a reddish-brown chestnut with no stockings. Fifty years later, Lord Cardigan led the Light Brigade down the valley of death on Ronald, a chestnut similar to Copenhagen, but with stockings on

both on side hooves ("on side" means the horse's right side, from which the rider mounts; the "off side" is the left). The 7th Cavalry's famous survivor, Comanche, was a modest brown bay with white crescents on the fore on side and hind off side hooves.

PAINTING CHESTNUTS

Let's start by painting the most common and simplest military horse, the chestnut. Horses can be painted with any paint, but the texture, flexibility, and subtle blending of artist's oils really come into their own. Some

painters like to use an airbrush for larger scales, and the results can be impressive, particularly if you under-paint the horse's coat with oils to give it a realistic hairy texture.

Much of the beauty of a horse's coat comes from its distinctive sheen, particularly apparent with the darker colors. This is nearly impossible to duplicate with varnishes, because even semigloss varnishes just tend to look wet. Paint an impression of the sheen, exaggerating the highlights beyond what would be expected for normal light and shadow.

Assemble the horse before painting.

and fill and smooth all of the seams. This can usually be done with five-minute epoxy smoothed with the finger, but some kits fit better than others; use plastic body filler or epoxy putty if necessary. The saddle and saddlecloth can be installed or left off, whichever is easier. Prime and underpaint in the usual manner.

A typical palette for painting horses includes burnt sienna, gold ochre, raw amber, black, and white. I usually paint a quarter of the horse at a time, laying in the colors and blending completely before moving to the next section. The principles of blending and shading are the same as for the figure; only the degree of contrast is increased. Using the color chart provided in fig. 8-3A, lay in your colors next to each other, following the muscle structure and overall shape of the horse. Remember that you are painting not only the usual highlights and shadows (according to the stop-sign rule), but also the reflective highlights on the coat. The highlights will be



Fig. 8-7. Horses' eyes are generally dark brown, with almost no white showing. The white is only seen when the horse is frightened or looking far to one side.

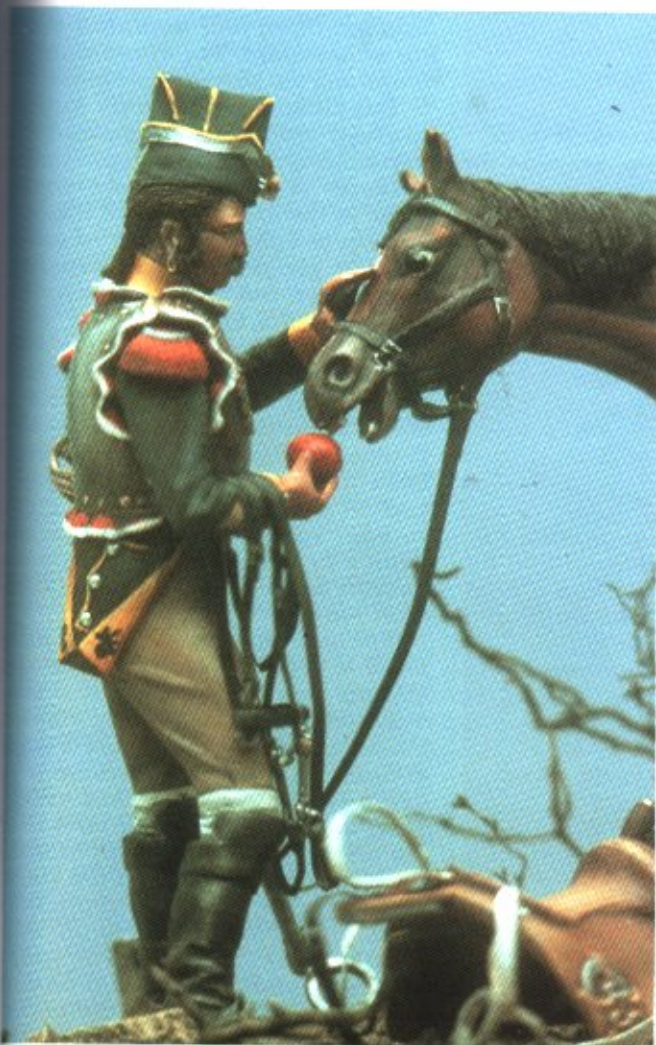


Fig. 8-8. Only a horse's front biting teeth are visible when he opens his mouth. Giving him a full arc of teeth makes him look like he's wearing dentures.



Fig. 8-9. Bay horses with their distinctive black markings on legs, mane, and tail, have long been favorite military mounts as with this 54mm Segom French Cuirassier.



Fig. 8-10. Grey horses were traditional in some armies to distinguish trumpeters from the rank and file, but they were also used as troop horses. The Royal Scots Greys drew their name from the color of their mounts (54mm Historex).

lighter than normal, and the contrast greater. In the beginning it may be easier to lay in the ordinary highlights and shadows first and then go back and build up the reflective highlights.

Use a pinkish gray in the sparse hair areas between the horse's hind legs, around the muzzle, and in the immediate area around the eyes. In the highlight areas this will be a lighter tone, and in the shadows it will be darker. Blend these areas into the rest of the coat for a gradual, subtle transition. Finally, add the white markings.

As usual, blend with the biggest brush you can get away with. For the final blending, brush in the direction the hair grows on the horse's coat (see fig. 8-3a); this makes the color transition more natural and the brush strokes (if visible at all) will give an accurate texture to the surface. Even the white areas should blend into the adjoining brown in a rapid but subtle transition of color.

A critical highlight is the one along the outer edges of the hind quarters and across the top of the shoulders. Making this area brighter draws attention to the distinctive shape of these areas and emphasizes the sheen of the coat, fig. 8-5.

Shade and blend the mane and tail as you would any other body of hair, picking up the stranded texture but not overemphasizing it. Paint the hooves the appropriate color, carrying a basic dusty brown up from the groundwork to the lower parts of the hoof and fetlock. If horseshoes or the

bottom of the hoof are visible, paint them this same dusty color. Whatever you do, don't paint silver horseshoes!

When you are done, examine the overall effect and touch up areas that need more work.

THE EYES AND OTHER DETAILS

The last things you'll paint are small details such as eyes and teeth. Horses' eyes do not generally show any whites, unless they are frightened, angry, or looking far to one side. For all horses, cover the orb of the eye with a brown iris, with a large black pupil in the center and a heavy black lid over the top, fig. 8-7. When dry, coat the eye with a heavy gloss varnish for a strong reflection and liquid look. The teeth, if visible, should be yellowish white. Even with the mouth wide open, the only visible teeth will be the upper and lower incisors at the front. There is a gap between the cutting teeth at the front and the grinding teeth at the sides of the jaw. Don't give the horse a full crescent of teeth above and below or he'll look like he's wearing dentures (fig. 8-8). The tongue and gums, if visible, are a yellowish pink.

PAINTING BAYS, BLACKS, AND GREYS

Bays are painted like chestnuts except the lower legs, mane, and tail are black. Blend these colors gently into the rest of the coat. The skin is darker, which will affect the coloring between the hind legs and around the muzzle and eyes. Black horses should be shadowed and highlighted as a

dark brown, subtly highlighted along the shoulders and outer edges of the hind quarters with dark gray; the technique is similar to the one we used in painting boots, fig. 8-9.

Because of the varied markings, grey horses are fun to paint. There is no single correct color. There are blue greys, red greys, dapple greys, and "flea-bitten" greys. A good generic mixture is white and raw umber, but don't be afraid to experiment with blue black or even burnt sienna (in moderation, to be sure — you'll never live down a pink horse).

A grey is more complicated because you must deal not only with shadow and highlight, but with variations in the color of the coat itself. As mentioned, the darker areas are the head, along the upper neck and spine down to the tail, the shoulders, rear flanks, and knees. Lay in shadows and highlights for these colors first, and then the shadows and highlights for the lighter areas in between (fig. 8-10). Greys don't show much of a sheen, so ignore the reflective highlights. Once the colors are on, blend in the usual manner, check your work, and touch up as necessary. The eyes should be brown and the hooves a pale ochre.

Dappling. Many greys are dappled (partially spotted), which makes for a particularly attractive figure and a challenge to paint. The spots usually occur in the darker areas of the coat and can be either distinct or so subtle as to be almost invisible. Dappling also occurs, but less frequently, in chestnuts, bays, and blacks.

The spotting should be even, with the spots getting smaller as they fade away at the edges, but the pattern should be distinctly irregular. A neatly outlined "honeycomb" effect, however beautifully painted, is unrealistic. Look at photographs of dappled greys in your reference book on horses (which by now you have been wise enough to purchase) and duplicate what you see.

The best dappling technique I have found is to lay in light spots over the existing grey shading while it is still wet, and then to blend them almost, but not completely, away. This is more difficult than it sounds, because it is exasperatingly easy to blend everything away with one or two strokes of the brush. The trick is to hold back on the blending until the paint has started to dry. This way the spots will "stick" in position, while you can still feather away the edges. The exact moment to start blending will depend on how you have laid on the paint. Start too early and your carefully painted spots will disappear; let the paint dry too long and you won't be able to blend at all. Because timing is so important, experiment. Wait half

an hour or so after painting the spots, try to blend a small area, and if it is still too wet, wait another half hour and try again. Be aware of the proper "feel" of the brush. When it is just right, you should experience a slight but distinct drag on the brush as you gently draw it across the surface, blending but not obscuring the spots as you go. Several passes may be necessary for a subtler effect.

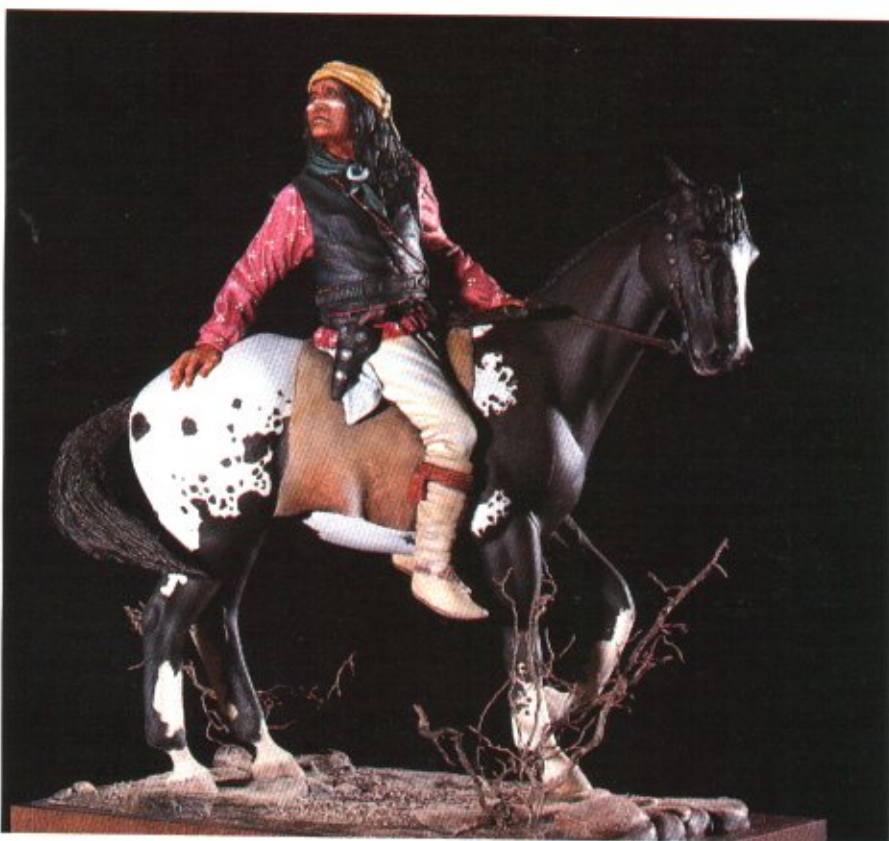
MORE CHALLENGING TECHNIQUES

After you have mastered the basic horse colors, you may want to experiment with more exotic varieties.

Multicolored horses, such as piebalds (white with brown patches) or skewbalds (white with black patches) are rarely seen in organized military units, practically the only examples being the heavy drum horses of Britain's Household Cavalry. Horses with this coloring were more common in irregular formations, the most obvious example being the famous "paints" favored by the Plains Indians, fig. 8-12.

There are other less obvious variations, too. An interesting twist on the chestnut, for example, is the isabelline, a light dun-colored animal with a "mule stripe," a subtle dark brown or black stripe running along the spine from the mane to the tail. Another bit of exotic coloring, often seen on Arabian greys, is the "nautch eye," a patch of darker color around the front and lower part of the eye. Perhaps the most difficult horse to paint is a roan. Roans are chestnuts or bays, with an overlay of pale gray hairs, partially obscuring the color underneath. The best technique for this effect is a dry-brush, but even then there is a distinct risk of failure. Many viewers, unaware such animals exist, conclude that they are seeing a grossly over-highlighted chestnut.

You can add many small but telling details that only a true horseman would appreciate. Prominent among these are "castors," small horn-like growths that sometimes appear on the inner surfaces of the legs. These are common but by no means universal, and take the form of tan oval spots about the size of a coin, rarely more than one per leg or three per horse. The lips are not always pinkish gray, but occasionally are blemished with small spots of pale pink. Finally, even chestnuts are not uniform in color. A noticeably lighter and brighter color can usually be found around the lower abdomen and between the legs, both front and rear. In blacks, this often has an almost orange tone. As these are also generally shadow areas, the lighter coat and shadow cancel each other out, but creative experimentation is certainly possible.



(Left) Fig. 8-11. Dapple greys are particularly striking and a real challenge to paint. The secret is to keep the dapple pattern random and subtle. Andrei Koribanics did a fine job painting this Post Militaire 90mm trumpeter. (Above) Fig. 8-12. Although the warriors of the American Plains rode all sorts of mounts, they particularly favored spotted ponies called "paints." A beautiful 100mm scratchbuilt by Jim Wildt.



Figs. 8-13 - 8-17. A gallery of fine mounted figures (counterclockwise from top left): A Polish Hussar by Michael Collins (54mm Historex conversion); Marshal Murat by Roy Andersen (Historex conversion); a spectacular 100mm scratchbuilt scene of General Colbert's charge at Waterloo, by Canada's Paul Francis; a Roman cavalryman by Martin Livingstone (again, a Historex conversion); and a Historex officer of Polish Lancers of the Guard by Bill Ottinger.





PAINTING SMALL SCALE FIGURES AND FLATS



Fig. 9-1. The principles you have learned so far in dealing with larger figures apply equally well to their smaller brethren: Wargame figures and flats. This superb 30mm war elephant by Roy Andersen shows what a skilled painter can achieve with flats. While other painters can manage detail at this level, it takes a true artist to create such a sense of life — the varied texture on the elephant's ear, for example, is nothing short of astonishing.

Virtually every principle and technique I've outlined for 54mm and 90mm figures holds true for smaller figures. So if you paint only small figures and have skipped right to this chapter, go back and read the others before continuing.

There are, of course, some significant differences. Surprisingly, smaller figures are easier to paint than larger ones. One reason is that smaller figures have fewer large areas to blend. That saves time, and makes it easier to paint these figures with water-based acrylics or fast-drying hobby

enamels, which don't blend as easily as artist's oils. As I've said before, use whatever paint you feel comfortable with; it is your understanding of what colors to use and where to put them that determine your success.

SCALE DISTANCE

In the discussion of detail, I examined the principle of scale distance, and mentioned that detail should be painted as it appears at this distance. This concept is particularly important for this chapter, because in smaller scales the scale distance increases dra-

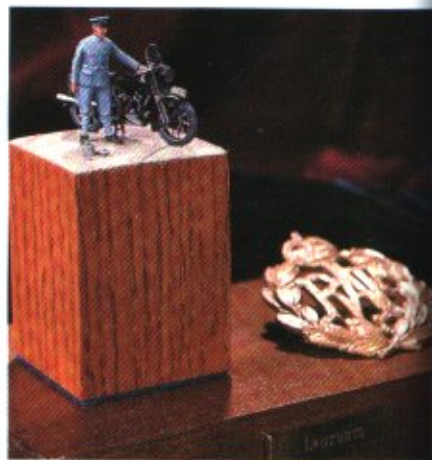


Fig. 9-2. This delightful little 20mm figure of T.E. Lawrence and his motorcycle by Joe Berton shows that even the smallest figure can stand on its own as a display piece if it is properly presented. Note the effective use of the RAF cap badge on the base.

matically. Remember that looking at a 90mm figure at the closest possible distance is the same as looking at a real person 12 feet away, fig 9-3. For 30mm figures, this closest viewing distance increases to 20 feet, for 20mm figures (1/72 scale) 30 feet, and for 15mm figures, 40 feet. So the only detail you'll need to paint on a 15mm figure are those still visible from 40 feet.

This is the second reason smaller scale figures are easier to paint than larger ones — there is less visible detail and hence less detail to paint. Consider an officer's belt buckle, for example: On a 90mm figure you can clearly distinguish the insignia on it, and this detail has to be painted; on a 54mm, you can still see the insignia, but it is indistinct, and you can generally fake it; on a 20mm figure, a simple gold dot will suffice for the entire buckle.

SCALE COLOR

Another factor of scale distance comes increasingly into play as the figures get smaller. This is the "hazing"

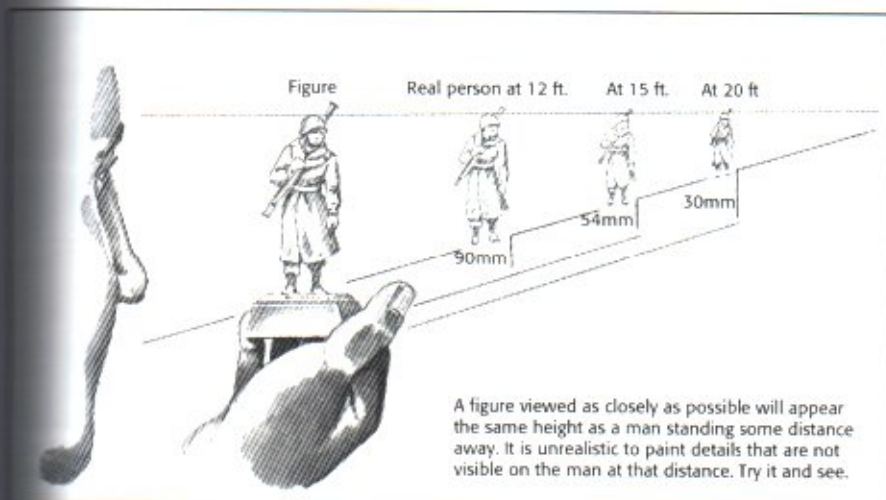


Fig. 9-3. The principle of scale distance we learned in chapter 5 assumes greater importance as the figures get smaller. A 15mm wargame figure, for example, corresponds to a human figure standing 35 feet away.

effect of the atmosphere as the viewing distance increases. You've no doubt noticed that mountains appear increasingly gray as they near the horizon, until those farthest away almost disappear in the haze. The mountains are an extreme example, of course, since they are miles away, but the principle holds true even at short distances. Even at 20 feet colors will appear slightly dimmer than they are at arm's length, while at 40 feet the effect will be more pronounced. This does not mean you should paint your 1/72 scale aircraft figures and 20mm wargame armies in varying shades of light gray, as if seen through a fog, but you will work with a slightly more subdued palette than you would use on larger figures. Smaller figures look more realistic and less like brightly colored toys if you add a tiny amount of white to each color.

Scale lighting also changes with smaller figures. Remember that in Chapter 3 I said supplementary paint-

ed shadows were necessary to compensate for the difference between a 1/32 figure and the full-size lighting conditions under which it is seen. It follows then that the larger the figure, the less these supplementary shadows are necessary, and that the smaller the figure, the greater the contrast necessary to bridge this gap. How much additional contrast is needed is a matter of taste; just use more than you do on your figures.

Other than that, there is no real difference between painting smaller and larger figures. The important principles — shading and highlighting, stop-sign rule, watching the consistency of the paint, mixing colors and handling the brush — remain the same.

PAINTING WARGAME FIGURES

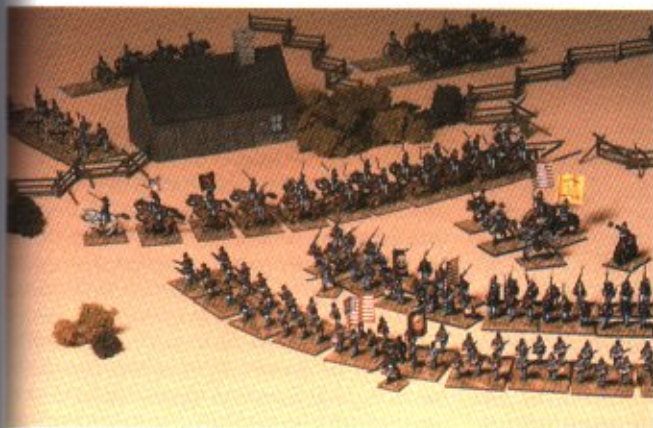
Even though smaller figures can be painted more quickly than larger ones, few wargamers are willing to take the time to paint each figure in their army

to collector's figure standards. After all, the game is the main event, and a hobbyist who spends all his time painting figures never gets to use them! An attractive appearance is desirable, of course, but anything that can be done to streamline the painting process pays off in more time available for the gaming table.

Most wargamers paint a battalion or a regiment at a time, in assembly-line fashion. This is the time-honored method, and no one has found a better way. After cleaning the flash off the castings mount the figure on a stick for painting. Resist the temptation to paint them on their movement stands; this may seem easier at first glance, but you'll soon find that the figures are too close together and keep getting in the way of your brush. Some painters like to use Popsicle sticks, but I prefer something larger that affords a firmer grip, such as a piece of 1" x 2" pine. Stick the figures in place with glue or any other adhesive that allows you to easily break the figures free later. Space them about one inch apart so you can easily paint the sides. Prime them with a standard figure primer (automotive primer will work in a pinch).

Paint each color in turn, going from one figure to the next until all of that color has been painted. Most acrylics and enamels cover well, so there is no need to paint the light colors before the dark. Start with the skin tones and work your way out to the belting and knapsacks; the detail projecting from the surface of the figure tends to get in the way of your brush as you paint the inner surfaces, and this way if you accidentally slop onto these areas you can just paint over the error when you get to that color. Follow the techniques discussed in the other chapters. Keep your brush pointed and monitor the consistency of the paint. Add thinner as necessary.

Some wargamers believe it is worth



Figs. 9-4 and 9-5. War game armies present special problems, in that they must be painted en masse, and withstand the ravages

of constant handling. Skip Peterson's Civil War figures very effectively combine painting skill and durability.

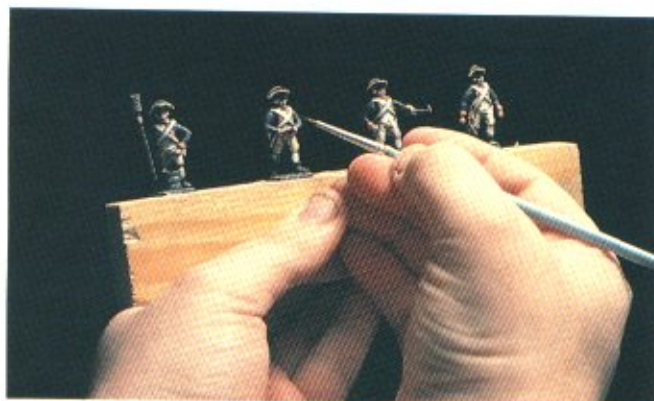


Fig. 9-6. War game figures are best painted assembly line fashion, a regiment or battalion at a time. Washes are a fast and effective way to shade them, but it is important to use a paint that sinks readily into the crevices and dries without mottling.



Fig. 9-7. For durability, war game figures are cast with heavy detail parts. Thinning the edges, as is being done to this flag, doesn't affect their durability and greatly improves their appearance.



Fig. 9-8. If the armies have to be painted en masse, the commanders certainly don't, and the time lavished on personality figures is seldom wasted. Here are two of Skip's generals — note the shading and highlighting, following the same principles outlined in the previous chapters

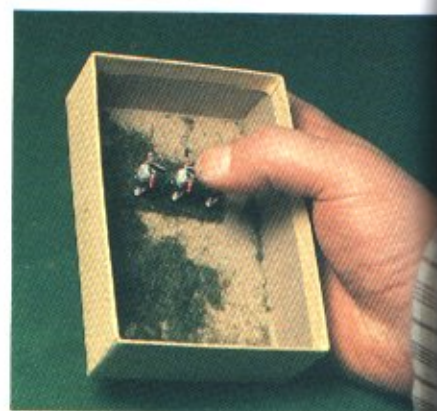


Fig. 9-9. It's easy to apply static grass to maneuver bases. Just brush the base with white glue, hold the figures in the box of grass, and shake. Presto — instant ground-work!

their time to shade their figures, but most do not. You're the one who will play with them, so the choice is up to you. Some painters devote more time and effort to personalities and command groups, shading these even when they are satisfied to paint the rest of their armies in basic colors.

With time at a premium, you certainly can't use the same methods you've learned for larger figures. The most common shortcut is to use a wash. In its most primitive form, this technique amounts to nothing more than flooding the entire figure with a brushful of thinned-down brown paint. This method is crude but effective, and works better with some colors (red and yellow) than with others (blue and green). Be careful to keep the paint thin: If you overdo it, the figures look like they've been fighting an oil spill. My feeling is that since this technique is quick to begin with, it pays to take a few extra moments to do the job right, washing each of the major uniform areas separately with a darker version

of that color. Control the flow by using just enough paint to cover the surface in question. If necessary, touch up the highlights with the original color (or, if you're feeling really artistic, a lighter shade acting as a highlight color).

Metal figures can sparkle if you burnish the armor, swords, and bayonets so they catch the light. Rub them down with a polished steel tool as described in Chapter 8, and varnish the surface to keep it from tarnishing.

Make the figure bases and movement stands inconspicuous by painting them the same color as the basic terrain of the wargame table. A nice touch is to cover both the wargame table and the movement stands with static grass (see Chapter 6). This material is sold in ready-to-use sheets that are ideal for the playing surface, while the loose material described in Chapter 6 is easily applied to the stands, fig. 9-9. For wargame purposes, there is no need to paint it.

Perhaps the biggest factor that sets wargame figures apart from their

"parade ground" brethren is that, as fighting troops, they are constantly handled and need a protective coating to keep the paint from wearing off. This means varnish; the kind you use is not important as long as it is thick and strong enough to protect the paint underneath. Some painters prefer a two-step process, applying a protective layer of gloss varnish, then a matte varnish to restore the flat appearance.

PAINTING FLATS

The two-dimensional flat figure goes back to the 18th century and is still the most popular style of model soldier in Germany. Although flats come in larger and smaller sizes as well, the most common size is 30mm. The range of available subjects is awesome, the detail is superb, and with dozens of poses available in each series, the diorama possibilities are inspiring. For all of these reasons, most veterans of the hobby try their hand at flats sooner or later, but they're difficult for the beginner to

Fig. 9-10. Greg DiFranco's 90mm flat of Napoleon in his coronation robes is proof positive that the finest flats approach the pinnacle of the figure painter's skill. Note the reflected light along his chin.

paint. If you have no artistic experience, develop your technique thoroughly on round figures before moving to flats.

There are several schools of thought on flats. One debate is whether it's appropriate to paint flats on only one side. One group points out that because the figures are going to be seen from only one side, it's foolish to paint a side of the figures that will never be seen. The other group counters that because the figures are engraved on both sides they should be painted on both sides. A logical compromise would be to paint only one side of figures when the other side will never be seen (as in boxed dioramas), and to paint free-standing figures, which might possibly be turned around, on both sides. In a similar vein some people spend hours painting a single figure, while others paint en masse, grouping large numbers of figures (often thousands) into great battle scenes. It speaks well for the flexibility of flats that the castings are suitable for both purposes. Obviously the time and care you can devote on a single figure is impractical when painting thousands, but the theoretical basis is the same, and a good painter will approach his subject similarly, whether he is painting one figure or a thousand, figs. 9-10 and 9-11.

The challenge with flats is to paint them so they look round. This is accomplished with painted shadows and highlights. Most of the lighting principles I've discussed in the previous chapters still apply. The stop-sign rule was the foundation of our work with rounds, and it is equally fundamental in working with flats. With a fully round figure, the room light will supplement our painted shadows. This luxury is denied when the figure is flat; each shape must be rendered entirely with paint, so the degree of contrast must be correspondingly greater than it would be for a round figure of similar size. For this reason the shading of the body shapes and not just the wrinkles is critical. Before you start, analyze every detail of the figure in terms of the stop-sign rule. Concentrate until you have developed a complete picture of the finished product in your mind, and keep this mental image as you work.

The stop-sign rule as it applies to rounds will have to be modified somewhat for flats. Because the figure is designed to be seen from only two sides, you don't need to visualize the



Fig. 9-11. The smaller 30mm flats have traditionally been used in groups, sometimes by the thousand. This less ambitious effort is a detail of a scene showing Napoleon receiving the captured flags of Austerlitz. Flats allow you to tackle subjects that would be impossible in other formats: what would be a mammoth undertaking in 54mm rounds is a manageable month or two project with 30mm flats.

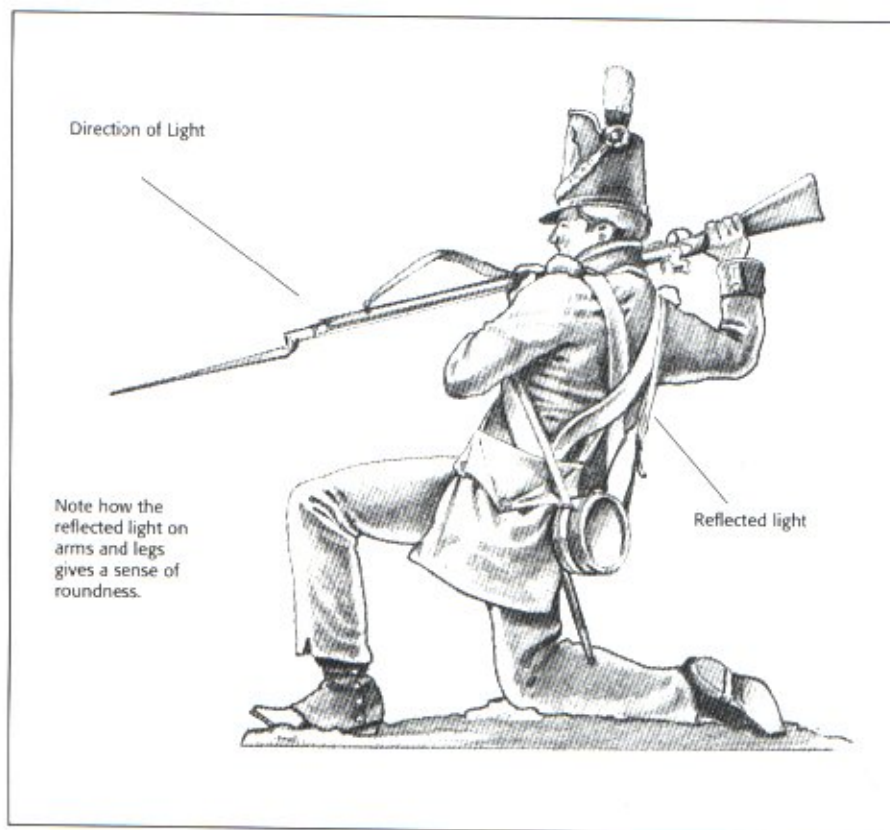


Fig. 9-12. The biggest difference between painting flats and round figures is that flats are designed to be seen from only one side, the direction of the light becomes an important consideration.



Fig. 9-13. Flats are detailed on both sides. Sometimes it makes more sense to paint the back, as in this case of Napoleon receiving the captured colors in fig. 9-11.

light source constantly behind you as the figure rotates. The "halo of light" concept can be a helpful visualizing tool for flats, but in strictest terms it only applies to softly lit, "cloudy-day" situations. For bright sunlight you must think in terms of a light not only from above, but also from the left or right of the figure. This is where we part company with the "halo of light"; with light coming primarily from one direction, hard-edged cast shadows suddenly become important. You'll also have to acquaint yourself with the concept of reflected light, in which light bounces from a nearby surface to create a faint highlight along an edge that would otherwise be in total shadow, fig. 9-12.

Having considered this theoretical background, the best way to learn to paint flats is to plunge in and try one.

Preparing the flat for painting. Well-made flats don't require much preparation, just careful trimming around the edges. Some flats come with optional arms and legs. Choose what you want and cut off the extras with a pair of nippers, trimming the edge smooth with a file. Mount the figures on a stick for painting (several at a time if you want) and prime them with a standard figure primer. Underpaint them in the basic uniform colors as you would a round figure.

Painting techniques. Flats can be painted and blended with oils or enamels or built up with a series of



Fig. 9-14. The variety of subjects and poses is one of the fascinating things about flats. These are part of the famous "Retreat from Moscow" set.

glazes in enamels or acrylics.

The paint-and-blend technique is the same as for round figures. Lay the highlight and shadow colors into their appropriate areas, and then feather the edge between them. As mentioned, the contrast will have to be greater than for round figures. As you learned in Chapter 3, the shape of the forms is indicated by the smoothness of the transition from light to shadow. A subtle, gradual change in tone indicates a gently curved surface, while a quicker, more sudden transition indicates a sharper, more angular shift in planes. With the first colors blended, increase the contrast, adding higher highlights and darker shadows. Blending inevitably reduces the contrast, so you may have to repeat this several times with still lighter highlights and darker

shadows.

The glazing technique is also the same as for round figures, but a smooth transition of color is easier to achieve because you are working in a smaller area. Acrylic or enamel glazes are worth a try on flats, even if you haven't had much success with them on other figures.

Artists working on canvas never use metallic paints, and some believe the same tradition should apply to flats. This is a minority opinion, and most flat painters use the same gold and metallic pigments that they do for rounds, fig. 9-14. The polishing technique for armor, sword blades, and other metal surfaces also works well for flats, and the results are striking. A simple black wash or glaze will provide the necessary shading.

MINOR CONVERSIONS FOR METAL FIGURES



Figs. 10-1 and 10-2. A minor conversion (above left, a Colour Sergeant of the Coldstream Guards in the Crimea) involves only minor changes in uniform details, and so on. A major conversion

(above right, a British infantryman of the Kaffir Wars in South Africa by Bill Horan) leaves little unaltered but the face and hands. Bill's figure is a good example of a weathered uniform.

Although you may be happy painting stock commercial figures, sooner or later you'll want to change what the manufacturer has given you. Even if this amounts to little more than changing the plume on a shako to a pompon, it's still a distinct departure from your previous experience, and your first step into the wonderful world of conversions.

Conversion work is not difficult and can be challenging and enjoyable. In

many ways, the hardest part is summoning up the courage to take a hacksaw to a figure for which you just laid out \$30. Compared to that traumatic experience, the rest is a piece of cake!

Up to this point I've concentrated on painting materials and techniques. Now we'll be moving farther afield, working in three dimensions, creating new forms instead of painting ones that are already there. You'll need to learn to work with new materials.

EPOXY PUTTY

The essential material for conversions (and for scratchbuilding) is epoxy putty, a two-part epoxy material that comes in sticks. The two parts are kneaded together to form a putty with the consistency and workability of modeling clay. It hardens at room temperature in about an hour. When set, the putty can be sanded, filed, carved, sawed, and even polished with steel wool.



Fig. 10-3. There are a number of brands of epoxy putty: A & B, Milliput, Duro Epoxee ribbon, Plumber's Seal, etc. All have slightly different properties (some are stickier than others, for example) and it is just a matter of choosing the one you like best.

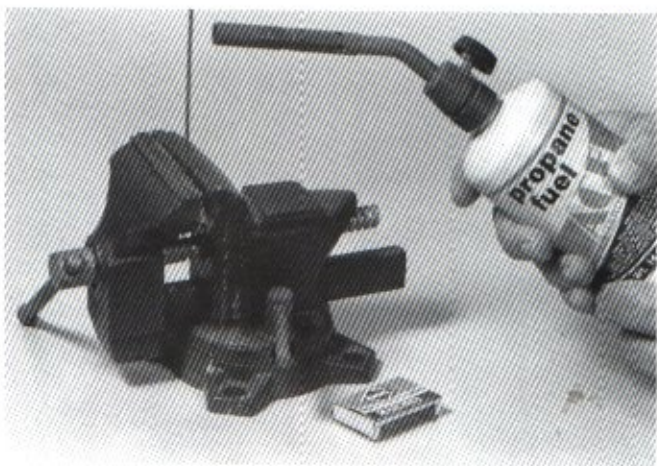


Fig. 10-5. To anneal or soften brass wire, grip one end in a vise and heat it with a torch until it turns red. Heating releases the molecular tension of the brass and when it cools it will be soft.

It's intended for sealing plumbing and automotive pipes, so a plumbing or automotive supply house is where you are likely to find it (Brookstone, 5 Vose Road, Peterborough, NH 03458, sells it by mail). Because it isn't formulated specifically for modeling, each brand has a slightly different working consistency. Most are gray but vary considerably in texture and stickiness, too much of which can be difficult to manage. One brand widely available in stores, Duro E-pox-e Ribbon, comes in blue and yellow strips you mix into a dark green putty; it takes detail exceptionally well and is especially popular for 54mm and smaller figures.

Epoxy putty sets hard in about an hour at room temperature. By putting a finished piece in your drying oven at about 130° you can reduce the setting time to about fifteen minutes. Putty work is best done in stages; don't attempt more work than you can comfortably finish in an hour or so. Work

on one part of the model, let it set, and then move to another part next to or on top of it. When applying new putty over old, ensure a strong bond by covering the joint with a thin coat of fresh putty. Mash it firmly into place, thinning it with plastic cement or water if needed for a good bond. Then apply the new putty over this intermediate layer.

To mix the putty, cut off equal segments from each stick, just enough for the job at hand. Two balls the size of a pea are fine for most applications. Knead them together with your fingers. Mix the halves by flattening the blob and folding it over repeatedly until it is uniform in color. Wash your hands when the putty is mixed; the putty is hard to manage when your fingers are sticky, and prolonged exposure to the stuff may not be healthy.

Everyone has favorite tools for sculpting epoxy putty. I use only three,

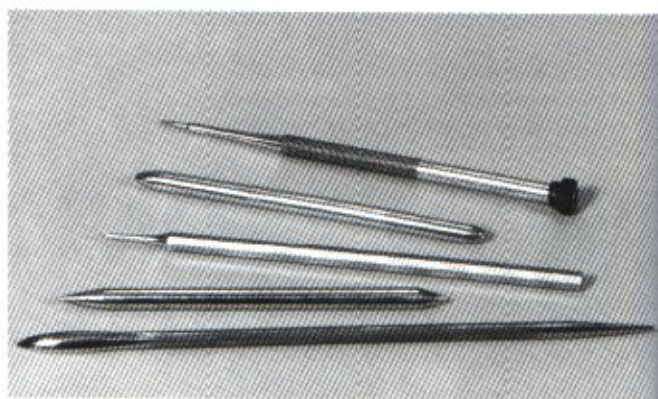


Fig. 10-4. Besides the few standard sculpting tools, most sculptors make their own for specific jobs. These are the ones I use (from top): a sharp machinists scriber for fine detail, a round-tipped version of the same, a sharp dental tool for detail, a pointed general purpose tool, with a different taper at each end, and a pointed spoon-shaped tool for certain clothing folds.

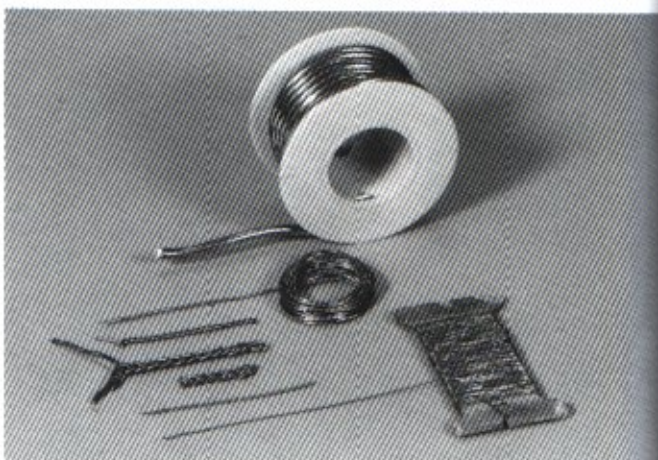


Fig. 10-6. Solder wire of various thicknesses is ideal for sculpting cord, uniform piping, and braid, to name a few applications. It is softer than annealed wire, and retains any form you press it into.

all variations on a simple pencil point. An orange stick, the kind sold at cosmetic counters to clean fingernails, is a good start; it has a pencil point at one end and a flat angle cut at the other. Use fine steel wool to rub the surface of the stick as smooth as possible to keep the putty from sticking to it. Years ago a friend made me a fancier stainless steel version of the same tool. A second version that I find useful has a similar point but is rounded at the end, with no sharp point to dig into the surface of the putty. Finally, I use a machinists scriber (available at any hardware store) for fine detail work.

A peculiar attribute of the putty is that it is soluble in both water and in some types of plastic cement (methyl ethyl ketone, for example) and lacquer thinner which allows you to smooth it out with a brush. You can also mix a thin solution and paint on fine detail, such as uniform piping, although several applications may be necessary.

BRASS, COPPER, AND SOLDER WIRE

Keep an assortment of wire in a variety of thicknesses and shapes for armatures, ropes, cords, and spear and arrow shafts. Brass tubing is also handy, and is sized so that each size telescopes into the next larger one. Both tubing and rod are available in square and round shapes.

Brass and copper are relatively soft metals and can be cut with saws, tin snips, or clippers. They can be sanded or filed smooth and take a high polish. Thinner strands of wire are easily bent with pliers, but the thicker stuff (more than 1/8") may have to be annealed, or softened, first. To anneal brass rod, secure it in a vise and heat a section of it at a time with a propane torch until it glows red; quench it with water or allow it to cool naturally. Once back at room temperature the rod will be easier to bend. Annealing can be useful with thinner wire as well, particularly when you are trying to force it into a tight or complex curl or get it to lie flat or drape naturally (fig. 10-5).

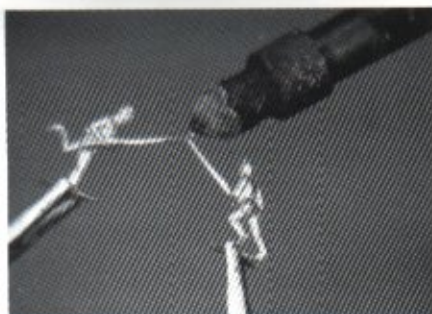
Also useful are similar shapes in white metal. Solder wire, for example, is excellent for a variety of jobs where even annealed brass wire isn't flexible enough. Thin solder can be twisted to form rope or braided into shako cords or aiguillettes. Thicker solder can be hammered or rolled flat to make flexible "leather" straps and belts. Some schools and industrial shops have bench-top rolling mills which quickly and evenly flatten wire of all thicknesses and materials, including brass. If you have access to one, you'll find it handy.

BASIC SOLDERING TECHNIQUES

Brass can be glued with super glue or epoxy, but no glued joint will ever approach the strength of a soldered one.

Soldering tools are not expensive. You'll need a soldering iron, preferably one with replaceable tips. Any 60/40 tin-lead solder is fine, although the small-diameter solder sold for electronics work is best. You'll also need flux. Flux is a chemical paste or liquid that cleans the metal and allows the solder to stick to it. The best fluxes for model work are acid-based liquids or pastes. Don't rely on "cored" solders that include the flux in the solder wire; they're convenient for electrical work but too imprecise for modeling. You can use cored solder as ordinary solder without any problem; just don't count on the core for fluxing. Finally, to hold the pieces together without burning your fingers, you'll need a fixture of some sort; a "third-hand" device is ideal.

Miniature soldering is easy once you learn the basic principles. The



(Above) Fig. 10-7. With proper technique, you can solder two wargame figures bayonet tip to bayonet tip. 1. Use an extra hands device to align the parts to be soldered. 2. Apply flux to the joint area. 3. Pick up a tiny ball of solder on the end of the soldering iron. 4. Touch it to the joint letting the heat from the iron flow through the solder into the two pieces being soldered. 5. When the pieces reach the right temperature, the solder will flow into the joint; immediately pull away the iron and let the joint cool. Fig. 10-8. Series 77 Figures are beautifully detailed, but are often too short in the legs. This flaw is easily corrected.



Fig. 10-9. To lengthen the legs, cut the figure at the knee, drill holes and insert rods to hold the parts apart, and glue the rods in place. Restore the contours of the leg with epoxy putty.

first principle is that solder will stick only to those parts of the metal that have been cleaned and prepared with flux. Excess solder will bead up on the fluxed area instead of flowing to any unfluxed portion of the work. The second principle is that both pieces being soldered must be heated to the flowing temperature of the solder for the

process to work. It is the heat in the parts, not in the solder, that makes the solder flow and provides a strong bond. If you are soldering big pieces it may take time to heat them up, even if the area of the joint is small. If you have trouble soldering, it is probably because you have failed to observe one of these two principles.



Fig. 10-10. The finished figure, an American infantryman of the War of 1812.



Fig. 10-11. Another lengthened Series 77, this time a frontier dragoon from the 1840's.

Miniature soldering differs from electrical work because the neatness of the joint is important. You need precise control over the amount of solder applied and where it goes.

Plug in your soldering iron, and while you are waiting for it to heat up put your pieces in the fixture and align them. When your work is positioned and the iron is hot, brush a small amount of flux into the joint. Then cut off just enough solder to do the job, and pick it up with the tip of the iron. To get the solder to stick to the iron, you may have to clean the tip by filing or scraping away the oxide. If this doesn't work, dip only the tip of the iron into the flux and try again. Carry the little ball of molten solder on the end of the iron to the work and touch it to the joint. Wait, letting the heat flow from the iron through the solder to the work. When the parts reach the right temperature, the solder will flow into the joint. Pull the iron away and the job is complete. Allow the joint to cool naturally — hastening the cooling can weaken the joint. In small joints, the solder cools in seconds, and with practice you'll be able to solder almost as fast as you can glue.

Soldering large pieces or multiple joints is more challenging. Large pieces call for more heat, so you may find it easier to solder heavy parts with a torch. The standard Bernzomatic propane torch sold in hardware stores will work. It may seem clumsy at first, but keep the torch on the lowest setting to avoid melting the casting. The trouble with multiple joints is that heat applied to a new joint may melt the one that you just finished. This is cured by using heat sinks, small metal clamps placed between the joint that is already soldered and the one that is about to be. The heat sink draws off enough heat to prevent the previous joint from melting.

SOLDERING WHITE METAL

These techniques can be used in soldering white-metal parts from the kit, but it calls for a more sensitive touch. Figure kits are cast in an alloy of tin and lead, just like the solder, and this alloy often melts at temperatures only a few degrees higher than the solder. The trick, therefore, is to heat the metal parts to the flow temperature of the solder, and withdraw the heat quickly before the parts melt. This is why you should develop the

habit of touching the little ball of solder, and not the iron itself, to the work; it gives you more control, and a few extra seconds to withdraw the iron before disaster strikes. Practice on casting scraps to get the hang of it. As you gain experience, you'll be surprised at what you can accomplish. A friend of mine could solder two wargame figures together, bayonet tip to bayonet tip, without melting either one.

Larger joints are more difficult than small ones, because larger pieces must be heated with a torch, and a torch is harder to control. One solution is to increase the difference between the flow point of the solder and the melting point of the metal by using a low-temperature solder. Some jewelry supply houses sell special low-temperature solders for pewter (also a tin/lead alloy); if you can acquire some, you can use the same techniques you would for brass. Otherwise, unless you can develop a quick and sensitive hand with a torch, secure larger parts with glue.

LENGTHENING A SERIES 77 FIGURE

A good way to learn about this new material is to take on a simple metal



Fig. 10-12. Pose conversions are a bit more difficult but not beyond the capabilities of most modelers. This Series 77 Confederate infantryman shows what you can do without much effort.



Fig. 10-13. Horses are hard to convert; muscle structure must be re-sculpted, often in a different configuration. French Carabinier, 100mm scratchbuilt by Mike Tapavica.



Fig. 10-14. Metal foil from paint tubes and wine bottles is useful for belting and free-flowing capes. If you have access to a metal roller, you can easily flatten solder wire into a variety of widths and thicknesses.

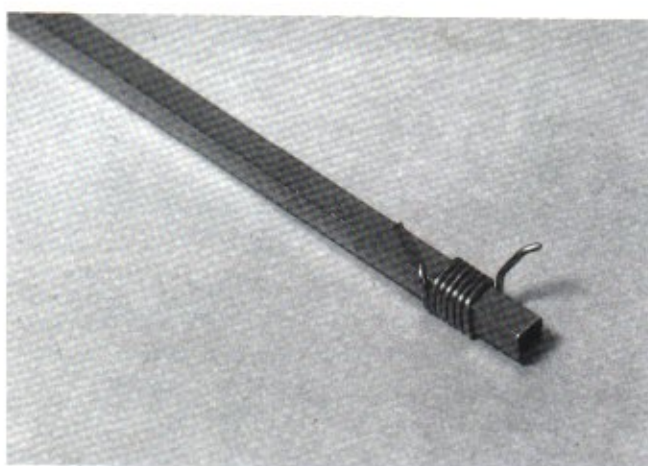


Fig. 10-15. Square frame buckles can be made by wrapping wire around a square brass rod and then cutting off individual squares.

conversion. Series 77 has produced some of the most popular kits on the market, but many otherwise beautiful figures are abnormally short, less than six heads tall. In fact, when we measure them we often see that the waist, not the crotch, turns out to be the halfway point between the head and the feet, indicating the legs are too short but the rest of the figure is fine. To restore the height we just need to lengthen the legs.

Begin by cleaning the casting in the usual manner. Next, examine the legs. If they're straight, with plain trousers, you often can get by making a single cut through each leg at the knee. But if a leg is bent or clothed in form-fit-

ting trousers, two cuts are required, one above and the other below the knee. For major cuts like this use a hacksaw, which cuts more quickly and is less likely to clog and jam than a razor saw.

Once you've survived the trauma of this drastic surgery, the next step is to drill a 9/64 hole up through each part of the leg, going entirely through the lower portion(s), and at least 3/4" into the upper ones. At this point, you're probably feeling a bit like Jack the Ripper.

Now you can begin to play Dr. Frankenstein, sewing your monster back together. Glue 3"-long 1/8" brass rods into the holes in the upper legs.

When the glue has set, bend the wire, either to duplicate the original pose or to create one of your own choosing. If you're going to change the pose, don't attempt a change so drastic that the old leg sections can't be adapted to it (changing a standing pose to a running one, for example). Next string the knee and lower leg sections along the rod, like beads on a string, space them the desired distance apart, and tack them in place with super glue.

Step back and look at your work critically. Most Series 77 legs can use an extra 1/4", but some need more, others less. Use your dividers to check the distance from the sole of the foot to the crotch and from the crotch to the top of



Fig. 10-16. Plumes and pompons can be easily built up out of putty over a wire form. The trick is to apply the putty in two layers, the first establishing the shape and the second, applied after the first has set, receiving the texture and detail. (This is a repair being done on an old figure by well-known French figure maker Josianne Desfonatines.)

the head; these should be the same. If necessary, break the glue joints and make adjustments. Also make sure your leg sections line up properly, with the knee in the front and the trouser seams, if any, lined up along the sides.

When you are satisfied, secure your temporary joints permanently by coating the joint with five-minute epoxy; several thin applications will avoid drips. Next, fill the gaps with epoxy putty. Use your orange stick or sculpting tool to restore the contours of the legs. Except for trouser seams, which must be impressed into the surface of the putty, leave the details for a second application of putty after this first one has set. Instead, concentrate on getting a smooth transition from metal to putty to metal again. Brush the surface of the putty smooth with lacquer thinner or plastic solvent.

When the putty has set, run your fingers across the areas where the putty joins the metal. If necessary, add more putty or sand the joint areas smooth. Finish it off with steel wool. When the details are complete, give the legs a quick coat of primer; this often will reveal minor flaws you missed, and you can correct them. When everything is satisfactory, prime and paint the figure as you would any other.

OTHER CONVERSIONS

These same techniques apply to other conversions. You'll find that the same basic "cut, drill, and pin" method lets you reposition arms as well as

legs, for example. You can turn heads by drilling and pinning, too, although you may need to modify the collar to avoid a "giraffe" look. Finally, you can reposition entire legs by making cuts at the thigh and ankle as well as the knee. This is more difficult and requires more experience, but once you get into the job, you'll be surprised at what you can accomplish.

Horses can be repositioned the same way, but be careful. The horse and rider are heavier than a dismounted figure, and the supporting legs will have to be pinned more securely to carry the weight. When possible, pin the horse's legs all the way up into the thighs. If the leg is bent and you don't want to re-sculpt the muscle detail over bare wire, the pin can be set into the side of the horse's leg in the following manner. Use a steel saw in a Dremel tool to cut a deep slot the width of the wire on the inside of the horse's leg, angling it where necessary to follow the line of the leg. This slot should run from the horse's body down through the leg and out the bottom of the hoof. Bend the wire to follow the angles of the cut, lay it in the slot, glue solidly with five-minute epoxy, and fill the rest with epoxy putty.

In changing poses, don't attempt anything too ambitious at first. Start slowly and tackle successively more daring conversions with each project. Allow your skills to develop at the same pace as your confidence. You'll soon find yourself doing things you

never thought possible.

CHANGING DETAILS

So far I've concentrated on modifying poses. These are easier than changing details because little resculpting is involved. New details often require a more skillful hand.

You can add belts and straps in a number of ways. The simplest is to use paper card stock. An index card is about right for 90mm figures, while ordinary writing paper works best for 54mm. Use a straightedge and knife to cut strips the right width. Measure the length, cut, and test the fit. Then wet the card stock to make it more flexible and secure it with super glue. Give it a coat of white glue to eliminate the paper texture, and you're done.

Flattened solder wire makes wonderful belting, but you need access to a rolling mill to flatten it accurately. Sheet metal cut from an old paint tube is effective and bends around difficult curves more easily than the paper. Cut open the tube, discard the top, clean any paint off the foil, and roll and rub it flat on a smooth surface, fig. 10-14. Cut and glue it in place as you would the card stock.

Whatever you use, make sure that if the new strap is supporting weight and resting on a shoulder you carve a depression in the shoulder and nearby fabric to realistically accommodate the weight.

Buckles can be scavenged from Historex kits and used on both 54mm and 90mm figures. Make square frame



Fig. 10-17. Sometimes all a conversion needs is an additional figure, in this case the Hessian's beer-quaffing companion (54mm by Pete Kailus).



Fig. 10-18. Little touches can mean a lot. Notice the faint wisp of cotton "smoke" from the officer's cigarette.

buckles by wrapping soft wire around a square brass or plastic rod; you can make bunches of them this way, all the same size (fig. 10-15).

Plumes and pompons are easy to make with epoxy putty over brass wire, fig. 10-16. Cut the wire extra long and grip the end in a hand vise. Give the wire a thin irregular covering of epoxy putty about the length of the

intended plume or pompon and let it set. This gives you a solid base to work on. Build up the plume or pompon to proper shape with fresh putty, and begin to texture it with a sharp needle. Set it aside periodically for 10 minutes or so, and then return to work when it has hardened a bit more. Continue until the texture is what you want or the putty has hardened.

These are basic conversion techniques. I'll describe more advanced methods in the next three chapters. Read them even if you don't plan to work with plastic figures or sculpt your own figures; the information can be used for any kind of model.

ASSEMBLING AND CONVERTING PLASTIC FIGURES



When plastic kit figures were introduced years ago, skeptical collectors often looked down on the “cheap plastic” newcomers and failed to see the potential of this versatile medium. Yet time has shown that plastic figures have a longevity that

exceeds their metal cousins, and the initial opposition has all but died away.

Today many manufacturers produce high-quality plastic figures. Tamiya, Esci, and Italeri all offer World War II and modern figures to



Figs. 11-1 thru 11-3. Plastic figures offer tremendous possibilities in animation, detail, and conversion possibilities. This diorama of Napoleon and his staff on the eve of the battle of Essling has more than 30 mounted figures, most of them distinct personalities known to have been on the scene at the time.



Fig. 11-4. To work with plastic, you'll need special plastic cements and solvents to glue pieces together and plastic body putty for filling gaps. Sprue solution (bits of plastic sprue dissolved in solvent) can be used to build up plastic shapes, and a hot knife is used to texture the plastic surface.



Fig. 11-5. The Historex figure laid out is a daunting prospect. Some parts are extra and will be not used. First, discard the fiber tape provided for the belts.

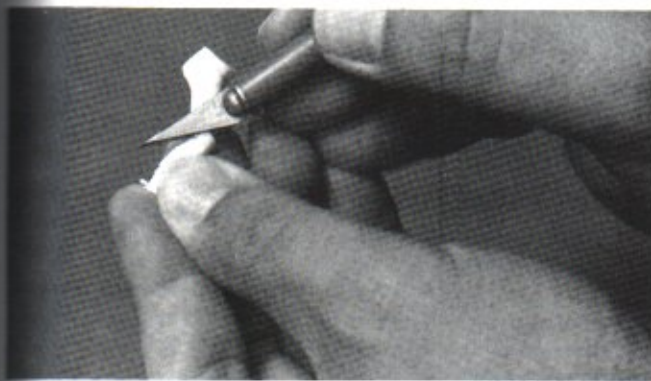


Fig. 11-7. Be sure to carve the frog in the bottom of visible hooves, glue on a horseshoe, and texture the longer hair of the fetlock with a hot knife.

Fig. 11-6. If your figure has cuffed boots, use a fresh blade to carefully cut behind the cuff.

accompany their vehicles. Historex in France was the first company to offer standard collector's figures in plastic, a lead that was followed by Airfix and others. The innovative Airfix "multi-pose" series of WWII figures is a favorite for figure converters.

The methods for working with all of the figures are much the same. I'll focus my discussion on Historex, not because these figures are the best, but because they are so complicated they can be intimidating.

SPECIAL TOOLS AND MATERIALS

Now you'll have to add a few items to your toolbox. Although plastic can be glued with super glues and even epoxy, the strongest and easiest joints are achieved with plastic cements, which are not really glues at all, but solvents. Solvents dissolve the mating surfaces of the two parts, welding them into a single solid piece. Plastic cement in tubes is not the best choice. It may bring back happy memories of childhood, with the gooey stuff spread all over the kitchen table, but it hasn't improved over the years. The best solvents are liquid, applied to the model with a brush — hold the parts together, touch a brushful of solvent to the joint, wait a second or two, and the job is done. The standard solvents sold in

hobby shops work fine, but if you work with plastic a lot, buy the stuff in bulk, investing in a quart or gallon of methyl ethyl ketone or ethylene dichloride at a hardware store or industrial supply house. These stronger solvents evaporate rapidly and give a professional bond.

A second useful tool is a hot knife, a small soldering iron with a needle or knife tip. X-Acto sells just such a tool (called a Hot Knife), but it's a converted soldering iron, awkward to use because the point is so far from the handle. More precise and convenient are the tools sold for woodburning and other crafts purposes. Check your local crafts shop or catalog. If you have to settle for the X-Acto version, it works better if you replace the knife blade with a sharp brass pin (brass holds the heat better than steel). A temperature control allows you to control the exact degree of heat, but it's not necessary. A desktop speed control for a Dremel tool works nicely, and as such does double duty on your workbench.

You'll also need some sort of filler. Epoxy putty works on plastic, but for some situations I'd suggest plastic filler, or "body putty." Commonly called "green stuff," this material comes in a tube and can be thinned with plastic cement. While most mod-

elers have switched to epoxy putty for conversion work, body putty is useful for filling seams and other situations where epoxy putty is clumsy to use.

Another versatile filling material for plastic is "sprue solution." As its name implies, it's made by dissolving bits of scrap plastic in a small bottle of liquid cement. Add the scraps over several days, allowing the plastic to dissolve gradually until the goop is about the consistency of thick honey. I top it off with liquid cement about half an hour before I use it; this way you have thick stuff at the bottom and thin stuff at the top, and you can easily mix them to any consistency in between. Sprue solution is good for minor filling jobs and for building up plastic in areas that will later be hot knifed, such as beards, moustaches, and hair.

HISTOREX FIGURES

One of the true pioneers in the field of plastic figure kits is Historex of France, which introduced the first of its highly detailed kits in the early 1960s. Even then the detail set the standard by which other such figures are judged today.

While Historex has always made foot figures, its cavalry figures are the glory of the line. Inexpensive, beautifully detailed, and easy to convert to



Figs. 11-8 and 11-9. Bevel the edge of the shabraque or saddle cloth for a thinner appearance. Historex figures were made to convert — few modelers ever build one straight out of the package. Plastic is an easy medium for conversion, and the posing possibilities are endless. "A Whiff of Grapeshot" shows the effect of close range cannon on a Napoleonic cavalry charge.

the pose you want, plastic cavalymen have it all over their metal counterparts. Even the strongest metal horse posed on two legs will gradually droop, as the weight of the casting pulls it inexorably to the ground. A plastic horse, on the other hand, is lightweight and can be posed on only one leg with no danger of sagging.

Historex figures are popular and let you produce spectacular results, but they take some getting used to, particularly for someone accustomed to the detailed, step-by-step instructions that come with other plastic kits. Your first Historex kit can be a daunting prospect — more than 200 itty-bitty parts, and only a single page of drawings to show you how they fit together.

Relax. Many of those parts won't be needed at all. As with many European kits, the parts for several related subjects are included on the same sprue, and this sprue with its extra parts is included in all the kits. The task of weeding out the correct parts for the kit you are making is complicated by the fact that there are no step-by-step assembly instructions, only a few drawings of the finished figure. These drawings, however, are detailed and complete, and every part you need is illustrated somewhere.

After opening a Historex kit take the peculiar little strip of tape provided for belting and drop it in the wastebasket; it's difficult to work with and has an unrealistic fuzzy appearance when painted. Paper or card stock

works better. Before proceeding, examine the drawings, then go over each sprue and try to identify each piece. The parts usually are found in logical groups on each sprue — insignia, horse harness, armament, and so on — but every so often one will appear out of context just to keep you guessing. With experience, the identification process is easier, and you'll be amazed at how much you learn about the uniforms and equipment of the period. After half a dozen figures, you'll qualify as a bona fide expert on Napoleonic armies. And if you can't identify a part after 15 minutes of diligent searching, you probably won't need it anyway!

PREPARING THE CASTINGS

After you have identified as many parts as possible, it's time to begin. Set the sprues of detail parts aside carefully in a box and concentrate on the basic body parts. Start by cleaning off the flash, scraping backward with a knife to avoid cutting off spurs or other delicate parts. Trim the soles of the boots and check the fit of the stirrups. Put a fresh blade in the knife and carefully undercut the cuffs of the heavy cavalry boots, fig. 11-6. Resist the temptation to glue anything together at this stage.

Now turn your attention to the horse. Trim off the parting lines, again scraping backward to avoid gouging the surface. Carefully round off all of these surfaces. Also round off the flat

edges where the inner surfaces of the hind legs come together, both front and behind.

Perhaps most important in working with Historex figures is knowing where to make changes. The horse, for example, can be assembled just as it comes in the package; except for the ears, which may need trimming, the fit of the parts is excellent, and you can complete the job in a few moments.

But modifying the horse will make it more realistic. The hooves, for example, are perfectly smooth on the bottom, which is fine when they are planted on the ground but unsatisfactory when the hoof is raised and the bottom visible. To detail the bottom of the hoof, use a sharp knife or small, high-speed cutter in a Dremel tool to cut a notch in the rear of the hoof. Now cut away the rest of the surface, leaving only a rim around the edge and a V-shaped ridge in the center. Don't worry about being neat. You'll cover the edge with a shoe, and the inner surfaces of a horse's hoof are usually clogged with dirt. When fitting the shoe, trim the tiny projections on its smooth side, which get in the way of a proper fit. Looking at the sprue carefully, you'll notice the shoes with two projections are marked "avant" for the front, while those with one caulk are marked "arriere" for the rear, since you are cutting off these projections anyway, this distinction, interesting as it may be, doesn't matter.

Finally, use your hot knife to carve the fringe of hair around the top of the hooves and the longer hair at the fetlocks (fig. 11-6). This is best done before assembly, so that the iron doesn't accidentally melt one leg while detailing the fetlocks of another.

Clean the flash off the saddle halves, sharpening the detail where necessary. The saddlecloth (a saddlecloth goes under saddle, while a "shabraque" goes over it) as provided is often too thick. Scrape with a knife to bevel the inner edges for a thinner appearance (fig. 11-7).

POSING THE HORSE AND RIDER

With the preparation out of the way, you are ready to pose the figure. Historex figures are invariably stiff and awkward looking when assembled straight out of the package, and few modelers ever build one that way. The best Historex figures are conversions, and the pose is the most important element. That said, however, don't get too ambitious with your first effort — limit yourself to a modest change of pose.

A quick pencil sketch can help, but you can just start fooling around with the parts, particularly if you haven't decided what you want to do. Let the figure serve as your sketch pad. You can use plasticene (child's modeling clay) or another tacky material to hold the parts together as you experiment with poses. Check your work from different angles until you have an arrangement you like.

As you experiment, keep in mind a fundamental rule of anatomy: The fleshy parts of the body are free to compress and stretch, but however much the body may twist, turn, and contort, the bones are rigid and remain the same length. The arms bend only at the elbows and wrists, and only in certain directions. The spine may curve and twist, but it does not lengthen. Because the spine runs down the center of the back, figures bending at the waist (either to the side or to the front) bend from the back of the waist. This means you'll have to remove a wedge of plastic from the front, either from the torso or the hips. Because there is usually detail on the front of the torso, it's easier to take this wedge out of the hips.

Reference material for posing is easy: Experiment in front of a mirror. Assume various poses, and note the way your body works. Discover the limits of motion for the wrist, elbow, and knee. As the immortal Yogi Berra once commented, "you can observe a lot just by watching."

Effective posing is largely a matter of deciding what looks right. Pay attention to subtleties. An extra turn of the hand, a slightly different angle

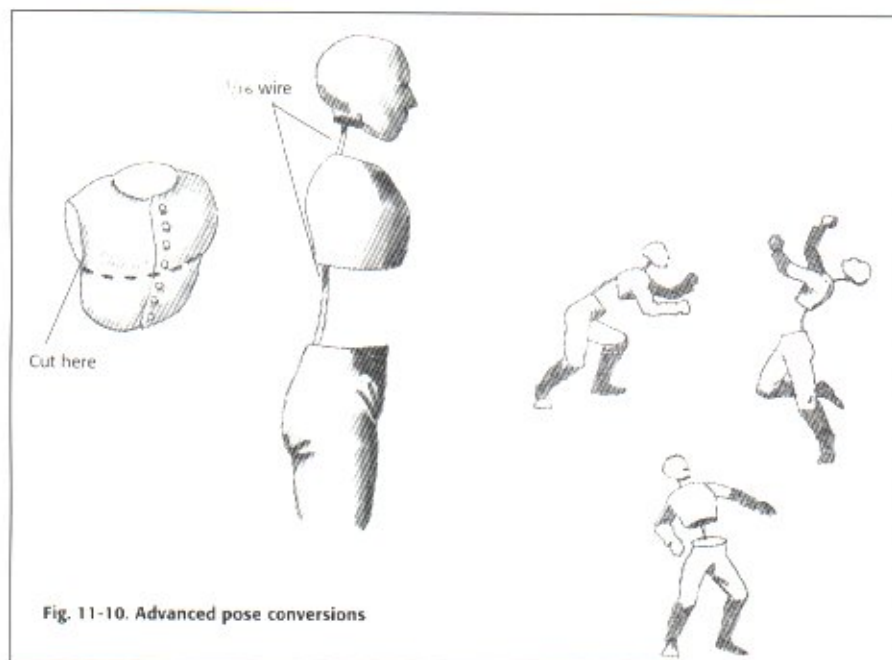


Fig. 11-10. Advanced pose conversions

Fig. 11-12. Bill Horan is a master when it comes to posing plastic figures naturally; notice the subtle shift of the hips and shoulders that gives this Zulu war subject such grace and fluid motion.

for the head, or a subtle shift of balance can bring an otherwise conventional pose to life. Avoid stiffness, particularly in relaxed poses. People at ease are round shouldered, with the head slumped forward. This is particularly apparent in sitting figures, even on horseback. A rider is trained to maintain good posture in the saddle, but a tired trooper who has been in the saddle all day is rarely a parade ground figure. People rarely sit bolt upright, nor do they bend straight from the waist; the spine is almost always curved in a gentle arc from the buttocks to the nape of the neck.

Standing people tend to support their weight on one leg, leaving the other leg bent and relaxed. This throws the hip out on the supporting side; assuming the legs are the same length, the hip above the bent leg must be lower than that on the straight leg. For a nude figure rotating the hips in this manner would require cutting, filing, and resculpting, but with military figures the uniform and equipment hide most of the hip area, so just reposition the legs and make the upper body upright. Note that when a person carries weight on one leg, the supporting foot is directly under the neck and spine. In conversions, this usually means moving the supporting leg in until it's directly under the head.

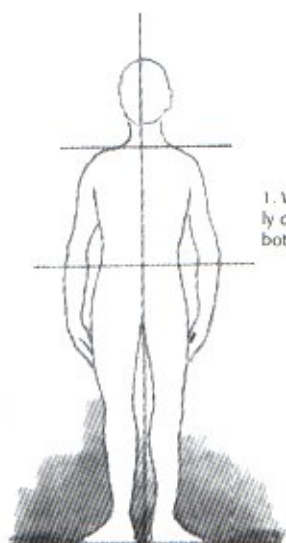
Feet rarely point directly forward; they tend to angle out at a natural



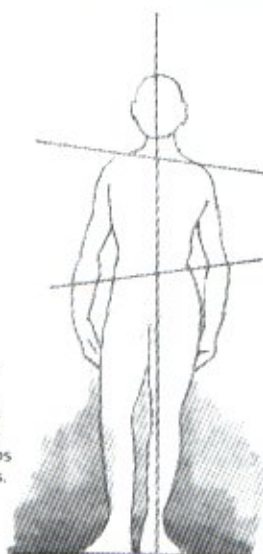
angle of 45°. Feet pointing inward are indicative of an unnatural pose or awkward activity, and can be used effectively for pathos or humor.

Check your pose with the figure on the horse, examining it from all angles. To alter leg and arm positions, cut directly behind the joint, almost but not completely through, as in fig. 11-13. Heat the joint over a candle

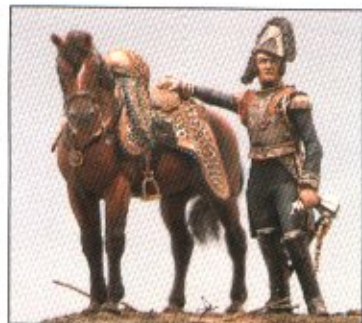
Fig.11-11. Relaxed poses



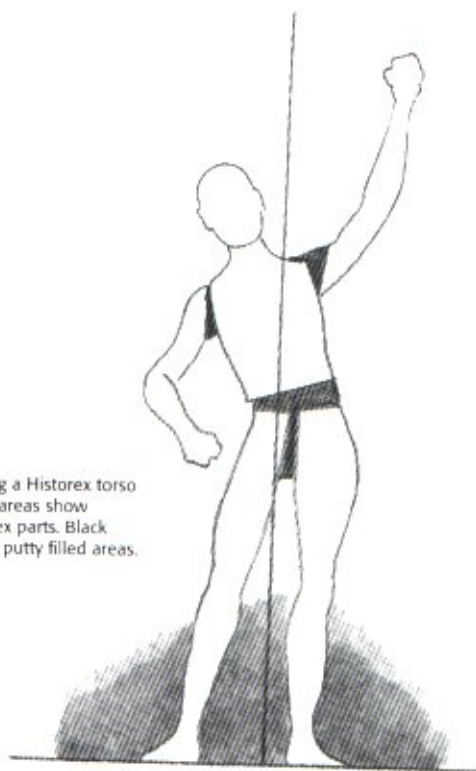
1. Weight evenly distributed on both legs



2. Weight on one leg, the other relaxed. Note counter-rotation of hips and shoulders.



Straight out of the package, Historex foot figures are stiff and unnatural. The legs and hips need to be shifted for a more relaxed and natural position (left).



Shifting a Historex torso
White areas show
Historex parts. Black
shows putty filled areas.

until it is flexible and open the arm. To close a joint, remove a wedge-shaped section, heat, and close it up. Do not attempt major repositioning without making these cuts, because using heat alone will result in "spaghetti" arms and legs.

Horse poses are achieved by interchanging the horse halves and heads. For your first figure you'll have to settle for the horse in the kit, but thereafter you can buy horses, or even individual horse halves separately (spare parts are available from most dealers carrying Historex figures). With 11 different right halves, 11 different lefts, and six different heads, plenty of combinations are possible. Resist the temptation, at least in the beginning, to attempt major conversions. Shift a leg a bit if you want, but leave it at that for the moment.

The next stage is to glue the figure together in the pose you've selected. Restrict assembly to the basic figure until you're certain this is the pose you want. You can add details later.

ASSEMBLING THE HORSE

Begin by assembling the horse. Historex horses are on the slim side, particularly for heavy cavalry mounts, so I like to widen them with sheet styrene (available at your hobby shop). Shim the body with small pieces of sheet plastic at the top and bottom of the hindquarters and shoulders, $\frac{1}{8}$ " for heavy cavalry and $\frac{1}{16}$ " for light, fig. 11-15. Leave plenty of excess plastic showing; after the solvent has set you can grind or carve off the excess without adding filler. Widening the shoulders alters the fit of the neck, so smooth over the gap with epoxy putty. Now add the mane and tail, texturing the hair with a hot knife.

Fit the halves of the saddle to the horse separately, filling with epoxy putty the gap caused by widening the horse. Now use more epoxy putty to build up the horse's rump to the edge of the saddlecloth, to achieve a realistic thickness of cloth (it's easier to build up the horse than to thin down the saddlecloth). If there is a hollow under the front of the shabraque where the cloak is rolled over the saddle holsters, fold a piece of wet tissue three or four times, tie it into a small roll with thread, cut it in half, and poke the halves up under the shabraque on either side.

If the shabraque is sheepskin, you can improve its appearance by texturing with a hot knife. Adjust the temperature so the blade cuts fairly deeply, and carve a series of small, interweaving C and S shapes into the plastic. For best results, don't make all your cuts the same depth or all your marks the same size, fig. 11-16.

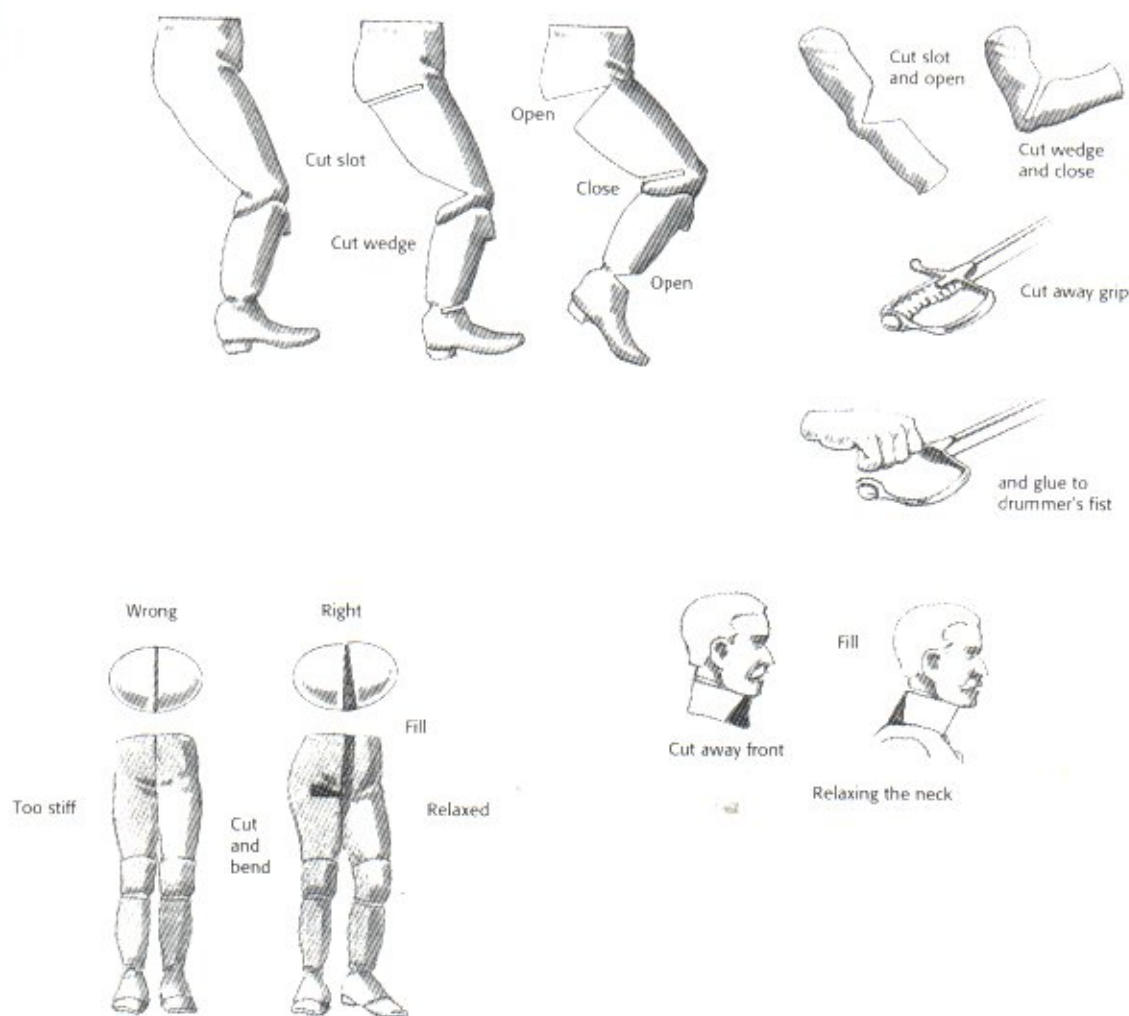


Fig. 11-13. Cutting and bending plastic arms and legs.

ASSEMBLING THE RIDER

As I've mentioned, Historex poses look stiff and unnatural unless you modify them. An important modification is a simple operation to relax the figure's neck. Start by carving back the front of the collar so you can shift the head forward (refer back to fig. 11-13). Then glue the head in place and fill the resulting gap at the back of the neck with epoxy putty. Finally, use epoxy putty to restore any collar detail you may have lost from this operation.

Next assemble the rest of the figure, checking the fit on the horse as necessary. You may have to open the rider's legs slightly to accommodate the wider horse. Don't worry about gaps, especially around the waist and coattails; you can fill them with epoxy or plastic body putty. Assemble only the basic body parts at this time. Belting and other details will be added later. With assembly complete, set the figure on the horse and check the pose

from different angles. Be critical at this stage, when it's still easy to correct mistakes. Make sure the pose is comfortable and that the clothing flows naturally. Never hesitate to take apart an assembled figure and try again if it still doesn't look right.

Hands. Anatomically the hands are the weakest feature of a Historex figure. Many modelers simply discard them and replace them with hands from Airfix multi-pose kits.

Whether you use Historex or Airfix, make sure that hands grasping things actually do, and that the fingers wrap tightly around the object being held. The best way to do this is to use drummer's hands that are already molded into a fist — but cut off the drumstick. To fit a sword or lance, cut away a section of the grip the width of the fist and glue the fist in its place.

The left hand holding the drumstick with only two fingers at first glance appears useless. In fact it's

valuable because this is how a trained horseman holds the reins. Just cut off the ends of the drumstick and carve away the small section molded against the two lower fingers.

Adding uniform details. How much detail you add before painting is a matter of preference. Some modelers like to add parts as they go (leaving the headgear off, for example, until after the face is painted).

I leave all the freestanding detail, such as pelisses, belting, harness, and weaponry, separate until I've painted the horse and rider. I also keep the rider and mount separate until the last possible moment. Carefully check the fit of all detail parts before assembly.

Before installing the headgear, use a hot knife to delicately texture the figure's hair and moustache. Keep the temperature low, and the texture subtle — Napoleonic hussars liked a dramatic personal appearance, but dread-

Using a wire spine

When pose is established, fill the abdomen with epoxy putty.

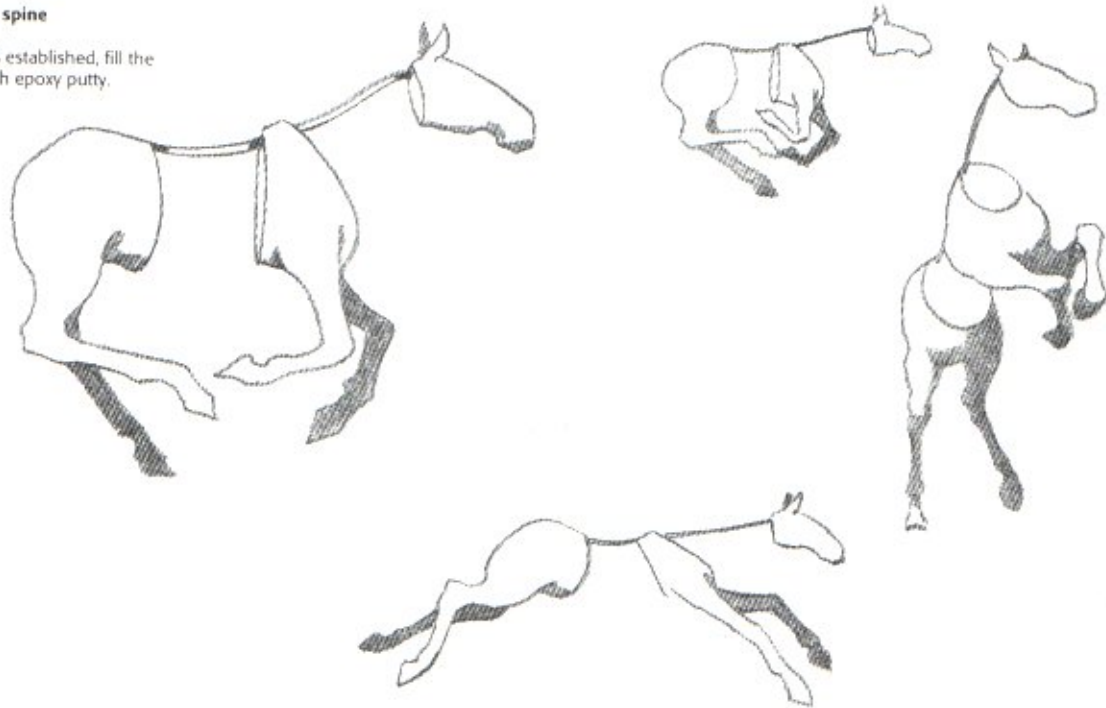


Fig. 11-14. Historex offers 12 different horse halves in various positions, which gives you a lot of poses to choose from without doing any conversion at all.

locks were not part of the act. If you want, you can build up the hair or moustache beforehand with sprue solution, which will take the texture just like the plastic.

Certain pieces, such as the cording on bearskins and shakos and the eagle insignia on shabraques, require bending and/or careful modification for a proper fit. For example, if you assemble a grenadier's bearskin the way it comes in the kit, the plate stands out a scale one inch from the forehead. You can obtain a far better appearance by gluing the plate separately to the man's forehead and then cutting away the bearskin cap until it fits around it, filling any gaps with epoxy putty. The bottom edge of some headdresses stands out too far from the head; in these cases, build up the figure's hair more realistically with sprue solution and hot knife the texture after it has set (figs. 11-17 and 11-18).

The chin chains that come with the czapskas (lancer caps) are excellent, but those provided for the shakos are sometimes too thick and difficult to fit. I make my own with a simple strip of paper. The chin scales for the helmets are also good, but need to be fitted carefully and pinched against the cheeks with cross-action tweezers until the glue has set. Chin straps were secured under the chin only when the soldier was mounted or

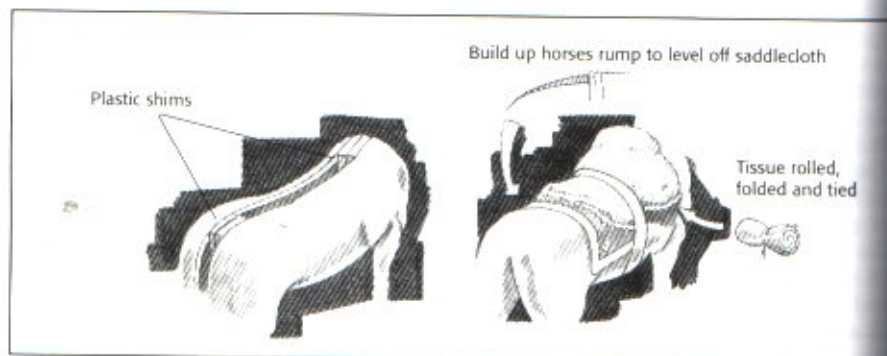


Fig. 11-15. Adding width to the horse and fitting the saddlecloth.

going into action; for ordinary dismounted wear they were tied up on the helmet. Read your instruction sheets for details.

Never be satisfied with an awkward, out-of-scale, or unrealistic appearance; if you can't work out a solution to a problem, set the figure aside until you do.

USING PAPER FOR BELTING AND HARNESS

Paint and shade the face, uniform, and hands completely before adding the belting.

Just about any standard writing paper will suffice, but avoid those that are textured or too thin. Cut strips with a knife and straightedge and carefully check the fit. Wetting the paper will make it more flexible, but don't overdo it; over-damp paper will shred, tear, and wrinkle unnaturally, clinging to the forms underneath.

Secure the paper to painted surfaces with white glue. To position small plastic buckles on the straps and slings, pick up the buckle on the tip of your knife, add a drop of super glue, and gently touch it in place.

When putting the shoulder belts on a figure, you can get a more natural fit by doing the front and back separately, joining them at the shoulder under the epaulet or shoulder strap. You also can improve the fit by cutting the belting on a curve, rather than straight, fig. 11-19.

Now you'll add sword slings, sabretaches, and final details to the rider. Paint these subassemblies first, remembering that the inside of the belts should be a light cream color.

Your figure will look better if you attach the stirrups to the rider instead of the saddle. Fix the stirrup leathers to the stirrups, paint them, and glue the stirrups to the soles of the figure's

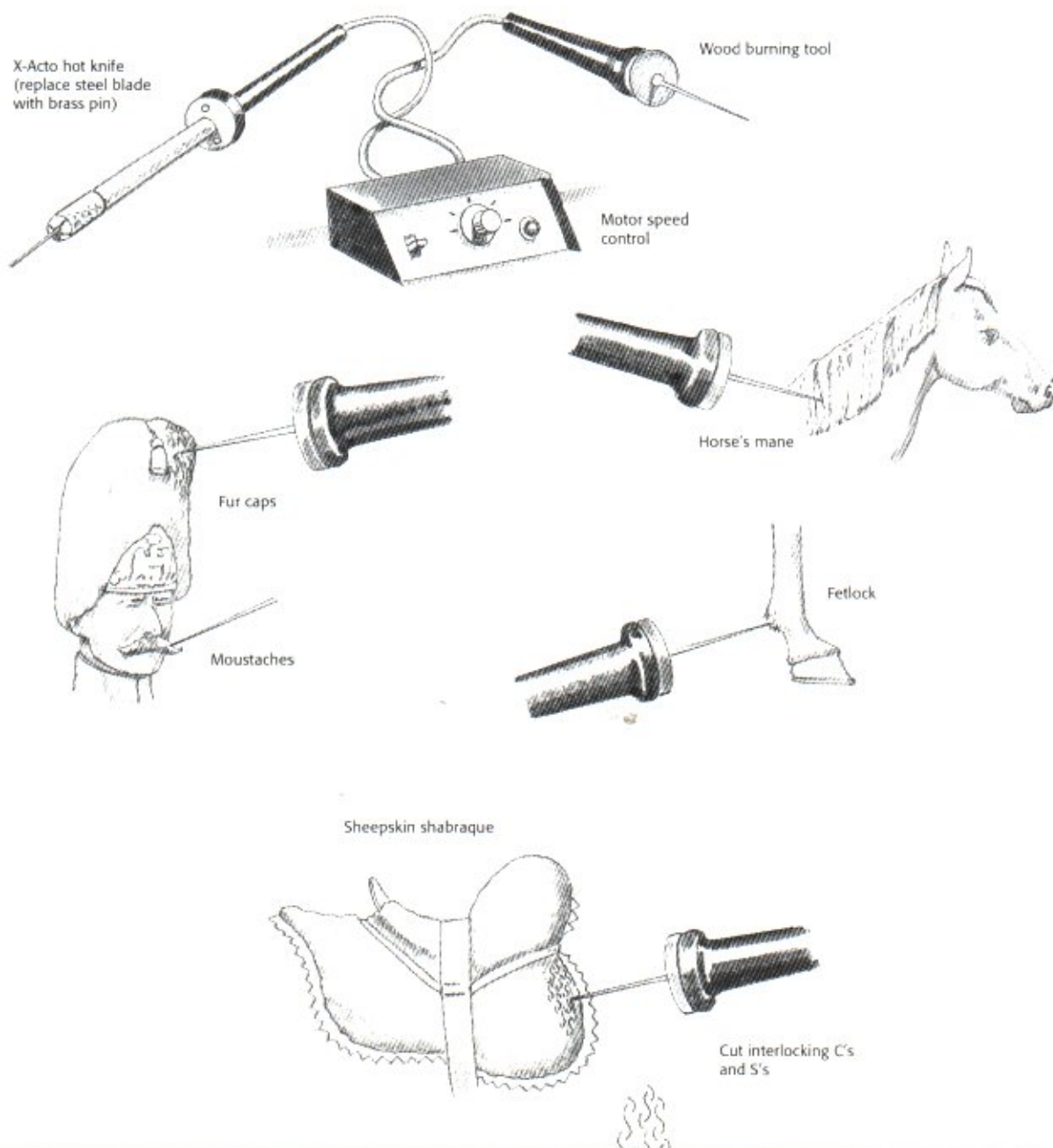


Fig. 11-16. Hot knifeing the sheepskin texture on a shabraque.

boots (at the ball of the foot, not the instep). Then run the leathers up along the inside of the boot, and glue them in place where they won't be seen.

Glue the figure to the saddle, making sure no daylight shows. If it does, adjust the fit or fill the gap with epoxy putty.

Blacken a piece of paper with a marker pen, and use a straightedge and a knife to cut narrow strips for the reins, fig. 11-20. The holes in the bit rings are too small to accommodate a proper rein, so insert a small rattail file and gently rotate it backward (with the grain of the file) to slowly enlarge the hole. Loop the ends of the

reins through the holes and secure them with white glue so they're still free to swivel on the rings. Add the buckles to each rein with super glue. Glue the bits to the horse's mouth, angling them well forward, almost parallel with the mouth line. Contact cement or Walther's Goo is excellent for this job, giving a flexible bond that is less likely to break. Measure the distance from the bit to the rider's hand, add half an inch, trim off what's left, and glue the ends to the rider's hand. Figure 11-20 shows the proper arrangement. When the glue is set, moisten the reins with water to soften

the paper and lay a blunt instrument such as a paintbrush handle across each one to give it a natural hang.

MAJOR POSE CONVERSIONS

After you've built several Historex (or for that matter Airfix) kits you'll want to try more ambitious poses.

Up to a point, major pose changes can be accomplished by extending the cutting and sectioning methods used for minor changes. I've used this method for much of my work with Historex. It's surprising how far forward you can bend a torso at the waist just by removing a wedge from the

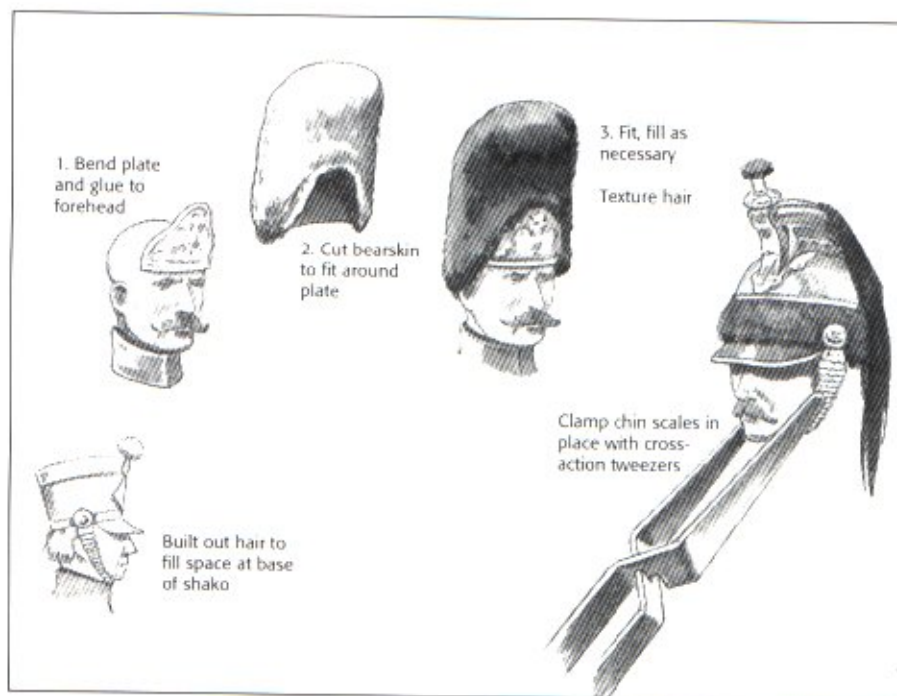
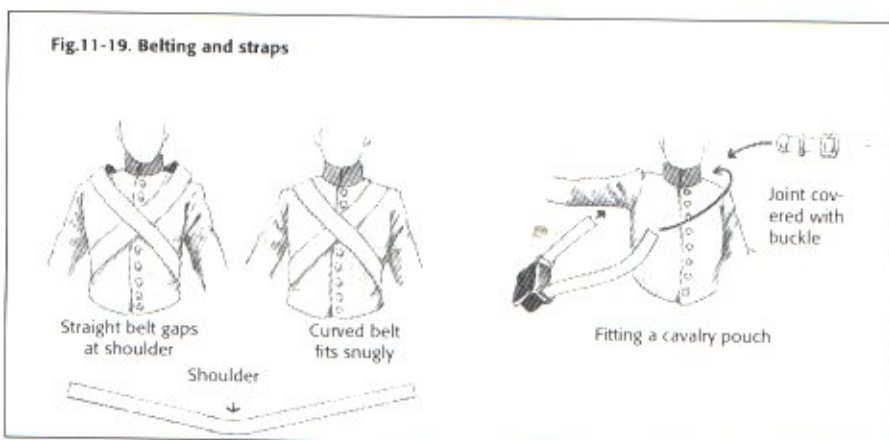


Fig. 11-17. The proper way to fit bearskins and shakos to the head.



waist, while almost any arm position is possible by cutting and regluing at the shoulder. The limitations, however, quickly become apparent. You cannot twist the body in any way that interferes with the detail on the chest without resculpting the detail. When the arm is raised above shoulder level, the shoulder rises too, and on hussar jackets the chest braid shifts accordingly. Similarly, your figures will bend stiffly and erectly from the waist with no curve to the spine.

Action poses. Extreme action poses are dramatic. Everyone wants to try posing a hussar charging at the full gallop, saber raised and equipment flying.

Because action poses depend less upon subtlety they are easier to make than relaxed poses. Here are a couple of tricks. First, throw the figure off balance to achieve a successful impression of violent motion. When viewers

see a figure in a pose that couldn't be held for more than a split second without falling over, they immediately comprehend that the figure is moving; the more extreme the unbalance, the more violent and dramatic the implied motion. The second key to action posing is exaggeration. By carrying motion just beyond the limits of normal body extension, you create a sense of muscular imbalance. As a practical demonstration, consider the calisthenic known as the "trunk twister," in which the upper body, with arms extended to the sides, is turned as far as possible, first to one side and then to the other. For a split second, momentum twists the torso farther than it can normally go, and then the body springs back within the normal limits of motion. For dramatic impact, pose the body just beyond the limits of relaxed motion, but don't cross the delicate border between hyper-extension



Fig. 11-18. This figure of a Grenadier of the Old Guard carrying Napoleon's son, the King of Rome, is based on a true incident. Note the way the bearskin fits the grenadier's forehead. Ironically, the baby's head started out as the Empress Josephine's, whom Napoleon divorced because she could not have a child! The rest of the baby's body is built up with putty and sprue solution.

and contortion.

The techniques for achieving action poses are the same ones you've already used: Notch, heat, and bend the arms and legs, and take a wedge out of the waist. A more fluid motion of the upper body can be achieved if you are prepared to resculpt some detail. Lapels and buttons are easy, but hussar's braid is not. You'll need to cut away the lower part of the trunk, leaving only the upper rib cage area. Drill holes at the back of this piece and the waist, and join the two by a wire rod you insert into these holes. Bend this wire "spine" to the desired pose and fill the empty space with epoxy putty. Resculpt the details using an unmodified torso as a guide, and the job is complete, fig. 11-22.

Posing Historex foot soldiers. Properly relaxing a Historex standing figure is more difficult than an action pose. I've already talked about how the hips rotate when a figure stands at ease. The Historex system of interchangeable body parts requires all hips to be in the same position, that is to stay level. To swivel the hips, cut a wedge out of the supporting hip, heat it, and close the gap; this will throw the point of the hip out and bring the supporting foot under the figure's

neck. Make a similar cut in the hip of the other leg, and open it slightly. Test the fit. Don't worry if the halves don't match perfectly. Ignore the gaps and judge the overall relation of the legs and hips to each other. If they look right, cement them together and fill the gaps with epoxy putty. Historex figures seem narrow through the hips, so even with figures standing at attention shim the space between the legs to widen the hips slightly. With walking figures cut the trailing leg through at the hip and rotate the lower part so the heel of the trailing foot is almost directly behind the heel of the front foot, fig. 11-23. If this seems odd, walk across the room and you'll see how it works.

Action poses with horses. Horse poses can also be modified, sometimes with little effort. The easiest way is to cut the horse halves into two parts at the belly. This lets you combine quarters instead of just halves, providing more possible combinations.

Historex offers many galloping poses, but after a while they seem staid. Because all the horse halves have to be interchangeable, the horses' haunches are all in the same neutral upright position. In fact, the haunches

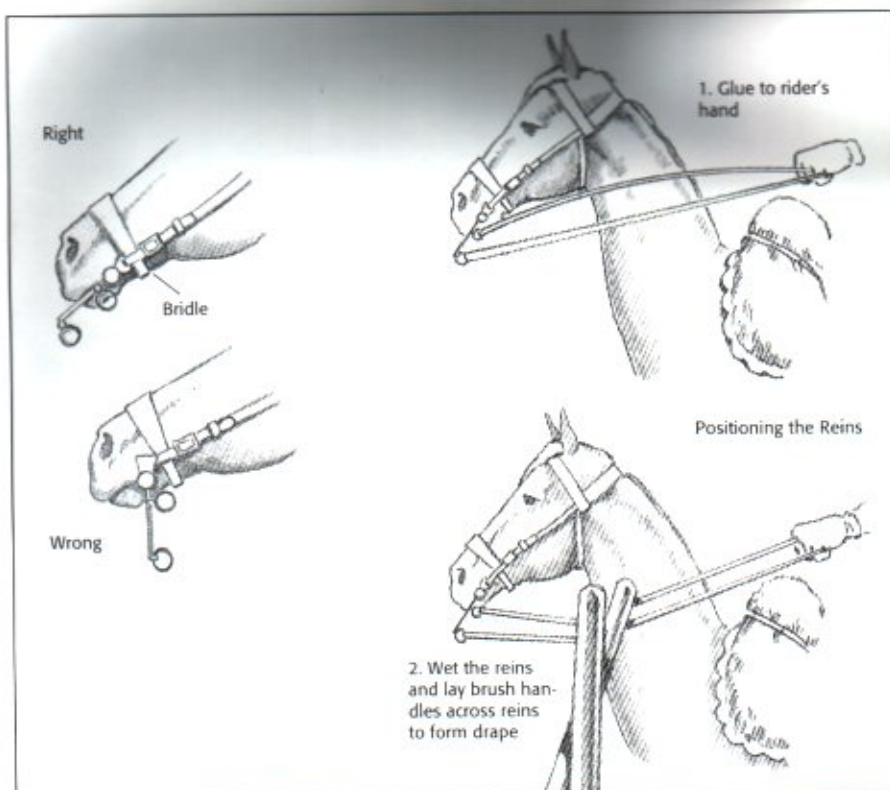


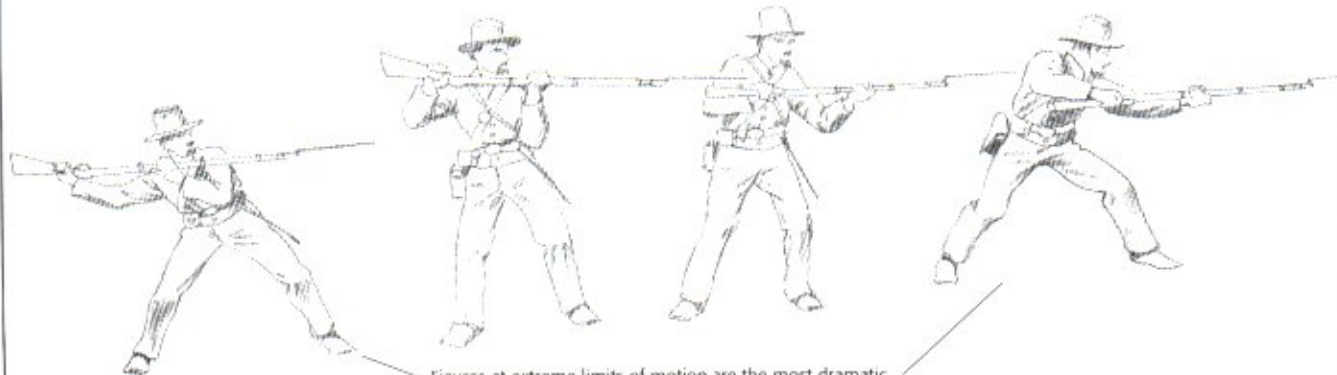
Fig. 11-20. Fitting the stirrups and reins.

Fig. 11-21. Keys to action posing

Imbalance:

Balanced figure gives little sense of motion

Off balance figure really seems to be running



Figures at extreme limits of motion are the most dramatic



Fig. 11-22. For extreme action poses, connecting the torso to the legs with a flexible wire spine makes posing easier, and the positions more natural. This figure, although a 100mm scratchbuilt instead of a Historex, was posed in this manner.

of galloping horses swivel forward and back according to the motion of the legs. The artist Frederic Remington knew this and liked to exaggerate this rotation, bringing the rear hooves so far forward that they are actually in front of the front hooves. This is artistic license, but it works; no artist ever captured the spirit and motion of a galloping horse better than Remington.

To achieve this fluid motion with a Historex horse cement the halves together, then cut away the entire center section of the horse, joining the front and rear halves with brass rod (refer back to fig. 11-14). You can then bend the brass "spine" to the position you want. Carve plastic away from the center section you removed until it fits back in place. Glue it in and fill the gaps with epoxy putty. There is no musculature to speak of in this area, much of which is covered by the saddle anyway, so any resculpting is well within the abilities of most modelers.

You can apply this brass rod technique to the neck, swiveling the head up, down, or to either side. The difficulty is that the musculature of the neck is more complex and changes from one position to another. You will have to resculpt this detail. Other Historex necks are an important and useful guide, but consult a book on horse anatomy to understand what you are doing.

Manes and tails for galloping horses. You can always use the manes and tails provided in the kits, texturing them with a hot knife.

For galloping horses, you have the option of using theatrical crepe hair

(see Chapter 6). In addition to the blond color used for tall grass, you can buy brown, gray, or any color human hair comes in. I have some streaked gray that works well for grey horses.

Because crepe hair comes in braided sections, the first step is to straighten it. Unravel several inches and wet it. Stretch the wet section out on a tabletop, placing a heavy weight at each end to keep it taut. It will be straight after it dries.

Making the horse's tail is fairly easy. Cut a section of straightened hair slightly longer than needed and form one end to a point with white glue or tube plastic cement. Let it dry. Drill a hole in the horse's rump to receive it, and glue the tail in place with epoxy or tube-type plastic cement. When the glue has set, wet the tail again and use blocks, pencils, or anything else handy to hold the tail in position; it will stay in this position when dry. When it is dry, trim the tail and shape it with scissors.

Manes are more difficult. The first step is to use a Dremel slotting saw to cut a slot along the horse's spine to receive the hair. Cut hair at least twice as long as needed, wet it, and glue the wet hair into the slot with tube plastic cement. When the glue has set, form the wet mane as you did the tail, tying it down to the neck with thread if necessary. Trim with scissors and the job is done. I'm sure you can appreciate that while this method is effective on galloping horses with flying manes, it is all but impossible with standing horses with the mane at rest. I used to use crepe hair tails and plastic manes, but it makes more sense to



Fig. 11-23. A good example of a simple standing Historex figure by Jerry Hutter. Notice the subtle counter-rotation of the hips and shoulders.

have mane and tail of the same material.

Facial expressions. Most facial expressions can be achieved simply by painting them on. One exception is an open mouth. Historex offers open-mouthed heads, but you can make your own. Drill a $\frac{1}{16}$ " hole in the chin, leaving the upper lip intact. Because a shouting person curls the upper lip back, revealing teeth, carve away a bit of the upper lip. If you don't the figure's mouth will appear relaxed, and he'll look like his jaw has dropped in astonishment. Carve back the corners of the mouth, too, so the opening can be seen from the side; otherwise, he'll look like he is singing. Rebuild the jaw

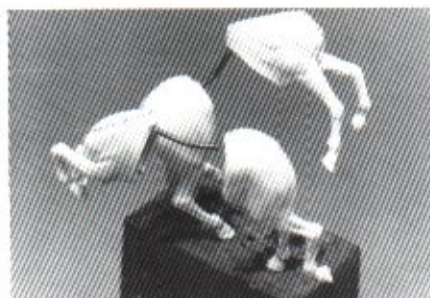


Fig. 11-27. Bill Ottinger clearly had fun doing this Historex drum major showing off his balancing skills. Creative work like this is what keeps the hobby fun, for both the modeler and his audience.

(From top) Fig. 11-24. Dividing and recombining a Historex horse in quarters allows greater flexibility of movement. Fig. 11-25. A horse with a wire spine. Fig. 11-26. Once the pose is set, the abdomen can be put back in place. The gaps can be filled with epoxy putty, and horse will be ready to paint.



Fig. 11-28. For the mouth, drill a 1/16" hole in the chin, leaving the upper lip intact.

with epoxy putty. Put a tiny ball of putty in the mouth and use the point of your knife to flatten it on the roof of the mouth to form the upper teeth; the lower teeth don't show as much and can be painted in if needed.

Spare parts. I've mentioned spare parts several times in this chapter. You'll always have a handful of parts left when you've finished with a figure, and these will quickly form the basis of your spare parts collection. In fact, experienced modelers tend to look on the kits not as figures to be assembled, but as source packets for parts, which can be adapted to their own designs.

Many Historex modelers (myself included) don't work from kits at all, but from little drawers full of parts and sprues; we buy kits periodically according to the parts we need to replenish our stock. A good collection of Historex parts can be very useful, not only for Historex figures, but for other 54mm and even 90mm figures.

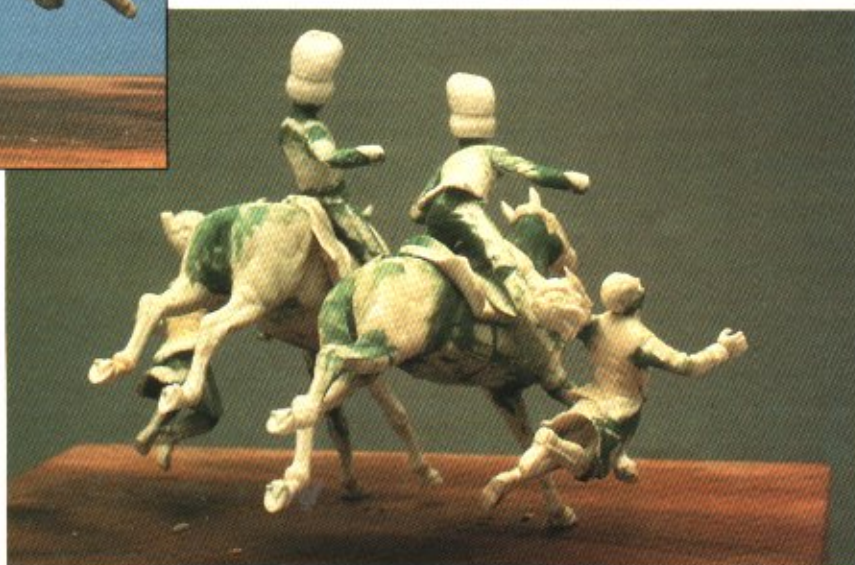


Figs. 11-28 thru 11-32. The charge of the Scots Greys and Gordon Highlanders at Waterloo. An example of the kind of extreme animation possible with plastic figures. The Highlanders are supported in the air by pins connecting them at the wrist to the riders' legs. The entire ensemble is supported on one of the horse's legs, a weight that could never be supported this way in metal. In plastic, the leg is reinforced with wire, but has no need of additional assistance. The in-progress pictures (opposite page) show the use of "Green Stuff" to fill gaps and smooth contours.





(Below) Fig. 11-33. Another example of dramatic posing in plastic, this time of "Roman riding," an exercise of horsemanship popular in the cavalry. Here, both horses and the rider are supported on a single horse's leg. The horse in midair is actually suspended from the rider's boot — the rider is supporting the horse, not vice versa!



MAJOR CONVERSIONS

A major conversion is a change of subject so complete that nothing remains of the original figure except the face and hands; a good example is the transformation of a World War II “desert rat” to a Napoleonic highlander. There is no point in kidding ourselves; this is advanced work, not something average modelers can plunge right into. Still, it is within the realm of possibility for many people, and you might be one of them. Most modelers work their way up gradually from minor conversions. Major conversion work forms an important learning step between minor conversions and scratchbuilt figures. Start with a well-proportioned figure with a good face and hands and practice and develop your sculpting skills on the other parts of the figure. After you have experience in this area, it's much easier to make the leap to a figure that is entirely your own. There is, on the other hand, no compelling reason to go beyond conversions, and many modelers are happy never taking that final step into scratchbuilding.

PREPARING THE CASTING FOR A MAJOR CONVERSION

Although some modelers prefer metal, most extensive conversions are in plastic, which is softer and easier to work with. Whichever material you use, first establish the pose, fig. 12-2. With metal figures this means cutting and repositioning the existing arms and legs; with plastic figures, whether Historex or Airfix multi-pose, it means selecting those arms and legs closest to the pose intended and modifying them until the position is what you want.

Next remove all extraneous surface detail. You don't need to shave the entire figure down to a nude form; any parts that are still useful, such as shoes, trousers, and sleeves, often can be retained without modification. But anything that won't fit — belting, buttons, and in some cases even clothing wrinkles — should be taken off at this time. With plastic this is a fairly simple operation with a knife or steel cutter in a Dremel tool. This technique also works on larger metal figures, but it's a long and tedious task; the job

goes faster if you use a Dremel tool with a Merit sanding disc (fig. 12-3). These discs snap on and off a specially designed holder, and a coarse disc can remove lots of material in a few seconds. Then smooth the surface with medium and fine discs; a metal figure can be shaved down almost as fast as a plastic one.

Now is the time to reposition the figure. Minor pose changes can be

made as outlined in Chapter 10 and 11. But let's talk about radical surgery, particularly as it applies to metal and large resin figures.

It's important to keep the motion and pose fluid, which is difficult when you're working with rigid metal or plastic parts. It helps to make more use of brass wire at the knees, elbows, and spine. After you have shaved down the detail so little is often left of



Lane Stewart

Fig. 12-1. Joe Berton's “Lucky Lindy” converted from Airfix multi-pose World War II figures. Only the faces remain of the original figures — everything else has been reworked. Fig. 12-2. Major conversions in metal are more difficult, but hardly impossible. This 90mm British Hussar officer by Mike Tapavica uses a Poste Militaire hussar torso, but little else.



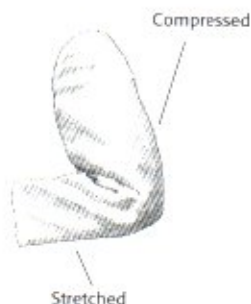
Fig. 12-3. The Merit clip-on sanding disc is an essential tool for converting metal figures. The coarse disc removes the old detail in seconds, while the fine disc smooths the surface for redetailing.



Fig. 12-4. A Russian sniper, a 90mm conversion from a Verlinden 120mm German WW2 officer with a U-boat head by Bob Knee.

the arms that it's easier to replace them with simple brass wire "twigs." This is often simpler than cutting wedges out of the elbow and armpit and reassembling the arm. When working with wire arms, be careful with proportions—use the original arms as your guide in locating the shoulder, elbow, and wrists. Wire "twigs" also can be used for the legs, but you'll have to build these up considerably later. Easier, especially on larger figures, is to remove sections of the leg at the waist, knee, and ankle, leaving a disconnected thigh and calf. Drill through the length of each of these pieces and run wire rod through them. Glue them in place, leaving gaps for the knee and ankle. You now have a robust leg easily bent at the knee and ankle that can be repositioned several times without cracking or breaking. A similar trick will help you reposition the torso. Unlike knees and ankles which bend at a specific point, the spine curves like a spring. Cutting and resectioning a torso is tedious. There is rarely any detail to save, so cut below the rib cage and insert a brass rod between it and the hip section. You can bend this wire easily in any direction and fill the belly area quickly with epoxy putty.

Wrinkles occur when fabric is stretched or compressed between two points.



Wrinkles naturally form in irregular zig-zag patterns.

Typical wrinkles on:



A standing figure

A running figure



Many wrinkles indicate thin fabric, fewer wrinkles, thick fabric

Fig. 12-5. Clothing wrinkle patterns.

Take your time in posing the figure; mistakes cannot be easily corrected later. Check it carefully from all angles, and look at it in a mirror to get a fresh perspective. Make adjustments if necessary and check it again. Don't move to the next stage until the pose is what you want. If necessary, go back and read the sections on posing in Chapter 11.

With the pose firmly established, you are ready to start building up the new detail. Most of the materials are already familiar to you: epoxy putty, brass rod, solder wire, sprue solution and straight pins. Of these, you'll use

the epoxy putty the most.

CLOTHING FOLDS AND WRINKLES.

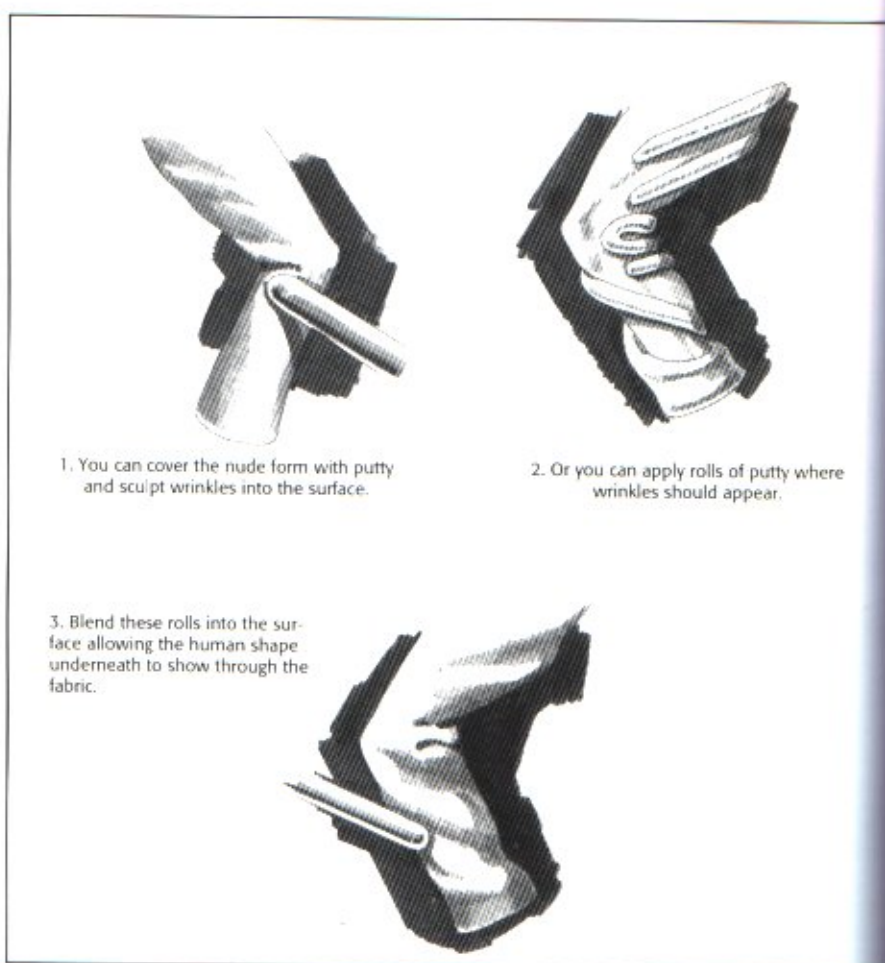
Because the figure is largely shaved down, this will be your first major experience with clothing wrinkles. Let's stop for a moment and consider the nature of fabric, and how it folds and creases under stress. Fabric in its unstressed state is smooth. Wrinkles result from two causes: stretching and compression. If, for example, a figure is bending forward at the waist, the front of the jacket is compressed and bunches together, creating a series of horizontal folds, fig. 12-5. At the same



Fig. 12-6. Examples of clothing wrinkles. Notice the zig-zag nature of the folds, the way the fabric is stretched between stress points, the thicker folds on heavier material, and the way the shape of the body underneath is still apparent.

time the back of the jacket is stretched, creating simpler patterns of folds, often in the form of "crow's feet," wherever the fabric is stretched between two points. Uniforms are designed so that a soldier standing at attention will show few wrinkles; when he moves from this position, however, this perfection vanishes and the material reflects the stress of the new position, fig. 12-6. A raised arm stretches the material between the shoulder and wrist; a bent leg not only stretches material between the buttocks and the top of the knee, but also compresses it at the back of the knee.

Study your own clothing and that of the people around you, observing how



1. You can cover the nude form with putty and sculpt wrinkles into the surface.

2. Or you can apply rolls of putty where wrinkles should appear.

3. Blend these rolls into the surface allowing the human shape underneath to show through the fabric.

Fig. 12-7. Sculpting wrinkles.

it behaves in different positions. Notice the way your trousers stretch from the crotch to the knee when you sit, and how your shirt bunches at the waist when you bend. Fabric is stressed not only between specific points such as the shoulder and the elbow, but also between broader surfaces, such as the dome of the knee and the side of the upper leg. Fabric stretched tightly across a broad surface such as a figure's back may not show wrinkles at all, but as soon as the tension relaxes at the edges of that surface wrinkles begin to appear.

Wrinkles naturally form ridges and valleys. These ridges interconnect, running smoothly from one to the next, in a series of irregular cascading zigzags.

Heavier fabrics have fewer wrinkles than thin fabrics. A cotton shirt may have a dozen folds at the crook of the arm, while a heavy wool jacket may show only two or three under the same circumstances. This is important to remember when working with uniforms. Too many wrinkles will make a figure's heavy overcoat look paper thin, while too few can make a light tropical uniform look like a blanket.

Sculpting (which is what you're doing at this stage) is largely a matter of observation. Be aware of what you see, and study photographs or a model whenever possible, particularly if you are having difficulty getting something right. If the bunching of fabric at the elbow is giving you trouble, put on a jacket of similar cut and weight, bend your arm to that position, and look in a mirror. Take some instant photos if you can. You'll soon discover what's wrong.

Now that you have a theoretical basis, let's get down to a practical example: an arm bent at the elbow to a right angle, the forearm parallel to the ground. Analyze the stretch and compression points. The material is stretched from the top of the wrist, across the muscles of the forearm to the point of the elbow, and to a lesser extent from the elbow to the shoulder; the fabric is bunched at the crook of the arm.

If you're going to build an entire sleeve, shave the arm to follow the general contours of a bare arm. Cover the entire sleeve area to the desired thickness with epoxy putty; a tighter sleeve calls for a thinner application, a looser sleeve for a heavier one.

General purpose tools:

1. A double-ended tool with different pencil points at each end. A true general purpose tool, the one I use most.

2. Similar but with blunted points, used for clothing folds and subtle facial work

3. A machinist's scriber, for fine detail work.

4. Another double-ender, this time with a curved spoon shape for clothing wrinkles.

Special purpose tools:

1. Double wheel for parallel lines

2. Pounce wheel for dotted lines

3. Peter Twist devised this nifty tool for chain mail.

4. Fabric stretched over a tool or finger for texture

5. Square tool for making buckles

Concave solid center section

Officer's lace

Shako plate

6. Custom photoetched brass tools to press into soft surface (mounted on brass rods).

Fig. 12-8. Special purpose sculpting tools

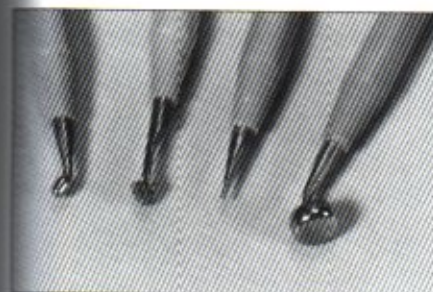


Fig. 12-9. Sculpting tools are where you find them. These tools were originally designed for use on mimeograph stencils.

Now use a pointed sculpting tool to press in wrinkles. I usually start with the bunched folds at the crook of the arm, working from the horseshoe loop at the center out across the smaller folds radiating from it. Remember the observation about the zigzag connection of the wrinkles. This is why you use a pointed tool; just pressing it into the surface of the putty from different angles creates just the ridges and valleys you're looking for. With practice you'll find it surprisingly easy, and the zigzag pattern becomes almost second nature.

When you're satisfied with the elbow, move to the forearm, adding the wrinkles that stretch from the top

of the wrist to the point of the elbow. These wrinkles radiate from the elbow forward toward the stress points along the top of the forearm, fig. 12-7, but they can be tricky as they curve across the muscles of the forearm. Clothing never completely conceals the form underneath it; that form often can be discerned in the valleys between the wrinkles. Sculptors working on larger figures often find it easier to sculpt the nude form and add clay "sausages" where the wrinkles of the overlaying fabric will be. They then can smooth out the sausages, shape them into wrinkles, and have the forms underneath show through. This is difficult in miniature, but at times this is the easiest and fastest technique. At other times, it's enough just to be aware of the shape underneath the material, and arrange the depth of your folds to reveal it.

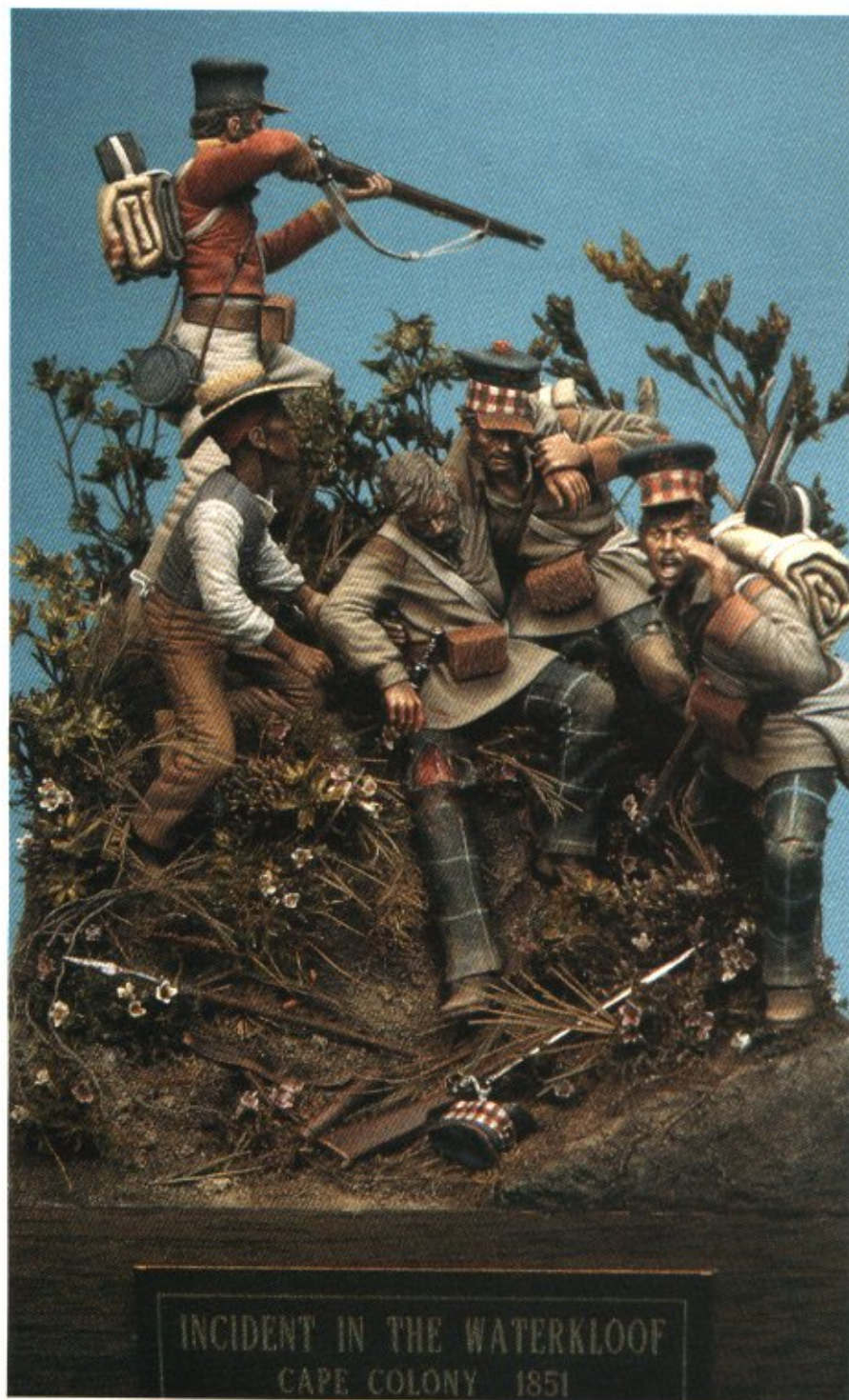
SCULPTING TOOLS

The simple pointed tool and its smaller brother are flexible enough for all of the clothing work. You also can use the smaller one (the machinist's scriber) for other jobs such as texturing fur and even a certain amount of detail sculpting. Detailing with a tool like this is mostly a matter of moving the material around with the point of the tool until it looks like a shako plate, helmet boss, or whatever. This may sound gloriously imprecise, but

there is no way to be more specific. It's all a matter of developing your eye through practice. That said, most sculptors fall back on a variety of tools, often improvised and home-made, for specific detailing tasks. Some of these, and their purposes, are shown in fig. 12-8. Such tools are helpful for texturing and repetitive patterns, such as scale armor. A particularly ingenious device is one Peter Twist designed for simulating chain mail — simply pressing it repeatedly into a coating of epoxy putty gives a detailed series of links unachievable in any other way. In this respect sculpting is a challenge to your ingenuity — if you're having trouble getting the effect you want with the tools at hand, try to design a special one. Keep a particular eye out for items (such as the grooved pattern on a pen, or the knurled knob of a camera) that can be pressed into the surface of the putty to make textures or patterns.

SPECIAL PROPERTIES OF EPOXY PUTTY

Learn to take advantage of the special qualities of any material you work with. There are many brands of epoxy putty, each with its own texture and properties, which may make it better suited to particular jobs. Duro Epoxy Ribbon, for example, is stiffer and holds fine detail better than other putties, making it particularly useful for



Figs. 12-10 to 12-13. Bill Horan has developed the major conversion to its highest form. Bill started out using Airfix multi-pose figures, but he eventually found it easier to work with Duro Epoxy Ribbon on a paperclip wire armature. The only commercial parts in this grouping are the faces (by Roger Saunders) and the hands.

smaller figures. Bill Horan uses it almost exclusively for his conversions, figs. 12-10 to 12-13. The Duro also has a unique, slightly rubbery consistency when it is set, making it ideal for delicate projecting detail that might break off if made with other materials.

As mentioned, epoxy putty is soluble in strong spirits, such as some forms of lacquer thinner and plastic

cement. This means that you can smooth out a sculpted surface by brushing it with thinner. You can even mix putty and thinner in a small glass to form a thick, brushable solution similar to the sprue solution discussed in the last chapter.

Another useful property of epoxy putty is that it sets up gradually over two hours. For certain sculpting jobs,



especially fine detail, the material can be difficult to manage when it is too soft. If you wait 30-60 minutes before starting, the firmer consistency can make the job easier.

A wonderful variation on this idea is a technique I often use for making thin sheets of epoxy for capes, coat-tails, and even flags. Take a polybag, cut off the ends and one side (forming

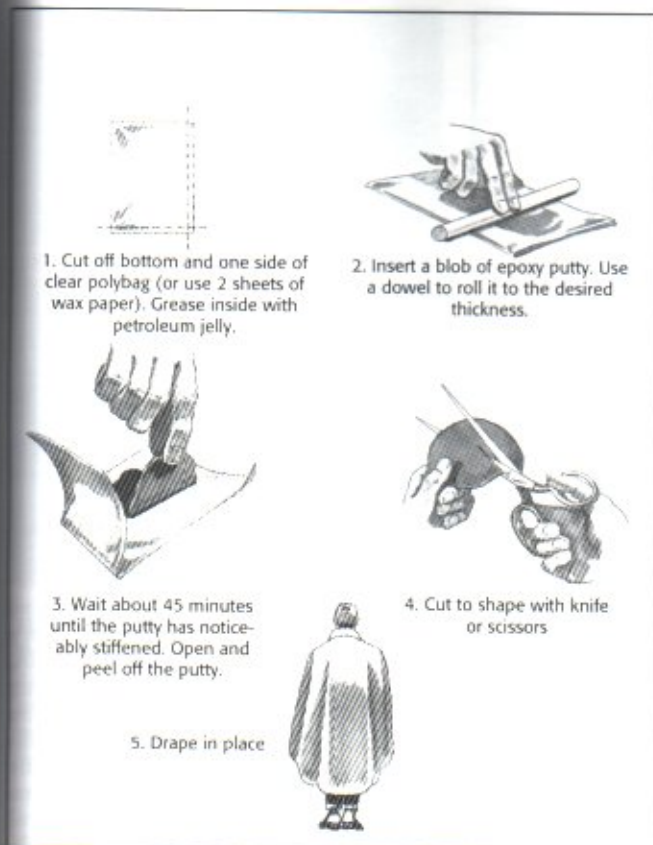


Fig. 12-14. Rolling epoxy putty in sheets.

a sort of booklet), and grease the inside with petroleum jelly. Insert a flattened blob of freshly mixed putty between the sheets and roll it out smooth with a pen or sculpting tool, rolling first one direction and then the other. You can make it fairly thin, but if you get much thinner than a sheet of .020" plastic it will break too easily when dry, fig. 12-14. The easiest way to judge the thickness is to hold it up to the light; you should be able to see light through it, but not too much. After an hour pick up the flattened material and test it occasionally as it starts to stiffen. When it is noticeably firmer but still flexible, open the sandwich and carefully remove the sheet of putty. Use a hobby knife (or, if it is stiff enough, scissors) to cut out the pattern you want. Carefully drape the sheet on the figure. Use your sculpting tool to form flowing folds in the material, and use anything handy to prop the whole thing in place until the putty has set. Because the adhesive properties of the half-cured putty are less than normal, run super glue into the joint to keep it from separating later.

This is a wonderful method for making flags. You can have them blowing dramatically in the breeze, drape them over a figure's arm, or cut realistic bullet holes in the fabric, fig. 12-15. You can add a sculpted fringe

when the putty has set.

USING OTHER MATERIALS

Epoxy putty is remarkably versatile, but for some things other materials work better. For example, rolled sheet lead strips work better for belting, straps, and even the soles of shoes. Buckles are often more easily bent out of brass or lead wire.

Thin solder wire is particularly handy. It can be twisted to form rope and braided into shako cords, and also can be glued to the figure to form piping on the seams of uniforms, fig. 12-16. You can special order solid solder wire (no resin core) in any size you want from a solder supply house; a one-pound spool will last several modelers a lifetime. I have a roll of solder .015" thick I've used for years, and I swear by it. In fact, I keep an assortment of solder wire and flattened strips in a box by my workbench. I need it. You can make buttons by rolling tiny balls of epoxy putty and flattening them in place with the blade of a knife, but it's hard to maintain a uniform size. An easier way is to use pinheads, cutting the shafts to about 1/8" long and inserting them in holes drilled in the figure. I keep an assortment of different pin sizes near my workbench.

Other materials can be used for capes and coattails, too. For smaller

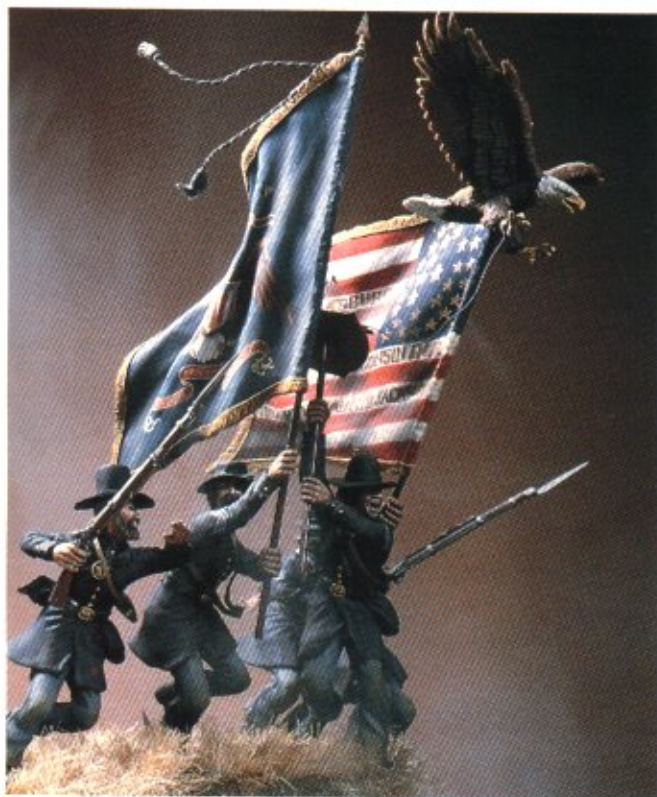


Fig. 12-15. The 100mm flags in "The Union Forever!" were made of epoxy putty. The eagle is suspended by a wire securing his wing to one of the flagstaves.

figures, such as 54mm, you can apply tissue paper to the figure wet and stiffened with a coat of white glue. Several applications of sprue solution will diminish the telltale texture of the tissue. Vary the layers of tissue according to the thickness of the material; two or three ply of tissue is sufficient for a thin cotton shirt, but six to eight may be necessary for a thick wool coat or blanket, fig. 12-17. For larger scales, the texture of the tissue is harder to hide, so use the same technique with actual fabric. You'll want a smooth and tightly woven material, such as silk, that won't show any telltale texture. As with the tissue, apply it wet and coat it with white glue to stiffen it, fig. 12-18. Some modelers find it faster to apply it dry and then give it a coat of super glue. This gives you a rigid form in seconds, but where speed is gained, accuracy can be lost. If you're not accustomed to working fast, the white glue method may be more convenient. In either case, the resulting form can be given body, smoothness, and strength by brushing on several coats of epoxy putty solution.

OTHER SCULPTING MEDIUMS

Epoxy putty offers distinct advantages to the miniature sculptor: Its working consistency stiffens slowly as it sets, it sets rock hard at room tem-

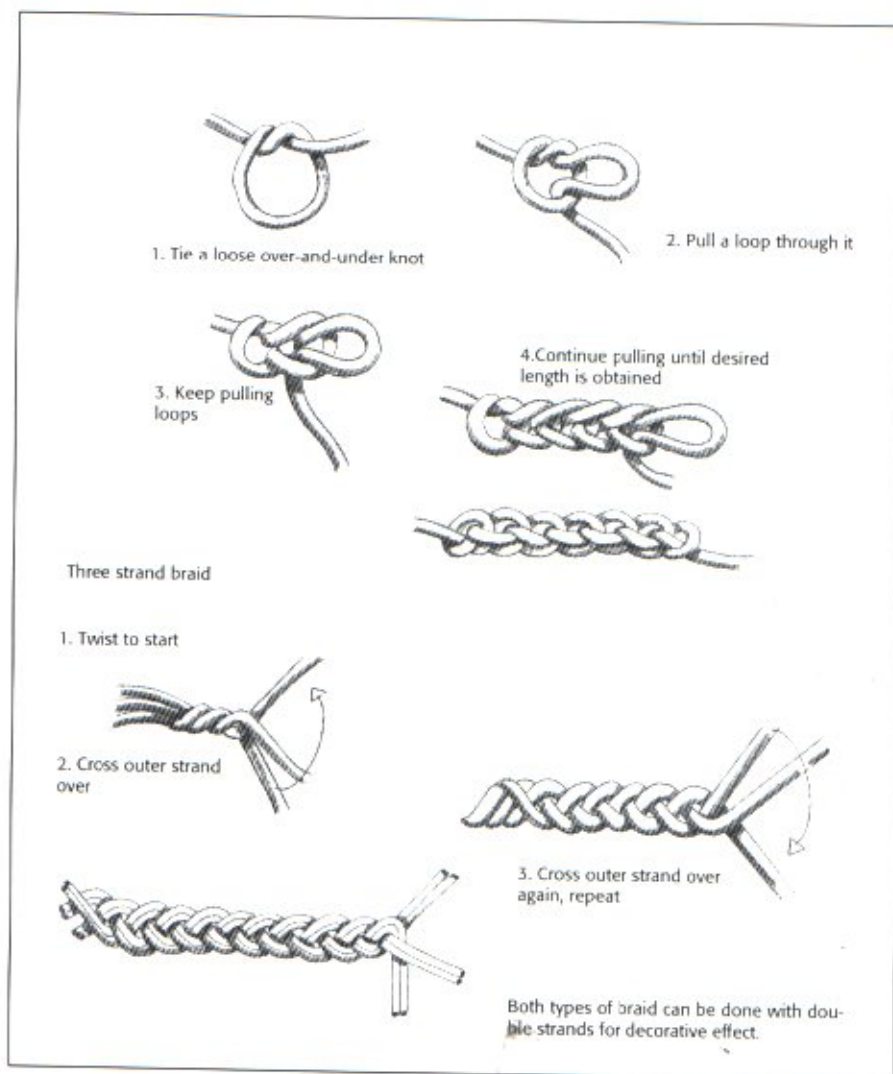


Fig. 12-16. Braiding solder wire.



Fig. 12-17. Joe Berton prefers to drape his Arab figures in wet tissue, covering them when dry with plastic body putty and sprue solution. This ensures that the shape of the figure underneath will show through, and gives the robes a thin, lightweight quality difficult to duplicate with epoxy putty or other sculpting mediums.

perature, it can be filed and sanded easily, and it takes paint without adverse chemical reaction.

That said, there are other mediums to choose from, their primary disadvantage being an incompatibility with paint. If you plan to make a mold and cast your figure, these other mediums offer their own advantages. Plasticene (modeling clay) is a traditional medium, available at art supply stores in varying degrees of hardness. Wax is another traditional medium long favored for miniature work. I know of one sculptor who swears by wax; he warms it to working consistency under a gooseneck lamp on his workbench. Tim Richards, who sculpts Phoenix figures, gets excellent results with a 50/50 mixture of beeswax and plasticene.

The most common sculpting alternative in the U.S. is Sculpey (also called Super Sculpey or Polyform; they are much the same). It has a smooth, pleasant working consistency and can be baked hard in the oven when you are done. Its only drawback is a tendency to develop a white crystalline surface bloom months after it has been painted. Long-term baking (several days at 200°) seems to solve this problem, but I've always been nervous about it.

In the end, as with paint, the choice is up to you — there is no magic secret ingredient that will suddenly make it all come together. Use whatever materials you find comfortable.

SCRATCHBUILDING WEAPONS

Most modelers who convert cannibalize their weapons from other kits, adapting and converting them if necessary. Still, you can make weapons if you approach the job methodically. Weapons are best treated as a modeling rather than a sculpting project — generally it's easier to assemble mechanical objects from separately made pieces than to carve or form them from a single block of material, fig. 12-19. Again, don't be afraid to use whatever materials seem to work — brass rod, sheet metal, styrene, etc. Let's take some examples step-by-step.

Edged weapons are the simplest weapons to make. A spear can be made with a piece of brass tubing for the shaft, with a spearhead-shaped loop of thinner wire inserted in the hole at one end. Fill the loop with molten solder or epoxy putty and sand and file it to the final shape.

Swords are made in much the same way. Wrap the hilt with solder wire. A multi-branch guard or basket hilt is more complicated; adapting a kit piece is the best solution if you can find one. The individual arms will have to be bent from wire and soldered together,



Fig. 12-18. Peter Twist made the cloak for this 100mm French cuirassier in Russia in 1812 by stiffening fabric with super glue and then coating it with thinned epoxy putty. The cuirass, helmet, and sword are by Poste Militaire; the rest is scratchbuilt.

meaning multiple solder jobs in a small area. It is not impossible, just a test of your patience. One secret is to use "heat sinks," or metal clamps placed between the joint being soldered and other solder joints to keep the heat from accidentally melting these, too. As in any modeling project, the trick is to draw on your experience and plan the job in a logical and practical sequence. I once made a highland basket hilt by sculpting the basic shape of the hilt onto a filed brass blade. I let it set, hollowed out the back, and then sculpted the intricate Scottish forms over the solid base. Fullered (grooved) blades are the biggest challenge. One method is to scrape out the fullers, holding the blade in a specially made jig, with a guide to keep the scraping tool steady. Jigs like this are useful, and have to be designed differently with each specific project in mind.

Another method for making sword blades and other intricate metal parts is to have them photoetched in brass. A number of small companies will provide photoetching services for you; one we recommend is Photocut (Erieville Road, Box 12, Erieville, N.Y. 13061). I won't discuss photoetching in detail here; the company you deal with will provide full instructions. Suffice it to say that you draw the parts you need in black ink on white paper, two or three times the size of the final product, and send this to a photoetching company, which will send back a few weeks later the parts you drew etched in brass, fig. 12-20. Sword blades are

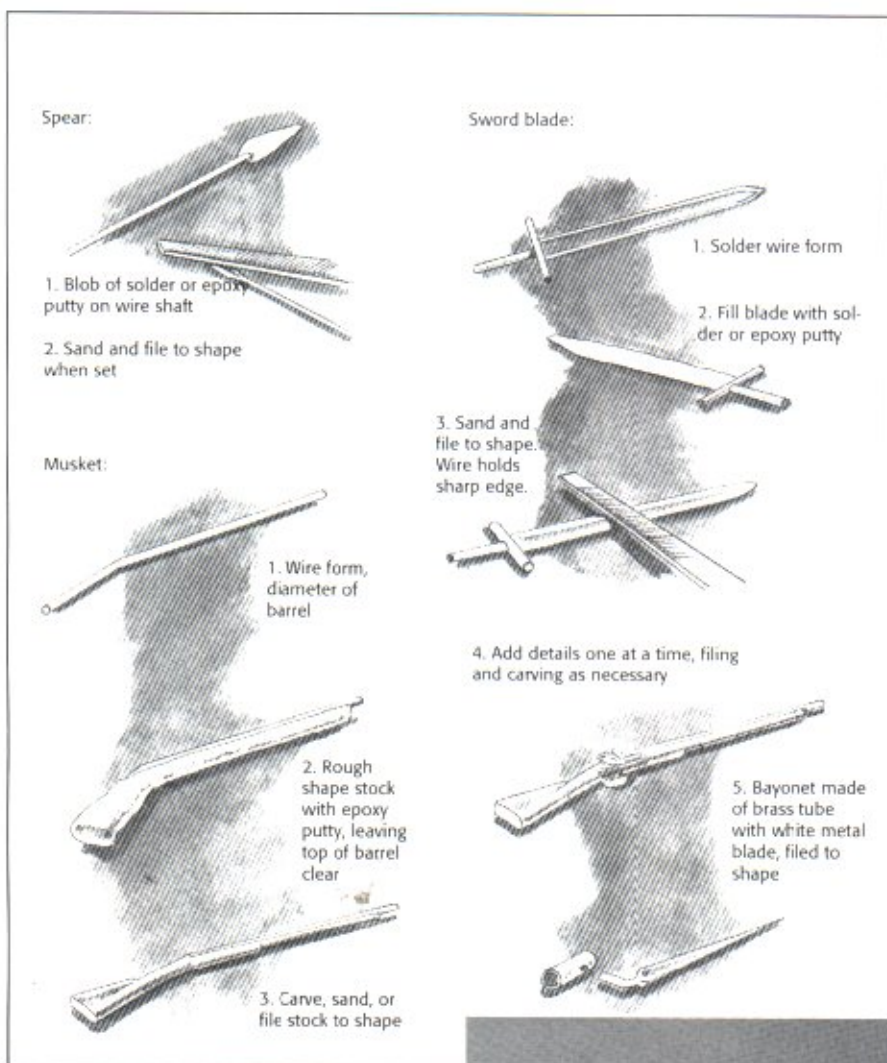


Fig. 12-19. Scratchbuilding weapons. (Right) This sword is a photoetched British model 1796 heavy cavalry sword (used by the Scots Greys at Waterloo), made from drawing to the right. The grip is built up with epoxy putty.



best designed in two parts, with the fuller etched on each side; multi-branch hilts can be etched flat, bent to shape, and rounded by coating the brass forms with molten solder or thinned epoxy putty. Advanced modelers use etched parts extensively for everything from regimental lace to brass plates. Photoetching is expensive, but if you gang a bunch of parts on one sheet the price per part is reasonable.

Building a musket from scratch. The barrel is the first step in making an infantry musket. Real musket barrels had a noticeable taper from breech to muzzle, one that is apparent in 90mm but less so in smaller models. If you are working in a smaller scale, or just aren't fussy, you can get by with a straight untapered barrel; a simple piece of straight brass tubing will do.

The most accurate way to taper a barrel is to turn it on a lathe. Because most of us don't own one, an alternative is to use two or three sections of brass tubing, telescoping one into the other so that the ends of the tubes line up with the taper. Leave the end pieces too long so you have something to hold onto as you work, and glue the tubes in place. Cover the barrel roughly with epoxy putty. When it has set, use a sanding block to make the surface smooth and straight. Sand it down until the end of each tube just shows through the putty. Refill and resand any errors, flaws, or depressions. When the taper is perfect, do the final smoothing with steel wool. Cut the ends off, and you're done.

Cut the "barrel" to length, and solder or glue a bent wire onto the breech end to form an armature for the butt stock. Coat this armature roughly



Fig. 12-20. Patterns for photoetching sword blades. These are reproduced in 2X100mm scale.

with epoxy putty, let it set, and then build up more putty to form the rough shape of the buttstock. When this has set, refine the shape with sandpaper and a file. Next, hold the model by the buttstock and apply fresh putty to the forestock area, concentrating on achieving the approximate thickness but leaving the surface and edges rough. Set it aside and allow the putty to partially set. Check your references and locate the dividing line between the stock and the barrel; carefully scribe a line in the partially set putty at this point and pull away the excess putty from the upper part of the barrel. This line should be accurate at this stage because it can be awkward to change it later.

When the forestock has set, smooth it out with sandpaper and file as you did the buttstock. Examine the overall shape from different angles, comparing it to photographs. Add putty and make corrections as necessary. With the stock and barrel established, you merely need to add details. The com-

ponents of the lock (the hammer and the frizzen) are best made separately over an armature of wire. Some modelers prefer to make tiny detail parts like this by melting lumps of solder onto the wire form, and then carving and filing these to shape. Refer to pictures frequently, paying special attention to the overall proportions of the piece. Be careful not to get your lock parts too big, which is easy to do. Drill a hole for the ramrod and add the barrel bands with sheet lead.

Weapons are a major construction job, and it is worth making a mold so you'll never have to make a particular type (or anything halfway close to it) from scratch more than once. I'll cover mold making in the next chapter.

JIGS AND FIXTURES

These special homemade devices hold parts in place while you perform repetitive tasks, such as sawing identical lengths of stripwood or cutting a series of angled slots in pieces of plastic. They are a standard part of the

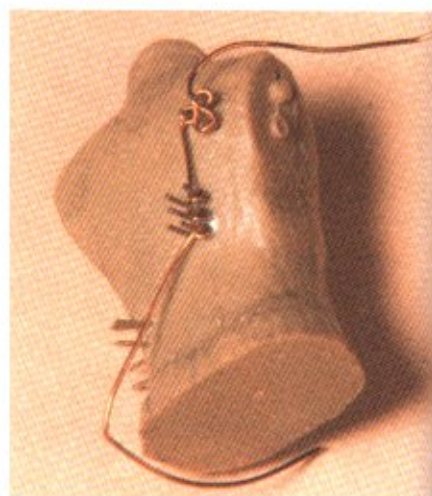
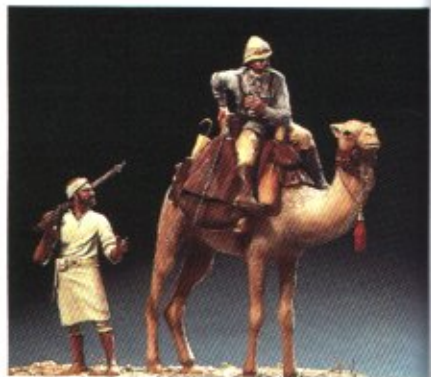


Fig. 12-21. The wire jig Jim Holt used to form the braided loops on the back of the hussar shown in figure 6-2.



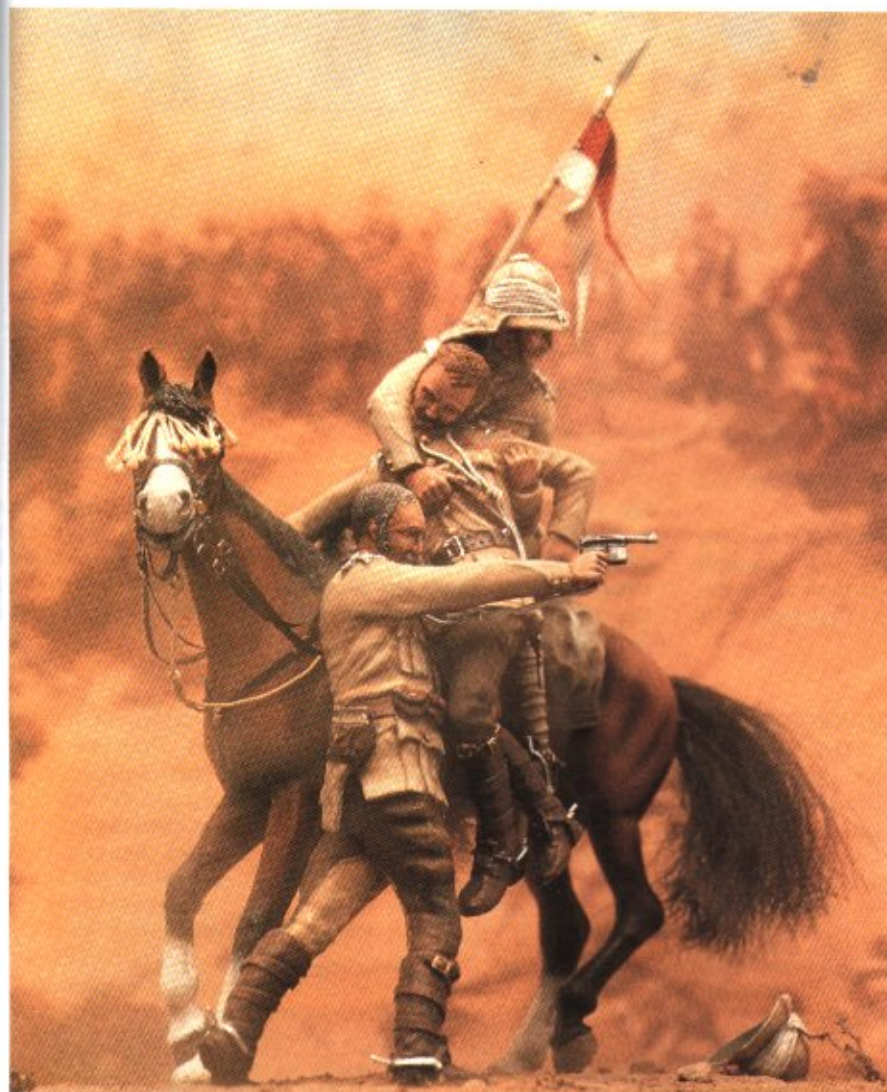
ship modeler's repertoire, but many figure modelers have never thought to use them. A good example of their application to figures is the complex braiding on a hussar's jacket.

Take a spare casting of the figure's torso and remove the detail. Drill a hole and insert a piece of stiff wire at each point where the braid loops back on itself. Then thread the wire "braid" back and forth around these posts. Remove the formed wire and transfer it to the torso. Make necessary adjustments and glue it in place, fig. 12-21.



Lane Stewart

Fig. 12-22. A gallery of 54mm major conversions by Joe Berton, showing the creative work that can be done with conversions (counterclockwise from facing page): "Revolt in the Desert" (Airfix figures on Heller camels); a Camel Corps officer and guide in the Sudan, 1885, by Lane Stewart; The 21st Lancers at Omdurman (Historex conversion); "The Jackass of Egypt" (also a Historex conversion, on a Britains donkey) and "The Fez Seller" (the mirror is a tiny sheet metal one), by Lane Stewart; T.E. Lawrence at ease.



Lane Stewart

SCRATCHBUILDING FIGURES



Fig. 13-1. The greatest challenge to the figure modeler is building a figure entirely from scratch. This is not as hard as it sounds; it is often but a small leap from major conversions to scratchbuilding. This is a soldier from Wayne's Legion, the first regular US Army, in 1796.

As I've mentioned, the significant difference between a major conversion and a scratchbuilt figure is that the latter has its own armature, face, and hands. With conversions, you can always fall back for reassurance on the basic proportions and facial features of the figure underneath. In scratchbuilding, you're working without this safety net, but you can probably handle it if you've managed to get this far. At worst you'll discover you're not quite ready for this kind of work, but the only way to find out is to try.

MAKING THE ARMATURE

The first step in building a figure from scratch is to make an armature. The armature is more than just a preliminary sketch; it's the framework on which the rest of your work will hang, so take your time and get it right. If the armature is wrong, if the figure is badly proportioned or posed, no amount of beautiful detail can cover it up, and your project is doomed from the start.

The armature is essentially an animated wire stick figure. You can make it from almost anything, fig. 13-3. The

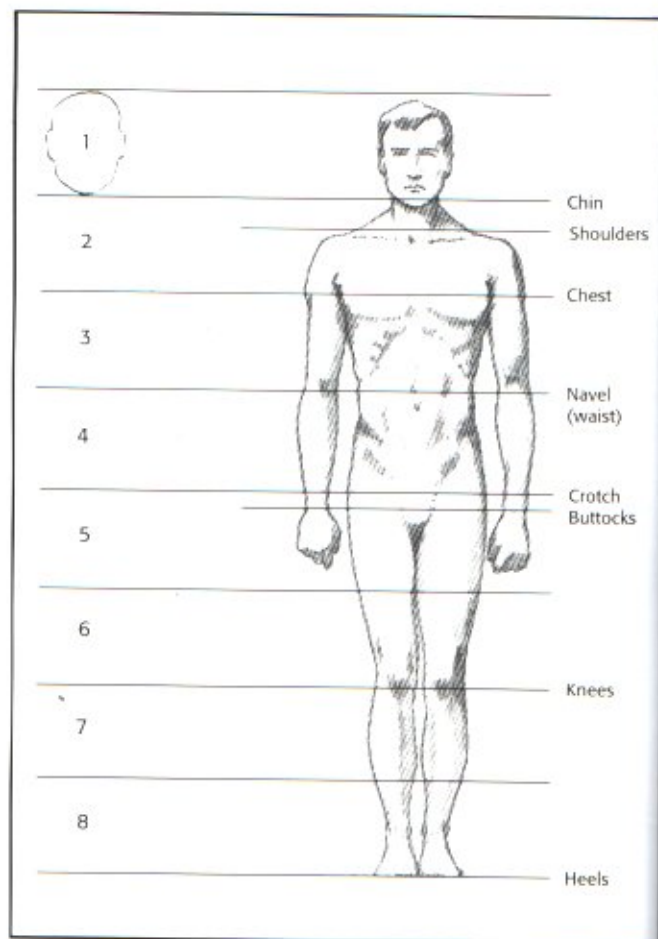


Fig. 13-2. Proper proportions are essential, and this is an area where many would-be sculptors fall short. It is too easy to get carried away with the detail and not notice the proportional errors until the figure has progressed too far to correct them. Check your work constantly as you go, to ensure the proportions are right. Generally, a human body is 8 heads high.

simplest and most convenient method is to use pipe cleaners. They bend easily, can be glued at the joints, and can be discarded with no great loss. Pipe cleaner armatures are convenient, but they tend to be flimsy, especially in larger sizes. When a stronger armature is called for, I prefer to solder one together with $\frac{1}{16}$ " brass rod. The brass armature is easier to bend if you anneal the wire first (see chapter 10).

When assembling your stick figure, make a spread-eagle figure first and then animate it. Concentrate on the proportions in the beginning, keeping

Fig. 13-3. Posing stick figure armatures



Fig. 13-4. Like most sculptors, Jean Josseau of France starts with a simple wire armature, carefully establishing the pose before going further.

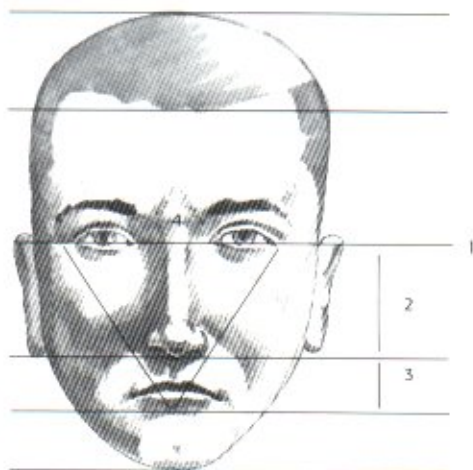
the shoulders the proper width and the crotch (not the waist!) halfway between the head and feet. Leave the arms and legs too long to begin with; the legs will need the extra length to pin the feet into the base, and you can cut the arms to proper length later. When bending the wire at the joints (shoulder, elbow, hip, and knee) keep the angles sharp. "Spaghetti" arms in the armature result in "spaghetti" arms in the final product. Attach L-shaped wires to the legs to form feet.

With the proportions firmly established, you can start working on the pose. Again, take your time and get it right. Pay particular attention to subtle aspects such as the rotation of the hips and shoulders and positions of the feet. You can achieve a remarkable degree of animation in these stick figures, and without the distraction of detail you can concentrate on poses.

Develop your eye for animation by making up bunches of stick figures and arranging them in different positions, both singly and in groups. Try variations on a single theme — charging figures with their left leg forward, for example — and see how many different poses you can come up with. Often the slightest change, a counter-rotation of the hips, a shift in balance, can radically alter the effect of a figure.

When the pose is firmly established, cover the armature with a rough layer of epoxy putty and let it set. Continue adding layers of putty, concentrating on building up the thickness. As the body bulks out to a more human form, begin to develop the muscle structure of a basic nude figure, fig. 13-4. You don't need a fully detailed nude under the clothing, but the basic muscle shapes (calves, biceps, etc.) must be there, because they affect the way clothing drapes

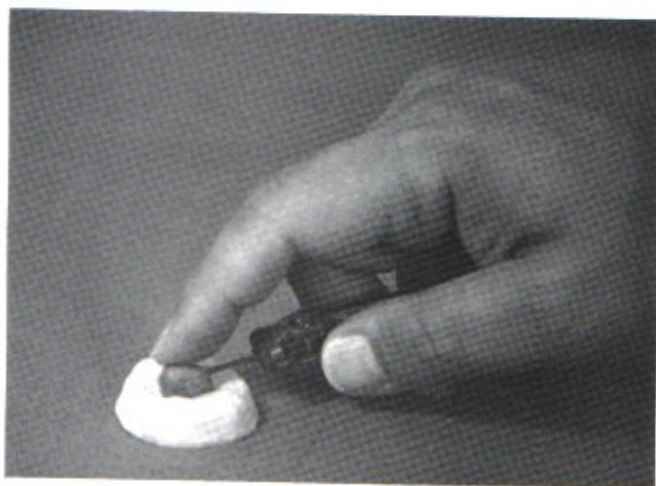
These will vary, of course, with the individual, but not by much. Our eye picks up surprisingly subtle differences to tell one person from another.



1. The eyes (not the browline) are halfway between the chin and the top of the head. The height of a figure 8 heads tall will be 16 times the distance from the eyes to the chin.
2. The top of the ear is level with the eye, and the bottom of the ear level with the tip of the nose.
3. The lower lip is halfway between the nose and the chin.

4. The eyes are set one eye-width apart, and the distance between the outer corners of the eyes is the same as that between these points and the bottom of the lower lip.
5. The face divides neatly into thirds: The hairline to the eyes, the eyes to the tip of the nose, and the tip of the nose to the chin.

Fig. 13-5. Proper proportions for the head and face.



(Above) Fig. 13-6. You can get a quick start sculpting a face by pushing the soft putty into a mold made from a previous face. What emerges is pretty grotesque, but you'll be surprised at how quickly you can push it back into shape. (Right) Fig. 13-7. Many sculptors love doing faces but are not interested in doing the rest of the figure. The solution: Do miniature busts. This 150mm example by Michel Saez of France shows what can be achieved.



Fig. 13-8. Doing actual historical personages offers the additional challenge of achieving a likeness. Ron Tunison has succeeded brilliantly with this large scale sculpture of General Custer as he appeared at the Little Bighorn.



Fig. 13-9. Another example of portraiture, this time Captain Hardy kneeling over the fallen Nelson on the deck of HMS Victory (100mm).

over the body.

The major challenge in sculpting a figure is the head. It tends to grow larger as you work on it. The human body is eight heads high, so it follows that any error you make in the size of the head must be compensated by a corresponding adjustment to the body as a whole. In other words, if the head is $\frac{1}{32}$ " too large, the body will have to be extended eight times that length, $\frac{8}{32}$ " (a full $\frac{1}{4}$ "), to compensate.

With your first few figures it makes sense to sculpt the head before you

make the armature. This way you can adjust the length of body to fit the head, rather than resculpting heads until you have one the right size for the body. With experience, you'll learn to sculpt heads that match your armature, but in the beginning concentrate on making a good head, and leave the figure's height to fall as it may. Who really cares if the figure turns out to be 110mm instead of 90mm?

SCULPTING THE FACE

Start with a 90mm head. Go

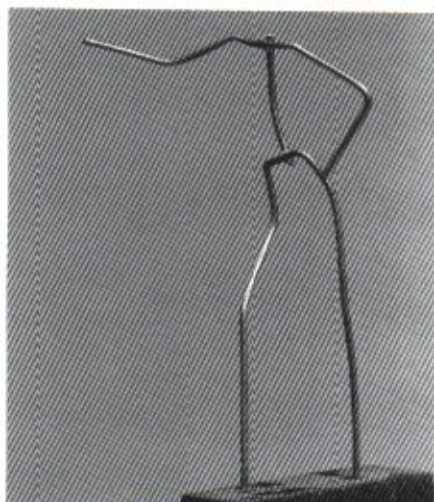
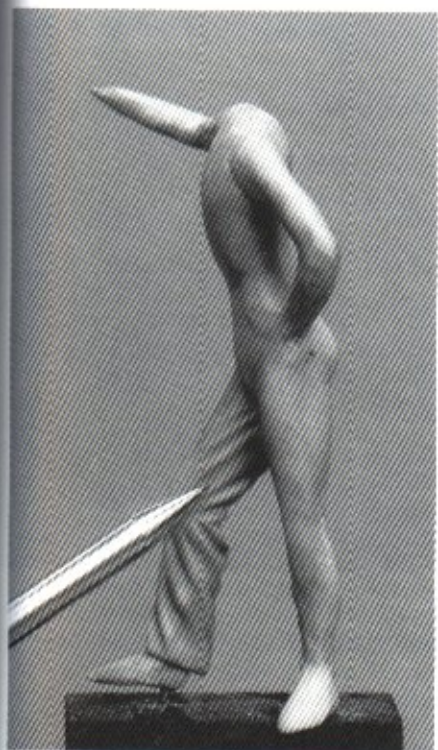
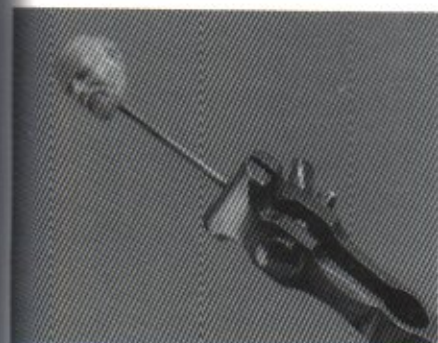


Fig. 13-10. A portrait of General Grant in progress. The head was done first, and the armature sized to match it. The armature establishes the pose, including the rotation of the hips and shoulders, and is covered with a thin irregular coating of epoxy putty; when it has set, it will give subsequent applications of putty something firm to stick to. The trouser legs are detailed next, and the skirt of the coat is rolled out and positioned as described in Chapter 12. The hat brim is made the same way.

through your collection of commercial castings and choose a figure with a well-proportioned head to use as a guide, fig. 13-5. Build an irregular ball the size of a small pea on the end of a brass rod about 2" long. This gives subsequent applications of putty something to stick to, and ensures that the putty will not break free and start turning around the wire from underneath. When this has set, cover the ball with putty until it is a bit smaller than the head on the figure you are working from. Clamping the brass rod in a hand vise or clothespin makes the piece easier to handle.

Note: If this is your first attempt at sculpture, resist the temptation to use epoxy putty; sculpting your first head is hard enough without having to finish it in only an hour. Make one or two practice heads in Sculpey or plasticine. This allows you all the working time you need, and you can work on a head for several days if necessary. Then, once you have experience under your belt, you can move on to the time pressure of epoxy putty.

Start by blocking in the basic features: Press the tool into the surface to form the eye sockets, cheekbones, and chin. Add a dab of putty for the nose and smooth it into the rest of the face. Now start to work. For the next 20 minutes or so things will seem discouraging; progress will be slow, and the figure looks like Kermit the frog. This is unavoidable; don't let it fluster you. Just persevere and a decent face will slowly emerge from the chaos.

There are no specific instructions I can give you from this point. It may sound flip to say that you push the stuff around with the tool until it looks like a face, but that's how it's done. It's a matter of developing your eye so it sees what needs to be corrected. Let the face develop as a whole; move quickly from the forehead to the chin to the cheekbones, and don't work any part for too long. Leave the fine details, such as crow's feet and wrinkles, until the face is almost completed. The eye sockets can be left empty until the face is well established. Compare your work constantly with

your sample head. The sample is easier to work with than a live model because it demonstrates the acceptable level of detail and shows the features the same size you are trying to sculpt them.

You'll find the overall shape and character of the face changing as you push the features around with the tool. Since most of the work is done by pushing the tool into the material, working around the nose can make your subject dish-faced, and working the mouth tends to give him a receding chin. Add material to build out the dish face and push up from underneath to restore the chin. A most common tendency is for the face to spread up, with the eye sockets creeping up the forehead to create a Neanderthal profile. Remember that the eye sockets mark the halfway point of the face, so push the forehead and cheekbones down whenever they creep up beyond this point. Another common mistake is to put all the facial features on the front of the head, leaving a flat profile. Check your work periodically from

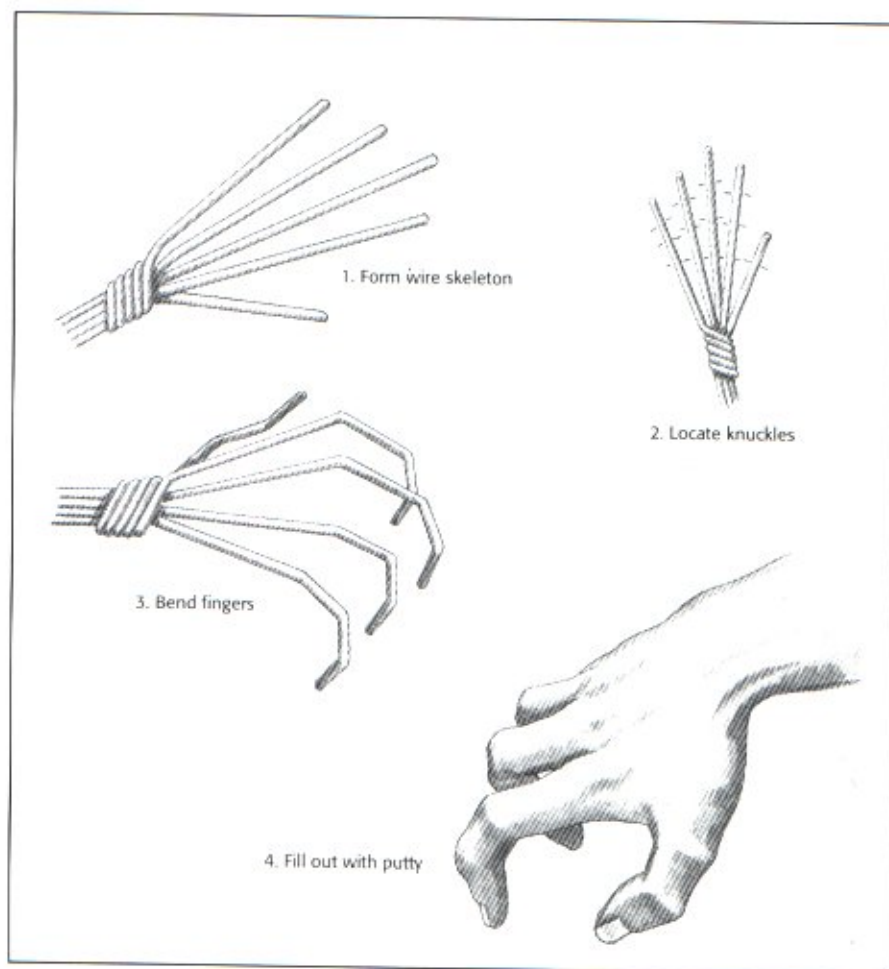


fig. 13-11. Sculpting hands

each side to ensure that the profile looks as good as the front. Don't pay much attention to the nose in the early stages — the putty is too soft, and the slightest touch of the tool seems to shovel it halfway across the face. Establish a basic nasal shape and leave it for later when the epoxy is firmer and easier to work with.

What started as Kermit the frog will gradually take on a more human shape. As the putty firms up, start adding details such as nostrils, facial folds, and wrinkles. I often work a face until the epoxy has almost completely hardened. In the final stages, you'll find that even a subtle movement of the tool can make a noticeable difference — a push of the chin here, a change in the line of the brow, a slight reshaping of the nose can totally alter the character of a face.

There is a limit to what you can do before the putty hardens, so I generally leave the hair until the head has set. Every figure starts out looking like Yul Brynner. This can be an awkward handicap when you're attempting to achieve a likeness — it's hard to compare the features when your reference pictures show a full head of hair and your model is bald as an egg. If

the difference is too disconcerting, plop on a few temporary blobs of putty to act as a hairline for reference purposes.

I often create the ears later, too. The ears are not difficult to sculpt, but position them far enough back on the head to leave room for the sideburns.

Sculpt hair the same way you've learned to paint it, in intertwining locks, not individual strands. The hair texture should show, but keep it subtle and let the larger shapes dominate. I start sculpting the hair with a blunter tool, adding the fine texture only when the locks are well established.

Once you've made several heads, a valuable shortcut is to make a mold of the front of the best one (see "mold making" later in the chapter). You'll still have to start your sculpture with the pea on a post, but after you've coated the pea with fresh putty, press the front of it into the mold. The face that emerges may look like Quasimodo with a hangover, but the basic proportions and features are there and can be pushed back into shape in minutes (fig. 13-6). This gives you a running start, eliminates the frustrating Kermit the frog stage, and allows you valuable working time before the

epoxy sets.

Part of the fun of sculpting a head is that when you start you never know how it will turn out. I like to let the face develop on its own, allowing the character to emerge as it goes along, fig. 13-7. Unintentional effects often lead in a whole new direction — if you leave yourself open to happy accidents, you'll be startled at what you achieve.

SCULPTING HANDS

Next to the face, the hands are the most expressive parts of the human body, and are worth the effort you put into them. Hands grasping things are fairly straightforward because you can sculpt the hand around the object being held. Open, unsupported hands are difficult in miniature; most sculptors make one pair, cast them, and modify the castings to suit individual figures.

I'll start with the easy kind. To make a hand holding a rifle, form a putty "mitten" and lay it in position. Next, work the flats of the fingers as they wrap around the piece. Then cut the separations between the fingers. Finish the fingers by widening the separations slightly between the knuckles. Add a small blob of putty for the thumb, and work the shape of this digit in turn. The final detail, in 90mm or larger, is the fingernails. Keep them subtle and don't overwork them.

When in doubt, use your own hand as a guide. Watch the way it changes shape as it grasps different objects, how the knuckles align, and how it changes in relation to the wrist. Next to the face, the hands are the most difficult part of the body to sculpt convincingly.

Open hands must be sculpted around a wire armature, with a separate wire for each finger. Working the putty around such a small form is tedious, which is why most sculptors make one and cast the rest.

CASTING YOUR OWN PIECES

Even if you don't want to cast complete figures, you'll want to be able to reproduce individual parts, particularly those that are difficult to sculpt, such as hands and weapons.

Casting your own parts is easy with modern materials. First you'll need a pattern. This can be an original kit part, a modified kit part, or something you have made up, figs. 13-15 and 13-16. If what you need is a complex assembly, you may have to break it up for casting. The mold is made from RTV (room temperature vulcanizing) rubber. The major manufacturers are General Electric and Dow Corning. There are many types; you want the kind that requires no special scales for mixing, will cure against any pattern material, and is of sufficiently low vis-



Figs. 13-12 and 13-13. Like most sculptors, Bill Horan uses a variety of wire and other materials to enhance his models. Note the use of lead foil for the belting.



Fig. 13-14. A superb (and genuinely frightening) example of a fantasy sculpture of Tars Tarkus of Mars, by Lyle Conway. The glass eyes were specially made for this sculpture.

cosity to form an air-bubble-free mold without the use of a vacuum system, fig. 13-17. The GE rubber I use is RTV 11, which comes in one-pound containers and includes a small tube of cata-

lyst. The mixing proportions for the catalyst are not critical; the more catalyst you add, the faster the material cures. Low-humidity heat can speed curing, which normally takes from

four to 24 hours.

Successful castings can be made with a variety of materials, ranging from plaster to plastic. You can even successfully cast metal on the kitchen stove. Several plastics are available, but the most convenient is Alumilite, available in many hobby stores.

First build a mold box to serve as a dike to hold the liquid rubber until it cures; even a crude wall of modeling clay will do. The usual material for the box is wood or styrene, but the easiest method is to build the box out of Lego bricks. The box should be large enough to surround the pattern with about $\frac{1}{2}$ " to spare on three sides, 1" on the fourth. There is no rule it has to be square; irregular shapes can save you rubber, which is expensive.



Figs. 13-15 and 13-16. Jean Josseau of France is a master when it comes to animating metal figures. He works in the traditional manner, sculpting a nude figure, casting it, and then clothing it in metal foil; this allows the wonderful flowing robes that so characterize his work. Notice the superb craftsmanship of the many small parts formed in brass, and the way the parts come together to form an ensemble of extraordinary grace, beauty, and vitality.

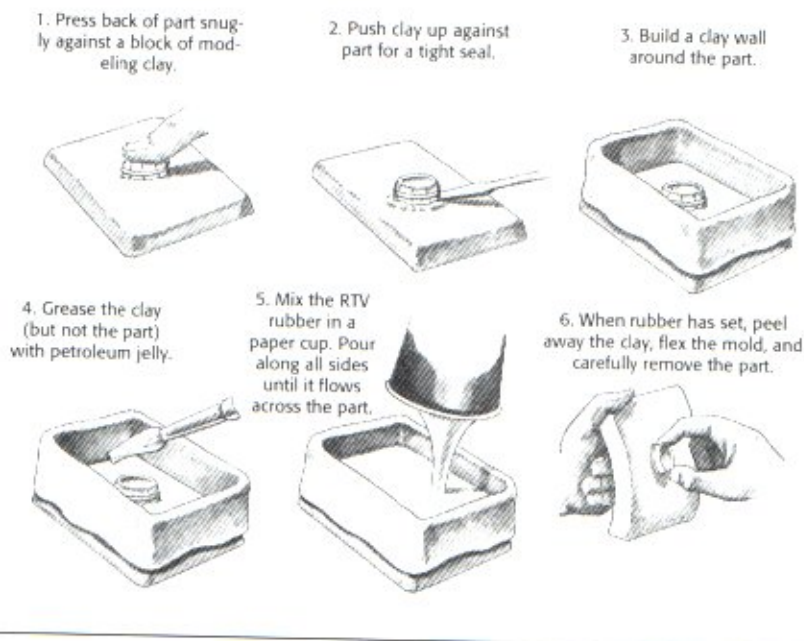


(Top) Fig. 13-17. Casting parts in rubber molds allows you to duplicate your work and saves a lot of time and effort. (Above) Fig. 13-18. Alumilite is a convenient resin-like casting material available in many hobby shops. It is relatively odorless and has a fast setting time (5 minutes or less), which can be extended by storing the bottles in the refrigerator.

If the part has one flat side with no detail, an open one-piece mold will do. Roll out a sheet of modeling clay and press the flat side of the pattern firmly against it. Arrange the side of the mold box around the pattern, making sure the corners are tight enough to prevent leaks. Brush a thin layer of petroleum jelly across the plasticine and the sides of the box (but **not** the pattern) to seal the corners of the box, keep the RTV from sticking, and act as a barrier between the modeling clay and the RTV, which sometimes reacts poorly with the sulfur in the clay and refuses to set up properly.

Mix up the RTV as directed and use

Fig. 13-19. Making a one-piece mold



a throw-away brush to spread it over the pattern, working it into all the details. With the pattern covered, pour the rest of the RTV into the mold box. Open the mold when the rubber has set.

MAKING A TWO-PART MOLD

While simple parts can be cast in a one-part mold, most castings call for a mold that splits into halves. The method for making one of these is similar, except the pattern is embedded halfway into the modeling clay, which is then pushed up firmly against it to form a leak-proof seal. The line where the clay meets the pattern will be the dividing line between the halves of the mold, called the parting line. While it is flat for most simple castings, you can build up the plasticine where necessary so it follows the contour of the pattern. With the parting line established and smoothed out, use a round pointed instrument, such as the cap from a ball-point pen, to press indentations about $\frac{1}{4}$ " deep into the clay. These will form the lugs that ensure proper alignment of the mold halves later. As with the one-piece mold, brush the clay and box sides with petroleum jelly, and pour the first half of the mold.

When the first half has set, carefully push the hardened rubber through the frame to the bottom of the mold box, flip the box over, and carefully peel off the plasticine. If you have coated the back of the figure lightly with vaseline before embedding it, the plasticine will come away quickly and cleanly from the pattern. Clean off any residue of clay or petroleum jelly

remaining on the back of the figure; try to do this without releasing the figure from the rubber. If the figure comes loose seat it completely and firmly back into the rubber; if there is even a slight gap between the rubber and the figure when you pour the other half a bit of liquid rubber will seep in and ruin the mold. When the figure is clean and firmly seated brush the rubber surface with petroleum jelly.

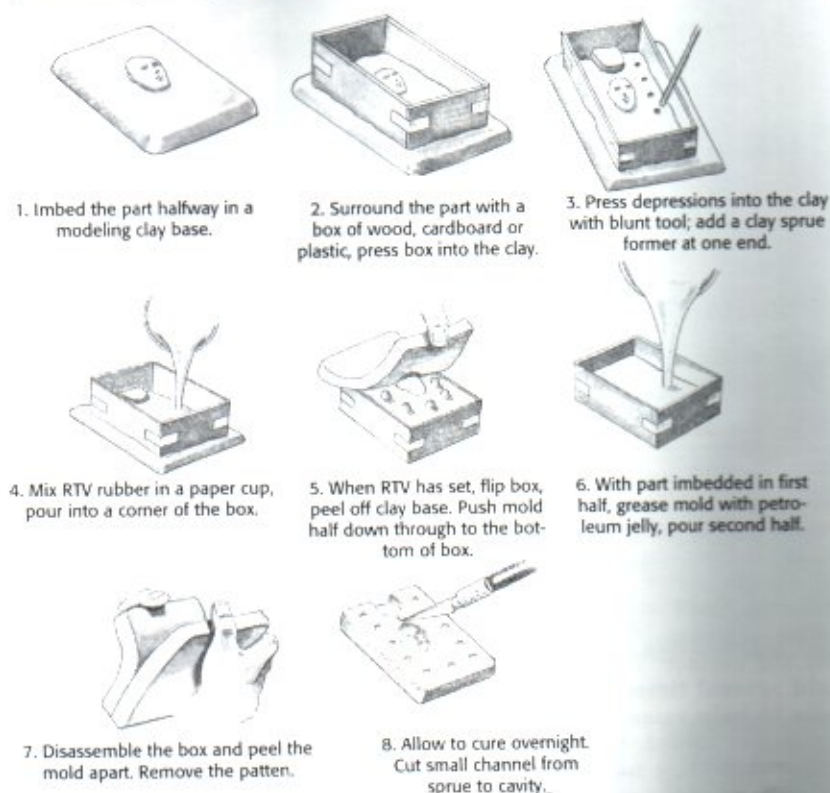
Now push the rubber mold half and figure back into the box until the back of the mold is flush with the edge of the frame. This gives you an empty box half into which you can pour the second half of the mold. Brush the sides of the box with petroleum jelly, being generous around the edges of the rubber mold to seal off any leaks. Pour the second half of the mold.

When it has set, disassemble the mold box and carefully peel apart the mold halves and remove the pattern. Set the mold aside to cure completely. Then use a sharp knife to cut one or more pouring sprues into the rubber. Make each sprue as wide as room allows, but keep the "gate" where it enters the figure cavity as small as possible. You probably will enlarge it later, but once rubber is cut out of the mold you can never put it back, so it's better to play it safe in the beginning.

CASTING WITH PLASTIC

There are many casting plastics on the market, and every modeler has a favorite. Look in the yellow pages under pattern makers and foundry supplies — industrial pattern makers use a lot of plastic, and you can find

Fig. 13-20. Making a two-piece mold



neat stuff that nobody else has ever heard of. Whatever you use, the casting methods are about the same. I've mentioned Alumilite, a material whose greatest advantage is also its greatest drawback — it sets solid in less than five minutes. Although you don't have to wait long to pull your castings, you also have little time to work with it before it starts to set. A neat trick is to store the material in a small refrigerator; the plastic doesn't set up as quickly at lower temperatures. The people at Alumilite have promised a retardant to extend the working life to 10 or 15 minutes, and that should solve many problems.

The basic principles of casting haven't changes since the dawn of the Bronze Age. Successful castings depend on getting the material into the mold and getting the air out. The sprue must be large to allow the material to flow into the mold, and the air vents must be sufficient to allow the air to escape as the material flows in. Of the two, escaping air is more challenging. Air often is trapped in recesses on the surface of the mold, causing air bubbles in the nose, ears, hat brims, and so on.

One way to control this problem is to mix enough material for one casting and brush it into the open halves of the mold, carefully pushing it into the detail areas. Close the mold quickly, secure it with a rubber band tightly enough to prevent leaks but not so tightly that it distorts the rubber, and pour the remaining material in the sprue at the top. Leave a generous amount in the sprue to take the place of any air bubbles that rise to the top. You can squeeze the mold with your fingers to "burp" out large air bubbles.

When the material has set, examine your results and try again, correcting any errors. Even experienced casters don't get perfect castings every time. Depending on the material, a 30 percent rejection rate is considered good when pouring by hand.

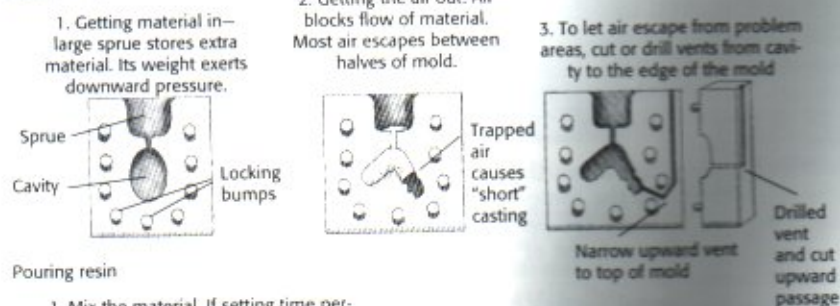
Professional resin castings are made in a material similar to Alumilite, but a vacuum machine is used to draw all the air out of the mold. A mold of liquid material is set under a plastic dome on a rubber-covered platform, and the air is pumped out through a pipe sticking up through the base. Castings made this way are virtually flawless, and if you do a lot of casting, a small industrial or scientific vacuum machine may not be out of the question. If you can get a vacuum pump you can even build a vacuum dome.

CASTING IN METAL

Metal casting on the kitchen stove is not out of the question, either. Lead-tin alloys melt at 300-600°, which is

Fig. 13-21. Pouring castings

Basic principles



Pouring resin

1. Mix the material. If setting time permits, brush it into detail areas of open mold. Close the mold quickly.

Pouring metal

1. Warm the mold in kitchen oven to reduce "capillary cooling." Powder mold halves with talc.



2. Wear heat resistant gloves. Heat metal in a ladle on stove. Skim dross off top with a spoon.



3. Carefully pour into mold. Use gloved hand to jiggle clamp to settle metal in mold. Allow to set and cool before opening.



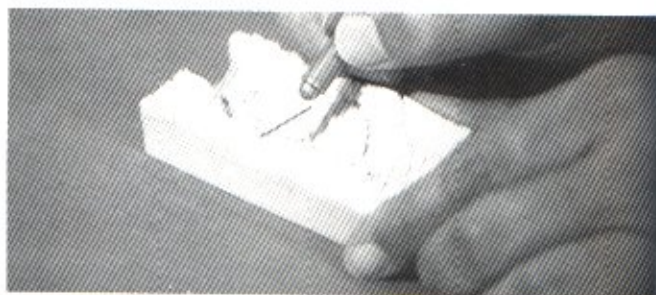
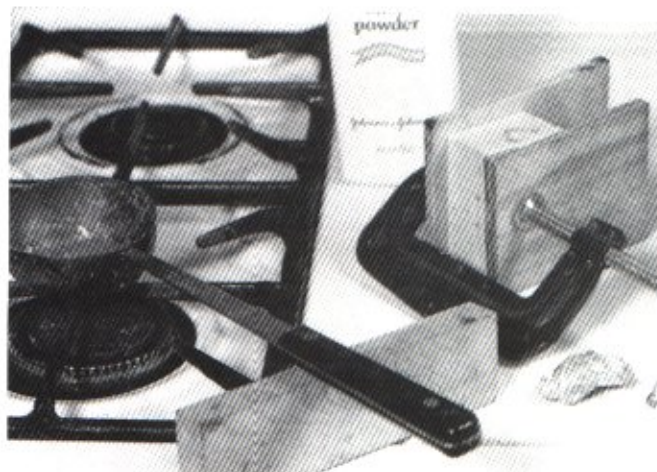


Fig. 13-22. Getting the air out is as important as getting the casting material in metal casting on the kitchen stove. You can see the ladle supported on a block of wood to keep it from tipping, the mold secured with a C-clamp, and the baby powder used to lubricate the mold. **Fig. 13-23.** Cut narrow vent into the mold surface to let air escape.

easily accomplished by heating a few metal scraps in an old kitchen ladle on a gas range. In the beginning the best source for metal is old figures, particularly the metal bases that you never use anyway, fig. 13-22.

Safety is important when you're working with hot metal. Always wear safety gloves and goggles. Long-sleeved shirts and a shop apron will prevent burns from the occasional splatter. Burns from small splatters generally are minor, but a large spill can cause a serious injury. In the beginning, you'll probably be extra-cautious working with hot metal, but once you get comfortable with it, it's easy to get careless. Wear safety equipment and concentrate, and you shouldn't get into trouble.

Powder each half of the mold lightly with talcum or baby powder, bang them together to knock off the excess, and put the halves together. The talcum powder acts as a release agent, lubricant, and microscopic spacer to allow air to escape between the mold halves. Talcum powder also helps the flow of the resin, too. Sandwich the mold between two pieces of plywood, and secure this assembly firmly but not too tightly with a C clamp. Don't use rubber bands because any hot metal that spills on them will melt the rubber and allow the mold to fall open, spilling its contents all over the stove and you. Clamp the mold just tightly enough to keep it from slipping out of the sandwich. Clamping it too tightly flattens the mold cavity and any casting you make in it.

Bend the handle of the ladle down so you can set it on a block of wood to keep it level while heating. Heat the

metal on high until it liquefies, then turn the heat down to keep it that way. Use a discarded spoon to scrape off any dross floating on top. Fill the mold with molten metal halfway up the sprue. Don't worry if a bit spills on the top of the stove—it won't stick or scar the surface. Tap the side of the mold several times lightly with the ladle to help release the air. When casting in metal, cut larger sprue reservoirs than normal, adding a weight to force the metal down farther into the mold.

Allow it to cool until the sprue has solidified, and then carefully open the mold and examine your results. Your first few castings probably won't be any good because the mold is cold and the cold rubber draws off the heat, causing the metal to solidify too soon. This illustrates an import principle in hot casting: The mold must be warm enough to keep the material liquid until it reaches all the recesses of the mold.

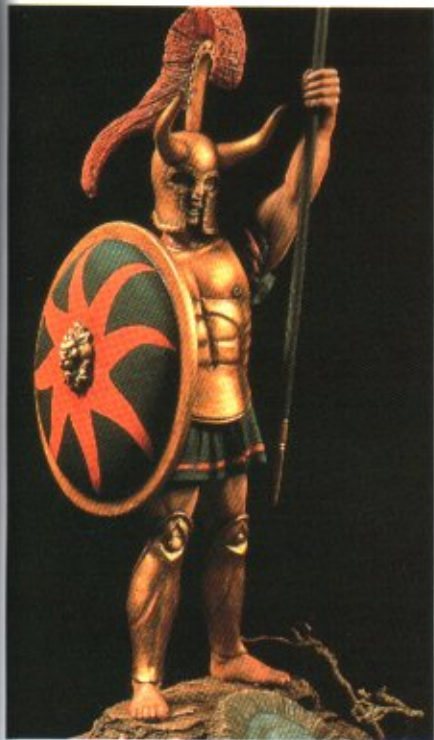
Other factors that affect the quality of your castings are the composition of the alloy, the pouring temperature of the metal, and the escape of trapped air from the mold.

Professional metal casters differ on the best casting alloys, and many have secret recipes. All you really need to know is that a high-lead alloy gives good castings in thick sections such as figure torsos, but is sluggish in filling small details such as bayonets, while a high tin content is excellent for small details but leads to porous, pitted castings in thicker sections. If you are melting down surplus kit parts, use metal from the best kits—if the manufacturer got good results, so should

you. Adjusting the temperature of the metal can help if you're not getting good results. Metal that is too cool will solidify before it fills the detail, while a temperature that's too high will burn the mold and give porous, unsatisfactory castings. Generally speaking, the temperature should be higher for small, thin parts, lower for thick ones.

Most of the air in the mold is pushed out the narrow gap between the halves, but other air is often trapped by molten metal before it can escape. The sign that this is a problem is when part of the casting doesn't fill but the rest of it is perfect. You can cut a narrow channel from the affected area to the side or top of the mold. Keep the channel tiny and direct it up to keep metal from leaking out. If you have to cut down initially, head up as soon as possible. Don't cut these "vents" until you have seen a casting and know that they are needed. If the affected area is recessed in the mold (such as a figure's nose) use a fine drill to make a vent through the mold to the outside, and then cut a channel up from that hole along the outside of the mold. Small, delicate castings may require a spider web of vents before they fill satisfactorily, fig. 13-23.

Fine metal casting is an art, and consistently good castings are the result of years of experience. So many factors come into play: On humid days, for example, the powder on the molds absorbs moisture, which turns instantly to steam when it comes into contact with the hot metal, causing porosity in the castings. Still, with practice you should be able to produce acceptable results.



Figs. 13-24 to 13-29. A gallery of scratchbuilt figures (from top left, clockwise): Aries, God of War, 100mm by Peter Twist; a shivering continental soldier at Valley Forge (surely the coldest-looking soldier I've ever seen) by Jim Wildt; in large scale, the Mandan chief Four Bears in paper mache, dressed in paper towel, by Ken Schwarz; a large scale Ron Tunison Zouave; a delightful Vietnamese boy with a water buffalo, 100mm by Phil Bracco; and a soldier of the Iron Brigade filling canteens.



DISPLAY, CARE AND TRANSPORTATION OF FIGURES

After you've lavished so much care on your models, it seems a pity not to display them with the dignity and care that they deserve.

For a single figure a glass dome is ideal, and can protect a figure displayed on a mantelpiece, coffee table, or bookshelf. Look for domes of various sizes in a clock or watch shop.

A collection, on the other hand, calls for a special display case. With the growing interest in collectibles, various types of collector's display cases are on the market. Look for one deep enough to accommodate figures and bases and that won't allow too much dust to pass between the sliding glass doors. A mirror back is a nice touch, allowing the figures to be seen from all angles, but is hardly a requirement. Avoid oak, because the tannic acid in the oak can cause lead disease (see below).

If your case is without shelves you can create a multilevel display by using boxes or old tin cans. These can be painted, covered tightly with fabric, or just loosely draped with velvet. The last choice is often the easiest and the best.

Avoid cases with lights built into the top. This angle of light is unflattering, and the figures on the top shelves will block out the light from those on the lower shelves. A recessed ceiling fixture, floor lamp, or picture light that lights the case from the front makes the figures look better and illuminates the bottom shelves as well as the top ones.

CLEANING DIRTY FIGURES

Even if you dust your figure periodically with a fine brush, fine dust sticks to the surface of the paint, and figures exposed to dust and air over a long time will lose some of their brilliance.

The best solution is to wash them, believe it or not, under hot running water. Just hold them under the tap, shake them off, and draw off the remaining water with a crumpled tissue, fig. 14-3. Use the hottest water you can, and dry the figure quickly;



(Left) Fig. 14-1. Figures should be protected from dust. A glass dome, box, or wall case is a usual solution. (Above) Fig. 14-2. Figures standing all in a row make a dull display. Try to use an assortment of boxes and cans under a velvet covering to create a multi-level display.

hot water warms the casting, causing any water remaining in crevices to evaporate quickly. If you do the job swiftly, even joints sealed with white glue won't have time to dissolve, and the colors will return to their former brilliance. Test a small section first. Don't wash water-soluble paints!

REPAIRING DAMAGED FIGURES

No matter how careful you and your family are, figures occasionally will get broken. This is rarely the disaster it first appears to be. Most broken figures can be repaired, often as good as new.

Save all the parts. It's frustrating to start a repair project and discover that the plume disappeared in the carpet three weeks before. Keep the parts in a box padded with crumpled tissue until you have time to make repairs. Test fit all the parts, making sure the joints fit tightly. Bend back any pieces that have been distorted. Thin parts are the biggest problem. Narrow ankles on a figure or horse can usually be pinned for strength (see chapters 1 and 10). Even plumes can usually be

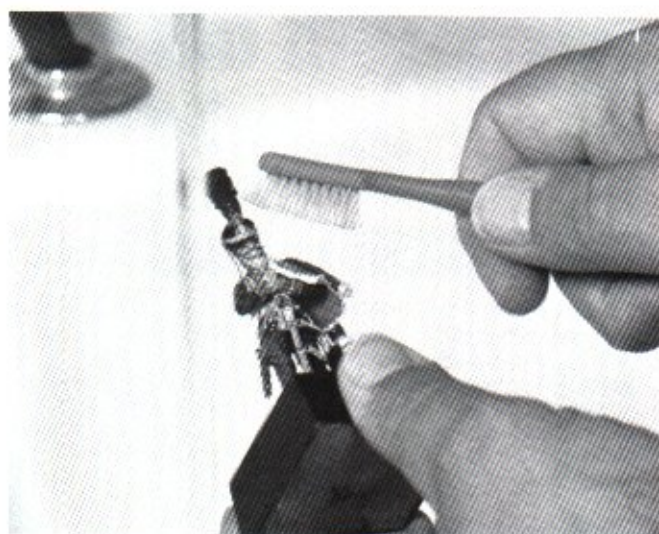
handled this way, but bayonets and other parts too narrow to accommodate a wire will have to be soldered or glued in place.

When the figure is reassembled, touch up the chipped paint. You may have to restore the level of paint with a bit of white glue or five-minute epoxy first.

LEAD DISEASE

For years the curse of model soldier collectors was a white powdery bloom that would erupt through the surface of the paint, often on figures that had been perfectly healthy for years. This blight actually seems to be contagious, jumping from one figure to the next, often wiping out whole armies before it finally stops. Today's figure kits are made of better alloys and rarely develop this problem, but if they do you can control it.

The amount of lead in the castings is a major factor. Lead disease rarely develops on figures that are less than 75 percent lead, but figures with a higher lead content, such as the custom-animated figures (Stadden,

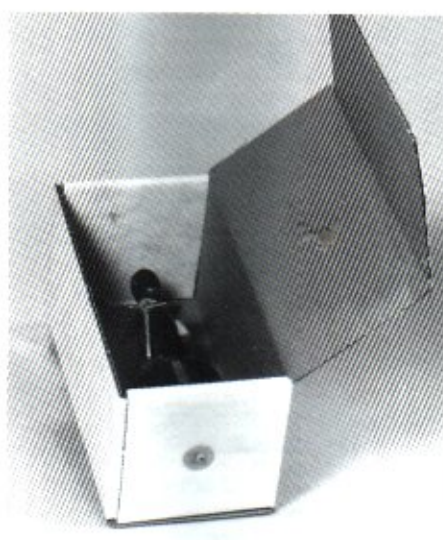


Figs. 14-3 and 14-4. Models should be dusted periodically with a soft brush. Most figures can survive a bath under the faucet

(crude, but surprisingly effective!) but test first to ensure it's waterproof.



Fig. 14-5. In years past, lead disease, the white powdery build-up seen here, used to wipe out whole armies of model soldiers, but it's rare in modern figures because of their higher tin content.



(Left) Fig. 14-6. Figures are delicate and awkward to transport. If you are taking them to a show, the best method is to immobilize them in a box, usually by screwing them in from underneath; be sure to use a washer so the screw doesn't tear through the box. (Right) Fig. 14-7. If you are moving, tape the figures into a box and surround them with plastic foam peanuts or better still, small plastic pellets.



Labeyen, etc.) that came from Europe in the 1960s and '70s, have not been so fortunate. Avoid them if you can. Use a primer on all your figures; this separates the metal of the casting from the paint, and prevents any bad reaction between them. The tannic acid in unvarnished oak cases can have a cumulative effect, as can excess humidity. Keep your figures in an air-conditioned room, if possible. Lead disease is contagious to the extent that conditions that caused one figure to rot are likely to affect its neighbor the same way. Remove all figures from a case where the disease has been discovered, and quarantine the diseased from the healthy patients.

Repairing lead damage is awkward

but not impossible. Scrape the affected areas clean, then re-prime and repaint the affected areas. Some collectors swear by various varnishes, plastic coatings, etc., but these have yet to stand the test of time.

PACKAGING FIGURES FOR TRANSPORTATION

Figures are generally too delicate to be shipped by mail or common carrier; do so at your own risk.

Packing for a move or hand carrying, on the other hand, is not difficult. The secret is to secure the base so the figure cannot move. Some modelers just tape the base in place on the bottom of the box. Others prefer to drill a hole in the bottom of the base and

screw it to the bottom of the box from outside (use a washer to keep the screw head from tearing through the cardboard). If the base has a rim around the bottom, you can glue some forms to the inside of the box and slide the base underneath them.

For hand carrying, this is all that's necessary. You need not put any padding around the figure. In fact, such padding may cause damage if it shifts en route. For a move, on the other hand, some sort of padding is called for. Crumpled tissue will do, but the most secure method is to fill the box with small Styrofoam pellets, fig. 14-7. When it's time to unpack the figures, gently remove the pellets from the box with a shop vac.

INDEX

- Alumilite, 106
- Analyzing figures, 18
- Annealing wire, 71
- Armature, 100-101
- Armor
 - painting of, 52
 - polishing of, 52
- Assembly, 6-7

- Bases, 6, 7, 39-40
 - attaching figure, 44
- Belting, paper, 82
- Blending, 19-22
 - faces, 27-28, 31
 - flats, 68
 - horses, 55-56, 59
 - nudes, 51
 - oils, 20
 - on leather, 36
- Braiding wire, 96
- Brushes, 9

- Camouflage, 48, 50
- Camouflage uniforms, 50
- Castings
 - flaws in, 5, 7
 - in metal, 107
 - in plastic, 106
 - preparation of, 53, 78
- Catch light in the eye, 28, 31
- Chin chains and scales, 82
- Clothing
 - highlights, 16, 24
 - wrinkle patterns, 91-93
- Colors, mixing, 12
- Conversions
 - detail, 74
 - major, 90-99
 - metal, 69-79
 - lengthening, 73-74
 - plastic, 76-87
 - assembly, 80-82
- Cross method, 25-28

- Detail
 - adding, 74-75
 - belting, 84-84
 - contrast, 19, 20
 - in conversions, 74
 - facial contrasts, 31
 - finishing touches, 37-38, 44
 - foliage, 44
 - horses, 57, 78
 - plastic, 82
 - removal, 90
 - shadows, adding of, 14-16, 20-21
 - techniques for adding, 35-36
- Distortion, 4-5
- Drybrushing, 42-43
- Drying oven, making a, 24

- Electroplating, 52
- Epoxy putty, 69, 93, 95
- Eyes, painting, 25

- Faces
 - action poses, 87
 - analyzing, 28
 - expressions, 87
 - features of, 28, 29
 - female, 32
 - major reference points, 28, 31
 - painting of, 25-33

- proportions of, 101
- sculpting, 102-104
- shading, 30-31
- Figures
 - care of, 110-11
 - flat, 67-68
 - metal, reposing, 90-91
 - mounted, 54
 - plastic, 76-87
 - small scale, 64-67
 - wargame, 65-67
- Five o'clock shadow, 31
- Flags, 48, 50
- Flesh tones, 28-31
- female, 51

- Glues, 6-7
- Groundwork, 40-44
 - highlighting, 42-43

- Halo of light, 15, 18, 67
- Hands, 30, 31-32
 - painting, 31
 - sculpting, 104
- Heraldry, 50
- Historex,
 - facial expressions, 87
 - hands, 81
 - headgear, 82
 - relaxing figure's neck, 81
 - soldiers, 85
 - spare parts, 87
- Horan, Bill, 9, 17
- techniques of, 21, 23, 42, 79
- Horses
 - action poses, 86-87
 - colorings of, 55
 - conversions, 74
 - crepe hair manes and tails, 86
 - painting of, 54-59
 - pinning legs, 74

- Joints, 6-7

- Kits, plastic figures, 77-78
- Knights, 49
- Koribanics, Andrei, 59
- Kostakes, Jim, 45

- Lead disease, 110-11
- Leatherwork, painting of, 36
- Light, 14-16
- Lighting, 8

- Metallic details, 37-38
- Molds
 - distortion, 4-5
 - making, 106-107

- Musket, scratchbuilding, 97
- Napoleon, 23, 55, 67
- Nudes, 51
 - airbrushing, 52

- Oils, blending with, 20
- Oven, drying, 24

- Paint
 - choices of, for detail, 36-37
 - consistencies of, 13, 20
 - different types, 9
 - matte varnish, 36-37
 - metallics, 37-38

- Painting
 - colors, 19, 26
 - faces, 25-33
 - finishing techniques, 21-22
 - flats, 67
 - gold braid, 38
 - preparation for, 7, 8-12, 18-19
 - order of, 18
 - racial color differences, 30, 32-33
 - shading, 14, 16-17, 22-23
 - details, 26
 - flats, 67
 - horses, 57
 - a terrain, 41-42, 44
 - underpainting, 17-18
 - using an airbrush, 51-52
- Parting lines, removing, 5-6
- Pinning, 6, 7, 40
- Plumes, making, 75
- Polishing
 - of armor, 52
 - electroplating, 52-53
- Posing figures, 78-80, 84-87
 - action, 84, 85
 - relaxed, 79
- Proportions, 4

- RTV rubber, 104

- Scale distance, 34-35, 64
- Scars, 33
- Sculpting mediums, 95
- Sculpey, 96
- Series 77, lengthening, 72
- Shading
 - dark and light colors, 23
 - polished metal, 52
- Shading chart, 16
- Shabraque, sheepskin texture, 81
- Soldering, 71-72
- Stop-sign rule, 15-16, 21
- Supplies
 - for electroplating, 52-53
 - ground cover, 40, 41
 - for metal conversions, 69-71
 - and metallic paints, 38
 - other materials, 11
 - paint, 9-11
 - mixing, 12-13
 - for plastic figures, 76-77
 - putty, 93-95
 - varnish, 67
- Swords, scratchbuilding, 96

- Tartans
- Terrain
 - dry wash, 43-44
 - snow, 44
 - tall grass, 44
- Tissue paper for clothing, 95
- Tools, 5
 - jigs, 98
 - and metalwork, 52
 - plastic, 76
 - for plastic figures, 76-77
 - saning discs, 90
 - sculpting, 93
- Trees, 43, 44
- Trews, 49-50

- Weapons from scratch, 96-98
- Wrinkles, sculpting, 91

Building and Painting SCALE FIGURES

In this book, internationally renowned figure painter Shep Paine shares with you the techniques he's used for years to produce award-winning figures. In fact, in step-by-step detail he shows you how to achieve the same great results.

Whether you're a beginner or have years of experience, this book has something for you. Covering all facets of figure painting, *Building and Painting Scale Figures* will get you off on the right foot or lead you down a new path toward greater success.

INSIDE YOU'LL FIND CHAPTERS ON:

- Setting Up to Paint
- Basic Shading
- Painting the Face
- Painting Detail
- Bases and Groundwork
- Painting Special Uniforms, Accessories, and Nudes
- Painting Horses
- Painting Small Scale Figures and Flats
- Minor and Major Conversions
- Assembling and Converting Plastic Figures
- Scratchbuilding Figures
- Display, Care, and Transportation of Figures

KALMBACH  BOOKS

\$17.95

12119

ISBN 0-89024-069-8



9 780890 240694