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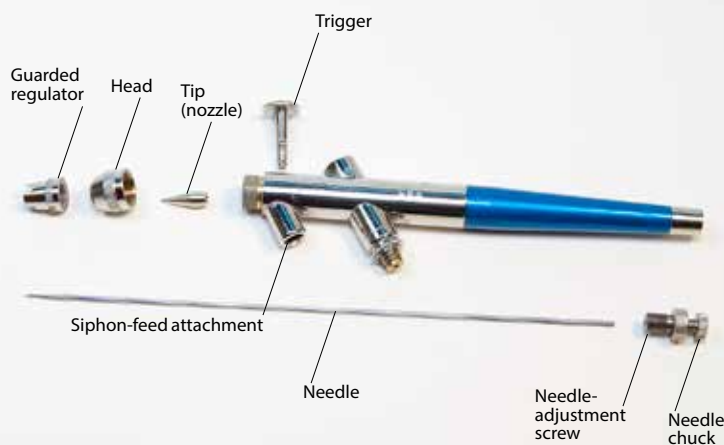
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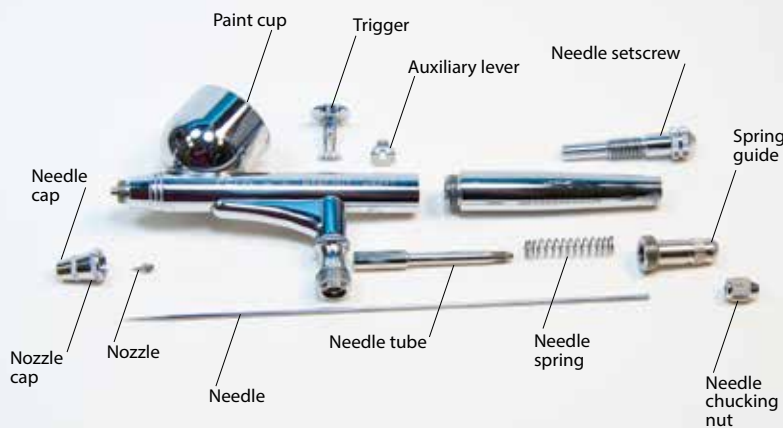
## Single-action, external-mix airbrush



## Single-action, internal-mix



## Double-action, internal-mix



The earliest devices, patented in the late 19th century, went by names like *paint atomizer* or *paint distributor* and were used by artists and illustrators. Nowadays, airbrushes apply fake tans, paint fingernails, decorate cakes, and put killer artwork on 1978 Dodge vans—and paint models.

While all airbrushes work by mixing air and paint, they are not all the same. They can be categorized into major subgroups based on how they regulate paint and air, where the paint and air mix, how the paint is stored, and a host of other features.

## Single-action and double-action

Action refers to how the trigger works. Of all an airbrush's features, this one most clearly differentiates the airbrushing experience.

On **single-action** brushes, the trigger (or a button) opens and closes the air valve, **1**. This one action controls only the flow of air. The paint flow is preset by adjusting the needle's position relative to the nozzle before spraying, usually via a setscrew, **2**. A disadvantage of a single-action airbrush is that changes can't be made in the middle of a painting pass. Advantages are that you know exactly the size of the paint pattern and that there is a lot less chance of making a mistake.

On a **double-action** brush (sometimes called dual-action), pressing down on the trigger releases air and pulling it back moves the needle, **3**. Control of the paint flow is now at your fingertip, so you can make adjustments on the fly. But this extra variable takes practice to master and provides more opportunities for mistakes.

Many double-action brushes feature a setscrew, usually on the back end, that limits the needle's movement, **4**. This minimizes the chance of applying too much paint if your finger slips.

When describing the differences between single-action and double-action brushes, I often use the imperfect analogy of car transmissions. Using a single-action brush is a little like driving a car with an automatic gearbox, needing to worry about just the brake and accelerator—stop and go. A double-action brush is akin to a manual transmission, which introduces the clutch and gear stick to the mix. You have more parts to operate, but you have more control—and it's more fun.

## Internal- vs. external-mix

Single-action airbrushes can be grouped by where the paint and air mix. Many single-action airbrushes, like their double-action counterparts, draw paint through the body of the brush. While called **internal mix**, the air and paint actually meet at the tip of the nozzle in these brushes. Another group, **external-mix** brushes, has separate paint and air nozzles, and they mix paint and air at the front of the brush, **5**.

I've found that internal-mix brushes tend to atomize paint better and have easier control of the paint pattern. On the other hand, there is no paint inside the body of external-mix brushes, so they can be easier to clean.

## Gravity-, siphon-, and side-feed

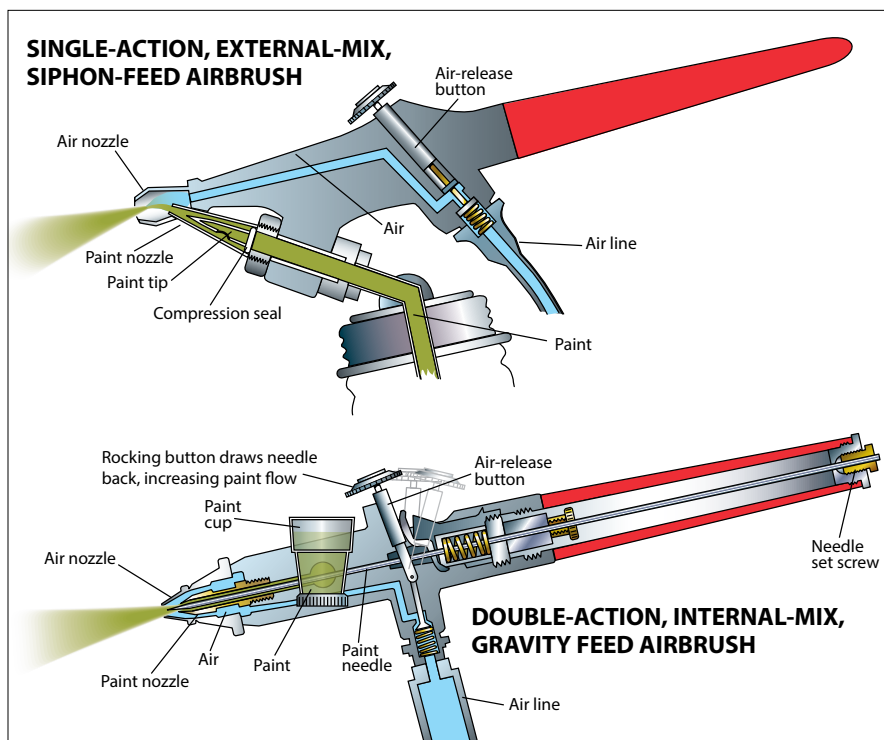
The placement of the paint reservoir affects paint use, the minimum pressure needed for spraying, and sight lines.

On a **gravity-feed** airbrush, the cup is mounted on top of the brush. At the bottom of the cup, an opening usually feeds directly into the paint channel; if you look down into it, you'll see the needle, **6**. The primary advantage is that gravity helps move paint into the brush, so you don't need air pressure to do the work. A disadvantage is that the cup mounts on the brush's centerline and blocks the primary aiming view, which can be a problem when painting details.

On a **siphon-feed** airbrush, paint enters from below as it is sucked in by air flowing over the needle and nozzle, **7**. My experience shows that you need more pressure to move paint efficiently, which is not a major issue except when you need minimal pressure, such as spraying detail work or special effects. An advantage is having a clear view over the top of the brush.

**Side-feed** brushes offer a little bit of the best of both worlds. Depending on which paint reservoir is attached, either gravity or air pressure moves the paint. Most side-feed brushes come with optional paint cups and bottles, **8**.

While cleaning the airbrushes, you'll also notice a difference. Gravity-feed brushes have fewer parts, especially if the cup is integral with the brush, so there are fewer places where paint can be trapped. Siphon- and side-feed brushes have tubes and channels that connect the reservoir to



The basic anatomy of single- and double-action airbrushes. Illustration courtesy of FineScale Modeler magazine

the body, which means there is more stuff to clean, **9**.

## Top button or pistol grip

Traditionally, operators hold an airbrush like a pencil and control the airflow and paint flow by pressing a button on top, **10**. The button presses directly down onto the air valve.

This grip gives airbrushing a similar feel to drawing or using a paintbrush, so it's instinctive. With practice, you can finely control the airflow by regulating how far the button is pressed. The grip can become a little awkward over time, and extended sessions at the booth can lead to hand cramps.

Pistol grips on airbrushes are relatively new. The air and paint are controlled by a trigger in front of an ergonomic handle usually built around the air valve under the brush, **11**. A single motion controls everything: the initial fraction of an inch starts the air, and then the needle starts to move and initiates the paint flow.

I'm a late adapter of the pistol-grip design, but now I find them quite intuitive and very comfortable to use over extended periods. But I don't like being unable to fine-tune the pressure with the trigger as I'm spraying.

## Nozzle and needle size

Since the relationship of the needle and nozzle affects the volume of paint dispensed, the size of the nozzle is important. Selecting one depends on the types of work you intend to do. The good news is that many manufacturers allow for the needle and nozzle to be changed, **12**. Because they need to fit together just right for good paint flow and proper closure, it is important to use the correct needle and nozzle combination. Failure to do so can mess up your paint job or, worse, damage the delicate needle or nozzle.

Nozzles are usually measured in fractions of millimeters, and the larger the number, the wider the paint pattern. Some manufacturers, such as Badger, refer to nozzles as fine, medium, and heavy. Most manuals give some indication of the range of spray patterns—the minimum to maximum width of the pattern from a given needle and nozzle combination.

If you use only one airbrush, a medium (or .3mm) nozzle provides a good compromise with a range of paint patterns—from 1/32" to 1" or 2"—tight enough for detail work but wide enough to paint large areas. If the maximum pattern is too small, painting a large area can take an age and a day.



**11** Sometimes the handiest paint stand is ... a hand. (I suggest your own.) It's easy to maneuver and control, but a wear a glove unless you want camouflaged fingers.



**12** Paint stands hold a model steady and allow you to turn it for access and ease of painting.



**13** Small cardboard boxes can be modified to fit particular models, and they are easy to replace after you cover them with paint.



**14** A convenient option, sprue makes a terrific handle for airbrushing parts. It's almost like they planned it that way.



**15** In preparation for painting the floor of a Messerschmitt Bf 109, I attached several small parts including the control wheel.



**16** I hate finishing a painting session and realizing that I've missed something, so I mark the sprue adjacent to the parts that will be painted the same color, as I did with this Bf 109 instrument panel.

Once you are satisfied that those spots are properly covered, you can turn up the pressure and spray the model for general coverage.

### Holding items to paint

You should support models and parts during painting so you don't paint your fingers (or gloves if you follow my safety guidelines), mark the model with fingerprints, or bang it on a hard surface.

If a model is large or awkward, needs an overall coat of paint, or doesn't fit easily into a paint stand, I prefer to hold it with one hand during painting. This keeps the model at the right height, and I can easily maneuver it while painting, **11**. With an aircraft, I'll hold one wingtip and start painting the other. That way, especially if I'm using faster-drying acrylics, at the end of the painting session, I can paint the wing I was holding.

You can also use a paint stand while painting, **12**. Ideally, it should securely support the model with minimal contact while allowing easy access for painting.

Some handy stands are available from model companies such as Tamiya and Micro-Mark, but a cardboard box or bent wire hanger will do the job as well and can even be customized for a particular model, **13**.

For small parts, airbrushing them on the sprue is a terrific technique, **14**. The plastic frame acts as a handle, and you can suspend the painted parts across a box or hang them to dry. If I have small assemblies that need to be the same color, such as cockpit walls and engines, sometimes I build them on the sprue, **15**. Then I can paint them together using the sprue for support. So no parts get missed on the sprues, place marks adjacent to them with a marker, **16**.

The disadvantage to painting parts on the sprue is that they still need to be separated and the nubs cleaned up, which can damage the paint and require touchup. Also, paint affects solvent cement and super glues, so joining surfaces need to be scraped or sanded before assembly, **17**.

For parts with small holes, toothpicks make perfect holders. I prefer round toothpicks because they are stronger. Using them is as simple as pushing the tip into a hole until it fits snug and the part won't fall off, **18**.

Wooden skewers serve a similar purpose, and their extra length makes the part easier to handle. For parts with larger holes, try more than one toothpick, **19**. Or you can use a wooden stirrer with one end trimmed to a tapered point.

To support the parts during and after painting, use a piece of styrene or floral foam. The other ends of the toothpicks can be embedded in the foam for support, **20**.

There are several ways you can handle parts without holes. If it's a hollow or flat part, use a bit of poster putty or tape to secure it to a handle such as a toothpick, stirrer, or even a bit of stiff wire or brass rod, **21** and **22**. Or you can attach a lot of parts to a piece of cardboard with double-sided tape, **23**.

Brass rod or heavy wire can support an entire model if there is a place



**17** Glue and paint don't mix. A No. 11 blade is the perfect tool for scraping paint from the joining surfaces on an area of a wheel well from an F-4 Phantom.



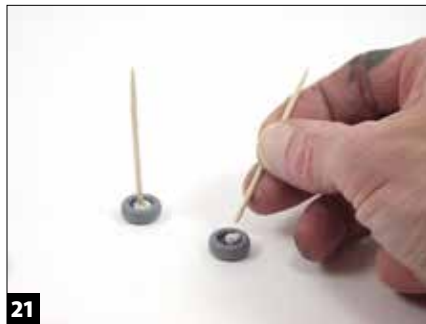
**18** A toothpick pushed into the prop shaft hole of this Messerschmitt spinner allows you to easily turn the part for all-around painting.



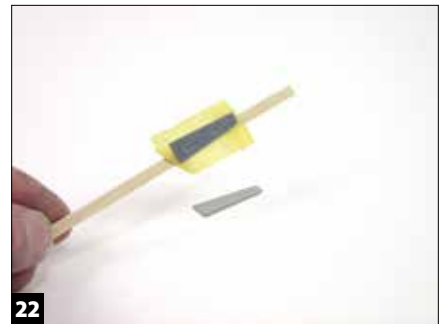
**19** If the holes are too big for a single toothpick, as on these T-90 road wheels, try squeezing two toothpicks in; the wood provides enough give to allow a snug fit.



**20** Save some foam packaging material to use as drying racks. Foam from around electronics components works well.



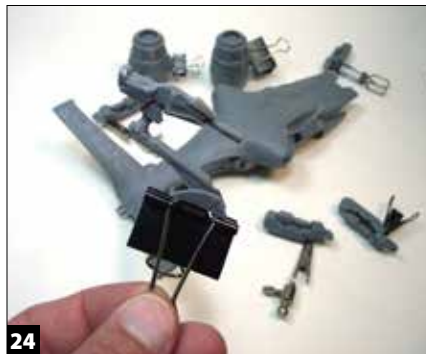
**21** The wheels from Tamiya's 1/48 scale Buffalo lack small holes, so I used poster putty to support the toothpick handles.



**22** To paint flat parts, such as gear-bay doors, I tape them to a handle like this wooden coffee stir stick.



**23** Double-tape pieces, such as this collection of T-90 details, to cardboard for painting. I keep a supply of scrap cardboard at my workbench.



**24** Binder clips, available from office supply retailers and most desk drawers, are perfect for gripping sturdy parts like the gun on Pegasus Hobbies' aerial hunter-killer from *Terminator 2: Judgment Day*.



**25** You can find alligator clips with other electrical supplies. The round wire holder is about the perfect size to hold a wooden skewer.

to insert it into the model. This handle works especially well with jet fighters; their exhausts present the perfect place to temporarily mount a handle. Wrapping foil around the rod improves the fit, if needed.

For prop planes, the hole for the shaft provides a spot for a wire or rod handle, but be careful when inserting a wire or rod to avoid pushing it through any interior structures.

Smaller parts and subassemblies with small tabs can be held in clips, clamps, or locking tweezers. I have a bunch of binder clips that work great for holding larger parts and even whole models, **24**. Alligator clips also work well to firmly hold parts, especially when you attach one to a skewer, which acts as a handle extension, **25**.

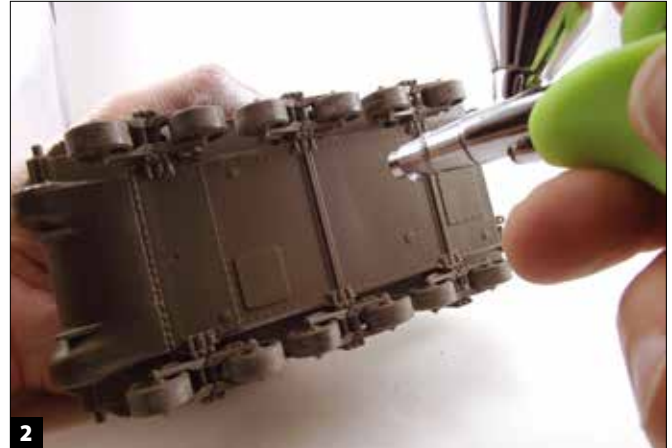
For a great, inexpensive part holder, flip the halves of wooden clothes pin; the

resulting clamp securely holds a part without crushing it, **26**.

For armor, openings for turrets and fighting compartments provide options for handholds, **27**. Some modelers mount a temporary handle by drilling a hole through the floor and placing a screw through it and attaching it to a wooden dowel, **28**. It's secure and allows the model to be turned in almost any direction for painting and weathering.



**1** Planning to use Tamiya acrylics, I first cleaned the surface using Testors Plastic Prep on a cotton pad to remove any skin oil left on the model during its construction.



**2** I mixed 2 parts Tamiya olive drab (XF-62) with 1 part Tamiya thinner (X-20A), and then set the air pressure to 20 psi. Start spraying under the tank's hull, where you can check the pattern and consistency.



**3** Spraying details like hatches and seams initially ensures that these areas are properly covered while minimizing the risk of spraying excess paint.



**4** I painted the Sherman's complex suspension next. Painting the hull before attaching the running gear can simplify this process, but this involves more cleanup. I prefer this method for tanks with bogies.



**5** To provide full coverage, keep moving the brush around the suspension arms, especially on the back sides of the units and wheels. Holding the model in your hand makes this kind of maneuver easy.



**6** On the hull, I airbrushed around details like the appliqué armor plates, skirt attachment rail, tools, filler caps, and engine plates.



31

I also sprayed the propeller with a coat of chrome silver.



32

In preparation for applying decals, I misted Testors Glosscote (No. 1161) mixed with Testors lacquer thinner over the model at 20 psi.



33

Work slowly and build up the Testors Glosscote in multiple layers to produce a glass-smooth surface.



34

Microscale Micro Set and Micro Sol help settle the decals into the recessed panel lines.



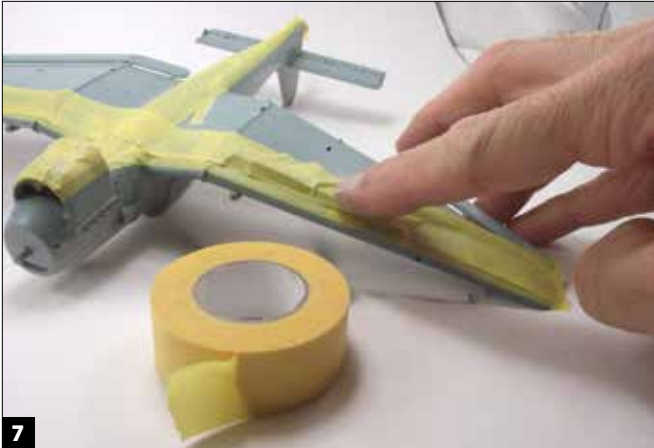
35

While fixing a tear in the serial number decal, I scratched the paint with a hobby knife. By smoothing out the spot with 600-grit sandpaper, I limited the effect to the damaged spot.



36

Holding a piece of paper over the decal, I touched up the spot with light gull gray sprayed at 15 psi.



The camouflage wraps around the leading edge of the wings. I marked the edge of the color with a thin strip of tape, pressing it around details like the ridge at the wing bend. Wider tape (14mm) backed the edge. I paid attention to raised spots like the dive brakes. Note the short piece of tape masking the chin scoop.



To start the upper surface camouflage, I sprayed RLM 71 dunkel-grun (No. 17) along the masked edges under the wings at 20 psi.



Keeping the brush perpendicular to the surface, I airbrushed the masked edges of the cowl and chin.



With all the edges painted, I opened up the pattern and sprayed the entire upper surface of the Stuka with RLM 71. I didn't mask the rear edges of the wings, preferring instead to spray straight down past the trailing surfaces. This left a hard edge without the risk of tape pulling up any paint.



Small vortices of paint generated by the airbrush produced a slightly rough texture on the paint around the wing roots. Fine sandpaper and a gentle touch smoothed the area without damaging the paint on the plastic, but some paint eroded from the photoetched-brass walkways.



The key to getting a sharp angle on splinter patterns is to miter the tape at the corners. I placed strips of Tamiya tape on a glass plate and then sliced them in half at roughly a 45 degree angle.





13

I sprayed on another layer of primer to check the body work and to provide an even surface for the red paint. You may need to repeat this process several times, but the extra work now can save you heartache later.



14

To make sure the surface was smooth and even, more sanding followed the final primer coat. Again, be patient and take the extra steps here for the payoff later in the process.



15

Before moving on to the color coats, I rubbed the surface with a tack cloth to remove any dust or sanding debris that would mar the paint and result in a rough surface.



16

I decanted the Tamiya Italian red and filled the siphon-feed bottle on my single-action airbrush. I started spraying the color in hard-to-reach areas, such as the front spoiler and wheel wells, keeping the pressure at about 30 psi and the airbrush moving.



17

I continued spraying details including the vents and recessed headlight covers. Airbrushing these tight spots first assures better coverage, even if you want to finish with a spray can, as many car modelers do.



18

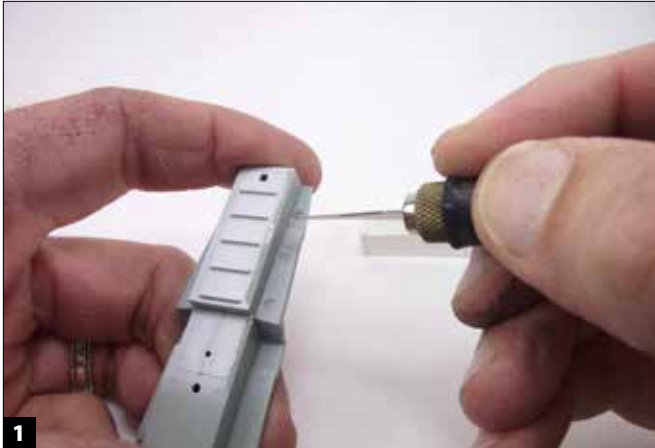
Moving around the vehicle, I sprayed additional details like the window louvers and door outlines. This coat maintains the density of these spots when you begin painting the overall color.

# Poster putty leaves soft edges

PROJECT  
11



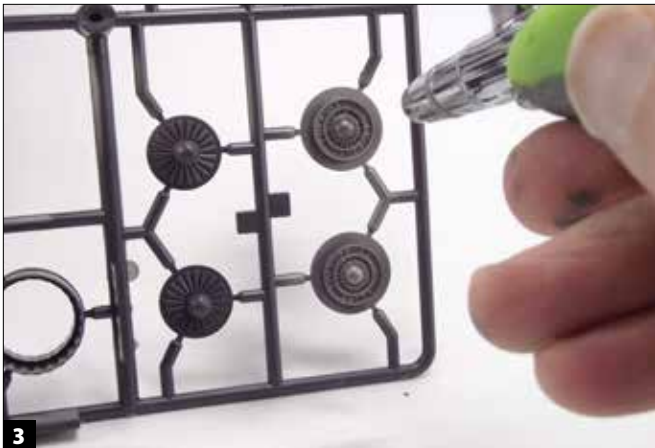
**S**old under various brand names, including Blu Tack, Blue Stik, Sticky Fix Tak, Fun-Tak, and Handi-Tak, poster putty is a great masking material. Like Silly Putty, it stays in place on a model without damaging underlying paint. Unlike the hard-edged demarcation left by Silly Putty, poster putty produces a softer line. This makes it ideal for masking tightly sprayed camouflage patterns such as those found on U.S. military vehicles in NATO service and on many modern military aircraft. It's the perfect tool for painting the U.S. Air Force's 1960s camouflage, which was widely used during the Vietnam War. I built Academy's 1/48 scale F-4C Phantom II as flown by ace Col. Robin Olds, which featured this camouflage scheme. I finished it with decals from Furball Aero Designs.



**1** I airbrushed the parts for the landing gear wells and legs with Acrylicos Vallejo white primer before assembly because they were easy to reach. Paint interferes with glue, so I scraped the attachment surfaces with a knife.



**2** The kit features deep one-piece jet pipes with molded interior detail. I airbrushed them with Testors Metalizer exhaust (No. 1406) with the pressure at 12 psi, so I could keep spraying without flooding the surface.



**3** I used Testors Metalizer exhaust on the engine fan parts that close the exhausts, but painted the front fans, which are visible through the model's long intakes, Metalizer dark anodonic gray (No. 1412).



**4** I flowed an acrylic wash (a mix of Tamiya flat black, water, and a drop of dish soap to cut surface tension) into the engraved detail of the engine fans. This increases the contrast and makes the parts more visible through the small intakes.



**5** When I started this project, I expected to use Model Master enamels for most of the painting. So I painted the inside of the intakes with insignia white (No. 1745), keeping the pressure at 15 psi to avoid producing strong vortices on the enclosed space. The light circles are putty-filled ejector-pin marks.



**6** I masked the intakes with tape ½" inside the lips, and airbrushed on the exterior colors—dark green (No. 171004) for the port side, and dark tan (No. 1742) for the starboard intake.