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**STAR TREK**  
*MODELS*

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INTERGALACTIC

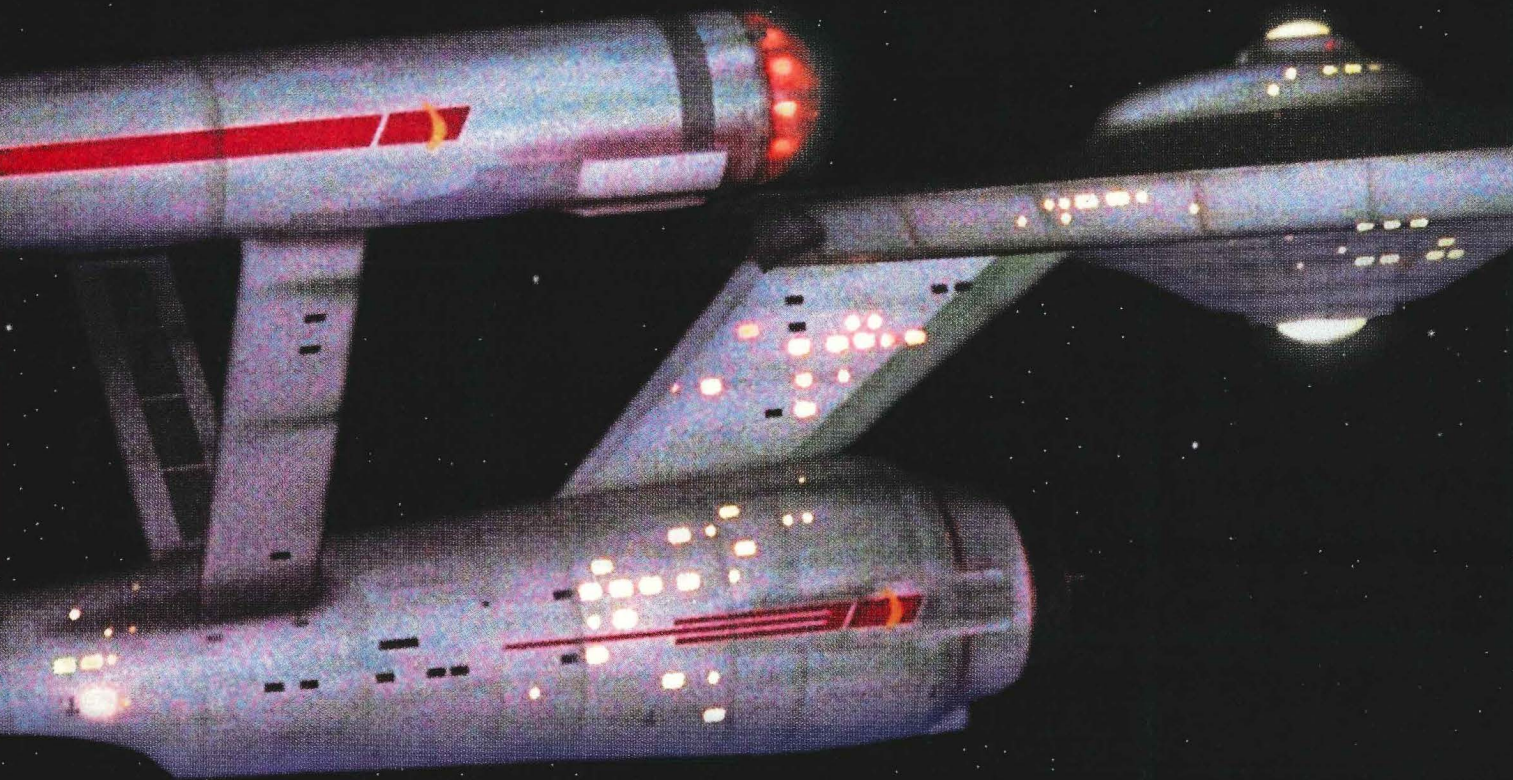
**Color &  
Camouflage**

S P E C I A L

By Charles Adams

Illustrations by the author

# THE STARSHIP ENTERPRISE



**Enterprise sails close to home. The fully restored 11' 2" model is a part of television history, and holds a place in the Smithsonian Institution. Charles Adams illustration.**

1996 marked the 30th anniversary of both the acclaimed series "Star Trek" and the maiden voyage of the United Space Ship *Enterprise*.

**P**erhaps no other vessel in cinematic history is as famous as the starship USS *Enterprise*. It is the most-modeled "spaceship" of all time; the first in a line of popular AMT (Ertl) "Star Trek" kits which collectively are the most successful plastic kit license in history.

Not bad for a vehicle that was never more than a handcrafted miniature. Because of this, questions on composition, color, and scale have been hard to answer. Despite the tremendous amount of "Star Trek" reference material available, getting accurate information about Paramount's original *Enterprise* is not easy. Despite numerous articles about the model over the last three decades, there has never been a definitive reference on the subject.

**A starship is born.** When Gene Roddenberry set out to make "Star Trek" in the early 1960s, his primary concern was believability – every facet of the show had to be plausible. This was particularly important in the design of the starship which would be at the center of the drama.

With "Star Trek" still in its infancy, Roddenberry called on technical experts to ensure his *Enterprise* concept would be scientifically valid. But the task of designing

the ship would go to Art Director Pato Guzman and his assistant, Matt Jeffries.

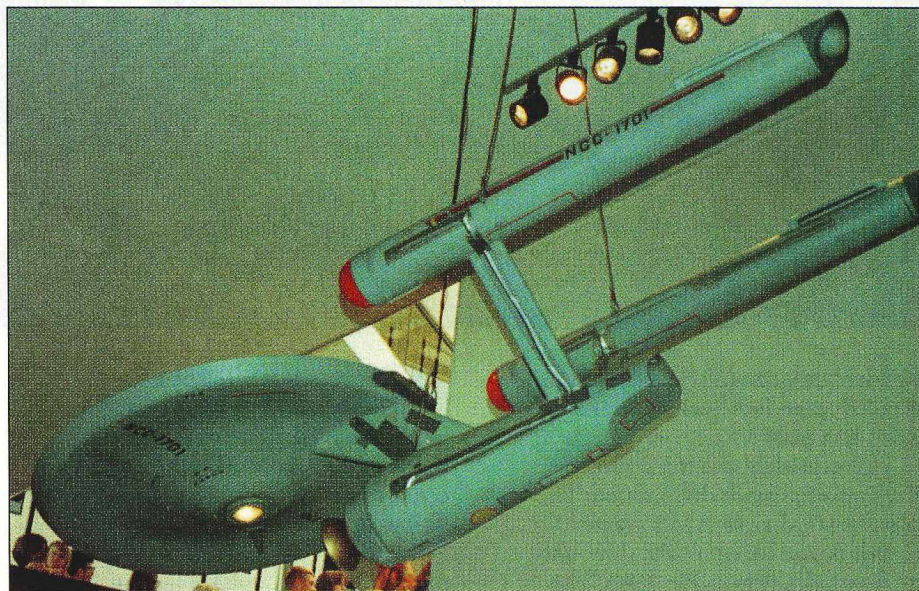
Starting with space exploration information from NASA and major aerospace companies, the two quickly realized they would have to think far ahead of the most advanced scientific concepts then available.

The USS *Enterprise* would be a heavy cruiser designed for deep space exploration and limited military duties. The second in a series of 13 *Constitution*-class vessels, it would bear the now-famous "Naval Construction Contract" number 1701.

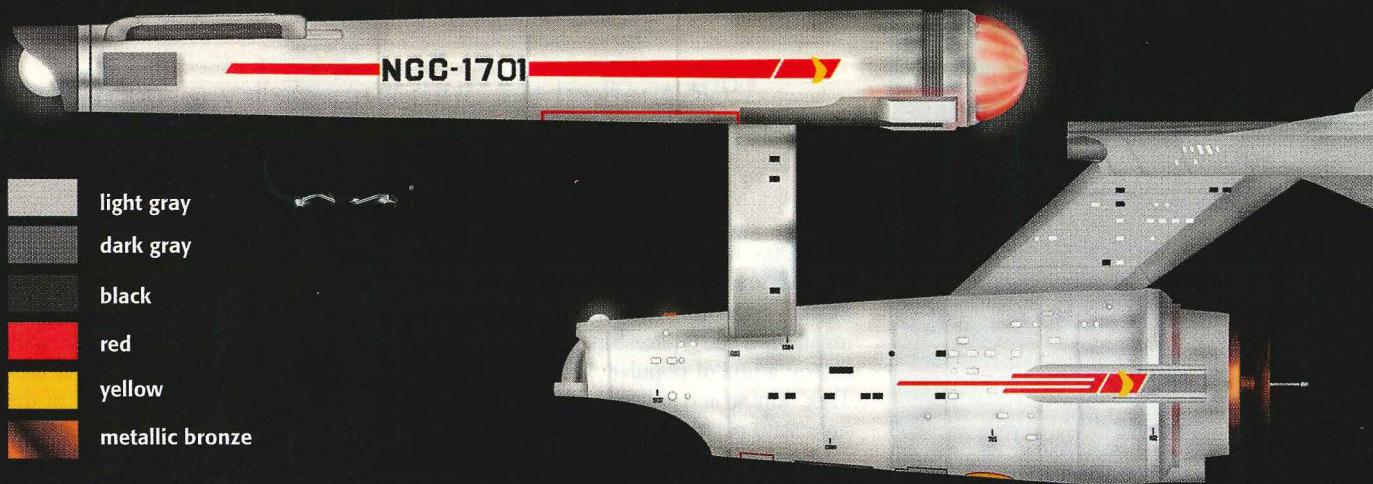
Such ships would be the largest in the Star Fleet, measuring 947' long. Their saucer-shaped primary hulls would be 417' in diameter, and the cigar-shaped secondary hulls 112' wide and 340' long. Each ship's two main engine nacelles would be 504' long and 56.8' in diameter. With these figures in mind, *Enterprise*'s complement was estimated to be 203 (this figure was later increased to 430).

**First flight.** Starship models constructed for the first episode of "Star Trek" began to take shape in 1964. Working from blueprints drawn by Jeffries, a small study model was built from cardboard and wood.

After approving this mockup,

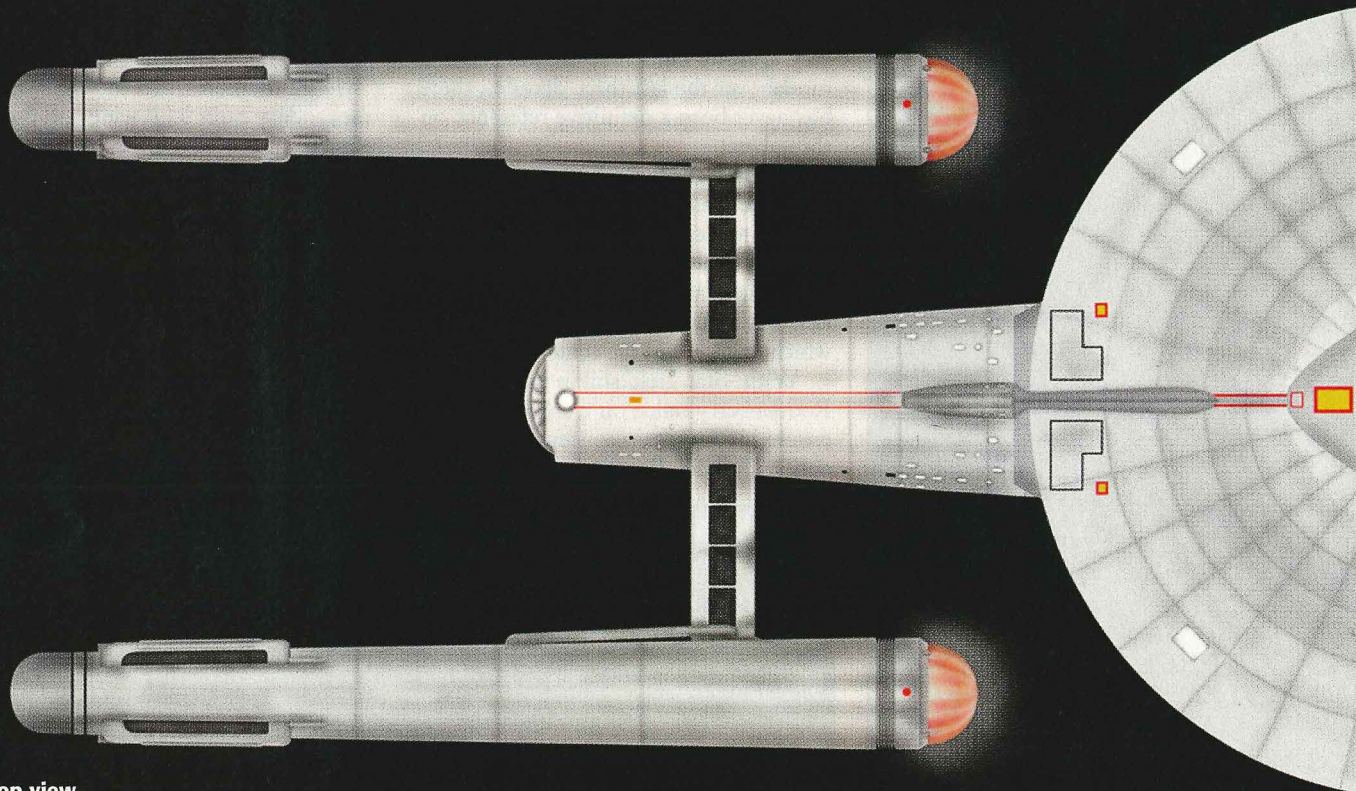


**The large TV *Enterprise* hanging from the ceiling at the Smithsonian. Wiring for the lights was covered with duct tape after its 1974 restoration. Also note the lack of detail on the left side of the model. William S. McCullars photo.**



-  light gray
-  dark gray
-  black
-  red
-  yellow
-  metallic bronze

**U.S.S. Enterprise NCC-1701**  
Right view



**Top view**

Roddenberry commissioned a more-detailed three-foot version created from wood and plastic.

Unfortunately, the three-foot *Enterprise* has since disappeared. The popular 1/635 scale AMT plastic *Enterprise* kit, based on the three-foot studio model, debuted in 1966. The dimensions and decals, however, were not accurate. Nonetheless, AMT models were used in the making of later "Star Trek" episodes, including "The Doomsday Machine," "The Ultimate Computer," and

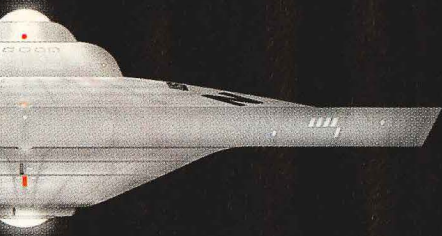
"The Trouble With Tribbles."

Though a yard-long miniature would be adequate for filming using today's motion-control cameras, the original could be used only for long shots and fast fly-bys in the series. To make the starship look realistic in close-ups, a more detailed miniature was required. Thus, an 11' 2"-long *Enterprise* was constructed of vacuum-formed plastic, wood, and sheet metal. Weighing nearly 300 pounds, this miniature was supported by a metal pipe at the bottom of the secondary hull dur-

ing filming. It was spray painted with light gray automotive paint and had numerous custom-made decals.

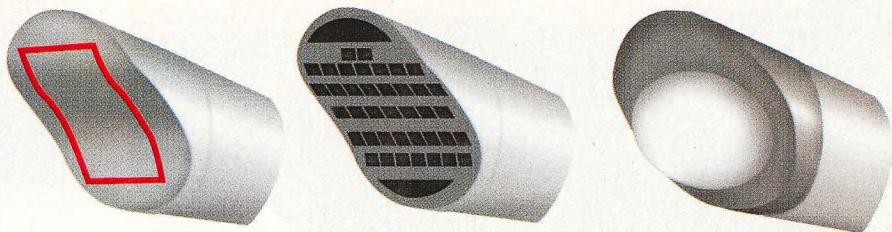
With these miniatures completed, production of the pilot episode could begin. In this historic first voyage ("The Cage," starring Jeffrey Hunter as Capt. Christopher Pike), the *Enterprise* was to make its television debut. Both models were used, but some details were difficult to spot since the ship appeared only briefly in the opening and closing scenes of the episode.

On screen, the *Enterprise* appeared to

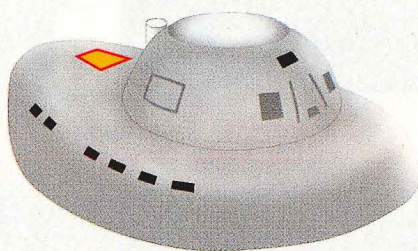


be white and most of its now-familiar markings were present. The fronts of the two engine nacelles, traditionally depicted as crimson, were actually metallic bronze. Each had a clear plastic dome with paint applied to the inner surface. They were intended to match the metallic finish of the antenna-like deflector dish on the secondary hull – all three had matching silver spires.

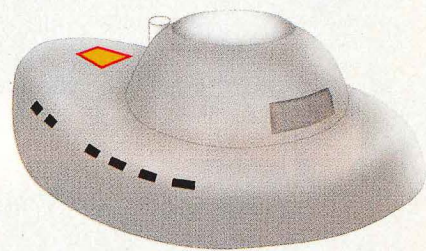
The aft ends of the engine nacelles were smooth with painted markings to match the cove on the aft end of the sec-



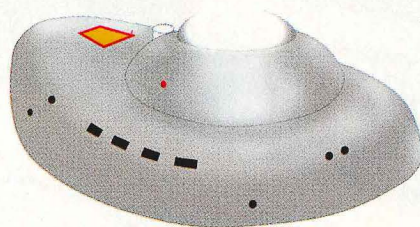
Aft ends of the engine nacelles in "The Cage" (1) differed from the second pilot (2) and the regular series episodes (3)



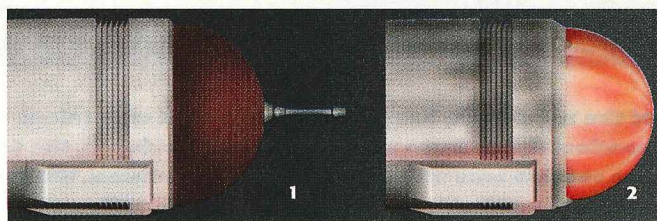
1) Bridge dome as seen in "The Cage"



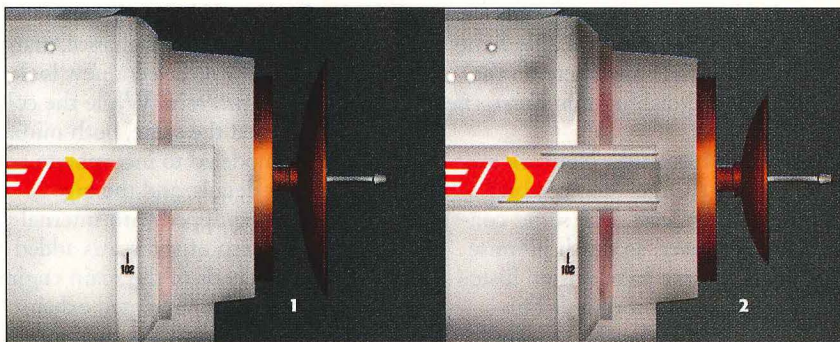
2) Bridge dome as seen in "Where No Man Has Gone Before"

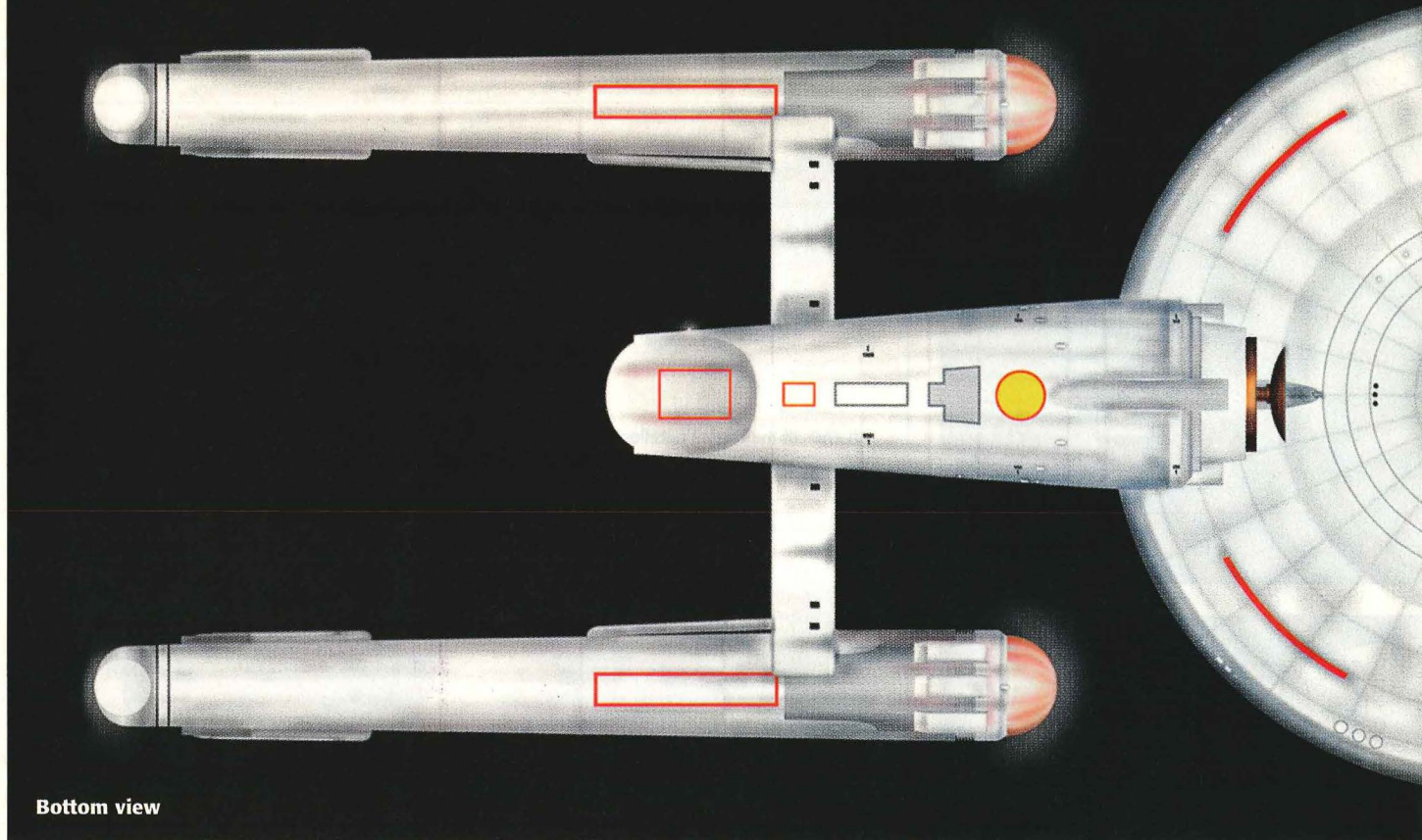


3) Bridge dome as seen in the regular series episodes. The large bridge dome shown in both pilots (1-2) gave way to a smaller unit at the beginning of the first season (3)



Spired nacelle domes and matching deflector (1) were replaced prior to the regular season episodes (2)





Bottom view



**Photos of the top of the model are hard to find. This shot was taken after the 1984 restoration. Apart from the lighted bridge dome, the top surface of the saucer section was still in its original condition. William S. McCullars photo.**

ondary hull. Up front, an oversize bridge dome sat atop the primary hull. No lighting effects were visible anywhere on the ship, further distinguishing this *Enterprise* from later versions.

**Second chance.** Network executives found "The Cage" "too cerebral" and it was not broadcast. The series concept, however, showed so much promise that, for the first time in television history, a second pilot was produced. This episode, "Where No Man Has Gone Before," marked the debut of Capt. James

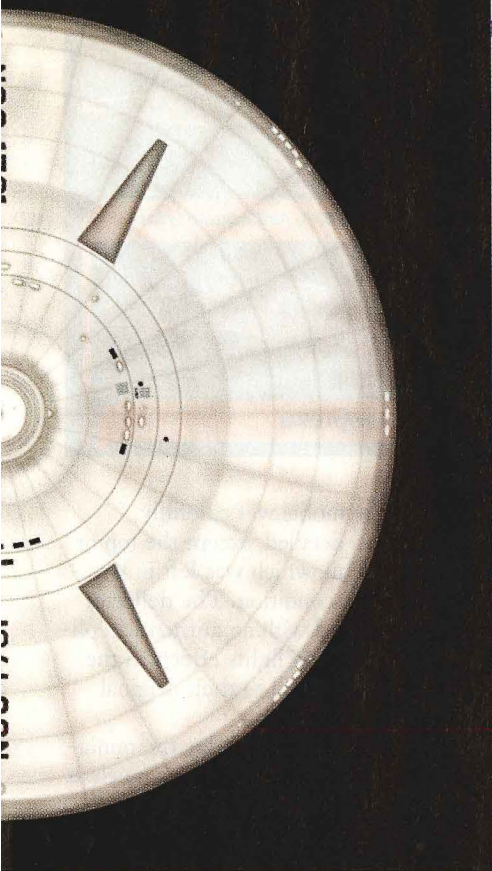
T. Kirk, played by William Shatner.

For this crucial second chance, many facets of the show received a new look, including the *Enterprise*. While the color scheme remained the same, both miniatures were remodeled to incorporate additional exterior details, and the big *Enterprise* was equipped with internal lighting. A pattern of vents was added to dress up the aft ends of the main engine nacelles, while eight simulated exhaust ports were painted over the two impulse engine vents on the back of the primary

hull. The large bridge dome lost some of its painted detail, but gained a lighted top and a forward-looking view port.

**Go for launch.** The success of the second pilot led to production of the regular series in 1966. This time the *Enterprise* received a more extensive overhaul. The basic color of the ship remained light gray, but many details were added, including a series of vents on the inboard side of the nacelle struts. The large bridge dome was replaced with a shorter assembly, the impulse engines were restored to the twin-port configuration used in "The Cage," and the secondary hull featured a smaller, more detailed deflector dish.

On the big model, the entire lighting scheme changed as well. Most notably, the



the big *Enterprise* at several points.

Now the model could be filmed only from its right side; therefore, many details were simply omitted from the left side of the ship. If a scene called for the *Enterprise* to be viewed from the left, the shots were either flopped photographically or filmed using the three-foot model.

In at least one instance, decals on the right engine nacelle of the large miniature were put on backward so the film footage would appear correct when reversed. Later in the first season, the starboard "NCC-1701" marking on the underside of the primary hull was permanently rotated 180 degrees to make it readable when the model was photographed from the front.

**USS Chameleon.** Though the studio model remained virtually unchanged throughout the show's three seasons, certain details appeared to vary from one episode to the next. The show's producers mixed stock footage from the two pilots with scenes in the regular-series episodes. As a result, the *Enterprise*, like a chameleon, appeared to change

from one moment to the next.

The optical process used to film the model often caused inconsistencies in color and detail as well. Unlike conventional photos, film footage had to be filtered and copied many times while being composited into a final shot. This reduced the quality of the finished scenes, obscuring small details and causing the *Enterprise* to appear white in some episodes while in others it was seen as light gray or even light blue!

**Making history.** In 1969, after the airing of 79 episodes, "Star Trek" was canceled. But this would be only the beginning for the landmark series. In the early 1970s the show's popularity exploded through syndication. At about the same time, studio executives agreed to donate the big model to the Smithsonian, where it would be displayed as a piece of television history.

When it arrived at the museum Feb. 28, 1974, the model was in fair condition. It was missing the frosted nacelle domes that housed the "spinning lights" effect, as



spires on the fronts of the main engines gave way to the trademark "spinning lights" effect. In turn, the grids on the aft ends of the nacelles were replaced with small lighted domes. This version of the *Enterprise* became most familiar to viewers.

Because of the new lighting scheme, the interior of the big starship was now a maze of wires. During the second pilot, there were no lights in the engine nacelles, and power for the rest of the model was routed through the support stand at the front of the secondary hull. But when the effects team added the new engine lighting effects, wires had to be run on the outside of the model because the nacelle struts were made from solid wood. As a result, power cables pierced the left side of

**The Enterprise as it appears today. The 1991 restoration included a new paint job and the return of the "spinning" lights inside the engine-nacelle domes. William S. McCullars photo.**

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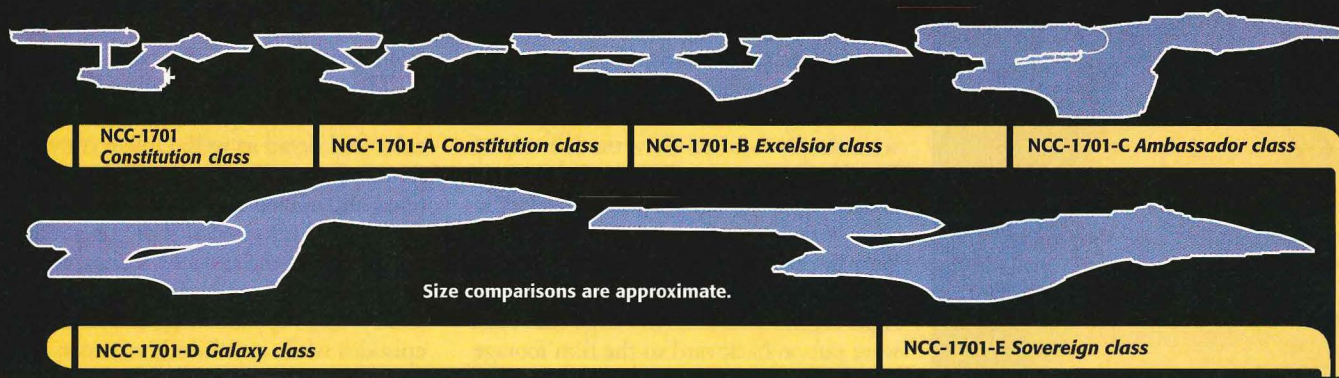
**The Making of "Star Trek"** Stephen E. Whitfield and Gene

Roddenberry, Ballantine Books, 1968  
**The Miniatures of "Star Trek,"** from the "Star Trek" Giant Poster Book #11 Allan Asherman, Paradise Press, 1977

**The Special Effects of Trek** James Van Hise, Pioneer Books, 1993

**"Star Trek" Blueprints** Franz Joseph, Ballantine Books, 1973

# AN EVOLVING ENTERPRISE



well as the antenna-shaped deflector dish. The job of restoring the model was given to Rogay, Inc., which completed the project in about three months.

The model's paint job was touched up, missing "windows" were replaced, and protruding wiring was secured to the left side of the hull with duct tape. Although the ship's lighting was intact, the trademark lighting effects in the engine nacelles were lost, replaced with blinking lights. In addition, the restorers mistakenly painted the nacelle domes red (the originals were translucent plastic) and fabricated an inaccurate replica of the deflector dish that lacked the detail of the original.

**Restoring a classic.** Over the years, the starship remained one of the

most popular items on display in the museum. By 1984, the *Enterprise* was in need of further restoration. The duct tape covering the external cabling was removed while the wiring was restored and encased in tubing. Many of the internal lights were repaired or replaced. Sequentially blinking lights were added to the main engines to simulate the original "spinning lights" effect, though the domes themselves remained red. The model's paint again was retouched and several decals were replaced.

In 1992, the National Air and Space Museum hosted a "Star Trek" 25th-anniversary exhibit. As the centerpiece of the event, the *Enterprise* received an overhaul by S.F.M.A. Modelers, a special-effects company.

The entire model was carefully repainted and detailed, except the top of the primary hull, which was left in virtually its original condition. The deflector dish was replaced with an authentic replica and the spinning lights effects in the nacelles were restored to their original appearance.

**Boldly going.** Today the miniature Hollywood starship appears much as it did during the filming of "Star Trek" more than 30 years ago. It remains the most famous spaceship in science-fiction history.

**FSM**

*Thanks to William S. McCullars for his help in obtaining many of the photographs included in this article.*

## ENTERPRISE MODELS

### Original TV Enterprise

- "Star Trek" USS *Enterprise* (No. S951, 6676EO). This first AMT *Enterprise* kit dates back to 1967. Original *Constitution*-class ship.
- USS *Enterprise* Command Bridge (1975 No. S950, 6007EO); a 12"-diameter model of the ship's bridge
- 30th-anniversary USS *Enterprise* cutaway (1996 No. 8790DO). This new kit is a larger, more detailed offering of the original starship.

### Movie Enterprise

- "Star Trek: The Wrath of Khan" USS *Enterprise* (1984 No. 6675DO). This is a detailed model of the starship from the feature films (rebuilt NCC-1701 and NCC-1701-A).
- "Star Trek III" USS *Enterprise* (1985 No. 6675DO)
- "Star Trek IV: The Voyage Home" USS *Enterprise* (1987 No. 6693DO); same as above
- "Star Trek V: The Final Frontier" USS *Enterprise* (1990 No. 6876DO);

same as above

- "Star Trek VI: The Undiscovered Country" USS *Enterprise* (1992 No. 8617DO); same as above
- Special-edition electronic USS *Enterprise* (1991 No. 6957DO); same as above with lights and sound effects

### Enterprise B

- "Generations" USS *Enterprise* B (1995 No. 8762DO). This is the *Excelsior*-class NCC-1701-B from the feature film "Star Trek: Generations."

### Enterprise C

- USS *Enterprise* NCC-1701-C (1998 No. 8001DO). New kit of the seldom-seen *Ambassador*-class *Enterprise* C.

### Enterprise D

- "Star Trek: The Next Generation" USS *Enterprise* (1988 No. 6619DO, 8400DO). This is the *Galaxy*-class NCC-1701-D from the "Star Trek: The Next Generation" television series.
- Fiber-optic USS *Enterprise* (1994 No. 8772DO). Same as 6619DO with fiber-optic lighting effects.
- "Generations" USS *Enterprise* NCC-1701-D (1995 No. 8793DO); same as

6619DO

### Enterprise E

- USS *Enterprise* NCC-1701-E (1997 No. 6326DO). This is the *Sovereign*-class *Enterprise* from "Star Trek: First Contact."

### Sets

- Spaceship set (1975 S953, 6677EO) includes a 7<sup>1</sup>/<sub>8</sub>"-long TV *Enterprise*, along with a Klingon Battle Cruiser and a Romulan Bird of Prey.
- USS *Enterprise* 3 Generations (1988 No. 6618DO) includes small versions of the original TV *Enterprise*, the feature-film version, and the "Next Generation" *Enterprise* D.
- Special chrome edition USS *Enterprise* 3 Generations (1991 No. 6005DO); same as 6618DO but all chrome plated
- USS *Enterprise* flight display (1995 No. 8787DO); same as 6618DO but with clear "in-flight" display stand
- SnapFast USS *Enterprise* three-piece set (1998 No. 8002DO). Includes small versions of *Enterprises* B, C, and E.



1/6 **Scale**

# Arming LT. WORF

How to fashion a realistic sword for GEOmetric's kit

by Dan Thompson

LARGE vinyl figure kits (1/6 scale and bigger) provide a new medium for modelers. They're a boon to science-fiction and horror modelers. The comparatively low setup costs allow small manufacturers to produce kits of subjects that 10 years ago would have been little more than wishful thinking.

**V**inyl is a good material for figures, providing natural-looking surfaces for flesh and clothing.

It, however, is not good for reproducing crisp details. This is especially noticeable when the subject requires a metal-edged weapon, like a sword. I discovered this when I purchased a 1/6 scale GEOmetric Design kit of Lt. Worf from "Star Trek: The Next Generation."

A key element in his warlike stance, Worf's bat'leth (a curved, Klingon sword), simply didn't look right. I couldn't see any way the two pieces of flexible vinyl provided in the kit could be made to realistically represent a metal weapon. The photo of a completed figure on the kit's



box supported my conclusion. I decided the best way to model a metal weapon, especially in this large scale, is to use real metal.

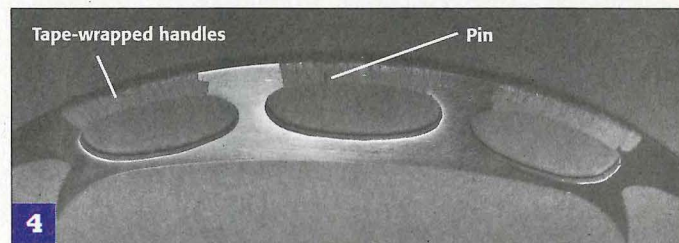
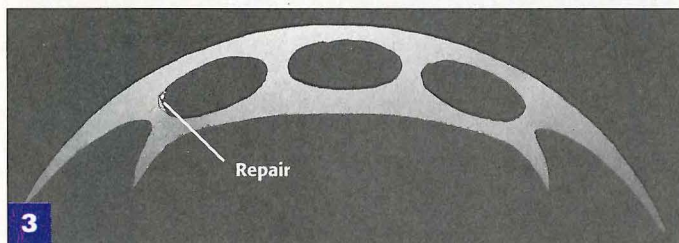
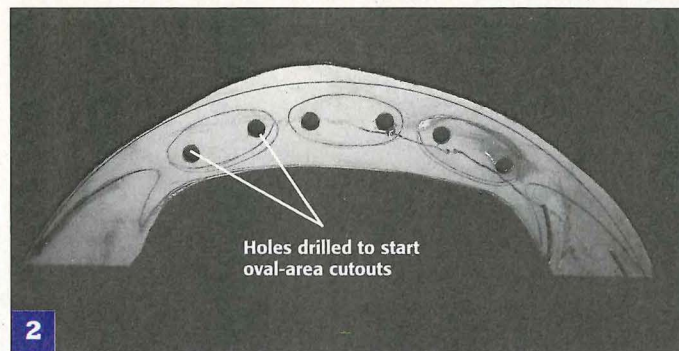
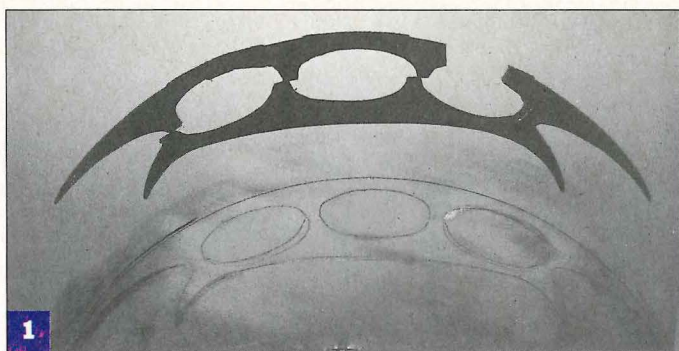
In the universe of "Star Trek," the bat'leth is made from an advanced, lightweight, super-strong alloy. But the actual props appear to be aluminum. That's what I planned to use, too. Like many modelers, I'm a pack rat, so my garage is stuffed with odds and ends that could be useful someday.

I found a box intended to house homebuilt electronics projects. Sold by Radio Shack, it comprised anodized aluminum sheet and extrusions. The top and bottom were 1/16"-thick flat aluminum

sheets. Any 1/16" aluminum sheet would have worked.

I laid the two vinyl pieces of the Klingon sword on the aluminum sheet and traced its shape with a .7mm pencil, **1**. Then I flipped the kit parts and traced the remainder of the bat'leth. Flipping the pieces made a more symmetrical shape than just tracing the entire kit sword and eliminated the problem of the gap for Worf's hand in the vinyl parts. I rough cut the piece from the sheet with a saber saw, being careful not to get too close to the pencil lines.

A jeweler's saw, a super-fine coping saw, is useful for plastic and indispensable when working with metal. The jeweler's



saw cut right to the outlines. The bat'leth has three oval holes for hand grips. I first drilled holes in each of these areas, **2**. Then I disconnected one end of the jeweler's saw blade, threaded it through a drilled hole, reconnected it, and cut out the oval opening.

My concentration drifted for a moment while cutting one of the holes and the saw blade crossed the marked line. I immediately got back on line, but left a notch in the oval opening. To repair this, I cut the corresponding bump off the cutout plug. I cemented this filler piece into the notch with cyanoacrylate cement, **3**. This repair looks good on the finished sword but not as good as if the mistake hadn't been made in the first place. Watch that saw!

At this point in construction, I finished removing the aluminum's anodized coating with sandpaper. (I had lightly sanded the sheet before tracing the kit parts to make a better surface for drawing.) The coating proved tougher than I'd expected and the vigorous sanding needed to remove it also slightly rounded all the edges. I'd suggest removing the coating first.

I used jeweler's files for final shaping, including the cutting edges. Successively finer grades of sandpaper produced a smooth surface. Novus plastic polish worked well, too, giving a gleaming metallic finish.

Another modification I made was to the hand gripping the sword. The kit part was designed to be cemented on each side of the hand, but it's nearly impossible to make this look like a hand wrapped

around a solid grip. Cutting a section out of the aluminum sword might have helped since it's more rigid than the vinyl part, but I decided to leave it one piece and open the hand instead.

A sharp hobby knife cuts vinyl almost too well, so don't cut farther than needed. I first removed the sections of plastic that represented the sword's grip. Then I cut through the base of the thumb to open the hand for the sword. This didn't give the correct grip, so I glued the hand back together. A shim the thickness of the razor-saw cut (made from scrap vinyl flash) brought the hand back to the original dimensions. I made a new cut across the fingers.

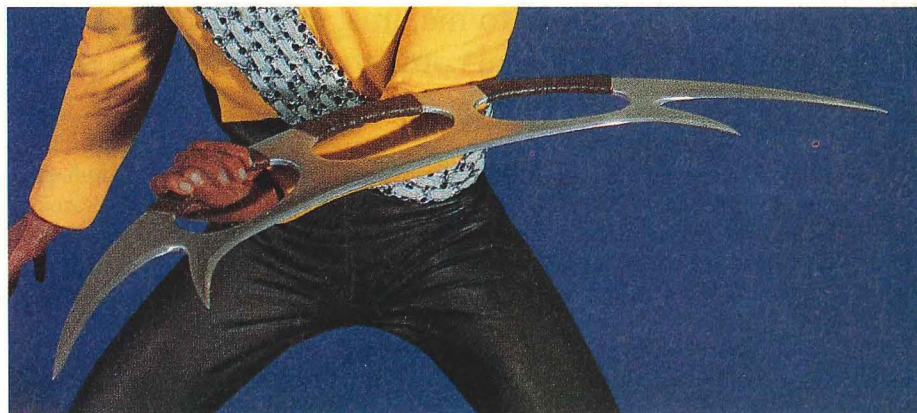
The bat'leth rests on Worf's forearm. To help secure it, I drilled a hole through the sword's handle and into the arm. A piece of straight pin cemented into the hole locked the sword to the arm. Before attaching the sword I wrapped the bat'leth's grips with strips of plastic elec-

trical tape that I painted brown to simulate leather, **4**. That also covered the pin-head. Finally, I applied Future floor wax to prevent oxidation that dulls aluminum.

The rest of the figure was built out of the box. I filled seams with super glue and painted with acrylics. I bought the base at the Louisville, Kentucky, Wonderfest. A single resin casting, it re-creates elements from Worf's holodeck exercise program. It even has a broken-off column that raises Worf's foot and makes his gaze less downcast. The skull of Worf's enemy (with a blade still embedded in its forehead) lies amid the ruins of a Romulan building. The casting had its share of bubbles, but I filled them with cyanoacrylate and styrene scraps.

Mixing materials in models has become common in other genres and I don't see why large-scale vinyl kits shouldn't benefit too. Replacing soft-vinyl weapons with real metal produces a more realistic model.

**FSM**



# Decal panels make Excelsior

Aztec pattern  
and surface  
decoration spiff up  
*Star Trek* ships

BY AARON SKINNER

In its first big-screen appearance in 1979's *Star Trek: The Motion Picture*, the starship *Enterprise* looked very different. The basic structure was still there, but the size and shape of nearly every element had changed. In addition, to increase visual interest on large screens, the surfaces were painted with varying shades and sheens. Under studio lights, this patterning, which came to be known as Aztec paneling, gave the filming miniature the appearance of being built from many parts.

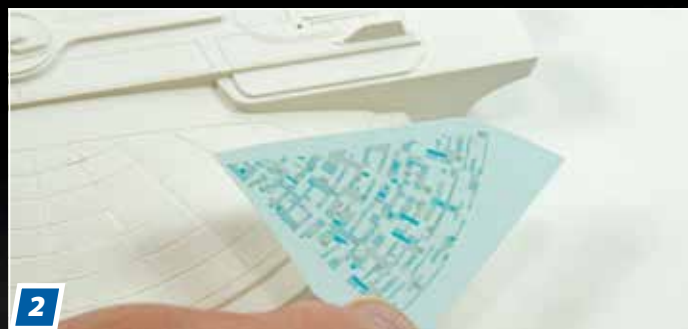
In the *Star Trek* films and TV series that followed, many new ship designs would emerge, but the Aztec patterning continued to be added, even to the CGI models used in later shows and movies.

Modelers have replicated this pattern with paint since 1979, but decals to represent the pattern have become more common of late. AMT has begun producing them especially for many of the ships in its catalog. Sized for a particular model, they are not hard to apply, but it is a time-consuming process. I used AMT decals to decorate a 1/1000 scale USS *Excelsior*.

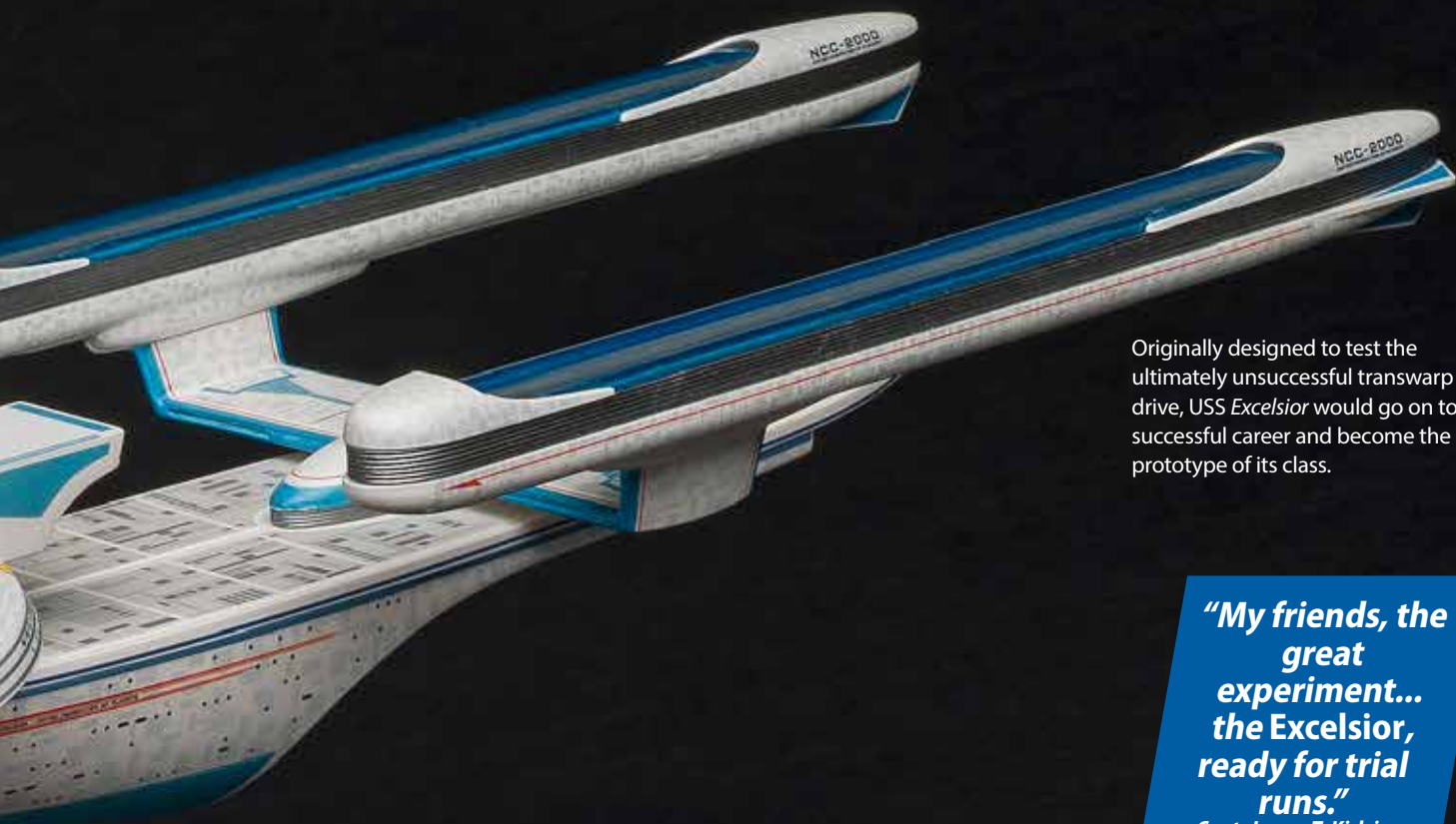
A good surface is essential for decals, so I first sprayed the major subassemblies — primary hull, secondary hull, and pylons — with white Tamiya fine surface primer. I painted the three outer sections of each warp nacelle separately to avoid awkward masking. After fixing blemishes and re-priming the parts, I applied several thin layers of Tamiya pearl white from a spray can and sanded it smooth.



Used with the kit decals, AMT's aftermarket set includes three large sheets. In addition to the Aztec panels that cover virtually every surface, the set has many of the ship's colored accents in two shades and registry numbers and hull names for several other *Excelsior*-class ships.



The paneling has to go on first and the sections are sized to fit specific areas with the edges often falling along panel lines. I started by cutting one of the primary hull's upper sections from the sheet.



Originally designed to test the ultimately unsuccessful transwarp drive, USS *Excelsior* would go on to a successful career and become the prototype of its class.

***"My friends, the great experiment... the Excelsior, ready for trial runs."***

***- Capt. James T. Kirk in Star Trek III: The Search for Spock***



**3** After dipping the decal in warm water and setting it on a paper towel while the adhesive activates, I apply Microscale Micro Set to the area the decal will be placed. The fluid helps to break up water surface tension for better adhesion.



**4** Once the decal moves freely on the backing paper, I placed it on the model and slide the paper out while holding the decal in position with a cotton swab. Avoid using your finger on the decal as it will often stick to skin. Use the swab to carefully refine the position of the decal.



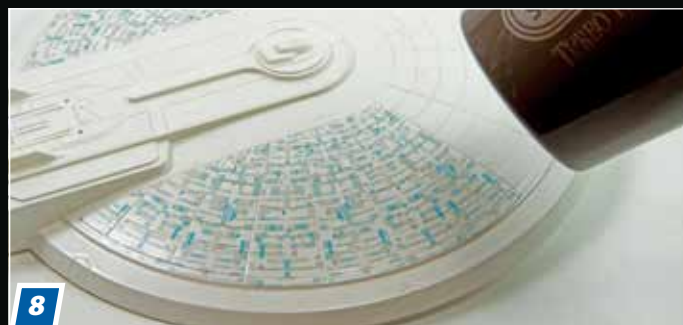
**5** If the decal starts to stick too early, you can gently work a little water under the edge of the film with a soft brush. Once you are satisfied with the position, roll a cotton swab from the center out to remove excess fluid.



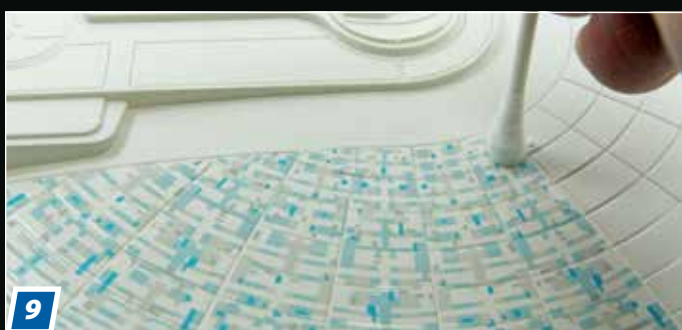
**6** To prevent the water from one decal lifting the one adjacent, don't apply them next to each other in a session. I applied one Aztec section on each side and let them dry before adding more. There are a lot of decals here so be prepared to spend several sessions at the bench.



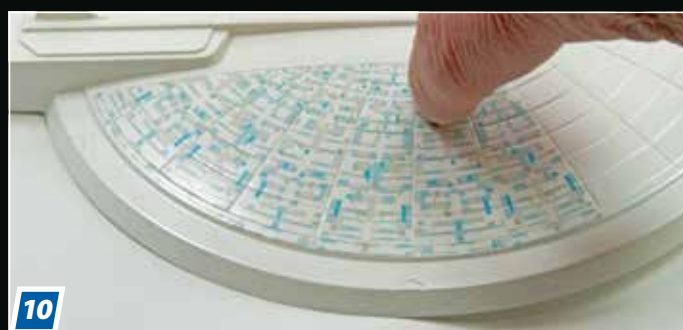
**7** Before setting the primary hull aside to dry, I liberally applied Micro Sol to each of the decals. This solvent softens the film, so the decal settles into detail. Micro Sol can wrinkle the decal as it works but resist the urge to smooth it out. Doing so will likely damage the softened decal and the marking ultimately should level as the solvent dries.



**8** Heat also can help decals settle by softening and slightly shrinking the thin film. I used a hairdryer to help the Aztec sections conform to the raised phaser arrays. Be careful doing this; if the dryer gets too hot, it will damage the decal and even crack the model.



**9** After heating the decal, I gently pressed the decal over the protruding phaser array using a cotton swab. Don't roll or drag the swab or you will damage the soft film.



**10** To ensure the Aztec section settled into recessed panel lines, I carefully ran a fingernail along the line. You also can slice the film along the lines and apply Micro Sol. Be sure the blade is new and replace it often during this process; even a slightly dull knife will tear the decal.



**11** Sometimes decals need help to go across gaps, over edges, and around corners. On the nacelles, I gently sliced the film at the front of the pylon fairing so it would lay down.



**12** I applied all of the Aztec panels before adding the accent decals. The pattern's contrast seemed too stark and I feared it would overwhelm the ship's markings. So, I decanted Tamiya pearl white from a spray can for better control and misted it over the parts to seal and mute the decals.



**13** Many of the accent decals need to be trimmed for fit. Using a hobby knife, I cut out the clear section from the upper hull's rear panels to go around the fins.



**14** Stripes in two shades of blue run around the upper edge of the secondary hull, but clear film between the divergent stripes at the front interfere with the fit. So, I sliced them apart.



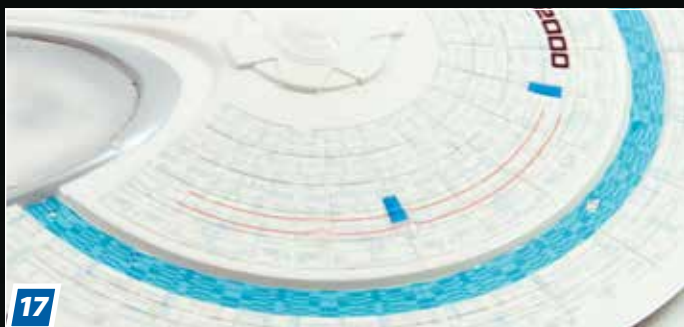
15

Conforming flat decals to complex curves, such as the base of the pylons, takes work. After positioning each one, I gently heated it to start the process and remove excess fluid. Then I brushed on Micro Sol, pressing with the brush as the solvent started to work, flattening wrinkles.



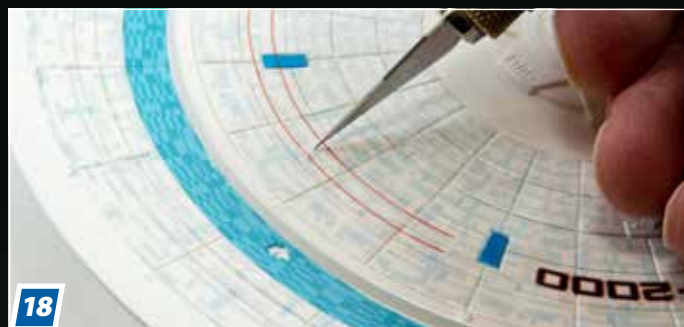
16

If you model NCC-2000 from *Star Trek VI: The Undiscovered Country*, the red stripes that run around the upper hull from the large registry number at the bow are a tad too long. After letting each decal dry a few minutes, I sliced the excess along the panel lines and removed it with a wet brush.



17

Under the saucer, the curve of the red stripes is too acute. I carefully bent it to match the curve of the panels and blotted out excess water at either end with a cotton swab.



18

Then, I sliced ridged areas on the inside of the curves, so the decal settled properly. A little Micro Sol settled the decals.



All up, I spent about 12 hours applying the decals to the *Excelsior* with the work spread over several days. The resulting finish looks right and is better than I could have done with paint and masks. **FSM**