STAR WARS
MODEL KITS

How To:
- Add lights • Weather & Paint
- Create a Simple Display
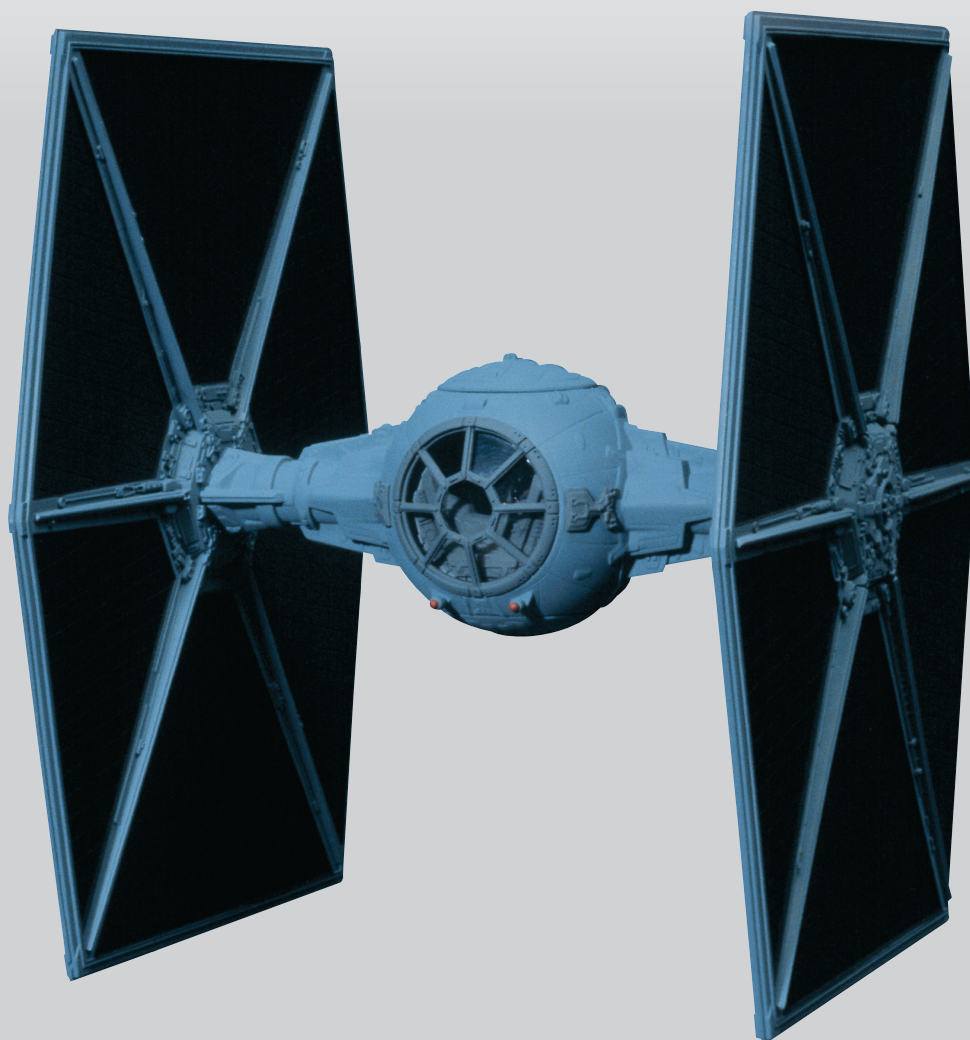
AT-AT

Almost Straight from the Box

Basic lighting and weathering techniques help bring the "Star Wars" classic to life

By Matthew Usher

A single battery-powered light-emitting diode (LED) gives the AT-AT's viewport its sinister glow. Rebecca Saliture photo.

Some of the most imaginative vehicles in the "Star Wars" universe, the giant Imperial AT-ATs (all-terrain armored transports) first lumbered on the screen in the second film in the trilogy, 1980's "The Empire Strikes Back."

Serving as both troop transports and assault craft, the giant, four-legged walkers attacked the Rebel base on the ice planet of Hoth, battling ground troops and Rebel Snow Speeders.

Although MPC/Ertl's AT-AT isn't in production right now, it's still easy to find in well-stocked hobby shops and offers plenty of opportunities to add detail.

One of the most striking details of the movie walkers was the sinister red glow from their viewports. Wanting to simulate it, I added a single light-emitting diode (LED) inside the head and hid the batteries inside the model's hollow main hull. The wiring and the kit modifications are straightforward, and would be a good first project if you've thought about adding lights to your models, but are uncertain about how to get started.

Also, unlike most of the Empire's hardware, the AT-ATs show signs of wear and tear – a little basic weathering will give your model the proper, oily, battle-scarred look. Let's go!

Assembling the legs

1 Start construction with the walker's legs. Many of the parts don't fit together well right out of the box; cutting off the alignment pins with a hobby knife makes them easier to align. Always test fit the parts before gluing them, especially if you use super glue like I did.
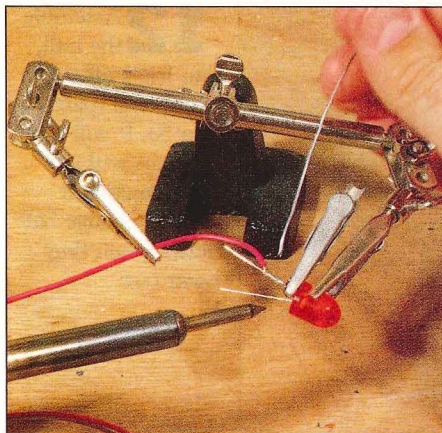
2 A medium-grit sanding stick removed all seams after the glue dried.

3 I knew from experience the finished walker is top-heavy, and adding batteries inside the hull would only make things worse. Filling the footpads with BBs helps keep the model on its feet.

Batteries not included

4 I used a pencil soldering iron and rosin-core solder for the wiring. An "extra-hand" parts holder held everything in place. The LED's "bulb" is plastic, so to keep the soldering iron from damaging it I added an alligator-clip heat sink to draw away excess heat.

The LED leads are different lengths – the longer one is the positive side. If the leads are reversed the LED won't light, so to keep things straight I used red wire for the positive side and black for the negative. Use plenty of wire – it's better to have too much than not enough, and any extra will be hidden inside the model.

5 The two AA batteries are too powerful for the LED – you'll need to adjust their voltage slightly. A rotary potentiometer, essentially a tiny dimmer switch, solves the problem. By adding it to the circuit you can reduce the voltage to an acceptable level.

Slide switch
LED
Rotary potentiometer
AA battery holder
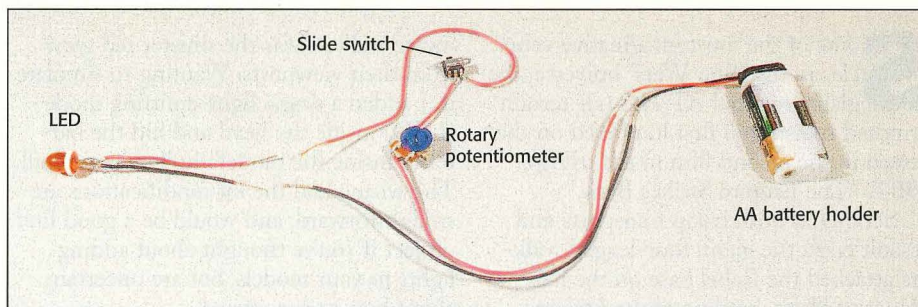
6 Note the LED isn't wired to the rest of the circuit yet. This happens after it (and its wires) are installed in the head, and the batteries and switch are installed in the main hull.

A hole in the head

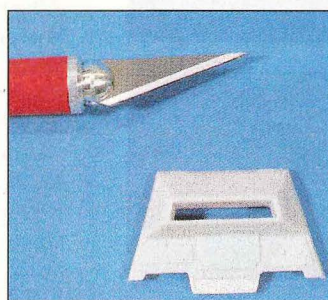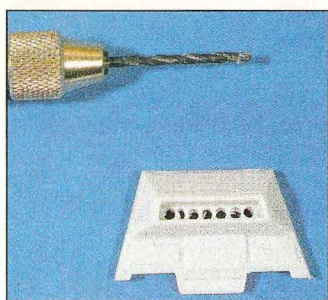**7,8** The model's viewport is molded closed, so I drilled seven holes inside the visor using a pin vise and a 1/16"-diameter drill bit. A hobby knife and a flat file helped open the slot the rest of the way.

9 The tubular section of part No. 10 makes a perfect holder for the LED after a section is removed with a razor saw. The LED installs from the back, and the wires are hidden in the neck. Although the kit provides parts to make the head posable, they'll get in the way of the wiring, so discard them and glue the parts in place.
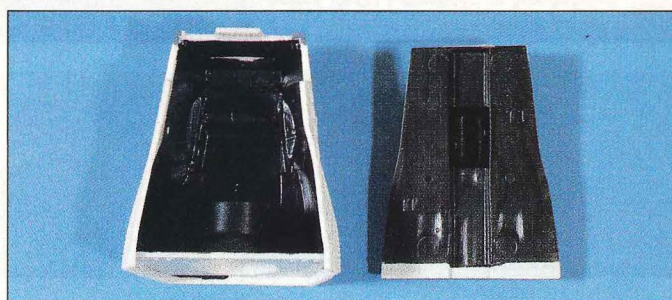
10 Assemble the head, but leave off the lower deck (part No. 11). To keep the LED glow from showing through the sides of the head, brush paint its inside surfaces with a thick coat of black paint. When it's dry the lower deck can be glued in place.

Part No. 10
Remove
LED

Building the hull
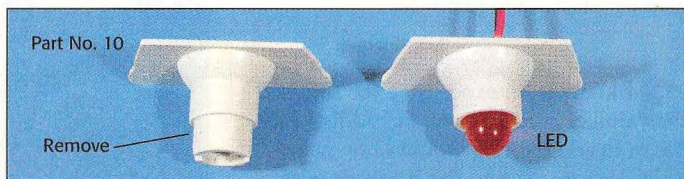
Part No. 21
Slide switch
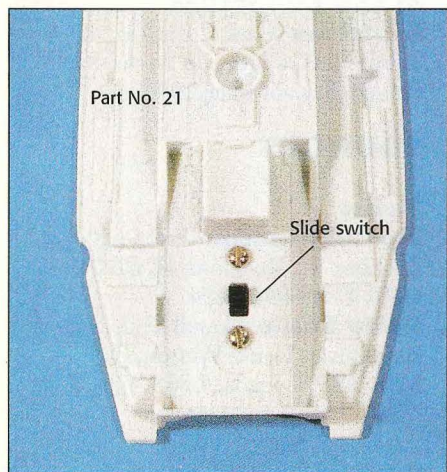
11 I hid the slide switch on the front end of the hull's bottom plate (part No. 21). An opening was made for it using the same method I used for the visor – I drilled a hole, then shaped it into a rectangle with a hobby knife. Tiny nuts and bolts hold it in place.
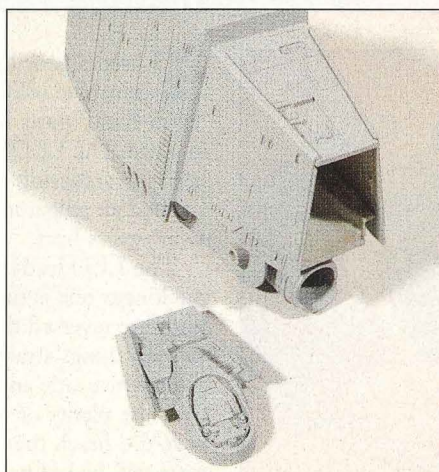
12 Assemble the hull, but leave off the rear panel (part No. 5). It will stay in place without glue, making it easy to change batteries when they wear out.

13 The hull has plenty of fit problems, particularly where the top panel (part No. 1) meets the sides. Before I sanded down the seam lines I covered all of the raised panel lines with masking tape so I wouldn't accidentally remove them.

Painting and weathering

I airbrushed the model's subassemblies with Model Master aggressor gray (FS 36252); it seemed to be the best out-of-the-bottle match. After the paint had dried for several days I started weathering the model.
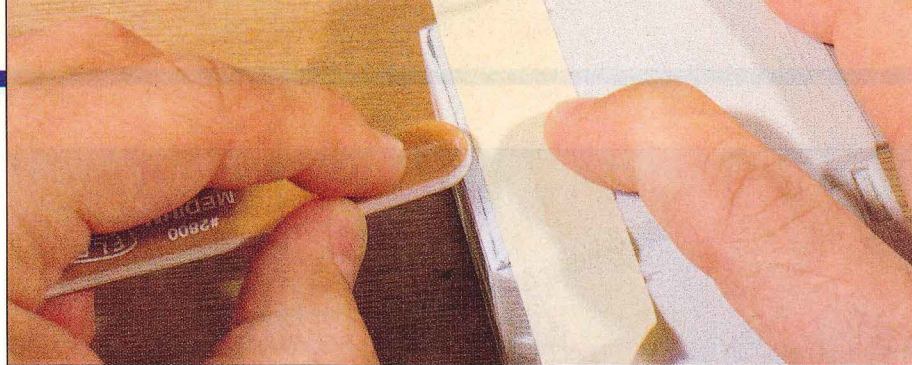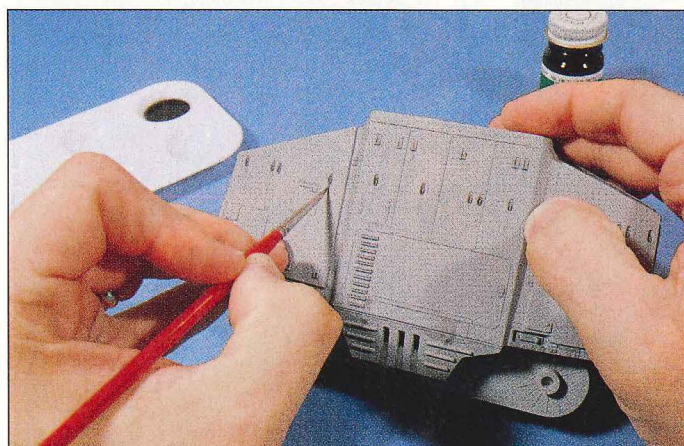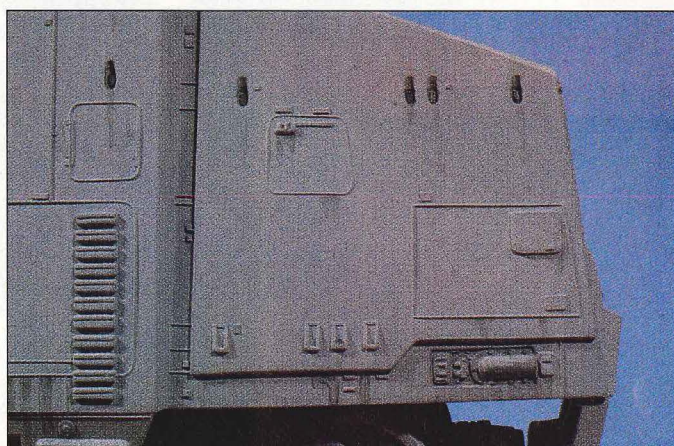
14 To simulate the walker's oil stains I thinned a small amount of Polly Scale night black acrylic paint until it was the consistency of black coffee. Consulting pictures of the production models as a guide, I added oil streaks using a fine paintbrush, letting the color build up slowly.

15 The stains run straight down the sides of the model, slowly thinning to a point.

When I was satisfied with the oil stains I thinned the black paint even more, until it was almost transparent. Using a wide brush I gave the model an overall wash, letting the color flow into all of the recesses.

Final assembly
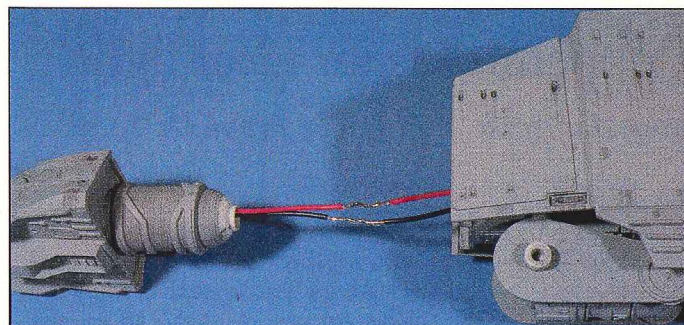
16 I glued the LED into the opening in the back of the head, then glued on the neck after routing the wires through it. I soldered the leads to the wires from the hull, covered the joints with electrical tape, and glued the head assembly to the main hull.

This is where all that extra wire comes in handy – the soldering iron never got close enough to the plastic to accidentally add any "battle damage"!
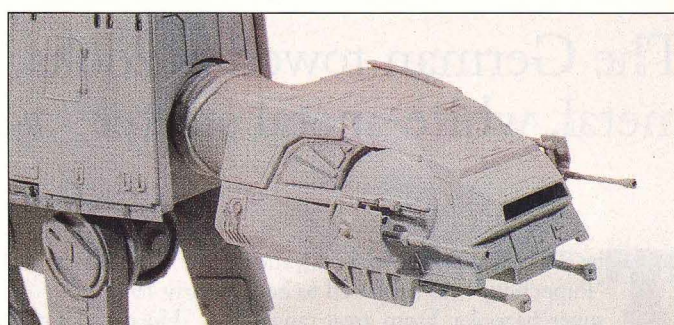
17 I added the legs using super glue, making sure all four feet were touching the ground, so the model would be stable. The blaster cannons were the final addition.

A flip of the switch and the AT-AT looks ready for battle. The "special effect" is worth the extra effort, and will help set your model apart in your display case or on the contest table.

FSM

POWER TIE

Lighting up AMT/Ertl's "Star Wars" Imperial TIE fighter with LEDs and fiber optics

By Matthew Usher

Star Wars" fans like me have been adding lights to their models one way or another ever since the first kits appeared in the late '70s. Some of the ships are easier to light than others; larger models like the Millennium Falcon and Imperial Star Destroyer have cavernous hulls and are easy to pile full of lights, wiring, and batteries.
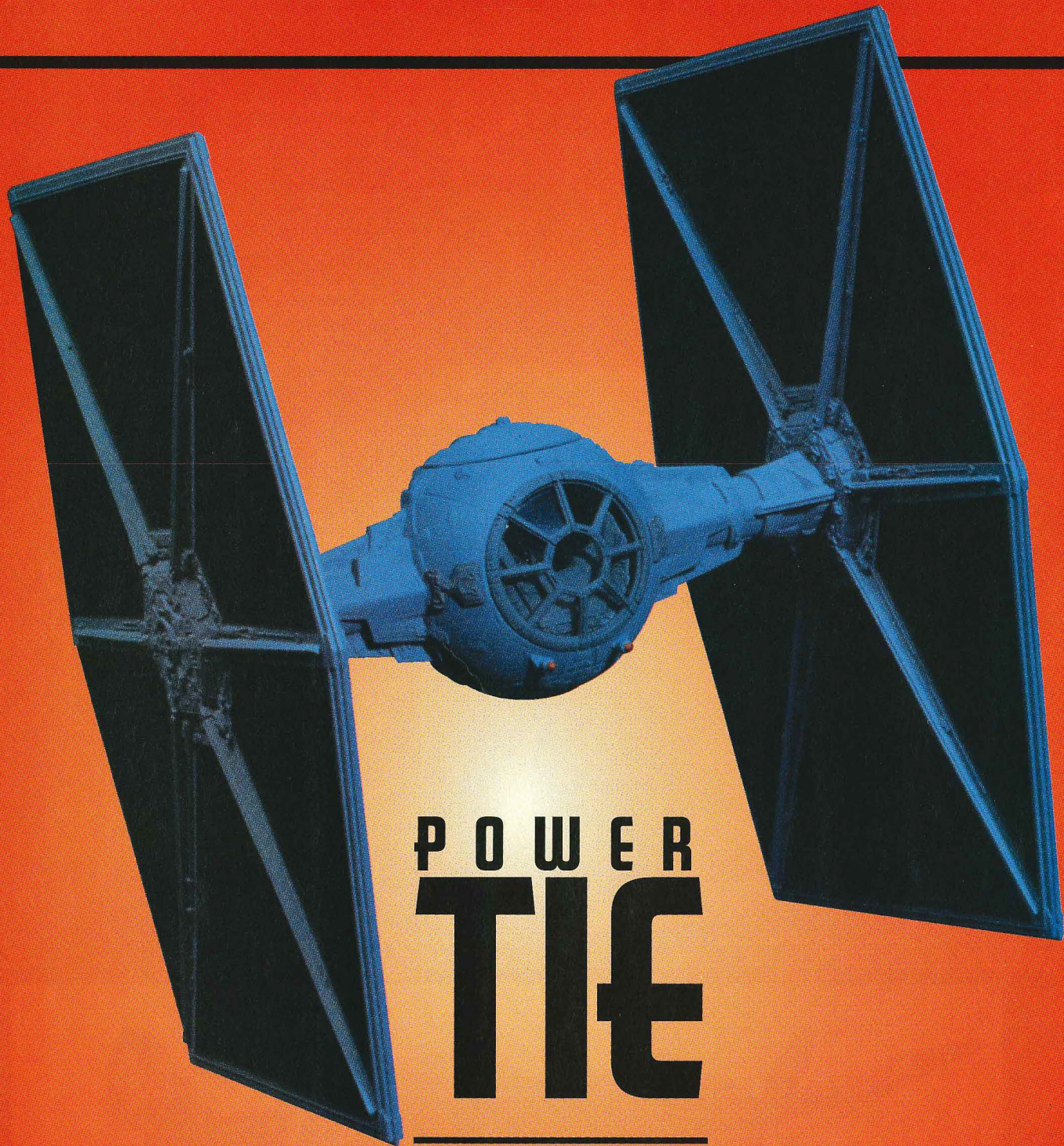
The smaller models, however, require a slightly different game plan. When AMT/Ertl's Imperial TIE fighter kit (No. 8438) appeared a couple of years ago, I wanted to light its twin engines, but the model's tiny interior (made even smaller by the full cockpit) presented the biggest problem. I knew that I'd have to add the smallest, most flexible lighting system I could come up with, then find some way to power it from the outside. I also wanted to detail and correct a couple of other areas on the kit, so armed with a pile of parts catalogs and reference books, I went to work.
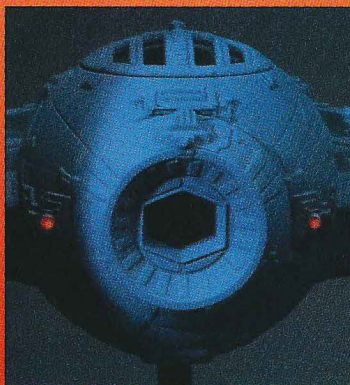
Rear window
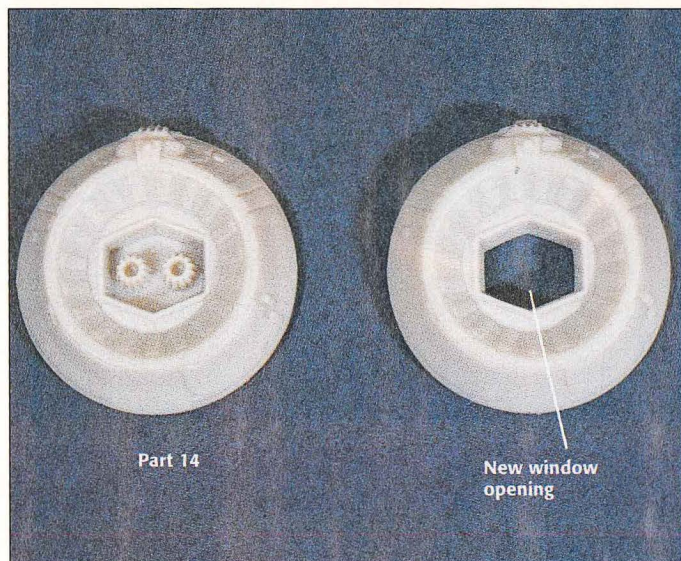
1 A motor tool with a steel cutter opened up the hexagonal window in the rear bulkhead.

Part 14

New window opening
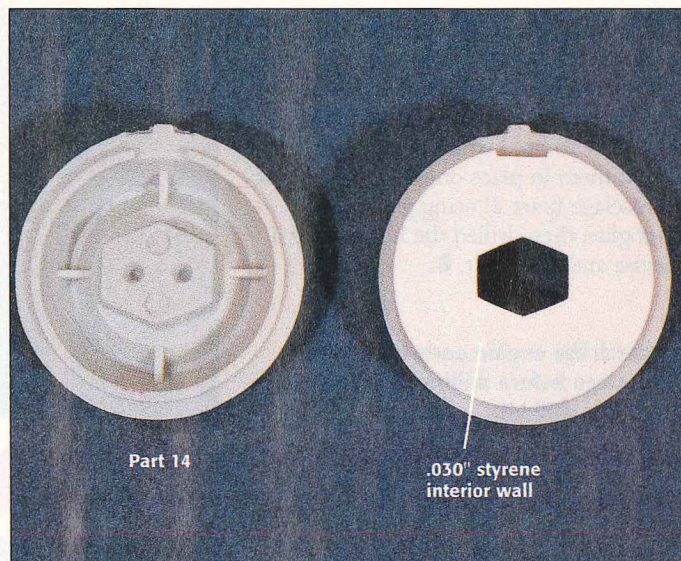
2 An .030" styrene interior wall covers the undetailed inside of the kit part.

Part 14

.030" styrene interior wall

One of the best references for the cockpit of the TIE fighter is the Death Star trench sequence at the end of "Star Wars." Looking at a videotape of the sequence in slow-motion revealed a hexagonal window directly behind the pilot's head (and perhaps that I have too much free time). The kit's rear bulkhead (part 14), however, has two engine nozzles mounted in the space that should be the window, so I had some minor surgery to perform. I started by removing the nozzles and cutting open the window using a steel cutter chucked in my motor tool. A square file cleaned up the opening's rough edges, **1**.

The inside surface of the kit bulkhead isn't detailed, so I made a new interior wall from .030" sheet styrene, **2**. After painting, I could trap an .010" clear-styrene window between the parts.

I had to modify the kit cockpit slightly to accommodate the new window. I omitted the rear wall (part 20) and removed the rear-wall alignment tabs from the cockpit sidewalls (parts 6 and 7) and floor (part 5). Otherwise I assembled the cockpit per the kit instructions and airbrushed it Testor Gunship Gray FS 36118 (No. 1723). It's the same color I used for the interior of the fuselage, the front-window framing, and parts 15 and 16.

The last step was assembling and painting the pilot. Although the entire uniform is black, by varying the shades and finishes, I was able to break up the

Gloss black

Aircraft Interior Black

3&4 The four-piece pilot figure was assembled with gap-filling super glue. Careful paint selection helps break up the pilot's monotonous uniform.

monotonous scheme. I assembled the figure using gap-filling super glue, **3**, then gave it an overall coat of Testor Aircraft Interior Black FS 37031 (No. 2040). After it had dried for a day or two, I hand painted the helmet, hoses, gloves, boots, and belt with Testor Gloss Black (No. 1747) using a fine brush. The flat, slightly gray color of the suit color contrasts nicely with the jet-black high-gloss details, **4**. I added the pilot to the cockpit and set the assembly aside, **5**.


INTERIOR WALL TEMPLATE
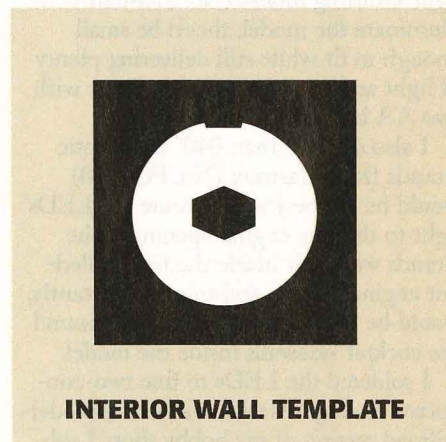
5 The completed cockpit assembly, ready for installation in the fuselage.

Fuselage modifications

The TIE's engine nozzles are included on parts 16. They're tiny, and I needed to drill them out before I could light them from inside the model. They would be impossible to hold while I drilled, so first I glued them in place on the lower half of the fuselage (part 2) using gap-filling super glue, then drilled the holes using a pin vise and a drill bit, **6**.

6 Attach the engine parts to the lower fuselage before drilling out the nozzles with a fine drill bit.

Part 16   Part 16   Drilled-out engines   Part 2
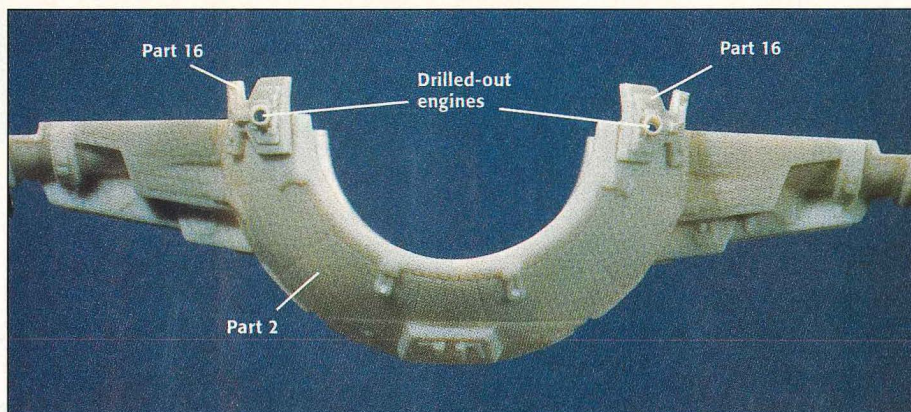
LEDs and fiber optics

After determining the space I had inside the fuselage with the cockpit in place, I selected Radio Shack T-1-size red light-emitting diodes (No. 276-026A) to illuminate the model; they'd be small enough to fit while still delivering plenty of light and would be easy to power with two AA batteries.
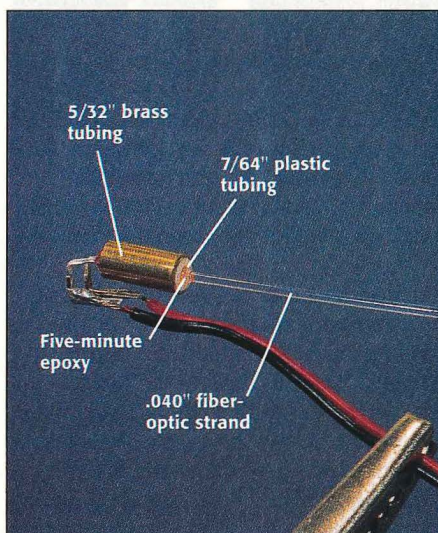
I also decided that .040" fiber-optic strands from Plastruct (No. FOP-40) would be the best way to route the LEDs' light to the tiny engine openings. The strands would fit inside the tiny drilled-out engine nozzles and more importantly, would be flexible enough to bend around the cockpit sidewalls inside the model.

I soldered the LEDs to fine two-conductor hookup wire I found in the model-railroad section of my hobby shop. I soldered the red wire to each LED's positive lead (the longer of the two) and the black wire to the negative lead. I made the leads at least a foot long – it's better to have too much wire than not enough, and I could always trim away the excess later. Afterward, I bent the leads forward using a pair of needle-nose pliers to keep things as compact as possible, **7**.
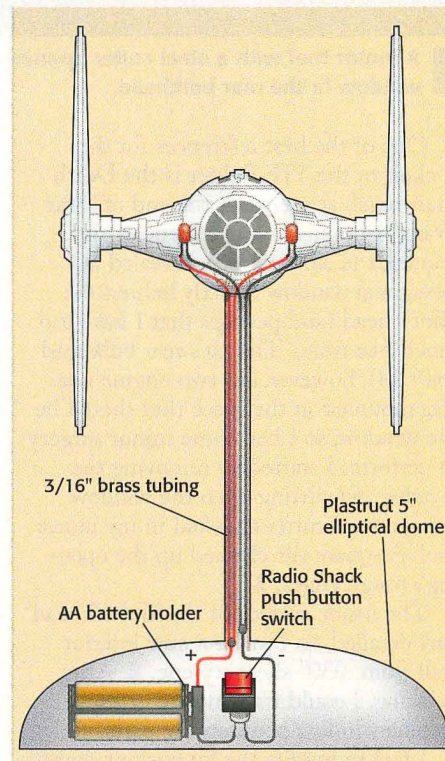
The next step was to devise a way to hold the end of the fiber-optic strand directly in front of the LED where it would transmit the most light. I slipped a short piece of 7/64" plastic tubing inside a length of 5/32" brass tubing, then epoxied a length of fiber optic in the end using five-minute epoxy, **8**. The finished assembly is just the right size; it fits easily over the end of the LED and doesn't take up too much space. Test fitting showed that both lighting assemblies would fit with room

Radio Shack T-1 light-emitting diode
Two-conductor hookup wire
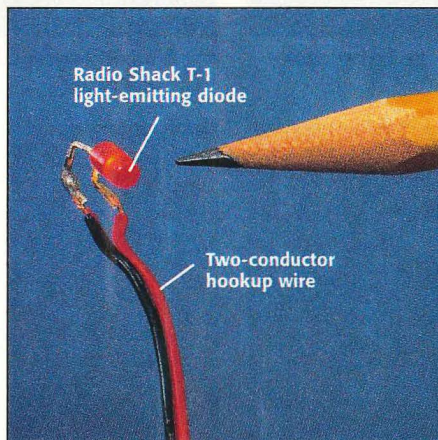
7 T-1-size red LEDs are small enough to fit inside the cramped fuselage while still providing plenty of light.

5/32" brass tubing
7/64" plastic tubing
Five-minute epoxy
.040" fiber-optic strand

8 Brass and plastic tubing hold the fiber-optic strand directly in front of the LED.

3/16" brass tubing
Plastruct 5" elliptical dome
Radio Shack push button switch
AA battery holder

to spare and that I could pass both wiring leads through the stand hole in the bottom of the fuselage, **9**, after I cut slots in each side of it using the steel cutter.

Combining the cockpit and the lighting system inside the fuselage is the trickiest part of the project. I trimmed the fiber-optic strands with a hobby knife to the correct length and shined up the cut ends with a three-grit polishing stick. I passed them through the holes in fuselage until 1/32" extended outside the model, then glued them in place inside the fuse-

lage using five-minute epoxy. After the epoxy cured, I glued the LEDs in place in their brass-tube holders and routed their wires through the stand hole.

Shoehorning the cockpit between the two lights and over all of the wiring takes careful fitting and patience. Carefully pull the lights apart and slide in the cockpit. The fiber-optic strands should pass between the inner cockpit wall and the outer fuselage wall – it's a really tight fit, but it can be done. If this seems like too much work, you can always remove the sidewalls from the cockpit and make the installation easier. The sidewalls are barely visible through the TIE's tiny windows, anyway.

With the cockpit in position, I cemented it in place with gap-filling super glue, then added the upper fuselage half (part 1).

Slots for wires

Gunship Gray interior

9 The lighting system in place before installation of the cockpit assembly. Trim the fiber-optic strands to the correct length before gluing them in place.

Imperial Standard colors

Determining the correct colors for the TIE fighter was tricky. The main fuselage color varies from film to film ranging from light gray to powder blue. A color photo of one of the studio models I found in *From Star Wars to Indiana Jones: The Best of the Lucasfilm Archives* served as my main reference. I settled on Testor Intermediate Blue FS 35164 (No. 1720) for the main fuselage color. I airbrushed it on the fuselage after masking the window openings, then sprayed the framework on the hexagonal "wings," **10**. When it was dry, I masked the black panels and airbrushed them flat black, **11**. Believe it or not, painting the panels was the most time-consuming part of the project – it's easy to forget there are 24 of them until you have to mask each one!

After the paint had dried for a couple of days, I glued the wing panels in place with gap-filling super glue, making sure they were properly aligned. I also installed the upper hatch, the front viewport, and the modified rear bulkhead, and their clear parts using white glue.

With the ship wired, assembled, and painted, I moved on to building a base for it. Although AMT/Ertl's kit includes a nice Death Star base, I wanted something a little more compact. I needed something to hide a pair of batteries and a bunch of wiring, too. The Plastruct catalog had what I was looking for; I ordered a 5" clear acrylic elliptical dome (No. VHE-500). It's wide enough to support the

Part 3

Pencil wrapped with masking tape

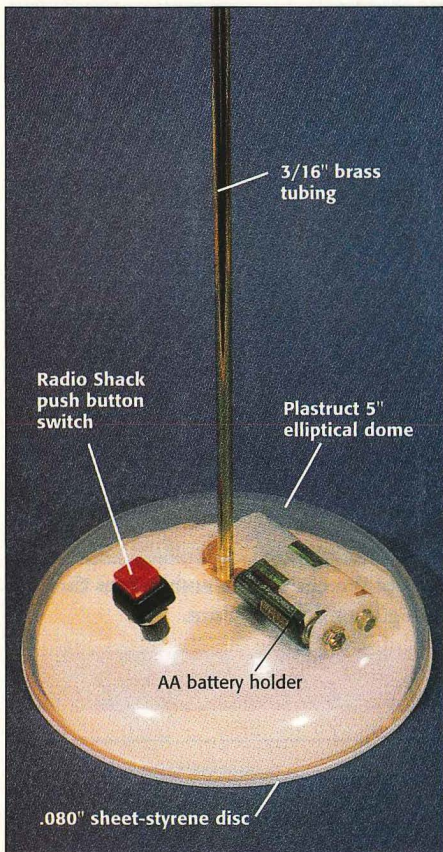**Intermediate Blue framework**
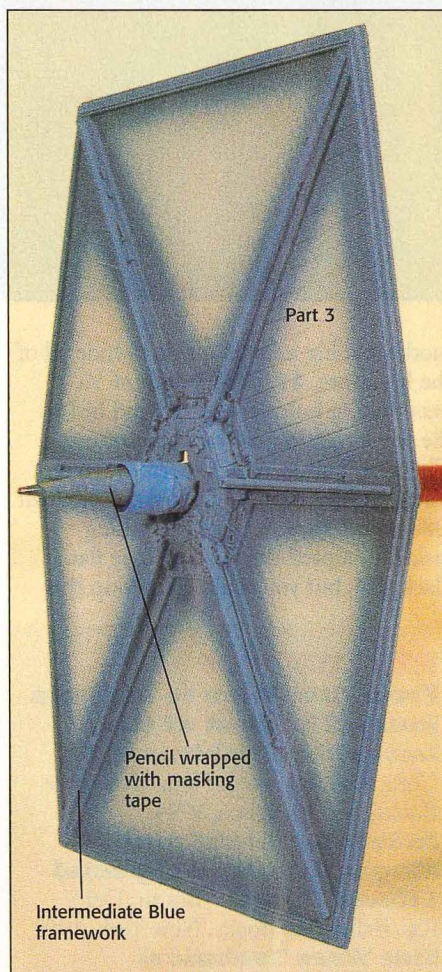
10 A pencil wrapped with masking tape helps hold the hexagonal wings during airbrushing.
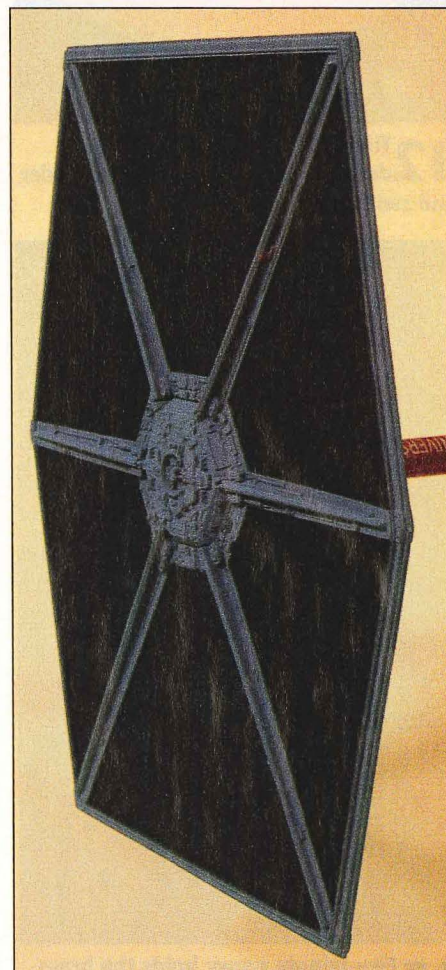
11 Masking the 24 flat-black wing panels was the most time-consuming part of the project.

3/16" brass
tubing

Radio Shack
push button
switch

Plastruct 5"
elliptical dome

AA battery holder

.080" sheet-styrene disc

12 The 5" Plastruct acrylic elliptical dome houses the AA battery holder and switch hardware.

The red push button lets viewers know there's more to the model than first meets the eye. Jim Forbes photo.
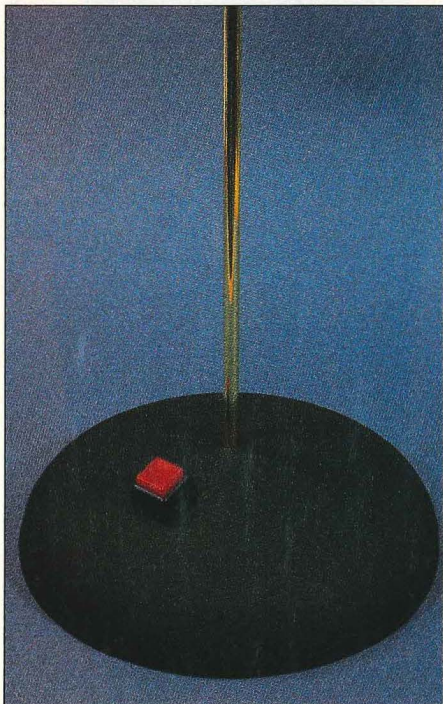
13 Five-minute epoxy holds the brass-tubing model support in place from inside the base.

model and big enough inside to hide all of the hardware, **12**. A 6" length of $^3/_{16}$" brass tubing holds the model and hides the wires running up from the battery. The push button power switch is from Radio Shack (No. 275-1565B). A circle of .080" sheet styrene holds everything inside. I painted the finished base flat black, **13**, but you could easily skip this

step by ordering a black plastic dome (No. VHE-500BK) instead of a clear one.

Although the project's size made some of the work a little more difficult than usual, seeing the tiny finished model with its engines blazing away more than makes up for the trouble, and I'm already looking at my collection of unbuilt kits to see what other models I can light this way. **FSM**

REFERENCES
From Star Wars to Indiana Jones: The Best of the Lucasfilm Archives Mark Cotta Vaz and Shinji Hata, Chronicle Books, San Francisco, 1994
Industrial Light and Magic: The Art of Special Effects Thomas G. Smith, Del Ray/Ballantine Books, New York, 1991
Star Wars Technical Journal Shane Johnson, Del Ray/Ballantine Books, New York, 1994

With a paper clip and some planning, Juan put FineMolds' 1/72 scale TIE Fighter in flight.

Give a TIE Fighter
FLIGHT

Create a simple display for a "Star Wars" model

by Juan Jose Dominguez Calvo

Straight out of the box, FineMolds' 1/72 scale TIE Fighter kit (No. SW-2) builds into a detailed rendition of the diminutive Imperial space ship. But, the stand provided is clunky and undramatic. I wanted a simple in-flight display posed at a dynamic angle. My "high-tech" stand includes only a small wooden base and a paper clip. **FSM**

1 Dark washes and light dry-brushing bring out the kit's nicely molded details, particularly in the cockpit. FineMolds includes decals to represent the ship's red-and-black side screens.
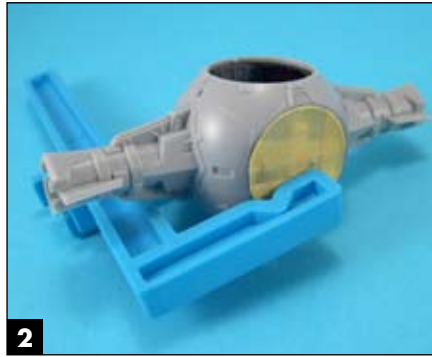
2 With near-perfect fit, construction went smoothly. Juan quickly readied the model for painting by masking off the interior.


3 Juan only used a couple aftermarket items: a small wooden base and a straightened metal paper clip. The clip should be thin enough to fit into the wing but strong enough to hold the model.


4 A ruler guides a sharp blade to cut a slot along a spine in one of the solar panel parts. FineMolds engineered the wing panels to minimize masking time. There are three parts in each: Two spider-like pieces, parts No. B1 and B2, form the exterior framework and sandwich the third part, No. C1, representing the black solar panel.
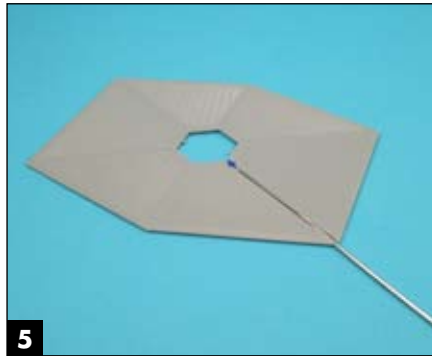
5 Juan inserts the paper clip into the slot and secures it with epoxy. Once the wing is assembled, the external framework will hide the clip and the slot.
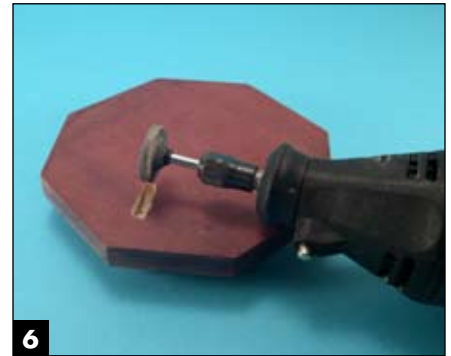
6 After drilling a hole the diameter of the paper clip in the wood base, Juan carves a gap in the bottom with a grinding wheel on a motor tool. The gap corresponds with the hole above. (Always wear eye protection when using a motor tool.)

7 After mounting the completed TIE Fighter to the stand by pushing the paper clip through the hole, Juan bends the end of the wire until the model is positioned. The carved gap prevents the model from spinning.

A couple of simple tools brought the model to life. Ready for battle, Juan's TIE Fighter appears ready to leap off the stand.