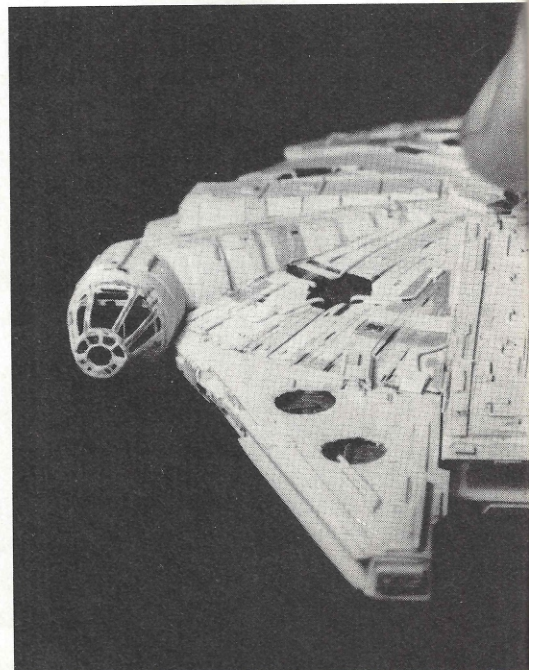
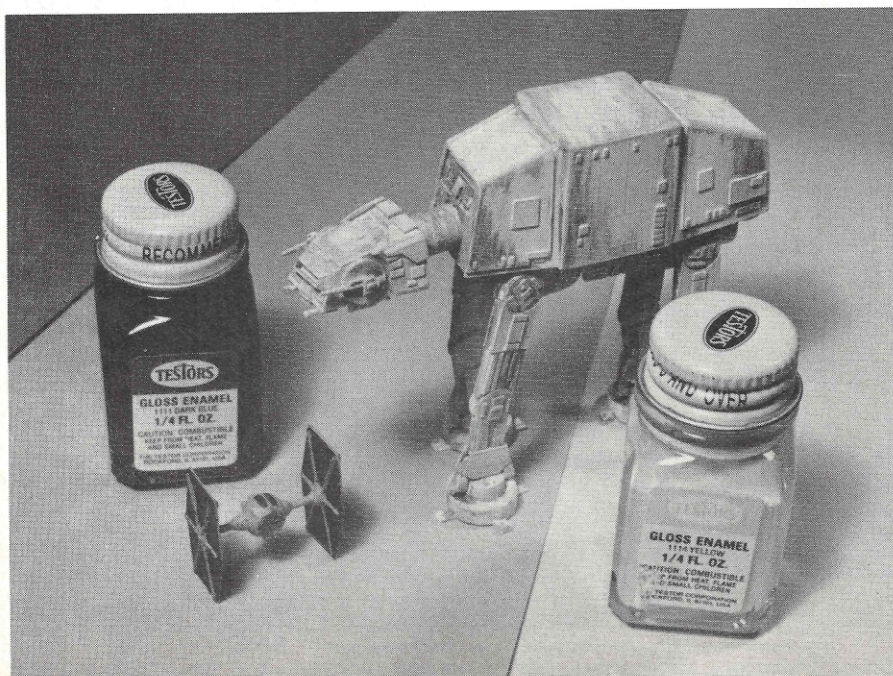


Fig. 4. To add realism, Walter inserted a small light behind a section of a color side of electronic equipment.



Well-made models from the commercially available *Star Wars* kits? No! Walter Vail's tiny 1/285 scale scratchbuilt models pose for these color photos. The All-Terrain Armored-Transport has articulated legs, head, and neck and features an LED in the head. The Millennium Falcon rests in the ice hangar Walter made from Hydrocal.

Macro-scale modeling techniques

Scratchbuilding tiny science-fiction models

BY WALTER VAIL

TURNING A two-dimensional sheet of styrene or balsa into a three-dimensional model is the miracle of scratchbuilding. Even more amazing is a tiny scaled-down representation of an object familiar to everyone. Scratchbuilding models, whether spaceships or sailing ships, can be a tedious process requiring much thought before anything is actually glued together. Unavailability of detailed plans and drawings adds to the problem and often turns people away from an ambitious project.

Deciding on a scale to model is usually the most difficult step for me. Several factors affect this decision: available work space, materials to be used, size of the completed model, and cost. For these reasons, I build small scales — 1/285 to 1/500. This means small models, three or four inches long, that don't require large amounts of costly materials, and can be comfortably built on my 16" x 30" work surface.

Since the introduction of the *Star Wars* saga in 1977, I have been captivated by its spaceships and vehicles and have built tiny models of them for photographic purposes. I've never found plans for the *Star Wars* subjects, so all of the miniatures in this article were built using photographs and drawings found in the *Star Wars* art books. Figures posed beside a movie miniature give me an idea of the size of the vehicle.

The models in this article are built to 1/285 scale. Because I plan to photograph them in different settings and positions, they have many moving parts. The Millennium Falcon has landing bay doors that open and close, removable landing gear, and a lighted interior. It measures 4½" long by 3¼" wide and is 1" high standing on its landing gear. The Tydirium Shuttle has folding wings and an operating boarding ramp.

It measures 3" long by 2½" wide and is 3½" tall in the landing position. The All-Terrain Armored-Transport (AT-AT) has poseable "legs" and "head" and could simulate walking using stop-motion animation. It stands 2½" tall, 3" long, and ¾" wide, and the head has a lighted interior. The smallest vehicle shown is the Rebel Snowspeeder. It's only ¾" wide, 1" long, and ¼" high.

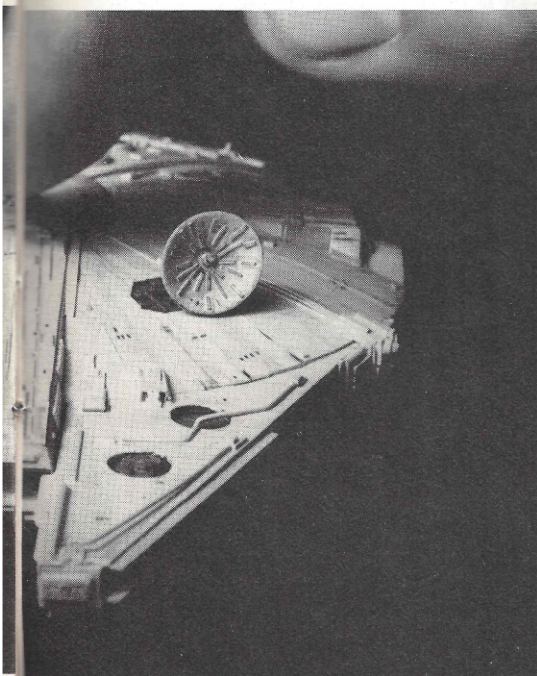
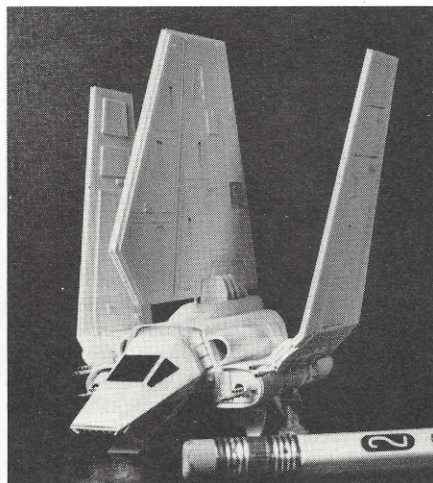
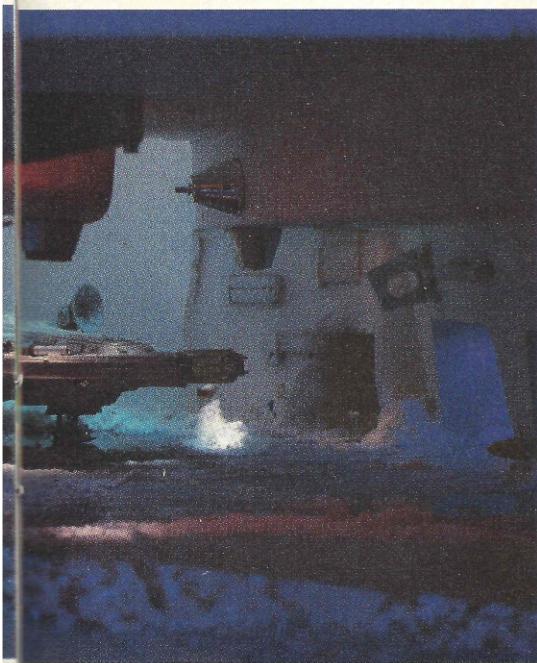
Millennium Falcon. All models are built using similar techniques and are constructed primarily of styrene. The Falcon is probably the most familiar vehicle and presented unique problems in constructing a detailed replica. Spherical or elliptical shapes require special efforts in construction. The solution to the Falcon's slightly spheroid hull is diagrammed in Fig. 1.

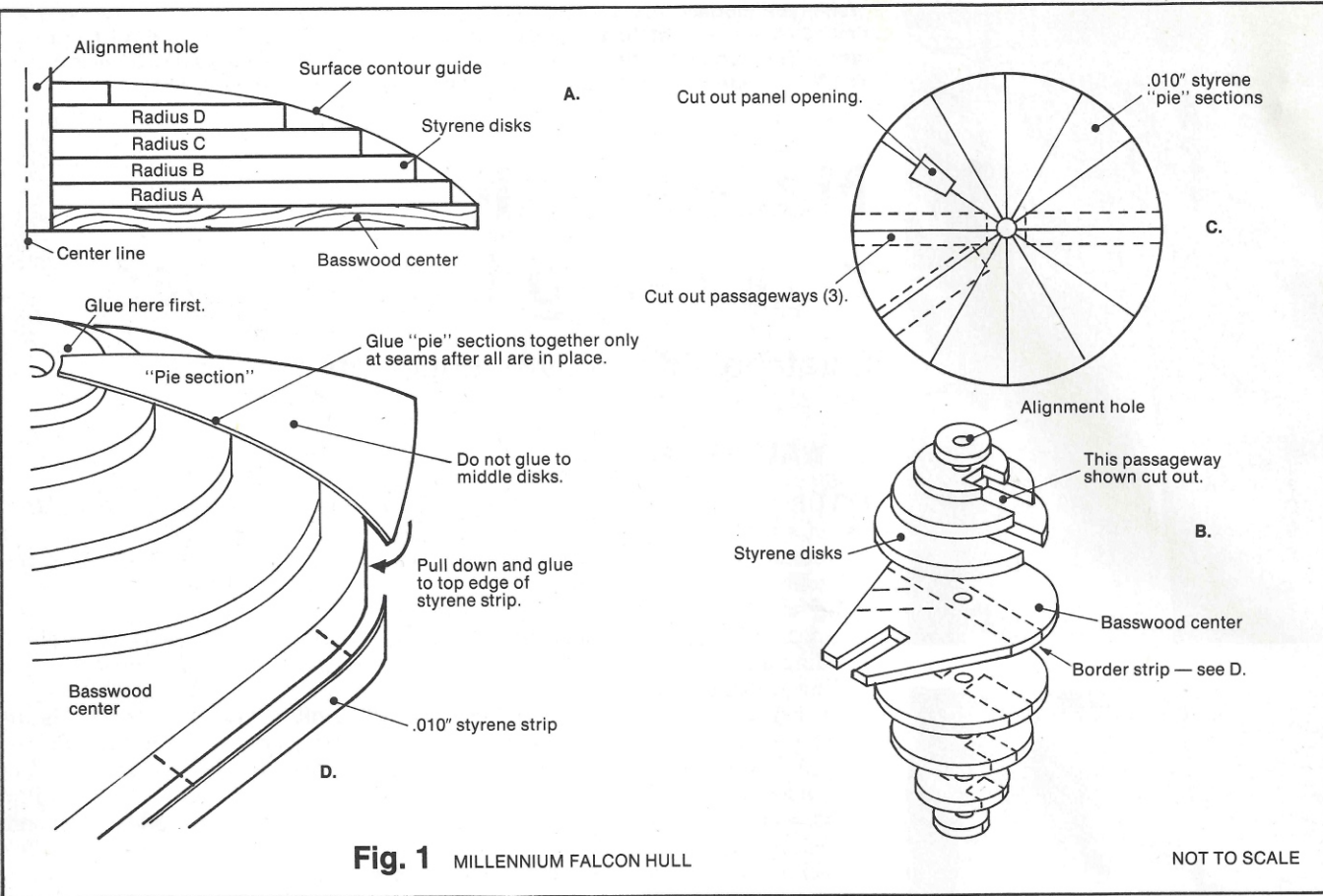
First, I built the two exposed passageways from styrene and a length of ⅜" hollow tubing and installed them on the basswood center. I placed small 12-volt lights in the cockpit access way and the center alignment hole, and lit both with a 9-volt transistor battery, giving a soft, yellow-orange glow and a better scale appearance. The wires go out the rear of the model through the propulsion opening.

I determined the contours of the outer hull from drawings and photographs and made a three-view drawing in the final size of the miniature, Fig. 2. Next, I drew a center line and the outline for the basswood core. I planned to make the hull from concentric disks of .030" styrene, so I drew these on the side elevation. From the drawing, I could establish the radius of each styrene disk by measuring the distance from the center line to the outer skin of the Falcon.

After cutting the basswood core and concentric styrene disks, I drilled an alignment hole in each and glued a strip of .010" styrene to the edge of the basswood core. Next, I cut the passageways in the lower half disks and glued

These photos give you an idea how small these models are. The Millennium Falcon has a lighted interior, the TIE (Twin Ion Engine) Fighter is dwarfed by the "huge" AT-AT, and the Tydirium Shuttle with movable wings and loading ramp poses next to a pencil.





all the components together. The hull was then surfaced using pie-shaped sections of .010" styrene. Each piece was glued at the center first, then only to the edge of styrene strip on the edge of the basswood core. Some of the pie-shaped skin sections have open panels cut in them which reveal the stairstep concentric disks, and add to the three-dimensional effect of the model.

A cockpit made of a turned dowel with windows painted on might do for some, but I wanted a hollow cockpit. Figure 3 shows how I built it. I turned a 3/8" aluminum rod on a miniature lathe, producing a cone. The cone provided support for the 20-piece cockpit as it was assembled. I built the bottom half using pie-shaped sections of styrene as in the hull construction. The rest of the

cockpit is made of .010" styrene strips. The cemented plastic was gooey enough to cling to the aluminum cone. Once the assembly was complete, I applied a coat of liquid cement and allowed it to dry for 24 hours. This final coat melted the styrene and left a few pits which I filled with putty. After the putty had set, I placed the aluminum rod with the cockpit still glued to it in

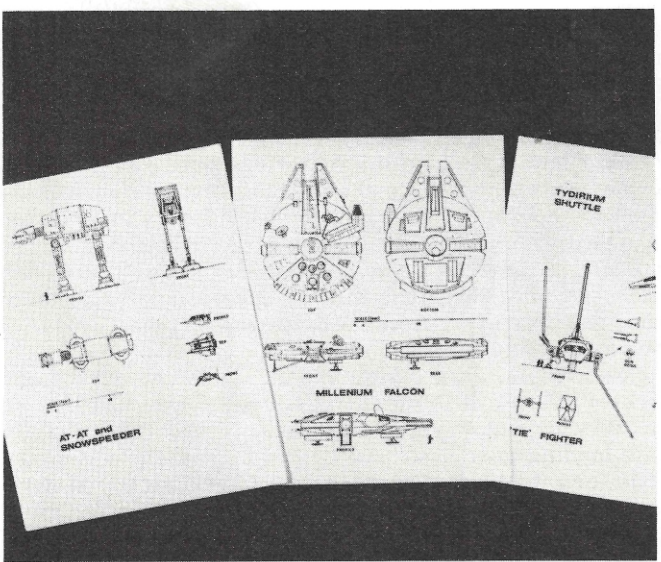
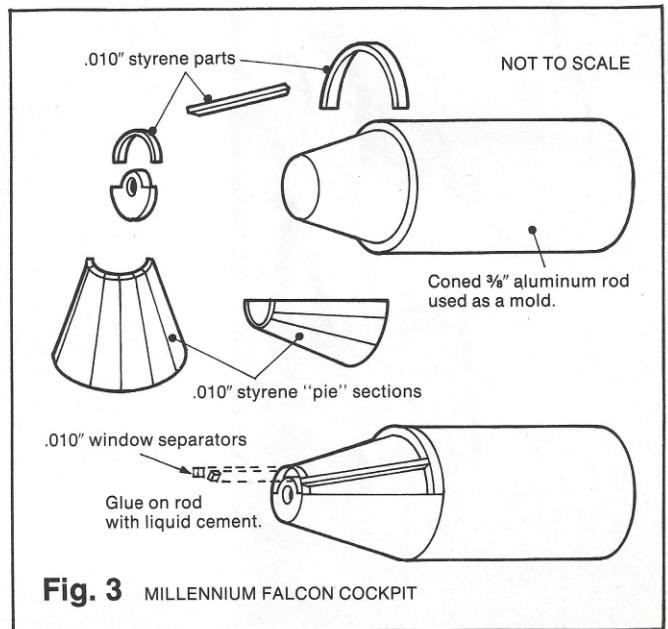


Fig. 2. Walter made these three-view drawings from the sketches in the *Star Wars* art books.



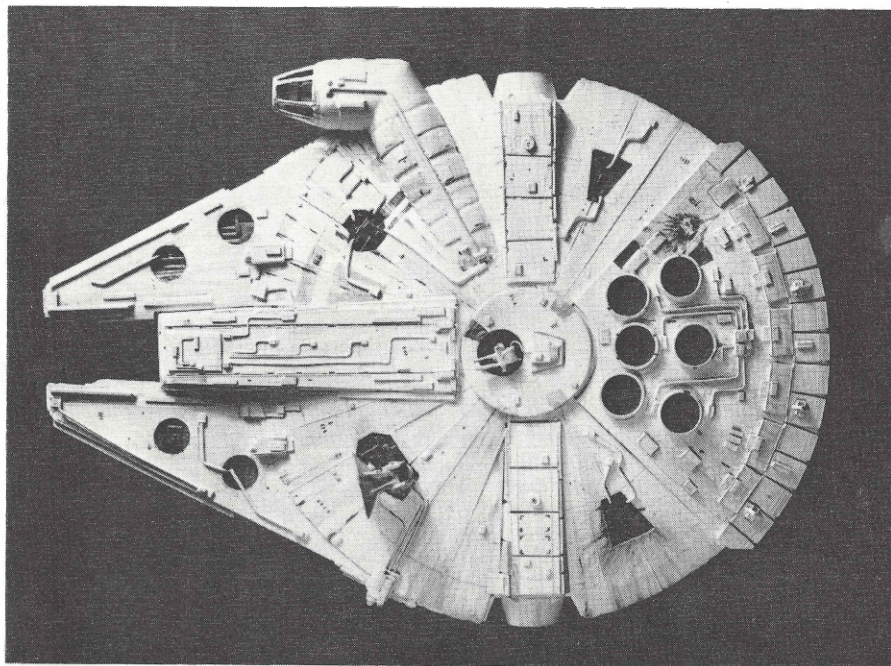
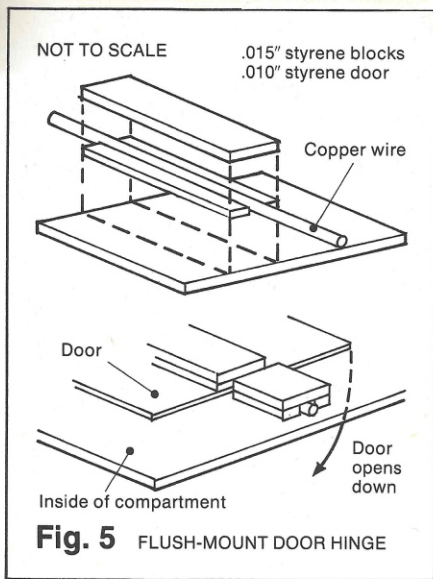


Fig. 6. The top view of Walter's Millennium Falcon shows some of the incredible detail he packed into the 4½"-long model.

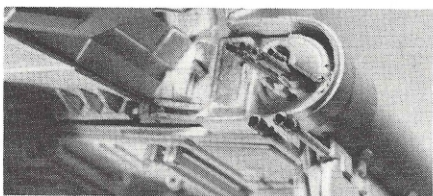
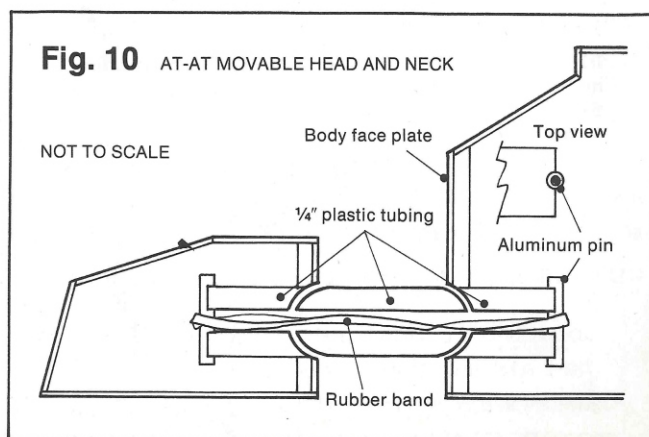
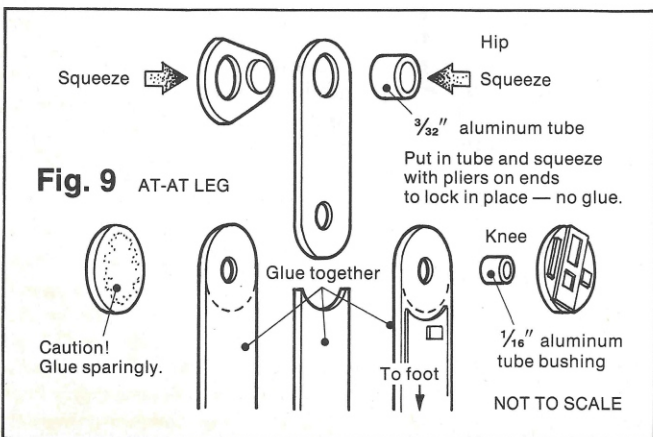
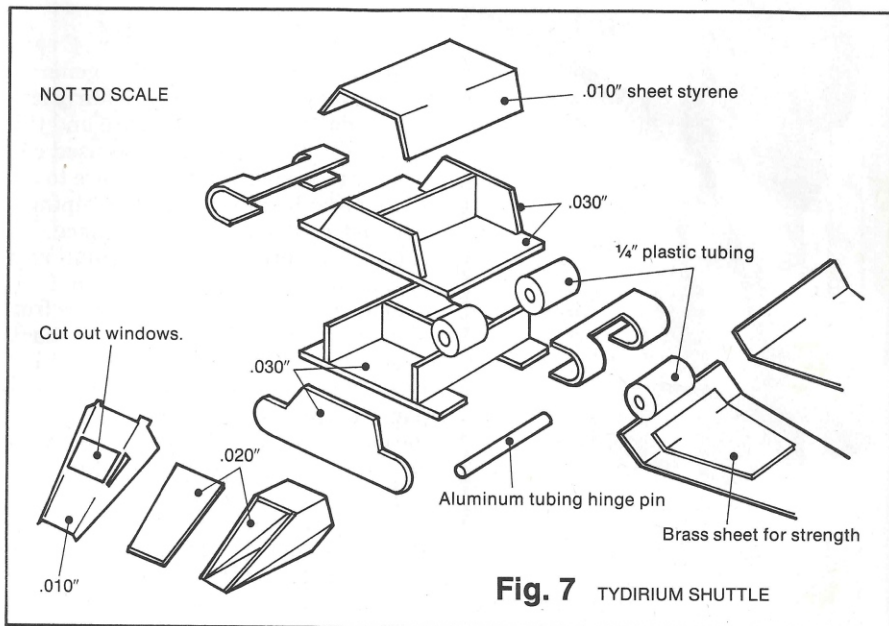


Fig. 8. The blasters on the Tydirium Shuttle were made from the barrels of small-scale machine guns.

the lathe, and carefully sanded the cockpit as it spun slowly. I then gently pried the completed cockpit from the rod using tweezers and a hobby knife.

Lights shining through openings in a model are usually effective, but I decided to add a little more. I shot color slides of electronic test equipment from a catalog, and cut the transparent photos to fit in the openings of the model. The most effective is the one I cut out with a hole punch and placed halfway down the cockpit access way — with the light behind it, the shadows and reflections cast toward the cockpit add exceptional realism even in this scale, Fig. 4.



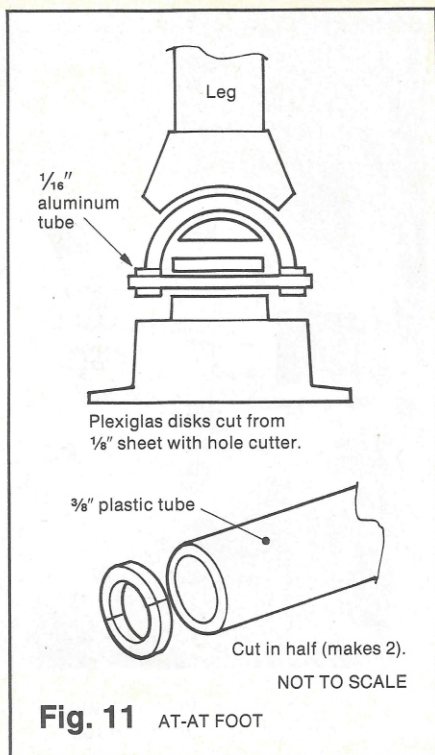


Fig. 11 AT-AT FOOT

Working doors that are .2" x .4" seem formidable at first, but with a generous amount of patience, they are fairly simple to make using copper wire and tiny styrene blocks, Fig. 5. I also used copper wire as piping on the surface to add realism to the miniature. The piping is not just randomly glued in place, but each has an origin and a destination as on the "actual" spacecraft, Fig. 6.

I cut the rear panel intake rings from 1/4" brass tube. By mounting a sharpened piece of this tubing in a drill press, I was able to cut disks from sandpaper to use inside the brass rings. The antenna dish and the lateral passage-way ends are tooled from 3/8" aluminum rod.

To give a more complex look to the ship, I randomly placed tiny styrene blocks on the surface, some as small as 1/100" square. After they are cut, I spear them with a sharp blade, touch them to a drop of liquid cement, and place them on the surface.

Tydirium Shuttle. The construction of the Tydirium Shuttle was fairly straightforward. The hull structure is built up of .030" styrene and 1/4" plastic tubing over which a .010" styrene skin is formed. An exploded view of the basic construction is shown in Fig. 7. The wings are laminated sheet styrene with a thin piece of brass sheet sandwiched into the "gull" shape for strength. A small piece of aluminum tubing is used as a hinge pin inside the plastic tube hinges. The windows of the shuttle are cut from a sheet of overexposed glossy photographic paper.

Few kit parts could be used on these

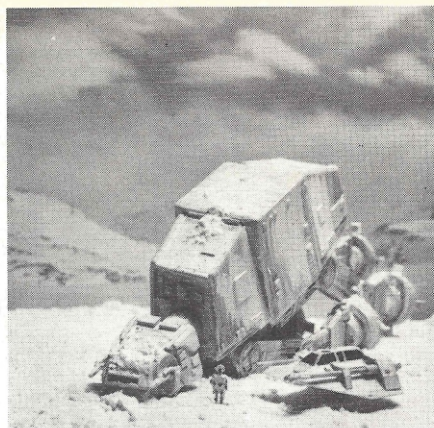


Fig. 12. The movable legs and neck on his AT-AT allowed Walter to create this scene from *The Empire Strikes Back*. The tiny Rebel Snowspeeder is only 1" long.

models without looking out of place. The exceptions are small-scale machine guns used as blasters and other pieces that are parts of parts. The blasters on the shuttle are made of two machine guns cut off at the stock and mounted under a hollowed HO scale water bucket, Fig. 8.

AT-AT. The All-Terrain Armored-Transport (AT-AT) was built with the same covered-frame technique used on the Tydirium Shuttle. Figure 9 shows how I built the legs so they could be poseable. Figure 10 is a cross section showing how I made the movable head and neck assembly with plastic tubing and a rubber band. I mounted a sub-miniature LED in the head and ran the wire leads through the neck tube into the body. The LED is powered by two 1.5-volt button-cell watch batteries taped together in series. The body faceplate is removable, allowing replacement of the batteries in the body. Figure 11 is also a cross section of the foot assembly. This detail provided only a minimum amount of movement and was the most trying part of assembly. If I build another AT-AT, I think I will simply glue the foot rigidly in place.

The TIE fighter is made from aluminum rod turned on a lathe and .010" styrene. The cockpit is hollow and contains a control panel and pilot behind a clear windshield.

I painted all the models with a hardware store flat white spray — this coarse spray adds a fine texture to the surface. I added subtle colors and weathering with a fine-tip brush after the white paint dried.

Diorama scenes. The color photos show these miniatures in dioramas I made for photos. The AT-AT is set in snow made of Durham's Water Putty and placed in front of a photograph from *The Art of The Empire Strikes Back*, Fig. 12. This shows how easily a model of this size can be photographed.



Meet Walter Vail

Walter, 28, runs a 1,200-acre dairy, row-crop, and game-bird farm with his father in Armstrong, Alabama. Married and with a 5-year-old son, Walter finds little time to model between chores, but when he does, he builds armor models, scratchbuilds HO scale structures, and is dabbling with radio control boats. His other interests include electronics, photography, and carpentry. Walter has been modeling since he was 8 and scratchbuilding since he was 13.

Paintings or photographs measuring 8" x 10" are large enough to provide backdrops and can be found easily.

The "Ice Hangar" scene is a little more complicated. I made a "negative" mold box of Plexiglas and wood blocks and poured Hydrocal (a plaster used in construction) to form a one-piece hangar. Dowels in the mold created places for six-volt light bulbs. Again, Durham's Water Putty was used as snow.

Macro-scale modeling allows large ships to be constructed that would be awkward to reproduce in the larger scales. Next on my list is the Sandcrawler from the original *Star Wars* in 1/285 scale. These and many other vehicles are waiting to materialize from sheet and scraps. Good luck and may the joy of modeling be with you! **FSM**

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- *The Art of The Empire Strikes Back*, Ballantine, 1980.
- *The Art of The Return of the Jedi*, Ballantine, 1983.
- *The Art of Star Wars*, Ballantine, 1979.
- Johnston, Joe, *Star Wars Sketchbook*, Ballantine Books, New York, 1977.

SOURCES

- Durham's Water Putty: Donald Durham Co., Des Moines, IA 50304.
- Sheet styrene: Evergreen Scale Models, 1414-12th Place N. E., Suite 107, Bellevue, WA 98005.
- Hydrocal: U. S. Gypsum Co., 101 South Wacker Drive, Chicago, IL 60606.
- K&S Engineering, 6917 West 59th Street, Chicago, IL 60638.