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Model modern American armor

Detailing Tamiya's

Decorate a Gulf War hero with accurate details

By James Welch Photos by the author

Like any detail-minded armor modeler, I enjoy examining minutiae – counting bolts, looking at close-up photos, and finding ways to improve a kit by adding a few easily modeled features to make a vehicle more accurate or timely. It's even more enjoyable when you start with a good kit right out of the box, because you can go straight to the fun stuff – details!

One such build is Tamiya's M2A2 Bradley (No. 35152), one of a new generation of high-quality armor models. It's a great kit – but I found ways to improve it with parts of Tamiya's earlier Bradley M2 (No. 35132), as well as bits and pieces from aftermarket detail sets, spare parts, and a few little scratchbuilt items.

Start with the hull. I veered off the kit instructions at about step 4, leaving off the tow cable and other stowed items to paint them separately. I also saved the armored side skirts for later, after everything else was painted but before weathering the vehicle; building and painting (especially the running gear) is much easier that way.

Photo **1** shows the scratchbuilt elevation arm I made for the driver's hatch, as well as a lead-foil exhaust cover detailed with styrene bolt heads. Photo **2** shows more added bolts as well as a carved-styrene fire extinguisher mount.

The rear lamps received lead-foil mounts and hex nuts to replicate bolt attachments, **3**. I made these and other hex nuts from sheet styrene, using a Historex punch-and-die set.

What's up front – and at the top. The driving lamps here were detailed with styrene bolts and lead foil for conduit brackets and electrical contacts, **4**. Additional mounting brackets, made from styrene rod and strip and detailed with Nimix photoetched bolts, also went up front.

I made a support-arm for the TOW missile launcher shield with fine solder flattened on the ends, **5**. Later, I bored out the front of the launcher and armed it with the tips of two warheads (actually reshaped Italeri Nebelwerfer rockets).

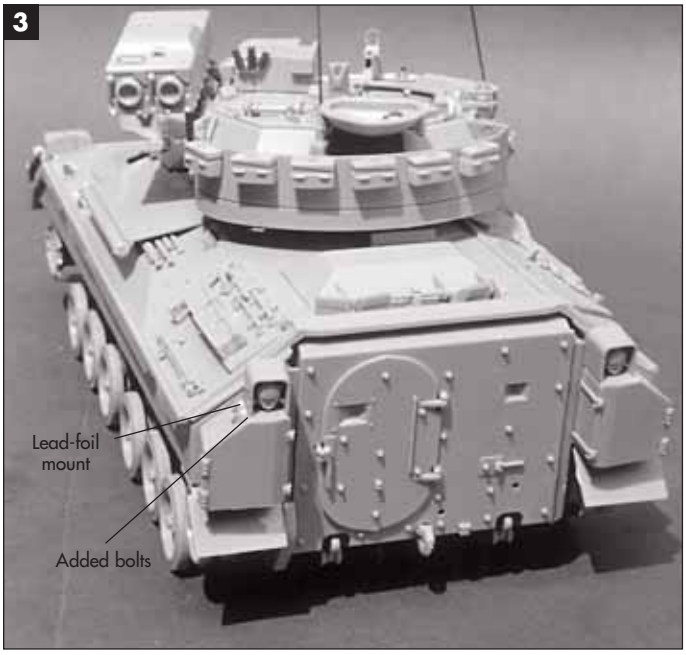
I also reshaped the end of the main gun, sanding it round and boring it out with a mini-drill at low speed to avoid melting the plastic. Lead foil worked well as a gun collar, **6**. The smoke grenade boxes each received three Grandt Line bolt heads. Strip styrene depicts a rain gutter around the commander's hatch. A lifting eye on the mantlet is made from flattened solder.

Out for a 100-hour spin: Bradley Infantry Fighting Vehicles performed with distinction in Desert Storm. The author detailed and added firepower to Tamiya's M2A2.

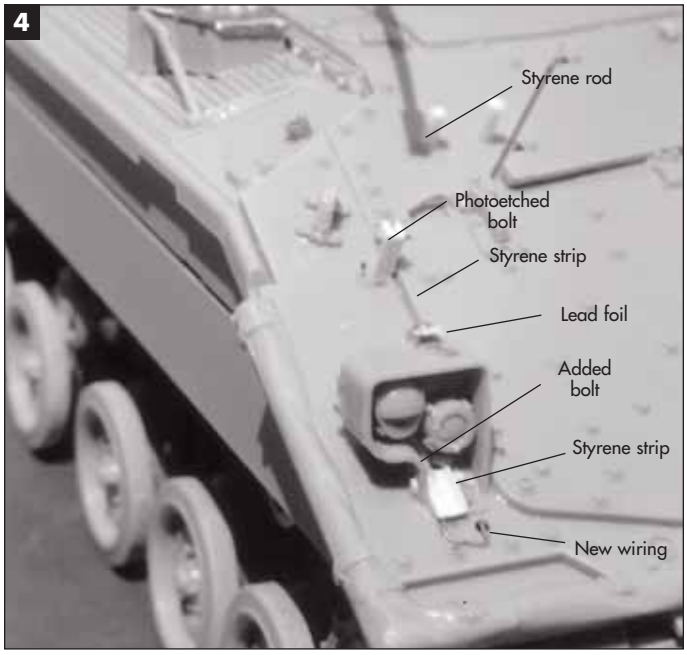
M2A2 Bradley

Added details are easy to see on the unpainted model: the white pieces are sheet styrene, and silver objects such as the exhaust cover (forward of the turret) are lead foil.

The TOW launcher is studded with styrene bolt heads; a carved styrene mount for the fire extinguisher is located just this side of the driver's hatch.



James brightened up the rear lamps with lead-foil mounts and styrene bolts.



Details to the fore: The headlights received special attention, as did mounting brackets on the front plates.

Numerous opportunities for detailing surround the commander and loader/gunner's hatches, **7**. The commander's hatch received sheet-styrene triangles for gussets. I used styrene tubing and fine-gauge wire to build a more accurate sight, and replaced the kit's antenna bases with Verlinden parts. Flexible plastic tubing took the place of the kit's signal-flag holders.

Looking more closely at the same area (minus the turret), I installed photoetched grilles from an Airwaves detail set (No. 35-004), **8**.

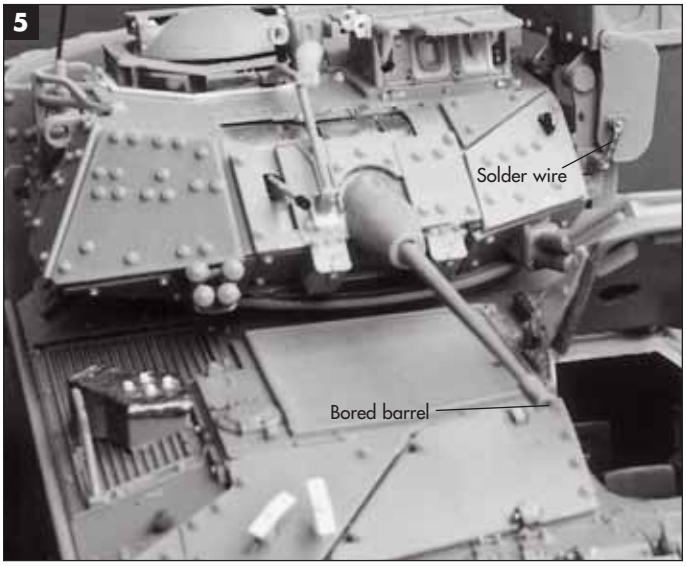
Painting and weathering with acrylics. Many acrylics – even the flats – are too shiny for armor models. Not so with Vallejo Model Colors, which provided a satisfying finish to my project. They cover well, yet are easy to clean up – especially important when mistakes are made! The paints come in neat, easy-to-use "eye-dropper" containers. The absence of noxious vapors is a plus, too.

I airbrushed the entire vehicle with a light base-coat mix of khaki, deck tan, and flat white, eyeballing the color until it looked right to me. After letting this coat dry for a half hour, I darkened the mix with flat earth to selectively spray recessed areas and make them look more shadowy. When that was dry I added more flat white to the mix and sprayed large, open areas on the hull. This pre-weathering shading lends definition to the hull's angles and details.

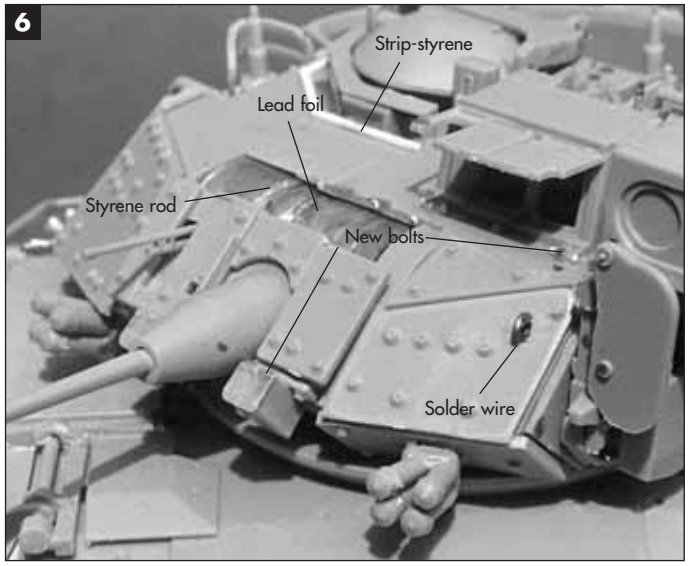
After allowing the vehicle to dry overnight, I applied a very thin wash of flat-black oils to the entire vehicle. When the wash had dried thoroughly, I dry-brushed with light shades of acrylics and oils. A precisely applied flat-black wash around bolt details made them stand out; dry-brushing sharp edges with gunmetal made them look more "steely." Photo **9** shows the effects of these techniques.

The same photo gives a good view of the driving lamps. I base-coated them bright silver and overpainted with Tamiya clear red and orange to make them look glassy. I used the same trick on the infrared sight.

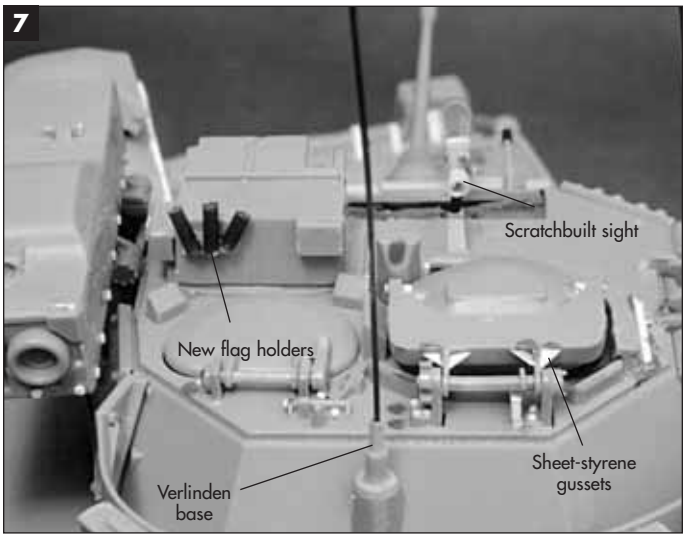
I prepared decal-bearing surfaces with clear acrylic gloss to



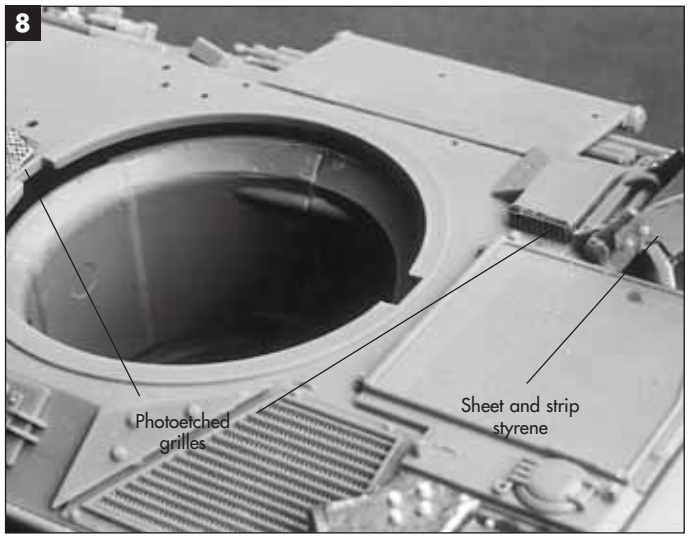
Gunning for accuracy, James shaped and bored the 25mm cannon and added a solder-wire support arm to the TOW shield.



A lead-foil gun collar and solder-wire lifting eye are joined by – what else? – more styrene bolts. Strip styrene around the commander's hatch replicates its rain gutter.



Antennas are fine-tuned with Verlinden bases, the commander's hatch gets gussets, and there are – count 'em – more new bolts.



A scratchbuilt hinge assembly and photoetched brass grilles are fancy touches.

provide better adhesion; after applying the decals, I resprayed with flat clear to restore the finish.

The tracks were painted with a mix of flat black with dab of flat earth, and dry-brushed with silver. The flat black tires were dry-brushed with German gray.

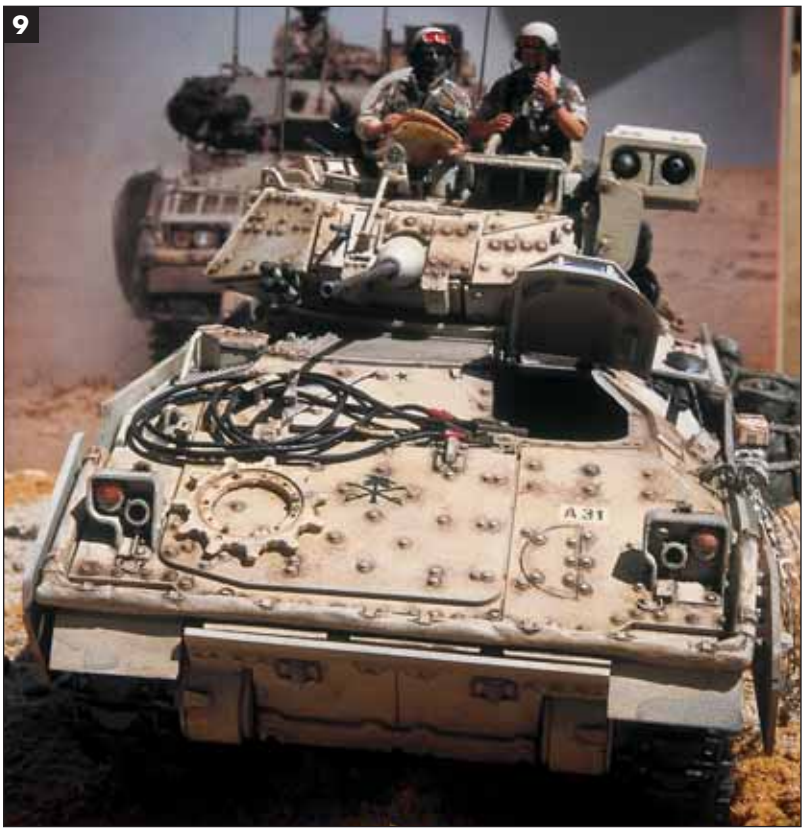
Manning the vehicle. Verlinden provides an excellent crew for any 1/35 scale American armored fighting vehicle. I repositioned the limbs of these figures to achieve the poses I wanted, and further detailed them with Royal Models photoetched microphones (little beauties, these brass etchings).

Using Vallejo acrylics, the base mixture for Desert Storm uniforms is 1 part khaki, 1 part deck tan, and 2 parts light flesh. Flak jackets are base coated with a mix of khaki and deck tan and detailed with camo shades of green and a mix of orange brown and saddle brown, with flat black applied last. Satin-black ear pads are detailed with khaki webbing. I painted goggles silver, then recoated them with Tamiya clear red shaded with a little clear orange and clear yellow.

I painted the driver's face with oils and filled his glasses with a drop of Envirotex clear resin to replicate lenses.

Stow away! Diversity is the key to modeling externally stowed equipment, and I like to mix it up for best results. My rear bin stowage, **10**, includes Alexander the Great cardboard water crates and various parts from my junk box, as well as bedrolls and backpacks sculpted in Milliput epoxy putty. I mounted a spare wheel from an M88A1 kit on the front of the hull. On the other side of the turret is a roll of Custom Dioramics camo netting, **11**. I coated it with a thin solution of white glue and water and rolled it in finely chopped spice leaves. On the same side, toward the front, is rolled razor wire made by Royal Models. More spare parts and Milliput packs completed the clutter on the hull.

With stowed equipment — or any other part of a project — creativity sets your model apart. Even the best of kits can be improved, refined, or updated with simple details. After all, if there were such a thing as a perfect kit, we'd soon be bored! **FSM**



James shows that painting deserves as much attention as building – both are needed to make a bolt look like a bolt. Verlinden figures, their limbs repositioned, wear photoetched communications gear.

Below: Disorder of the day: James filled the turret stowage with lots of cool junk.

Right: C rations, Milliput epoxy-putty rolls, and Royal Models razor wire look sharp on the side of the vehicle. Rolling a glue-moistened camo net in finely chopped spices gave it a leafy look.

Bradley M2A2 Infantry Fighting Vehicle

Looking for a replacement for its aging M113 assault vehicle, the U.S. Army issued a design request in 1972 that led to the development of two separate but very similar vehicles: the XM2 Infantry Fighting Vehicle and the XM3 Cavalry Fighting Vehicle. When the X denoting "experimental" was dropped, these vehicles became the M2 and M3, respectively. Production vehicles started rolling off the line in 1981. Later that year the vehicle was named in honor of the late U.S. Army General Omar Bradley.

Much more than a mere troop taxi, the Bradley is an all-purpose armored fighting vehicle: nimble on land, fully amphibious, and, with its complex turret drive and stabilization system, able to fire on the run, even at speed over rough terrain. Not that it can't take a little heat – the mixed composition armor of steel laminate and aluminum plating resists 95 percent of all ballistic attacks encountered in infantry combat. The Bradley is capable of putting up a good fight, with its TOW missile launcher and a 25mm Bushmaster cannon which fires either single shots or automatically (up to 500 rounds per minute).

Photo courtesy Department of Defense

Several modifications led to the M2A2 version. Most visible was the improved armor plating, including steel appliqué armor, reactive armor plates, and steel laminate skirts to protect the lower sides. A circular shield mounted on the bustle provided spaced-armor protection as well as more external stowage space. Also added to the M2A2: Kevlar liners to reduce injuries from loose rounds; a new smoke-screen system; reconfigured ammunition stowage; reworked electrical, hydraulic, and fuel lines; a protective cover for the driver's periscopes; and new headlights. Inside the vehicle, a seat was eliminated from behind the driver, reducing the crew to six.

The added weight of the new features dictated an upgrade of the engine and drive train as well, with the souped-up Cummins V-8 diesel engine developing 600 hp (100 more than before) and sending that power through an improved transmission. These upgrades also required changes in the intake and exhaust systems.

Combining firepower and mobility, the Bradley was well suited to the fast-moving action of Desert Storm. American and Saudi troops were equipped with more than 2,000 Bradleys, for which Iraqi forces had no match. In addition to destroying enemy personnel carriers at will, Bradleys also claimed a few T-72 tanks. Most casualties suffered in Bradleys were from "friendly" fire, inspiring further modifications to command and control systems, target acquisition, and driver vision. Defensive improvements included a missile countermeasure device and reactive armor packages. – *James Welch*

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Punch-and-die set Historex, 157 Snargate St., Dover Kent, CT179BZ England 44-13-04-20-67-20 www.historex-agents.demon.co.uk

Scale bolt heads Grandt Line, 1040B Shary Court, Concord, CA 94518, 510-671-0143

Styrene sheet, strip, rod, and tubing Evergreen, 18620-F 141 Avenue NE, Woodinville, WA 98072, 425-402-4918

Water crates Alexander the Great, 13 N. Kountouriotou St., 546 25 Thessalonki, Greece, fax 030-52-65-58

Iraqi War Bradley

Building and detailing a front-line M2A2 fighting vehicle

By Ron Poniatowski

I was looking for a project to snap me out of a modeling slump when I thought of modeling an Iraqi War Bradley Fighting Vehicle. Building a vehicle from the 3rd Infantry Division would allow some interesting research and detailing.

Research. The U.S. Army provides technical manuals (TMs) that show crews how to organize their vehicles.

Crews, however, tend to put things where they want, so stowage can vary. In Iraq, ammo storage takes up much of the room inside the vehicle – space that had been vacant during stateside training. Crews became creative, and additional stowage boxes and other means of attaching equipment to the vehicles' sides started to appear. I had lots of opportunity to model a unique in-the-field vehicle.

Armed with my reference books, including a detail-filled set of Bradley TMs, I decided to combine the interior from Academy's M2 kit (No. 1335) with the rest of Tamiya's M2A2 kit (No. 35132), working in subassemblies.

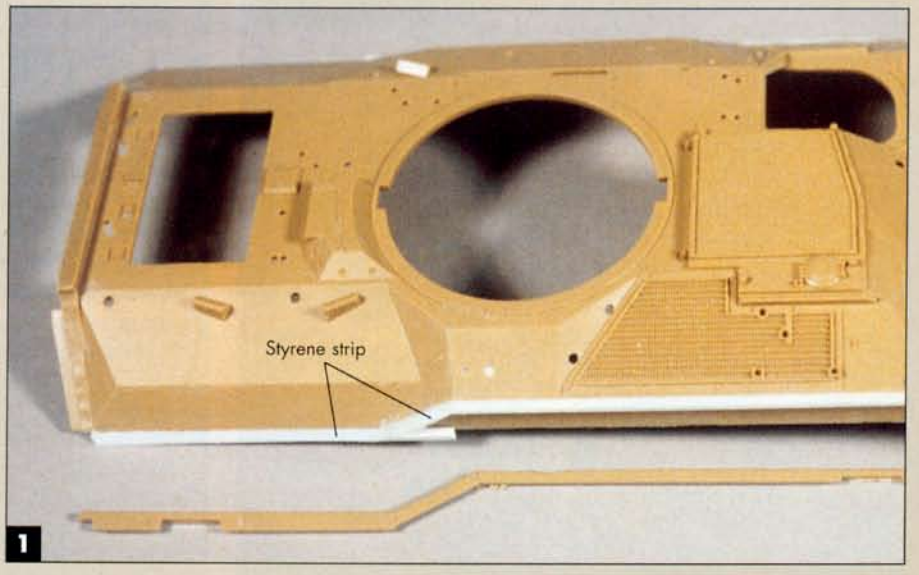
Ron combined Tamiya and Academy components to build an accurate Iraqi War Bradley Fighting Vehicle. Jim Forbes photo

A Turret and hull modifications

I wanted to add a full interior to the model, but the Academy kit's turret isn't detailed inside. I decided to model what would be visible through the open hatches, omitting the details that would be out of sight. Helmet bags placed behind the crew positions give the compartment a "lived-in" look, and I simulated areas of worn-away paint (and exposed aluminum) in high-traffic areas.

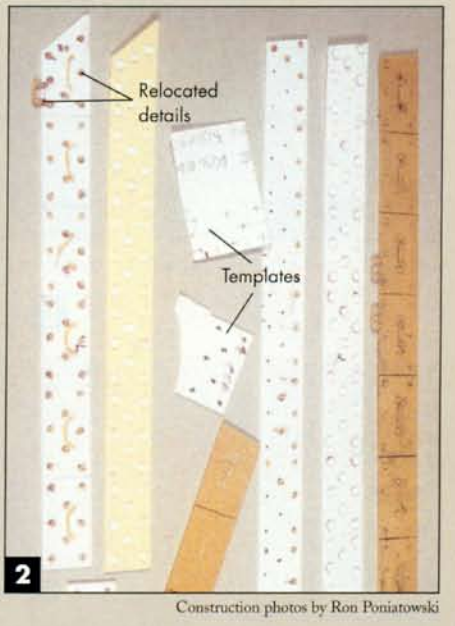
On the turret's exterior, I drilled out the drain holes in the bustle bin and added a central brace near the aft antenna mount. Of course, most of this would be hidden under piles of personal gear, but the drain holes are still visible when the model is viewed from a low angle.

The photos I had of Bradleys operating in Iraq showed that their water barriers (fording kits) had been removed, so I eliminated these details. The space this created between the outer hull and armor was filled with styrene strip, **1**, contoured to match the hull armor at its top edge. The add-on armor plates bolt directly to the sides of the vehicle.



Rebuilding the lower protective skirts over the suspension is a simple and effective modification. The kit parts are solid, attached to the upper side armor. On the full Bradley, these sections are spaced armor – two plates held apart by spacers and bolted to the vehicle in sections.

I cut the kit's skirts from the upper armor plate at the outer edge of the step-like mounting brackets. Using the kit skirt as a pattern, I cut four .010" sheet styrene copies to model the inner and outer plates of the skirts. Next, I drilled a bolt master template to help relocate the bolt positions onto the new plates, **2**.

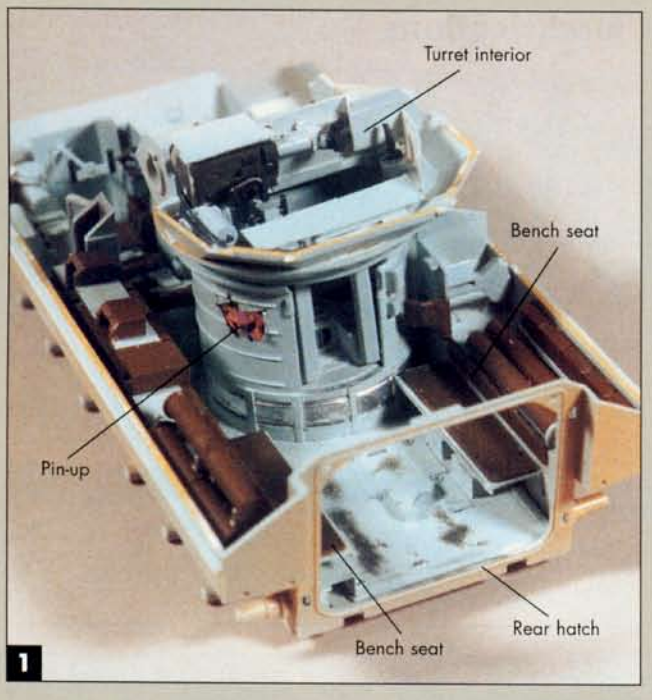


Construction photos by Ron Poniatowski

The round spacers between the plates were made with a punch-and-die set and .020" styrene. I glued the spacers to the inner plate at the bolt locations. Once that was done, I carefully cut the bolts, plate handles, and stirrups from the kit plates and relocated them on the replacement skirts.

Once the details were in place, I painted the inner surfaces of each plate. Then I separated the parts at the seams and assembled the inner and outer plates, creating true spaced armor. Finally, I cemented each panel in place on the upper armor plate.

B Interior details



1

Using my reference books, I updated my kit's interior, adding the "Operation Desert Storm" modifications, which include bench seats for the infantry, similar to those found in the M113. The Bradley's interior offers plenty of opportunity to add detail, **1**.

C On-board equipment

Typically, there are four types of stowage carried on an armored vehicle. First, there are Basic Issue Items (BIIs), such as tools, rammer staffs, water cans, and tarps – things that are issued with every vehicle. Next there's ammunition. This is stowed in prescribed areas and sometimes in other nooks and crannies to increase a crew's fighting ability.

The crew has its field gear and individual equipment, too. This includes K-pots, load-bearing equipment, ammunition magazines, canteens, weapons, night-vision devices, and protective, survival, and combat gear. The Bradley's crew carries personal gear, too, including towels, wash-up kits, pocket cameras, cots or sleeping pads, and rations. Add all that up and you've got a lot of equipment!

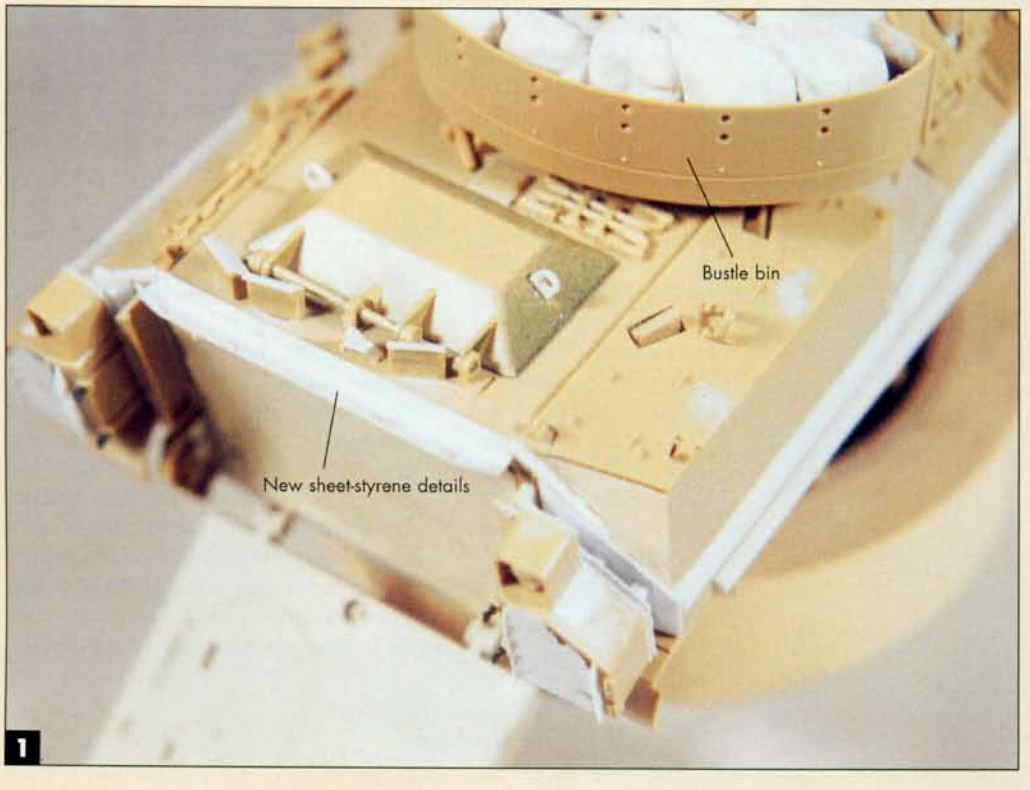
Some of my Bradley's equipment came from Tamiya's accessory sets. I made the other bits from styrene sheet and rod (10 cots) and Sculpey Clay (duffle bags, rucksacks, and tarp rolls), **1**. I also raided my spares box.

I made RTV rubber molds of the rucksacks, water cans, and other equipment and cast additional copies in resin. Thick foil from a wine bottle provided straps.

My reference photos show different methods of attaching equipment to the side armor. In each case, though, a side-armor bolt was removed to accommodate the fitting. I used the method that incorporates lengths of wide grommeted strapping that are bolted to the side armor. The gear could be secured to the lengths of strap between the bolts.

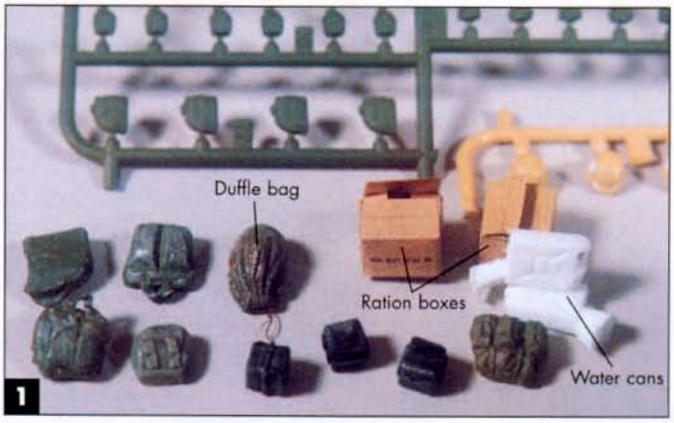
I made straps from .010" styrene sheet, **2**, then attached the gear over the top, **3**, **4**.

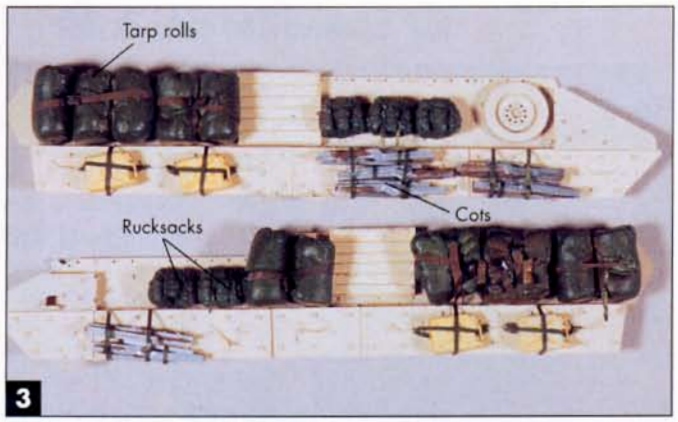
D Correcting the hull exterior

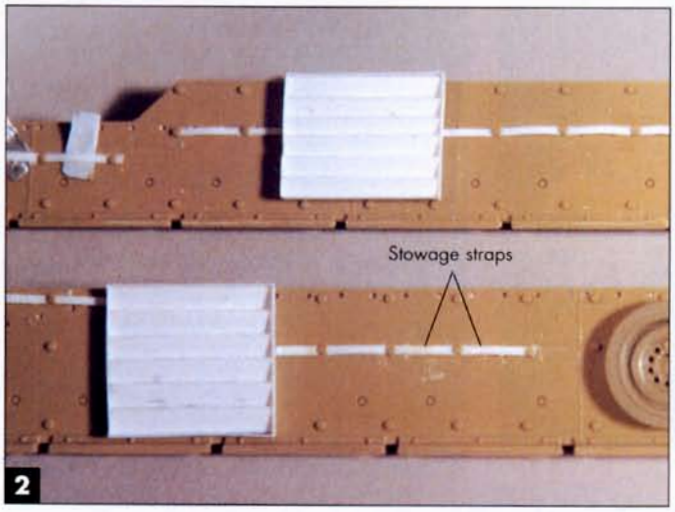


1

Reference photos of an M2A2 showed that Tamiya's kit is inaccurate at the back of the hull where the storage boxes are mounted on the bulges in the back plate. A fix was required, so I cut off the bulges and replaced them with flat sheet styrene, then made additional spaced armor to go between the boxes and the hull plates, **1**.





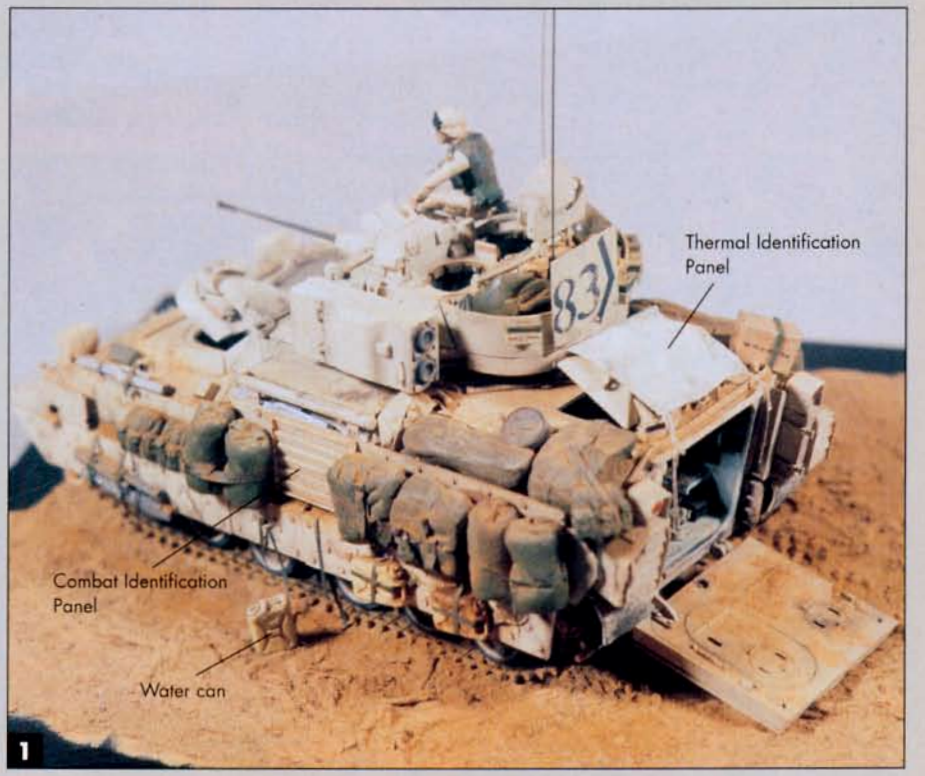


E Adding CIPs and TIPs

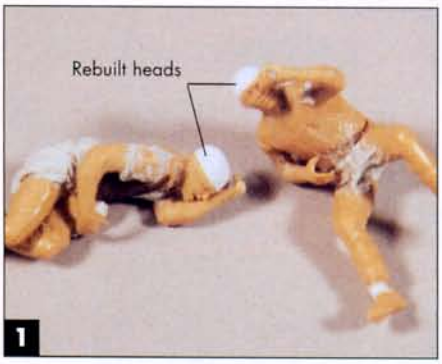
Bradleys wear Combat Identification Panels (CIPs) in Iraq. A CIP is a 24" x 30" louvered panel covered in special thermal tape. Seen through a thermal imaging device the CIPs appear as a contrasting "cold spot," allowing gunners to identify friendly vehicles more easily.

I used strips of .040" styrene, overlapped and framed with thin strips of .010" styrene to create my panels. My references showed the louvers facing down on the rear of the Bradley and up on the sides. This arrangement may not have been universal, but it's accurate for the vehicle I modeled, **1**.

Since my vehicle would be parked, the crew would have placed a Thermal Identification Panel (TIP) on the back deck. A TIP is a 4'-square thermal-cloth panel that's tied 20 degrees from horizontal to reflect the cool night sky. These panels are visible to friendly aircraft. The TIP has grommets at each corner and at the midpoint of each side. A reinforcing strip runs around the edge and across the center, dividing the panel into quarters.



F Modeling the crew



1

Modifying and painting figures is not my strength, but I wanted to populate my Bradley with a few crew members. With the vehicle parked, I posed the crew at rest, too.

I modified Tamiya's modern U.S. infantry figures to model the crew. I had to rebuild the tops of two heads so the at-rest soldiers' helmets could be removed, but other than that, the "reposing" was just a standard cut, glue, and fill procedure, **1**, **2**.


2

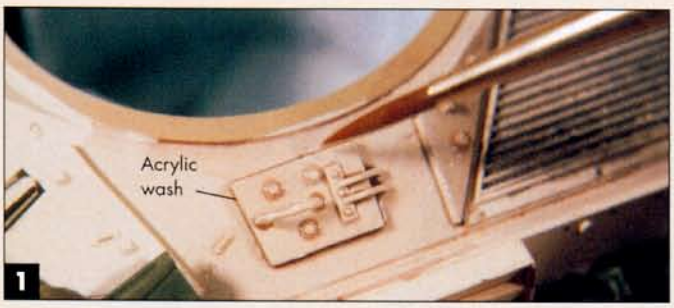
G Tactical markings

1

I put only a tactical marking on my Bradley. To make the vehicle's tactical panel, I painted a square of .020" styrene sheet gray. Over this, I applied an "83" using an old set of dry-transfer numbers, then masked the tactical chevron next to it, **1**.

Next, I painted the panel Desert Sand. When the paint was dry, I used masking tape to pull off the dry-transfer numbers and the tape chevron, revealing the gray paint underneath. I attached the panel to the bustle bin, and added two bolt heads for detail.

H Painting and weathering the Bradley



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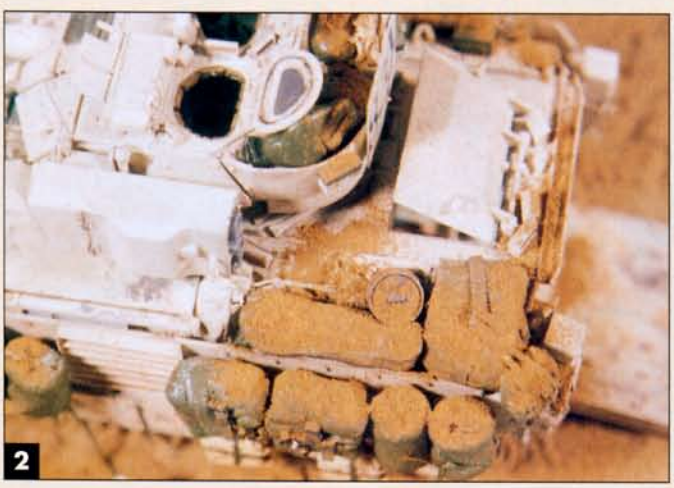

2

I painted my Bradley with Testor Model Master enamels. Then I used artist's acrylics to weather the model, adding oil spots and grime, **1**. Once all the paint was dry, I sanded some earth-tone chalk pastels and poured the resulting dust onto the model where dust would have settled after a long day of driving through the desert, **2**. A fan brush removed the excess dust, **3**.

3

The Bradley Fighting Vehicle

There are two types of Bradleys: the M2 Infantry Fighting Vehicle and the M3 Cavalry Fighting Vehicle. Bradleys are in service with the U.S. and Saudi Arabian armies, and almost 7,000 vehicles of both types have been fielded since 1981.

The role of the M2 is to transport infantry on the battlefield, to provide fire cover to dismounted troops, and to suppress enemy tanks and fighting vehicles. The M2 carries three crewmembers (commander, gunner, and driver) plus six infantrymen. The M3 performs scouting missions and carries three crewmembers and two scouts.

The Bradley has a 45-mph road speed and a 300-mile range. All Bradleys are amphibious; Their tracks provide their propulsion in the water. – *Matthew Usher*

❶ A desert base

1

The base is a scrap of Formica-covered shelving I painted black. When the paint was dry, I covered it liberally with wood putty. After it had set a bit, I sifted some backyard dirt onto the base, then pressed it into the still-soft putty with a paper towel. **FSM**

I pressed the model into the base to create track marks in the sand, then used the lower half of a figure to add footprints around the vehicle, **1**. The finished piece is an accurate depiction of a front-line in-service Bradley.

Frequent FSM contributor Ron Poniatowski is a teacher and a member of the National Guard. He lives with his family in Baraboo, Wis.

Ron added a few "at rest" crew members to his Bradley by modifying Tamiya infantry figures. Jim Forbes photo

Jim Forbes photo

Accurate Abrams

Detailing Shanghai Dragon's M1A2 Abrams main battle tank

By Greg Kolasa

The U.S. Army asked General Dynamics Land Systems to make a few upgrades to the Abrams main battle tank – resulting in the M1A2. Author Greg Kolasa of Wantage, New Jersey, made sure his 1/35 scale model accurately reflected these changes. Jim Forbes photo.

When I bought the 1/35 scale Shanghai Dragon M1A2 Abrams kit, I found that most of the kit's details were accurate. But as nice as this kit is straight from the box, with just a bit of added effort, you can make a much better model.

The hull. Because I planned to mount the Abrams on a display pedestal, my first step was to drill a 5/32" hole in the center of the lower hull. I epoxied a nut to the inside of the hull over the hole, then ran a securing bolt through the bottom of the display board into the model.

The front four feet or so of the real Abrams fenders are hinged to swing up. There are wire torsion springs to hold them in the closed position, which the kit omits. I made the springs from .020" brass wire, and held them in place with small loops of the same wire stock. The forward ends of the torsion springs are cradled in pieces of .004" shim brass. The brass was formed

over a piece of the wire, creating a "J" shape, **1**.

While I had the wire out, I replaced the upper-hull grab handle with one made from wire. The grab handle nestled behind the side-skirt latch mechanism would be nearly impossible to grab from ground level, so I changed its location. The outlet for the hull bilge pump nestles under the turret. While the kit has a nicely molded deep opening, the pipe on the actual Abrams is covered with a rubber boot, its end "flattened" to keep water and debris out of the pipe. I crimped the end of a 1/16" aluminum tube, then super-glued it in place. After the super glue cured, I drilled a 1/16" hole through the fairing and into the hull. After the boot was attached, I checked the fit of the turret through full rotation, **2**.

Next I assembled of the rear face of the hull, leaving off the optional box-like structure on the rear panel. The instructions aren't clear as to the orientation of the taillight guards. A look at my references revealed that these openings are toward the inside top when viewed from the rear, **3**.

The two tabs flanking the lower tow hook on the rear face should have holes drilled in them, as they're for mounting tow lugs. On the upper surface of the rear face there are two lifting lugs (again, molded as tabs without holes in them). I replaced them with brass stock, but relocated the one on the right to the center of the middle grille. With all the details added, I attached the rear face to the lower hull, where I had to fill and sand a large seam.

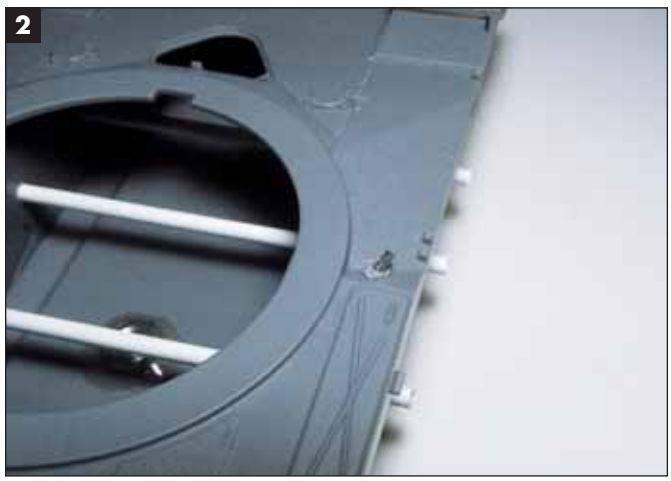
This was where my assembly diverged from the plans sequence; the kit order would have made painting difficult. Step 3 instructed me to attach the side armor skirts to the upper hull; I saved this for later on, after the vehicle was painted. Meanwhile I joined the side skirts with several pieces of sheet styrene on the backside for strength, **4**. I made sure the glue set the assembly straight by laying it flat, and before they totally set up, I checked that they aligned properly along the hull. While the skirts dried, I went to the upper hull.

Directly aft of part A6 there should be a scale 3" x 5" well in which the engine compartment fire extinguisher system "T" handle sits. The side armor skirt was dry-fitted to the hull to serve as a guide for the well since it is directly aft of the hinge. I drilled a round hole, then filed it square. A piece of sheet styrene was cemented to the backside, closing off the well, and the tiny "T" handle was made from two pieces of strip styrene. The area on the hull side (A1) beneath the opening of A6 was drilled out to provide the look of a deeper opening when A6 was cemented in place over the holes.

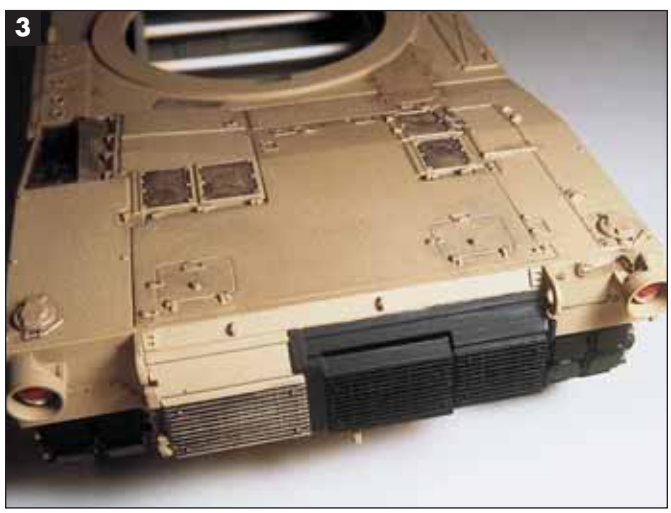
The lower side skirt hinges are mounted to tubes (approximately 4" in diameter) which project out from the hull between the upper and lower tracks. I duplicated these tubes on the kit because they helped stiffen the side skirt mounting. Four 1/8" holes were drilled through the hull to correspond with the approximate location of the skirt hinges. A word of caution: measure the location of the holes on one side of the hull, then measure the location on the other side from a fixed point. Don't drill holes on the second side based on the spacing between the road wheel axles – the road wheels aren't in the same location on both sides.

Once the holes were drilled, I dry-fitted the skirt assembly on one side, and passed 1/8" styrene tubes through the holes until they just contacted the side skirts, **5**. After cementing them in place, I used a pair of dividers to measure and trim the tubes on the other side to mount the skirts there. I also drilled out the

Thin brass wire is used to make the fender torsion springs. The end nestles into a "J" bracket formed from brass sheet.



Greg used thin aluminum tubing (flattened at one end) for the bilge-pump outlet. Before gluing, ensure that it stays below the turret bottom by test-fitting the turret to the hull.



The two small lifting lugs were replaced with fine wire, and the power cable running to the right rear taillight was added. Note the position of the notches on the light shrouds.

Greg used sheet styrene to reinforce the segments of the armor side skirts prior to assembly. A smaller piece below the long strip was used to provide a visual backing to the hinge assembly.

Plastic tubing was used to make the side skirt mounting tubes. Be sure to keep them clear of the road wheels and return rollers when marking their location. They should extend all of the way to the side skirt.

The prism vision blocks do not fill the entire cavity in the driver's hatch – there's some space in there. Greg used laminated strips of styrene to create the "glass."

lightening holes in the track return rollers only to realize they'd be virtually invisible under the armor skirts.

It's important that all of the road wheels touch the ground simultaneously, or the tracks won't fit right. I opened up the holes in the wheels slightly, so they fit a bit loosely on the axles. When it came time to mount the road wheels, I cemented them to the axles with slow-setting cement, then placed the hull on a level surface and filled it with lead shot. The added weight ensured that all fourteen wheels touched the ground at the same time. The upper and lower hulls were then cemented together, and the seam on the front glacis was filled. Next I moved topside to the turret, an area which required a bit more effort.

Onwards and upwards. The driver's hatch needed a bit of work. The areas where the driver looks through are molded as open areas, and this is correct – however, the periscopic vision blocks are not provided. These features, on the driver's hatch and up around the commander's weapons station as well, allow the crew to look through an opening indirectly through a series of prisms. To simulate the prisms, I carved three pieces of .030" styrene to fit loosely into the openings in the hatch, **6**. There should be air space around the blocks as they fit into the hatch recesses. They're small, so it's easier to paint them outside then install them, which is best done after the tank is painted. Later, after painting, I also simulated two windshield wipers on the center pane with 1/64" black drafting tape.

Continuing upwards, I started the turret assembly. The upper and lower turret parts needed filling and sanding. Because of the sharp angles of the Abrams turret, the kit parts were molded so that the upper part fits over the base sections. The trick was not allowing the base to "sink" too far into the upper part as the cement was setting, since this would cause the sides of the turret to scrape the hull as the completed turret was traversed.

The side stowage boxes didn't fit well to the turret. I outlined the location of the boxes on the turret side with a pencil, then removed the locating tabs and fit the boxes flush to the turret sides. I chose to replace the side basket rods with .031" brass wire, **7**. The rearmost side brackets for the basket rods, when installed as per the kit locating pins, were too close to the turret sides. As a result, the rods which should have intersected them would pass right over the top. The cure was to make two small .070" thick styrene blocks which would space out the brackets from the turret sides.

After the side baskets were dry, the vent stack was cut from 1/8" plastic rod and cemented into place as shown, **8**. A slightly larger diameter "cap" was carved from scrap plastic and placed to cover the vent assembly. Notice that when it's done, it should be approximately the same height as the top of the stowage boxes.

The ammunition compartment bustle blowoff doors of the real M1A2 do have the six flat discs on top, but they should be flat, without the relief details of the kit-supplied discs. Before installing them, I passed them over some sandpaper a few times to reduce the raised detail. The doors fit within a recessed groove in the turret roof, and the right door seat was molded "filled in," and as a result the door didn't fit properly into its seat. A bit of grinding with a motor tool opened up this channel, and the door fit properly. The turret rear panel also required quite a bit of sanding to get it to fit right.

The 120mm gun mantlet is nicely molded, but I had a problem with the rear upper portion of the assembly. On the actual Abrams, this panel is hinged to allow it to move up or down as the gun is elevated or lowered. This hinged panel fills the "gap"

as the mantlet moves. The kit plans said to cement this part to the forward mantlet top, but doing so would prevent the gun from elevating. A means of hinging the panel on the model was needed. I fit the two parts together and taped them into position, then smeared the back with silicone bathtub caulk. The caulk remained flexible after drying, allowing the filler panel to move a bit.

Another problem was discovered – with the gun at the zero elevation, the top of the mantlet should be flush with the top of the turret. On the kit, the mantlet is mounted 1/16" too high. To correct the fit of the mantlet, I used a motor tool to thin the walls of the receptacle on top. They were thick enough to take it, and thinning them allowed me to mount the mantlet slightly lower on the trunion for a more realistic fit, **9**.

Basket weaving. The very first step in the construction of the turret stowage basket was to cement the upper and lower halves of the main frame together. That done, the circular rods molded into the basket parts were cut out and replaced with the .031" brass wire. All the other places where wire was used to replace the kit rods required only cutting and bending the wire to shape.

The bottom of the kit basket is formed with only two rods, but the Abrams has a diamond-patterned metal screen as the floor of the basket, so I cut brass screen to fit. Once the final trimming of the screen was completed, it was secured with a few tiny drops of super glue, **10**.

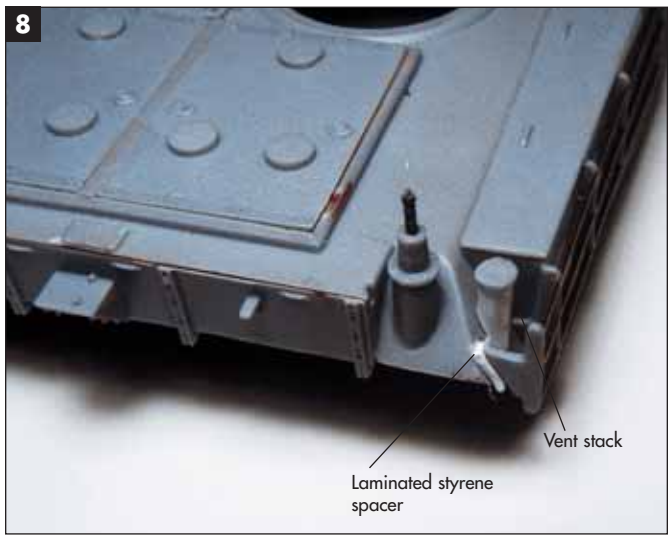
Target acquired. The gunner's thermal imager and laser range finder were assembled next. While the instructions would have you paint the inside of the thermal imager white, it should actually be tan, the color of the overall tank. Since the unit simply sits atop the turret, I chose to paint it along with the turret and hull. I made a .020" brass wire grab handle and added it to the loader's hatch.

Next I tackled the ICWS (Improved Commander's Weapons Station) and CITV (Commander's Independent Thermal Viewer). The Abrams tank on the box sides show the CITV in the correct shape, but the item supplied in the kit is a bit off. The real CITV, when viewed from directly above, looks like a keyhole: circular, with a small rectangular protrusion at one edge. The kit shows it as rectangular with a rounded edge. I decided it would look much better if the front of the kit-supplied CITV were attached to a circular cylinder, so a visit to the scrap box yielded me a drop tank half, type and scale undetermined.

The drop tank had a fairly long straight cylindrical section, and when the halves were glued together, they appeared to be just about the right diameter (.361"). I cut out a section just a bit longer than 1/4", and trimmed the front half of the kit's CITV from the remainder. It would be butt-welded to the cylinder, so a handful of passes over 400-grit sandpaper (wrapped around the rest of the drop tank) provided the round edge to mate with the new CITV body. After joining the two flush with the top of the kit-supplied CITV, I cut a small disc from sheet styrene and glued it into the open end, forming the top of the "new" CITV. The roof was then filled and sanded smooth. The new CITV was passed repeatedly over 600-grit paper until the bottom of the cylinder was the same height as the front. The real CITV has a welded-on panel on the rear side (opposite the view port); I simulated this with a piece of sheet plastic. It was formed over a paintbrush handle (to give it the proper curve) and was then "welded" in place with cement, **11**.

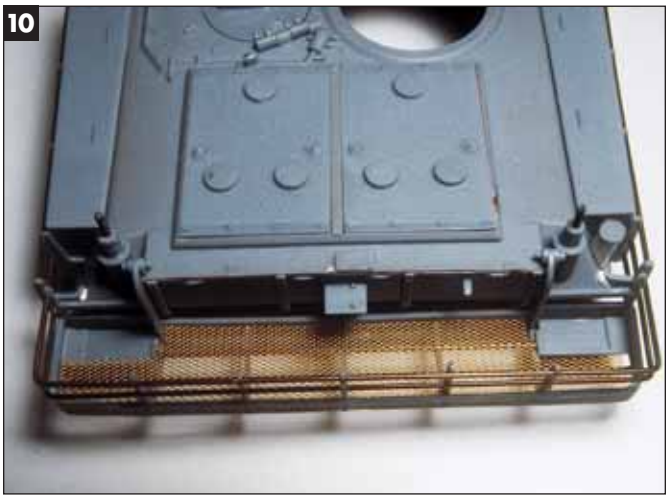
The ICWS was next. The "real" unit features an octagonal

The kit-supplied plastic stowage rack bars were replaced with brass wire. Also note the tow cable mounting sleeve, made from sheet brass.



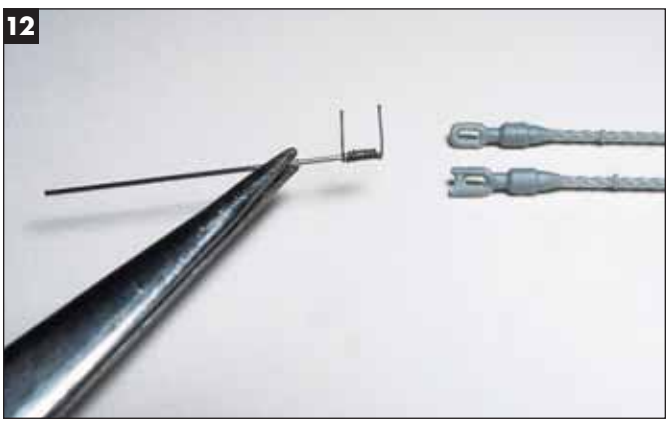
Note how the rear stowage rack mounts needed to be "stood off" from the turret with sheet styrene to keep them in the proper alignment. Also note the added vent stack of the M1A2.

The main gun mantlet in the kit won't sit right in the high position. To flush-mount the upper surface, file down the surrounding plastic from the inside until the fit is more true to the prototype.



The completed basket was test-fitted to the hull to check alignment of the rods in relation to those on the forward part of the hull. It was then removed and set aside until painting time.

Both the ICWS and CITV needed to be corrected from the kit shape. The CITV was modified with tubular styrene, and the ICWS, which lacked the machine gun mount locating gear, was modified with R/C servo parts added to the lower lip.



Greg wrapped fine wire around slightly larger-diameter wire to form the spring bases of the antennas. On the right is the kit-molded tow cable with mounting sleeve (below) and the modified cable end (above) ready to be fit into the brass mounting sleeve Greg installed on the upper hull.

ring of periscopic vision blocks surrounding the hatch. For whatever reason, the kit replaced the forward-facing vision block with something that looks like the flip-up screen of a laptop PC. To replace it I laminated a pile of sheet plastic to form a stack of the proper thickness, and trimmed this stack to the proper size and shape to fill in the gap on the vision block ring. Once a good fit was achieved, it was cemented in place, and a .010" piece of sheet plastic was cut to simulate the raised vision glass. A few passes over 600-grit sandpaper ensured that the top of the new piece was the same height as the remainder of the vision block ring. Finally, I drilled four tiny holes into the new vision block to match holes that appear in the remaining seven segments of the vision block ring – a No. 75 drill bit was about the right size.

I added tow cables along the bottom edge of the turret. The kit-provided tow cables are okay for this model, but on the real Abrams the rear loops slide into steel "sleeves" welded to the turret sides. The kit's sleeves are molded into the cable lugs, just showing up as blobs of plastic on the cable loops. I cleaned up the loops and cut new mounting sleeves from .008" brass sheet stock and formed them over the ends of the cable.

This kit was manufactured without the twin whip antennas that are usually at the rear of the turret. The real antennas are fiberglass and have a taper to them, along with a small teardrop-shaped ball at the tip. I couldn't figure out how to replicate this effectively, so I decided to leave the antennas off. What usually does show up are the spring antenna bases, and the kit doesn't provide them, either. To make them, I wrapped very fine wire around a piece of thin music wire, **12**, then compressed the coils so they sat one atop the next, making a "spring" over the wire core. These two springs were super glued to the top of the antenna base. The springs are black, and they have the tiny red shipping caps atop them (to keep water out of the connectors).

Finishing. I decided to show the Abrams in the desert scheme, overall U.S. Army/Marines Gulf Armor Sand. The Testors Model Master line has this color already mixed under this name. I decided to depict a clean M1A2 just as it left the tank plant. The roadwheels and main gun were painted with a few drops of white added to show just a tad of a color mismatch. The various intakes and grilles were picked out with a darker wash to give the illusion of depth. DML did some pretty nice detail molding on the rear deck area, and the wash highlights their efforts. The left rear grille was also given a dark wash to accentuate the moldings. The center grille is the turbine exhaust, and on the real vehicle, it and the right grille are painted black.

The molded-in mounting tabs on the backsides of the tow cables didn't match up with the mounting indentations, so I trimmed them flush. Since the mounting indentations placed the tow cables too high up the sides of the turret, I filled them and touched up the paint. The cables are ¼" too long, and were trimmed to fit (note that on the real Abrams, only half of the rear tow hooks slide into the sleeves). Finally, a gentle curve needs to be added to the tow cables where they follow the lower contour of the turret. My reference photos of factory-fresh M1A1s showed the cables painted the same tan color as the rest of the tank, but the cables just looked unfinished in tan so I painted them a metallic-black color.

All the glass on the Abrams is periscopic, so when the vision blocks are viewed from ground level they take on a peculiar metallic orange-purple color as the light passes through a series of mirrors. They actually change color (to slightly more orange),

as the angle at which they are being viewed changes, due to coatings that cut down relections between the elements of glass. Mixing up this weird hue is not an exact science. This applies to the vision blocks in the driver's hatch, ICWS, and the loader's hatch. I mixed orange, silver, and a touch of purple for the finish. Each block was painted a slightly different shade, and each window itself was painted so that the color was not completely uniform. It sounds weird, but it works. My references indicate that the left pane of the range finder takes on a black/purple color. The right window is a bit different – it's a lighter shade of black/purple and light green spots show up when viewed from the front, no doubt part of the optics contained within. It was painted as such, and the window of the CITV was also given the dark black/purple treatment (very few references show the CITV with the window exposed). If you think the tank looks silly with purple windows, gloss black is a pretty good standby.

Back to earth. The road wheel center caps, plastic on the full-size tank, were painted gloss dark gray. DML took the time to mold the anodized securing bolts into the center cap, so I took the time to paint them gold.

The tiny engine fire extinguisher "T" handle was painted red, and added to the hull side well and, while the red paint was open, the taillights were done as well, **13**. A light wash was used to pick out the locking rings of the thermal shroud and bore evacuator, not so much to simulate dirt and grime, but to accentuate the shadows. The plans would have you paint the track for the loader's machine gun flat black, but add a few parts of silver to make a gunmetal color. The two machine gun ammo boxes needed to be filled on the bottoms, as the hollowed-out bases are visible when they're installed in the storage baskets and, as my references showed, were painted green instead of tan.

The tiny cable loops hanging down from the side skirts were cut from stranded HO-grain-of-wheat bulb wires and super glued into small holes drilled into the bottom edge of the side skirts. A tiny "blob" of gel super glue at each end simulated the mounting sleeve on the real tank. The armor skirts were then hung in place, completing assembly.

Overall, the project wasn't too complicated, and can be undertaken by any intermediate modeler with pleasing results. With no major surgery and a few simple fixes, this project has turned just an "OK" M1A2 tank model into an accurate showpiece! **FSM**

The center caps on the roadwheels were painted dark gray, with gold mounting bolts in the center. Note how the side skirt mounting tubes nestle in among the road wheels and return rollers. The Abrams is almost never seen without the armored side skirts in place.

The M1 Abrams Series Main Battle Tanks

In the middle 1970s, the U.S. Army faced the realization that NATO was losing the hypothetical tank war with the Soviet Union/Warsaw Pact forces. The Cold War was running at full tilt, but Europe was patrolled by an aging fleet of M48 and M60 upgrades. After many years of research and development, a new tank, named the "Abrams" after former Army Chief of Staff Creighton W. Abrams, was delivered to the U.S. Army starting in February of 1980. There were 2,374 M1s built.

In 1985, an upgrade came in the form of the M1A1. The biggest change from the older M1s was the replacement of the main gun with a 120mm smoothbore gun. The "A1" variant could be distinguished from the earlier M1 by a larger bore evacuator chamber halfway up the main gun tube, and the stowage basket that wraps around the rear of the turret. The M1A1 HA (Heavy Armor) was next up. The "HA" carried armor made of DU (depleted uranium), a very dense, inert waste product of the nuclear industry. DU is much denser than steel, and the increased weight led to the incorporation of the "bigfoot" track. These tracks had a larger "footprint" than previous models, distributing the Abrams' ever-increasing weight more evenly over the terrain.

Next was the M1A2 in 1993. Internally, this new Abrams differed from its predecessors in that all electronics were now digital, making the fire control system more lethal than ever before. But the changes weren't only "invisible" internals. A new protrusion grew from the turret roof on M1A2 – the Commander's Independent Thermal Viewer. M1A2 tank commanders now could (independent of where the gun was aimed) scan the battlefield looking for the next target of opportunity while the gunner concentrated on hitting the previously selected target.

The commander's station was also upgraded to the ICWS. Instead of a fixed machine gun mounted to a rotating cupola, the A2 used a rotating machine gun mount and a fixed cupola. By 1996, only 62 "new" M1A2s were built, the remaining 1,079 being rebuilt M1s. The full order's delivery is scheduled to take place by 2003. Allied countries have also purchased the digital Abrams.

During Operation Desert Storm, Abrams units racked up an impressive kill ratio over Iraq's elite Republican Guard, without losing a single Abrams crewman to the hostile action. M1A1s were able to literally "pick off" Iraqi tanks before the Abrams could even be seen by the Iraqis.

Perhaps the Abrams most glowing compliment came not from an American tanker, but from an Iraqi tank battalion commander captured during Operation Desert Storm. He said "…On 17 January I started with 39 tanks (T72M1). After 38 days of aerial attacks, I had 32, but in less than 20 minutes against the M1A1, I had zero."

– Greg Kolasa

Wash and dry-brush an Iraqi Freedom

M1 Abrams

Direct from the streets of Baghdad, the M1A1 Abrams tank! John used the Tamiya mine-plow version with extra detailing parts from Eduard and AFV Club tracks. A thorough wash and dry-brush finish makes this model look as though it just rumbled into your living room.

Finishing techniques reveal your hard-earned detail

Story by John Plzak

Photos by William Zuback and Jim Forbes

You've spent hours researching, building, and detailing your latest kit only to watch all the fine detail disappear when you paint it. The problem is that details on small objects like models don't cast shadows large enough to distinguish them from the surrounding area. The solution is to apply a wash and use dry-brushing to enhance shadows and highlights on your model. These techniques will make that hidden detail pop out and reproduce some of the effects of weathering at the same time.

The process requires no expensive tools and only a few supplies, some of which you already have on your workbench. I'll demonstrate it on a timely subject: an M1A1 Abrams tank, the spearhead of U.S. armor forces in Operation Iraqi Freedom.

The model. Building and detailing the model was straightforward. I started with the version of the Tamiya M1A1 kit equipped with a mine plow (No. 35158). The kit is more than 10 years old, and though it's fairly accurate, I decided to update it with Eduard's photoetched brass detail set (No. 35-333). Eduard even includes the louver-like protrusions on the turret for the infrared IFF (identification friend or foe) devices used on Iraqi Freedom coalition vehicles – the kind of detail that benefits from the wash-and-dry-brush process.

The kit's tracks have guide teeth incorrectly located in the middle of the track blocks instead of between them, but fortunately I found an AFV Club set of T-158 tracks (No. AF3512) that are more accurate for M1A1s in service today.

Despite extensive media coverage of the war, I had some difficulty coming up with markings for my M1A1. Eventually, I found a photo in a special edition of *U.S. News and World Report* showing several M1s apparently with the 2nd Brigade of the 3rd Infantry. Like their Desert Storm predecessors, Iraqi Freedom M1s are loaded with external stores that seem to include everything but the kitchen sink. I gave my Abrams a pile of accessories from Greif's "Modern U.S. Tank Crew Gear" set (No. GF004) and the Academy "Tank Supplies II" set (No. 1383), but it still looks underdressed!

Coming out with the wash. The first phase in finishing my M1 was to apply the wash. A wash is simply highly thinned pigment – mostly thinner and only a touch of pigment – applied over the base coat. Just about any water- or oil-based paint can be used in a wash – enamels, acrylics, watercolors, or artist's oils. I've tried the exotic mixtures some modelers use, like chalk pastels diluted in lacquer thinner, but I prefer the artist's oils.

Artist's oils have several advantages that make them ideal for washes: opacity, intense colors, and finely ground pigments. Many modelers fear the long drying times of oil paints, but when thinned as they are for a wash, they dry in a few hours.

Compared to modeling paints, artist's oils are expensive, but only a small amount is needed to do an entire model. One tube will usually last you for years, and you don't need many colors. Most of my washes are made using burnt umber (dark brown) dark-

Here's John's Abrams and plow before painting. The dark items are photoetched brass details from Eduard. Larger detail pieces were left off the model until after the wash and dry-brushing steps were completed.

Tools of the trade: John mixes artist's oil paints and thinner in a six-hole mixing palette. A fine brush is used to apply the wash. For dry-brushing, John will mix colors on the ceramic tile, then apply them with a short-bristle brush.

With a blob of burnt-umber oil paint on the rim, John pushes a little into the shallow pool of mineral spirits.

With the solution thoroughly mixed and resembling strong coffee, John draws off excess wash on the rim of the palette.

ened with black. For thinner, I use ordinary mineral spirits (paint thinner) purchased at a home center or hardware store.

Apply the base coat. I completed all the basic construction steps and added the major detail items to my Abrams, **1**, before I applied a base coat of acrylic Polly Scale U.S. Desert Storm Sand (FS 33446). I use acrylics for my base coats because the mineral spirits in the wash won't damage the paint even if it's had only a few hours' drying time. The thinner will wrinkle an enamel base coat if you don't wait several days for the base to dry or apply an acrylic flat clear coat as a barrier.

Mix the wash. Mix the wash in a small container that's disposable or easy to clean, **2**. I mix mine in a plastic six-well artist's mixing tray. I use a white tray because it allows me to check the color density of the wash before I apply it.

When preparing the wash, you don't need to squeeze a big glob of paint out of the tube. Remove a small dab about the size of a BB with a toothpick and place it on the edge of the mixing pallet. Fill the well about three-quarters full of mineral spirits. Using a fine brush, stir some of the paint into the thinner, **3**, adding paint until the color of the wash looks like strong coffee. Work the brush as though you're cleaning it until it's clear of pigment. While stirring, tap the bristles on the side of the mixing well from time to time to check the intensity of the color, **4**.

Apply the wash. There are two ways to apply washes. For a small area where you want to represent weathering as well as shadow, such as a truck cab floor, flood the entire area with a coat of wash, **5**.

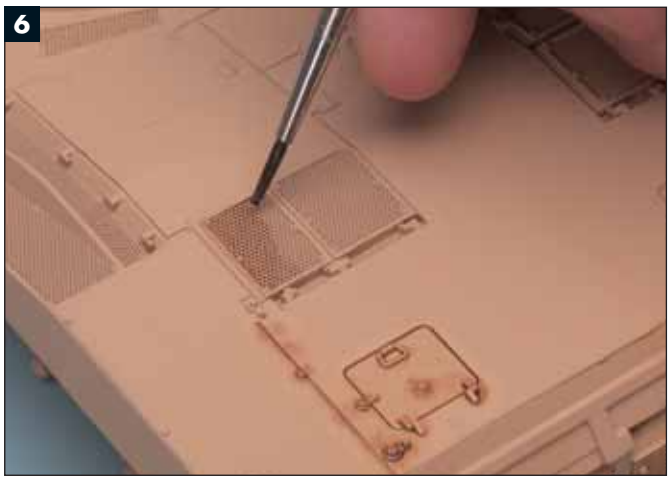
For large areas like the hull and turret of a tank, I prefer a more controlled method. Fill the brush with wash and touch it on the model, **6**. The wash will easily flow around raised or scribed detail. If it's too dark, remove most of it with a cotton swab or a dry paint brush. If it is too light, add more pigment to the wash and apply more to darken the area. Remember that the wash will dry lighter than it looks when first applied. Experiment a bit to learn how much pigment is needed.

Don't worry if the color varies a bit on the model. The paint on full-size AFVs doesn't weather evenly, and colors can vary quite a bit from one part of the vehicle to another.

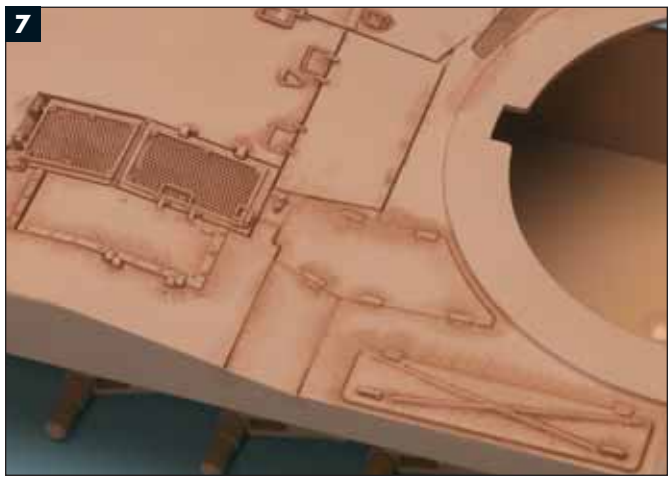
Continue applying the wash wherever there are details on the model, **7**. The pigment will settle quickly in the mixing well, so stir often and test it frequently on the pallet. The wash will also darken as you use up the thinner in the well. Add more thinner and remix as necessary.

What have I done? After about half an hour, your model

Here are the wash and dry-brush techniques in a (lug)nutshell: (left to right) first the tire color was sprayed on the road wheel; a lighter gray dry-brushed on the tire edges; tire was masked and wheel color airbrushed; burnt-umber wash applied to the wheel details; dry-brushed highlights add depth.



The fine brush transfers the wash to the recessed detail of the hull. When properly thinned, the wash should flow quickly around hatches and along recessed panel lines.



The wash has been applied to all the topside detail on the hull. It looks messy now, but don't fret! The excess will be cleaned up in the next step.

will look awful – very uneven and blotchy. Don't panic! Your hard work is not ruined. Let it dry for another hour or two, then take a cotton swab dampened with mineral spirits and carefully go over the entire model, **8**. Don't rub too hard or you may rub through the paint. Pay particular attention to the large flat areas of the model. You just want to cover the model with a thin coat of thinner, and gently remove the wash from the areas where it doesn't belong.

When the thinner dries, the wash will be much more even. Let it all dry overnight before you move on to dry-brushing the model.

Dry-brush fundamentals. The second phase of the finishing process, dry-brushing, is almost the opposite of a wash. Paint is applied to the brush, then removed until almost none is left. The brush should be dry, hence the term "dry-brush." As the brush is passed over the model, small amounts of paint collect on the high points of the details (see photo **5**).

Dry-brushing can be done with either enamels or acrylics. I use acrylics for small jobs like tires or road wheels, but for large areas I find enamels mixed with artist's oils work best. Enamels give me access to a wide variety of colors, while the oils will increase the paint's blending ability and working time.

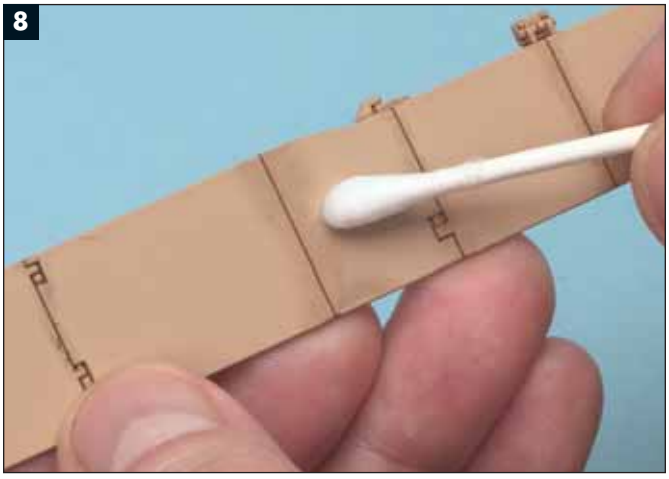
How the mine plow works

The mine plow developed for the M1 tank is based on a Soviet design. It works by pushing aside most of the mines rather than exploding them. A small "dog bone" roller suspended on a chain between the plow blades trips mines with tilt-rod fuses.

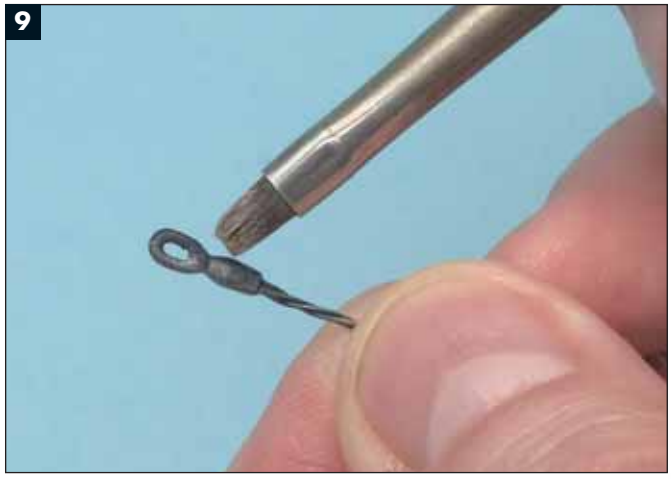
The plow was very effective in Desert Storm and later in Bosnia and Kosovo. It also works well against defensive berms and dug-in emplacements. No doubt it was put to good use in Operation Iraqi Freedom.

The plow unit simply bolts to the front of any M1 tank. The right periscope is removed from the driver's hatch so the hydraulic control cable can be routed into the driver's compartment.

Tamiya did an excellent job of reproducing the plow in its M1A1 kit, including the fine chain and turned-brass "dog bone." It can be positioned on the model in the deployed or stored mode, and the deflection plates can also be shown extended or stowed. *– John Plzak*



After waiting an hour or two for the mineral spirits to dry, John wipes off the excess wash with a thinner-dampened cotton swab.



With most of the pigment removed from the flat brush, a light grazing of Testor steel enamel on this tow cable shows how effective a good dry-brush technique can be.

Here's the finished mine plow, effectively washed and dry-brushed. Note the metallic sheen of the plow blades, created with a dry-brushing of Testor chrome silver.

You don't need a lot of oil colors in your pallet; you'll mainly use white. Yellow ochre is useful when working with greens because it will keep the white from bleaching out the color. I like to mix the paint on an old piece of white glazed wall tile. As with the wash, the white surface helps me check the color. The tile also won't absorb paint and is easy to clean when I'm done. Small, stiff, flat brushes with short bristles work best.

Scrub-a-dub. Find a paint close to your base color (it doesn't have to be a perfect match). A small amount is needed, so use a toothpick to scoop out a dab of the pigment that has settled to the bottom of the bottle. Place a dab of white oil paint next to the enamel and use your brush to mix in a bit of the white until the enamel is only slightly lighter than the base color.

Load the brush with the mixture and wipe off the excess paint on a piece of paper, rag, or paper towel. You want to remove almost all of the paint from the brush.

Start brushing the model, paying particular attention to scrubbing over the raised detail and edges, **9**. It takes a little practice to learn how much paint you should have on the brush and how much pressure you should apply to the brush. Use more pressure if the results build up too slowly.

Go over the entire model, then add more white to the base and go over everything again, this time using less pressure. Add even more white and do a light third pass just on the high points. Take care: If you put down too much of the final color, your model may end up looking frosted. Let it dry overnight, and if the finish looks a little too uneven the next day, apply a topcoat of your favorite clear flat.

Make it metallic. One of the best ways to replicate metal is to dry-brush the parts with metallic enamels. Two of my favorites are Testor steel from the bottle and Testor chrome silver from the paint marker.

Begin by applying a coat of flat black paint to the parts to be metalized. Put some of the metallic paint on your pallet, pick up a bit with the brush, wipe the brush almost dry, and work it over the details. To use the paint from the pen, I simply push in the nib several times on my tile pallet until I have a small puddle of paint to work with.

You'll be amazed at how realistic items like shovels, tow cables, and track links can be made to look using this method, **10**.

These finishing techniques are not difficult to learn. They will give the appearance of any model a shot of realism and show off the fine detail molded into modern kits. Practice them a bit, and soon people who see your models will say, "Look at all the detail! How did you do that?" **FSM**

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Meet John Plzak

John's byline will be familiar to *FineScale Modeler* readers from his many Workbench Reviews. This article is the Milwaukee, Wisconsin, modeler's debut as a feature contributor.

He began modeling more than 40 years ago when he received an Aurora P-61 Black Widow kit on his seventh birthday. "I think I spent all of about 60 minutes building it, including a nice thick coat of glossy black paint."

John became more serious about modeling in his early teens. Although armor is his focus, his interests include aircraft, racing cars, and even science fiction subjects. A member of the Milwaukee's Richard I. Bong Chapter of the IPMS since 1979, he has served as the club's secretary, president, and contest chairman at different times.

Among his many modeling achievements, John is proudest of winning his first IPMS National award in Chicago in 2001, contributing models to several museum displays built by the Bong Chapter, and seeing his work in FSM.

Even in 1/35 scale, an M1 is intimidating from any angle. With its details brought out by the wash and dry-brushing, John's Abrams is hardly distinguishable from its full-size counterparts in Iraq.

GENERAL MOTORS' LAV-25 AND LAV-AT (TUA)

General Motors of Canada, Diesel Division, produced the first LAVs in early 1979, the MOWAG Piranha six-wheeled LAV (light armored vehicle) for Canadian armed forces. The U. S. Army and Marine Corps selected an eight-wheeled variant for rapid-deployment forces.

The vanguard land forces of Operation Desert Storm came equipped with LAVs. By their nature, LAVs are frontline weapons: they can be air-dropped, they have a top speed of 62 mph, and they provide protection against small-arms fire.

The LAV-25 is 25′ long, 8′2″ wide, 8′10″ tall (or 8′5″ without the pintle mount), and weighs 24,100 pounds in combat. Its main weapon is an M242 Bushmaster 25 mm automatic cannon. The LAV-25 mounts two 7.62 mm machine guns (M240 and M60E3) and two M257 smoke grenade launchers, and it carries a crew of nine.

The LAV-AT (antitank or TUA) is taller (10′3″) and heavier (27,650 pounds loaded). It mounts an M901A1 TOW II missile launcher as well as an M60E3 machine gun and two M257 smoke grenade launchers. The LAV-AT carries a crew of four.

LAVs can cross a 6′9″-wide trench and climb grades as steep as 60 percent. And they're amphibious: Two propellers generate a swimming speed of 6 mph. (In a landlocked operation the propellers can be removed.) A 275 hp Detroit Diesel and a five-speed Allison transmission power four rear drive wheels (eight-wheel drive is optional). With an independent suspension and power-assisted brakes and steering, driving an LAV is like driving a heavy-duty truck. Photos courtesy of General Motors of Canada.

Step 1. Suspension and lower hull. Let's start by correcting the suspension, back to front. Cut both rear-axle housings flush with the hull bottom. Cut a 41 mm x 72 mm plate from .020″ sheet styrene to fit the rectangular rear hull bottom, and cut notches in the plate for the rear-wheel drive lines (**A**). Reattach the third axle mount 6 mm from the front edge of the new rear plate, and attach the fourth (front) axle mount 36 mm forward of the rear. The right axles are about a millimeter behind those on the left because of the torsion bars. If you are a real stickler for accuracy, mount the left axles 1.5 mm forward of the right axles: However, you'll have to cut off the mounting tabs, fill the resulting slot, then glue the axle onto the flat side of the axle box.

To correct the tie rods (parts 25B), trim off the mounting pins of the four axle arms (parts 41B and 42B) and sand the tie-rod mounting pads flush. Glue a 10 mm x 62 mm strip of .080″ styrene in the middle of the forward lower hull (**A**). Cut the tie rods to make four 19 mm pieces, each with a pad on the end. Bend each tie rod so one end touches the

Accurizing Esci's 1/35 scale LAVs

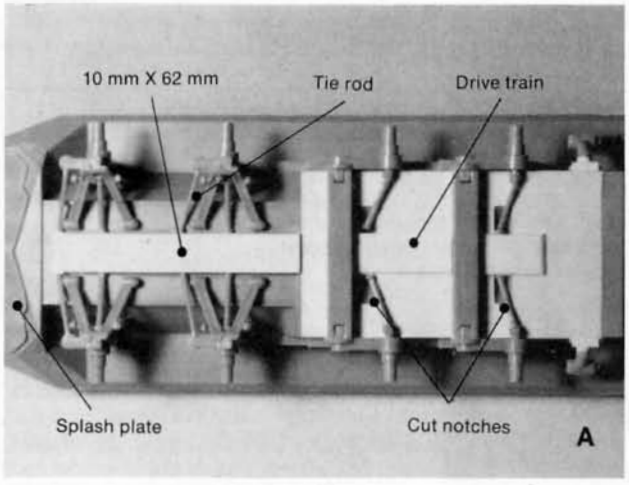
Getting the "Frog" in shape

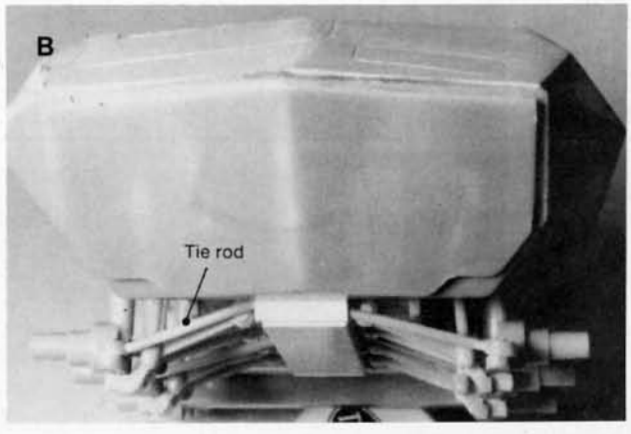
BY COOKIE SEWELL

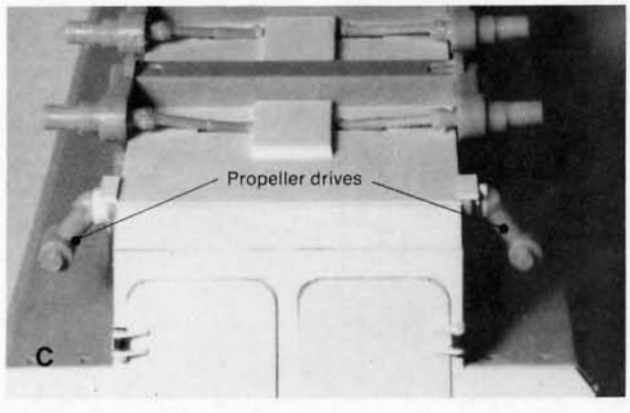
AFTER a close look at Esci's 1/35 scale LAV-C2, LAV-25, and LAV-TUA TOW launcher, I gave up on building an accurate LAV straight from the box. I decided I would have to correct the entire vehicle profile to get it right. I built Esci's LAV-25 and LAV-TUA TOW launcher, but you can use these techniques on any of the three Esci LAVs. Refer to your kit and instructions as we proceed.

The Esci LAVs have two basic flaws. One, the nose is out of joint. For example, the angles for the two upper nose plates (a total of four panels, two on each side of the nose) are 71 degrees forward, 78 degrees rear — and that's all wrong. The correct angles are 68 degrees forward and 82 degrees rear. The other problem is the suspension, which is so compressed it makes the LAV look like a trolley from a 1930s cartoon.

Cookie Sewell wasn't satisfied with the profile of Esci's LAVs — so he took matters into his own hands and rebuilt the upper hull to his liking with sheet styrene.



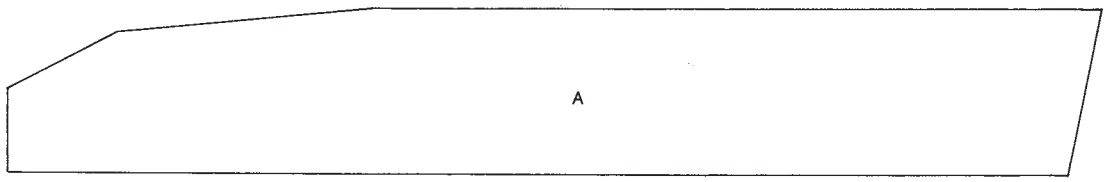


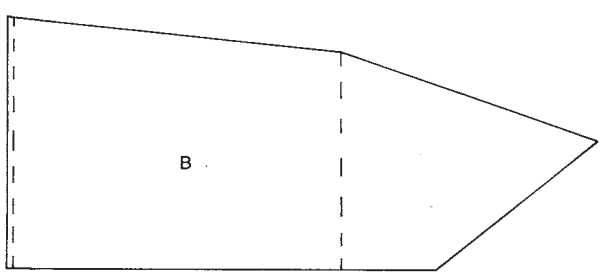


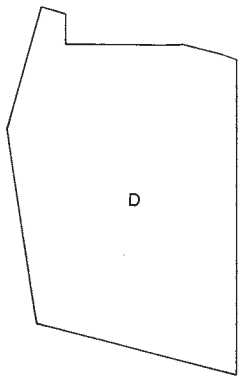
new center strip, and the pad rests on the top of the axle-arm mounting pad (**B**).

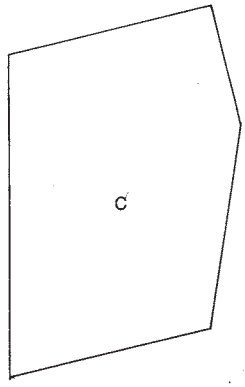
Now correct the propeller drives (**C**). Cut off the 90-degree bend in the drive arms (parts 46B and 47B); the long part will have the propeller gear drive on it. Use scrap plastic to shim the mounts (parts 45B) so the propeller drives project 2 mm from the part 45B pads. Cut the base of the prop drive so that the drive is aligned with the axis of the vehicle.

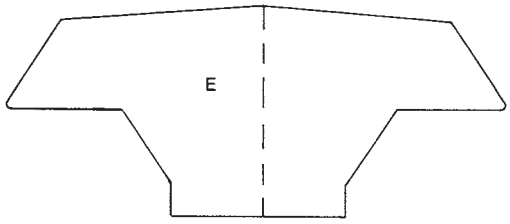
Modify the splash plate (part 15B) according to template G. You will need to scrounge or make two more towing rings, similar to kit part 37B, to mount near the notches. Now complete step "1" of the kit instructions.



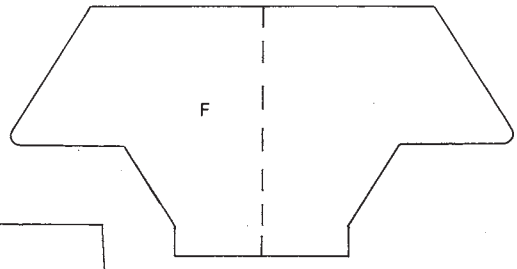


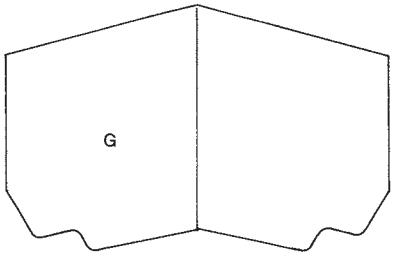


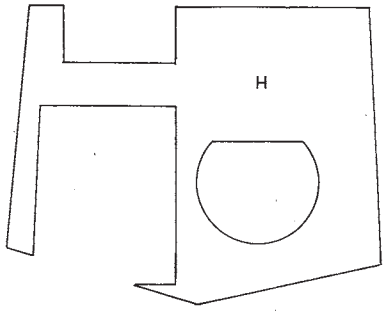


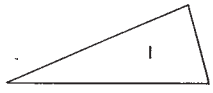


1/35 SCALE









PREPARED FOR
FINESCALE MODELER
BY
Phil Kirchmeier

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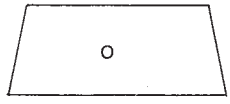
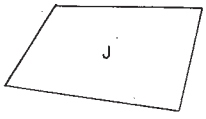
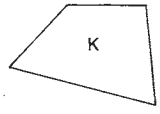
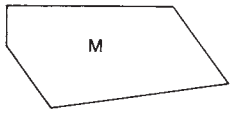
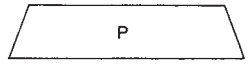
1/48 — 73% 1/72 — 48.6% 1/76 — 46%

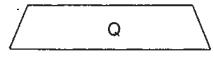


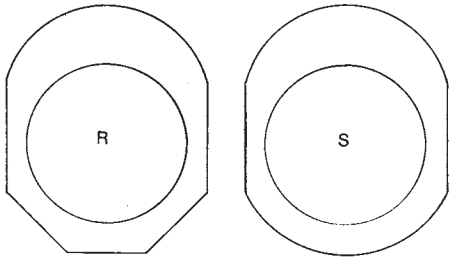


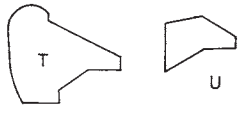


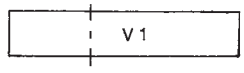


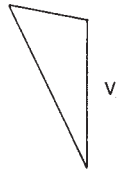


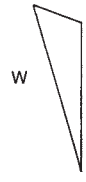


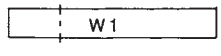


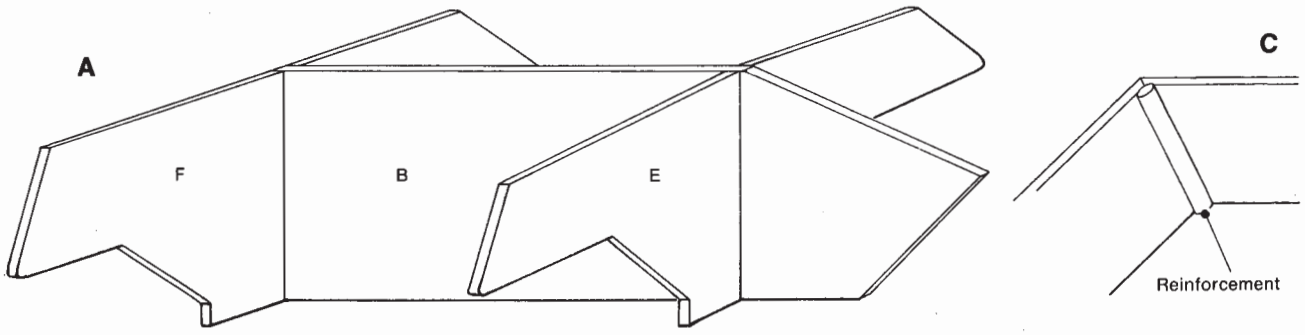








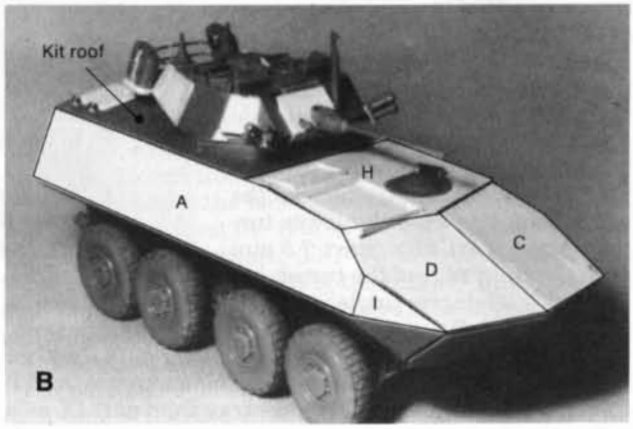




Step 2. Upper hull. Cut the center bulkhead former for the bow section using template B and .040″ sheet styrene; test fit it on the inside of the lower hull. Two internal bulkheads, attached to template piece B, support the nose: Template part E fits at the junction of the 68-degree and 82-degree nose angles, and template part F fits on the back edge of template part B (**A**). Cut parts E and F as indicated on the template and glue them to template part B. Glue this assembly on the inside of the forward lower hull.

You can use the kit-supplied part for the rear hull-roof plate (part 2E on the APC, part 22C on the TUA), but replace the rest of the upper hull with these pieces of .030″ styrene: two side plates (template A); two upper front cheek pieces (template I); two forward hull deck plates (templates C and D, left and right respectively); and the mid/upper hull deck plate (template H) (**B**). Cut all the pieces before assembling the upper hull, and test fit pieces every step of the way. Reinforce the plate joints with thin strips of sprue glued to the underside of the plates along the mating edges (**C**).

Glue the cheeks (plates I) to the top edges of the lower hull (**B**). Next, glue the sides (plates A) to parts I and the rear bulkhead installed earlier. Install hull plates C and D; make sure they fit the nose, the center former (B), the cheek plates (I), and the sides (A).

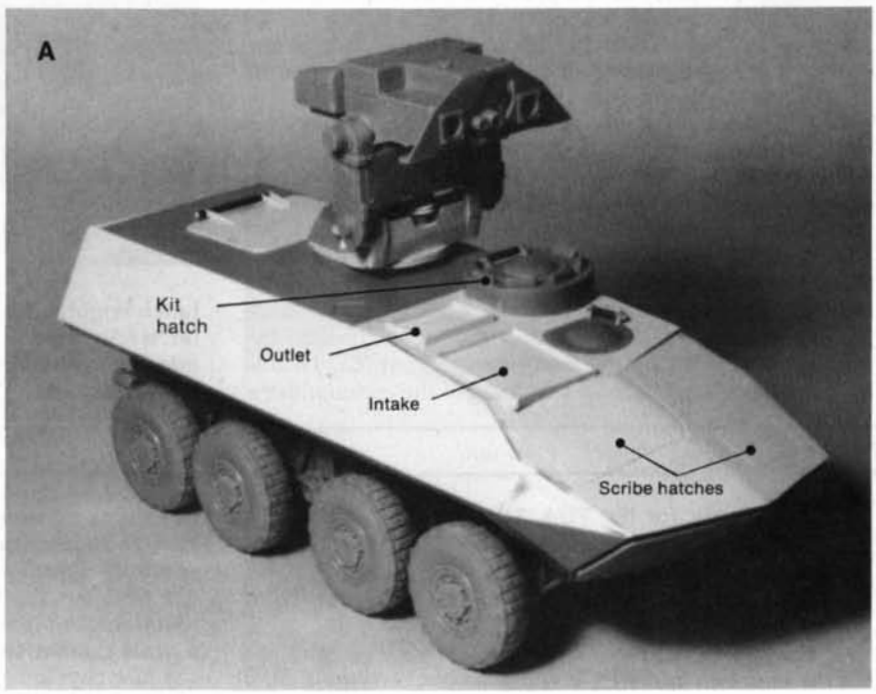


Note the additional hatch on the TUA, about 51 mm back from the front edge of plate H. Mount plate H behind plates C and D. Glue a strip under the rear edge of the plate as a seat for the kit hull roof, then install the roof. Fill seams with epoxy putty and sand them smooth.

Step 3. Radiators, hatches, and lights. Now that you've replaced the top half of the hull, you'll have to make new details. Scribe hatches for the engine and the winch bay in the front plates (**A**).

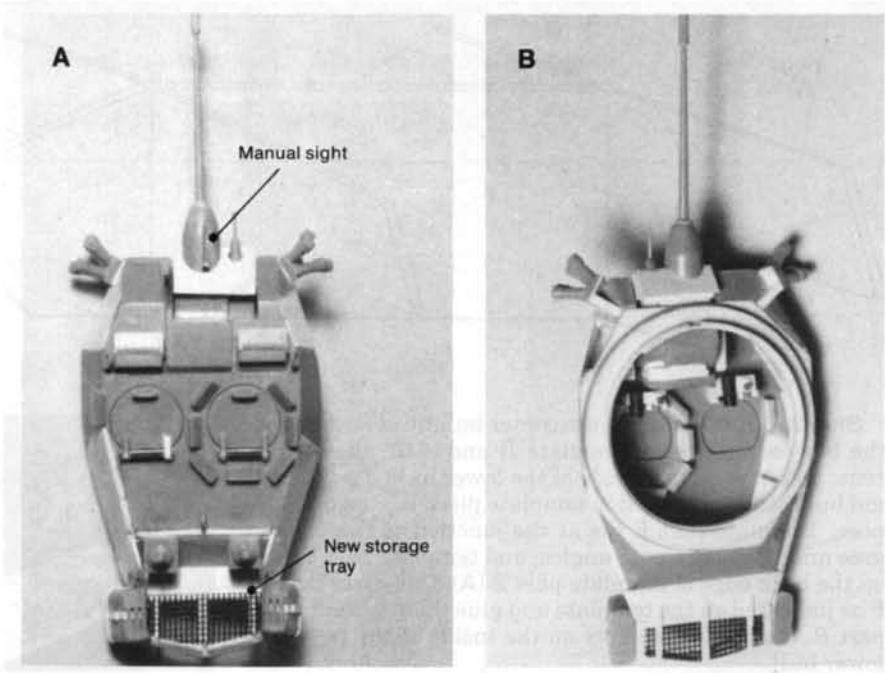
I scratchbuilt a new radiator intake and outlet. The radiator intake is 20 mm wide by 23.5 mm long, and 2.5 mm high overall. Note that it sits level; when viewed in profile, the armor plate descends toward the front and away from the top of the radiator, so that the housing looks "taller" in the front. I used a .5 mm base with .25 mm x .75 mm strip lateral supports and .5 mm rod bars to simulate the grille. The radiator *outlet* is 12 mm long and 18 mm wide but only 1.5 mm high; it sits deeper in the hull roof (**A**).

Trim the outside lights from the light assemblies. Mount a shrouded night light (U. S. Notek-type) on the left light assembly (it's time to rummage through your scrap box).



Step 4. Turret and mantlet for the LAV-25. To make a new outer mantlet, cut the mount/shroud from part 21E. (If you have a Tamiya Bradley turret handy, dig it out.) Groove a manual direct sight in the top of the shroud (**A**). Bore a new hole for the coaxial machine gun in the mantlet, too. This aperture is octagonal on the prototype, but you can use a round one, especially with an M240 machine gun barrel and armored jacket (such as is found on the Bradley). The gun barrel extends 52 mm from the back of the mount/shroud to the tip of the muzzle. Set this assembly aside.

Remove the following sections from the top of the turret (part 1E): forward left side panel; rear left side panel; forward right side panel; rear right side panel; and turret stowage tray at turret rear (**A**). Remove the right front side from the lower turret section (part 8E): Start 7.5 mm from the front edge of the turret, cut down at a 90-degree angle, and continue back 11 mm to the joint edge (**B**).



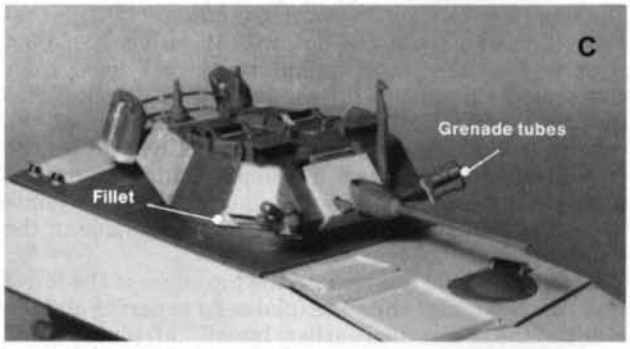
Cut out template parts J, K (make three), L, and M from .030″ sheet; cut template parts N (make two) and P from .020″ sheet. Use the stowage tray from part 1E as a pattern and cut a new one from .030″ sheet. Join parts 1E and 8E, trapping the gun mount (part 22E).

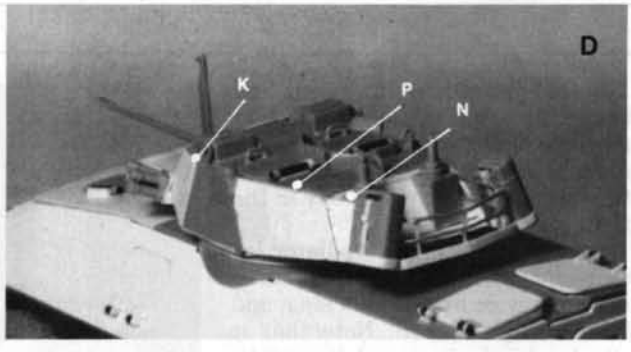
Starting at the right front (**C**), glue template piece L perpendicular to the turret roof; this is the shell ejector plate. Use scrap plastic to fill the rear section of the plate where it joins the roof. Cut the tip of one plate K at a 90-degree angle just behind the leading, top edge of the plate; this mounts on the turret front. Mount another plate K in the opening; this is a movable plate on the real turret. Leave a gap, as if the plate were ajar; put a triangle of sheet at the rear lower edge as a fillet. Mount the rear plate J in place of the previous plate; trim the remaining turret section to receive the new plate.

On the left side (**D**), trim the remaining section to receive the forward plate K. Plate M must be trimmed to fit. Fill the joints and sand them smooth.

Cement the guard wings (plates N) to plate P, and mount the stowage tray on the edge of plate P with strip styrene (**D**). Note that some LAV-25s have an extra pair of jerry cans on the sides of the turret rack; this may help you when aligning the stowage bin. I recommend replacing the kit parts with either Tamiya or Italeri jerry cans.

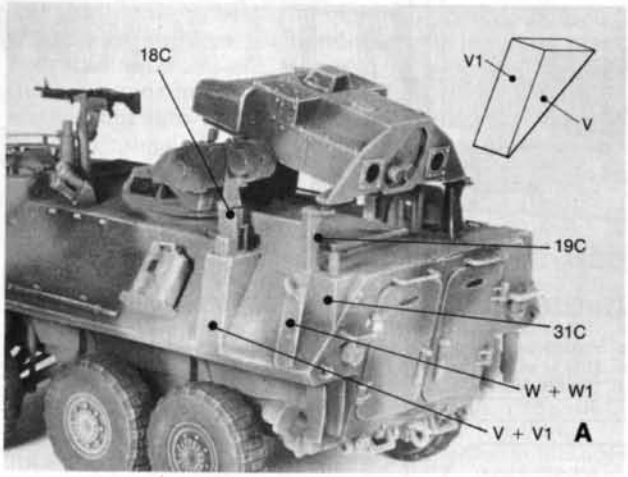
Mount the new gun mantlet. Correct the smoke grenade launchers: Trim the tabs from the backs of parts 17E and mount the grenade tubes (parts 14B) on a triangle of scrap plastic on the lower turret front (**C**). To add an M60 machine gun mount in front of the commander's hatch (right side), bend an .080″ rod in a 13 mm-diameter circle, glue a small tube at the top of the circle to mount the machine gun, and use scrap rod as the mount base. Use either Tamiya or Italeri's M60.

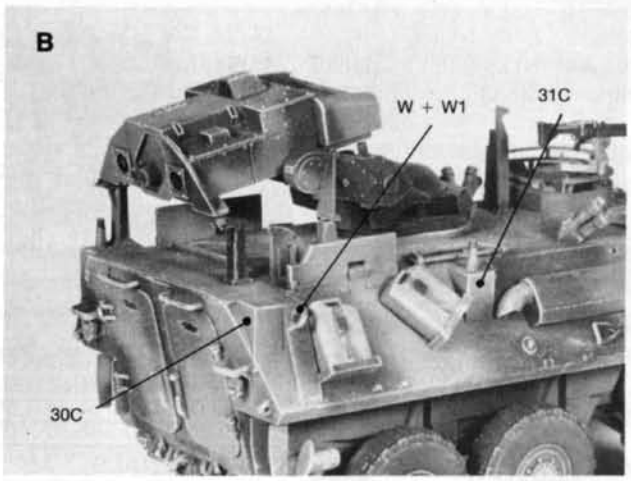




Step 5. Turret for the TUA. The commander's cupola (part 5C) mounts in the same place, but if you want an open hatch you should trace the outline of the part on the new roof and cut a hole about 1.5 mm inside the outline (**A**).

The "hammerhead" launcher is the key assembly on the TUA: Use the kit-supplied launcher (assembly 3D), as well as kit assemblies G, K, and J. Remember, if you glue the umbilical cable (part 38C) the launcher won't move. The gunner's cupola and hatch (parts 6C and 15C) are fine, but the base plate (part 14C) must be redone (**B**). Cut two pieces of .040″ sheet using templates R and S. Part R is the top, part 15C cements to it, and part S is the new cupola base (**C**).





Step 6. Rear details of the TUA. The side guards (parts 34C and 35C) are OK, but mount them 14 mm from the rear of the roof.

One of parts 31C mounts over the holes for the grab handle (part 11B) on the left hull, flush with the top of the hull with its lower rear corner touching the rear (**A**). Cut the tab off the top of part 30C, fill, then put it in the same spot as 31C but on the right side of the hull (**B**).

You need to replace parts 18C and 19C, but don't discard them yet. From .020″ sheet, make two pieces from template V and four pieces from template W. Cut template V1 from .030″ sheet and attach it to template pieces V as indicated (**C**). Use .030″ sheet for template W1; make two. Assemble templates W and W1 as indicated. Glue the V assembly to the left side of the hull with its rear edge 26 mm from the rear of the roof (**A**); it should be centered under the hole in part 34C. Mount the W assemblies 8 mm from the rear of the roof forward of part 31C and its counterpart, 30C (**A**) and (**B**). Mount the other part 31C on the right of the hull, 39 mm from the rear (**B**). Cut off the mount of part 18C and center it on top of assembly V (**A**). Remove the mount (top) of part 19C and glue the mount atop the assembly W (**A**).

Put part 21C 8 mm from the rear and 9.5 mm from the right edge of the roof. Now run a 4 mm x 7 mm x 1.5 mm

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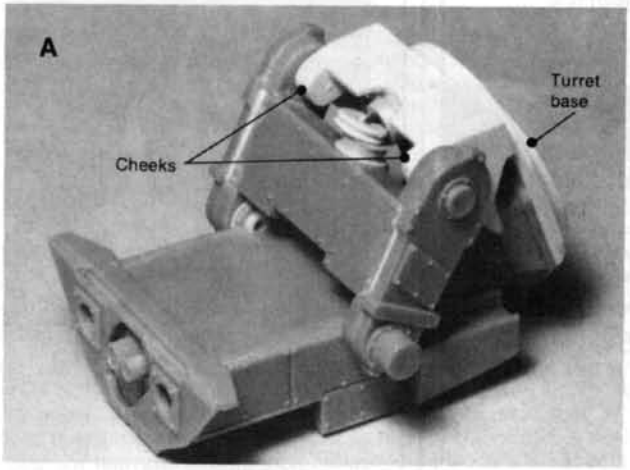
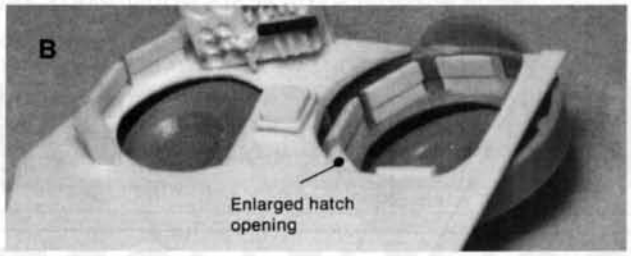
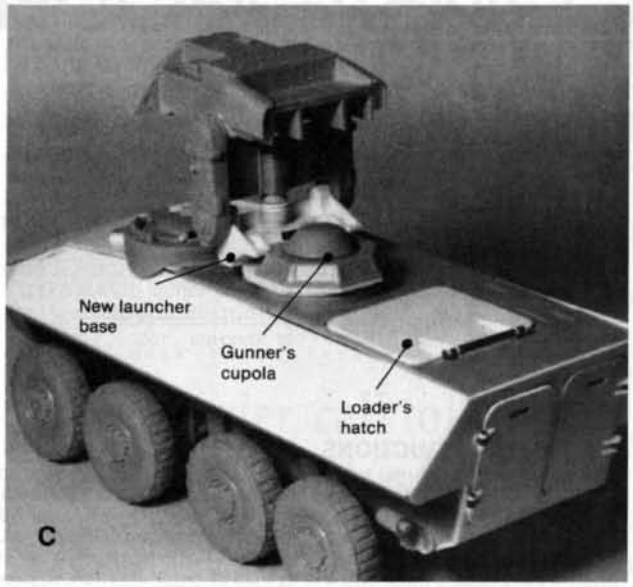






Don't bother using kit assemblies E and F. Use .040″ sheet to make two pieces from template T. Laminate three pieces of .040″ to each piece, but only along the rounded forward portion. You can join these to part 16C, or make a new piece from .030″ sheet. Glue the new cheek pieces (template parts T) to part 16C. Cut two parts from .030″ sheet according to template U. Each template part U mounts inside the launcher assembly and forms a brace with a flat pad that mounts on part 15C (**B**). The new launcher base mounts around the front edge of the gunner's cupola (**C**).

On the actual launcher there are hydraulic rams on either side of the umbilical cable, but I left these off so I could pose the launcher.

strip of plastic from the edge of the roof through the hole in kit part part 35C (**B**). Mount kit part 20C at the end of this strip (**B**); part 20C's other edge touches the opening for the loader's hatch. (Note: The "blade" of the mount travels parallel to the center line of the vehicle, rather than perpendicular to it as shown in the kit directions.)

Now add rubber bumpers and mounts to the new versions of parts 18C, 19C, 20C, and 21C, using strip styrene and 1 mm slices of 2 mm rod to simulate rubber pads. Add triangles (12 mm base, 5 mm sides) of .030" sheet to kit assemblies G and J along the ridges just under the top hinges on the outside of each part. These parts rest on mounts 18C and 20C; adjust to fit. Use scrap for two small bumpers under the rear of the launcher assembly. The launcher head rests on these when lowered for travel. **FSM**

SOURCE

• Sheet styrene: Evergreen Scale Models, 12808 N. E. 125th Way, Kirkland, WA 98034

Meet Cookie Sewell

Stephen L. "Cookie" Sewell is a retired U. S. Army warrant officer and intelligence analyst. He and his wife, Nancy, and daughter, Katie, live three miles from what he calls "armor Nirvana," the Aberdeen Proving Ground in northern Maryland.

Cookie says: "I've been building models since I was 5, when I thoroughly trashed my mother's dining table with Testor's liquid glue and wound up taping the model together.

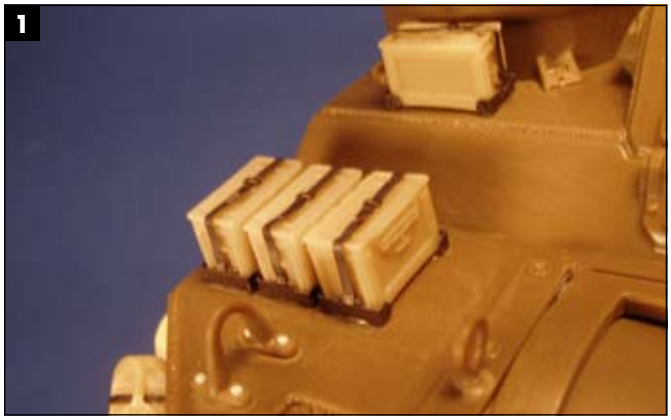
"I've written for various IPMS organizations, including IPMS/Deutschland, and also for the Association of Military Modelers' *Review* and *Modell-Fan* magazine. Along the way I've met some of the best modelers in the U. S. as well as Canada and Germany."

Bart takes his Paladin to the next level with a few simple aftermarket parts.

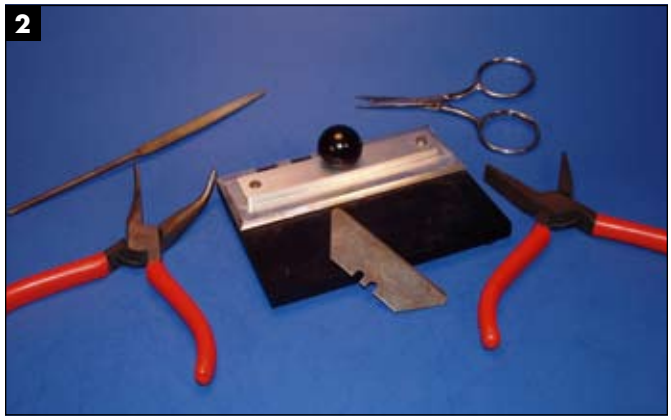
PUNCH UP an M109A6 Paladin

Combine aftermarket parts and modeling skills to transform a basic kit into a detailed masterpiece

By Bart Cusumano



Adding the aftermarket ammo boxes was a challenge because the kit's molded-on detail needed to be removed before Bart put the turret together.



Bart recommends pliers, tweezers, metal files, and a Hold and Fold for working with photoetched parts.

Holding the photoetched parts with a flat-nose pliers makes it easier to file away any attachment-point excess.

After lots of styrene and gap-filling super glue, the transmission cover finally fits.

Getting Started

I am amazed at the improvements in plastic kits over the years. Despite the new tooling and moldings, I still like to give my models extra details that are usually not provided with box-stock materials.

I decided to dress up Italeri's 1/35 scale M109A6 Paladin (kit No. 372) with Eduard's photoetched set (No. 35-319) made specifically for the Italeri kit, Skybow T-136 individual-link tracks (No. TP3502), along with scratchbuilt additions of resin parts, sheet plastic, brass rod, and copper wire.

It's important in a detailing project like this one not only to carefully review the kit instructions but the detail set instructions, as well. Often, aftermarket photoetched parts require modifications to the original plastic parts before they can be added. For example, I planned on using Eduard's parts for the ammunition boxes, but when it was time to add the parts, I realized I had forgotten to remove the molded-on plastic details. But, I was able to fix it, **1**. In addition to reviewing instructions, plan what photoetched parts you wish to add. Remember, just because it's on the fret doesn't mean it has to be on the model. It's simply a matter of personal preference, so detail as you desire.

It's also necessary to have the right tools for the job. I use a good set of pliers, tweezers, metal files, and a Hold and Fold to bend and shape photoetched parts, **2**. To remove the photoetched parts from their frets, I cut with a cuticle scissors or a round-edged hobby knife. Remember to wear safety glasses as photoetched parts have a tendency to fly when cut from the fret. Double-sided tape secures the fret to my work surface. Even though I always try to cut the part as close as possible to the carrier, inevitably a bit of the attachment point will be left on the part. I've found using a flat-nosed pliers aligned with the edge of the part will hold it steady enough to remove the excess from the attachment point with a metal file, **3**.

Once I've prepared the parts I want to use, I find ample reference material to make sure everything will look just right. Unfortunately, I wasn't able to find much in print on the Paladin, so for the first time, I used the Internet as a reference tool. I just typed "M109A6 Paladin SPH" into a few major search engines and came up with photos. With references in hand, I was ready to build.

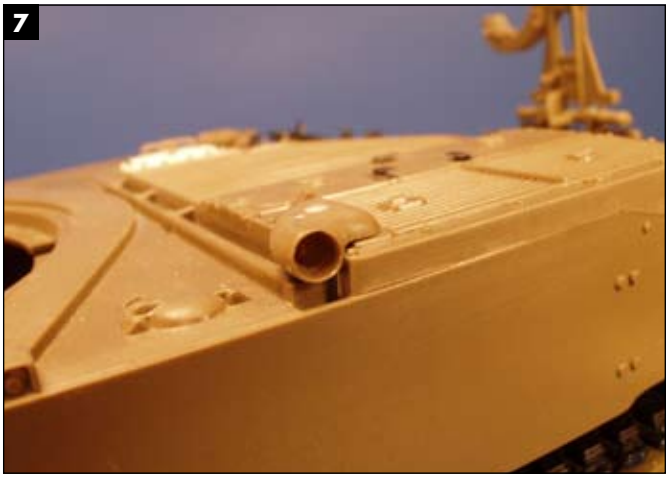
The hull

I started with the hull per Italeri's instructions. The Italeri M109A6 is based on a previously released M109, and the hull retains the fit problems from the old tooling. I began by dry-fitting all the basic hull parts. The rear hull plate fit adequately, but the fit of the transmission cover to the main hull was abysmal. The addition of the hull sides wasn't any easier. I shimmed the joints between the transmission cover and main hull and hull sides with styrene rod and strip and used lots of gap-filling super glue, **4**.

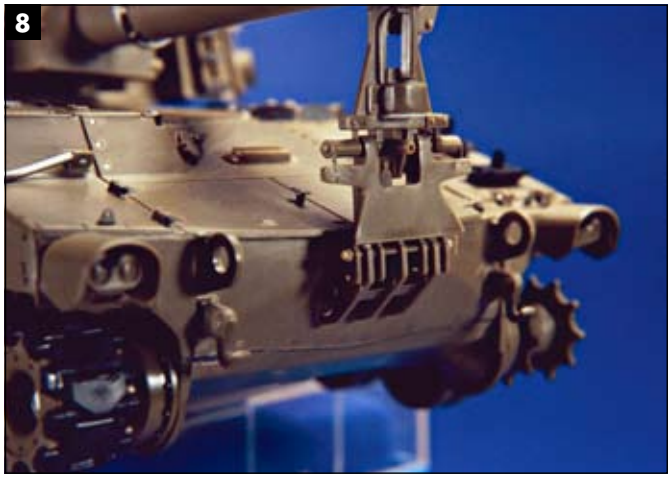
Fortunately, the remainder of the hull

Sheet plastic, cut to fit with Grandt Line bolt heads, form an additional armor plate on the driver's hatch.

Bart added three bolt heads near the bilge-hose pump and formed the bilge hose from a piece of solder.



Bart hollowed out the exhaust pipe with a motor tool set at a slow speed.



The gun travel lock received additional bolt heads, and the lifting eyes were detailed with weld beads.

went together without complications. I removed all the appropriate plastic in preparation for the photoetched parts, per my pre-build notes.

Eduard included many easy-to-add brackets and handles that really improve the original kit. Most of the photoetched parts were secured with super glue. I find a thinner super glue is easier to remove from the delicate mesh or screen parts; all that's needed is paper towel or a similar material with enough capillary action to absorb the excess glue. I use a thicker super glue in tight spots to avoid runs.

I decided to add scratchbuilt details to the hull, filling in what was missed by the kit and photoetched detail set. According to my reference photos, the Paladin's driver's hatch looks like it had an additional armor plate bolted to it. So, using a circle template, I cut a sheet of plastic to fit and added plastic Grandt Line bolt heads from my spares box, **5**.

The panel on the front of the hull that houses the bilge-pump hose fitting required three additional countersunk bolt heads. After measuring the bolt heads' locations, I drilled depressions using a round-headed motor tool burr, then added the bolt heads made with a punch-and-die set. Even though the kit includes a bilge-hose pump fitting, it doesn't include the hose; I made one by hollowing out the end of a piece of solder, **6**. The exhaust pipe was molded as a solid piece, so I had to drill it out and thin it to scale using my motor tool on slow speed, **7**.

Nut and bolt-heads are another easily added detail to hinges, hatches, and the gun travel lock, **8**. The attachment points of the lifting eyes and hoods received weld beads made from stretched sprue softened with Testor liquid styrene cement and textured with a dull hobby knife blade.

The last details added to the front of the hull were the spare track links provided in Skybow's individual-link track set; they have mounting brackets molded on, **9**. I was able to measure the precise location of the spare track links by studying my reference photos.

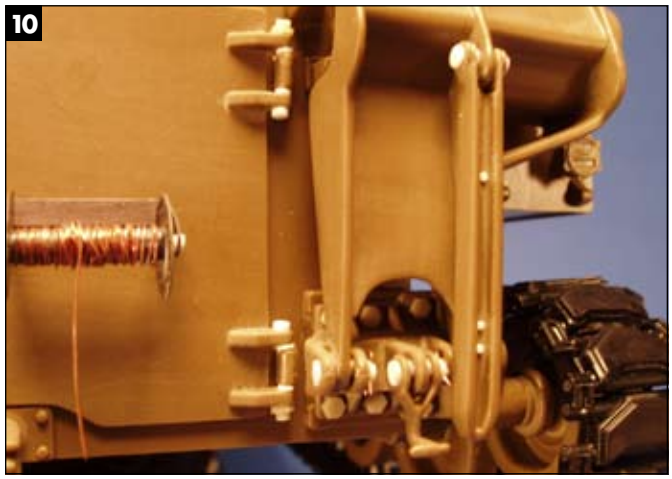
I used Squadron white putty to fill in the sink holes on the anchor-spade parts on the hull rear, sanded them as best I could, then assembled the parts. I added lots of punched bolt heads, hinge detail, and even cotter pins from fine servo motor wire, **10**.

The running gear assembly went together with ease. The only modification I made was covering the open holes on the drive-sprocket hubs, **11**.

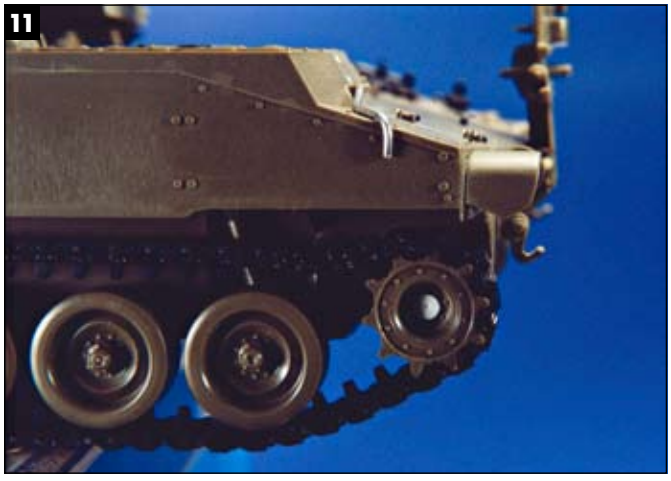
The turret

The turret assembly was a breeze when compared to the hull. This may be a result of Italeri's new tooling for this part of the M109A6. However, the gun tube was less than accurate. The muzzle-brake shell apertures should be two tight circles. The outside circle is fine, but the circle inside the brake is just a big opening. I couldn't find a good way to fix this, so I left it, **12**. Also missing from the kit are the rings near the base of the gun where it meets

Bart attached the extra track links provided in Skybow's individual-track link set.



Cotter pins, bolt heads, and hinge details finished the anchor-spade parts.



The only modification made to the running gear was covering the holes on the drive-sprocket hubs.

The gun muzzle's opening couldn't be fixed, so Bart left it as it was out of the box.

the recuperator housing. I detailed this area with two rings of flattened solder and more Grandt Line bolt heads and nuts, **13**. I couldn't find an aftermarket barrel, but if you can, I recommend using it.

The kit-provided turret has lots of eye-catching surface details like ammo boxes, jerry cans, and stowage baskets; and the photoetched parts really brought these details to life. I wanted to add the photoetched mounting straps and brackets for the jerry cans and ammo boxes. This, of course, required resin parts in place of the kit parts. Luckily, I had some spare Verlinden Productions resin pieces, **14**. The kit's .50 caliber commander's machine gun was spruced up with photoetched details, a resin ammo box and handles, and a drilled-out gun barrel, **15**.

The large stash of pioneer tools housed on the right side of the turret needed help. I used all the Eduard-supplied photoetched details, along with homemade plastic and brass rod modifications and VP resin shovel handles and pick and mattock heads, **16**.

The commander's hatch was completed with armor plating on the inside surface, brass wire handles, and another VP resin bolt head, **17**.

I replaced the tow cable with cord I had in my spares box. The cord was part of a floral arrangement and is just the right width for tow cable, **18**. In addition to photoetched details on the turret, I replaced hinge details on the gunner's escape hatch with brass rod, **19**, added punch-and-die bolt heads to the storage-basket hinges, and made three brass-wire antennas and glued them into the kit-supplied mounts.

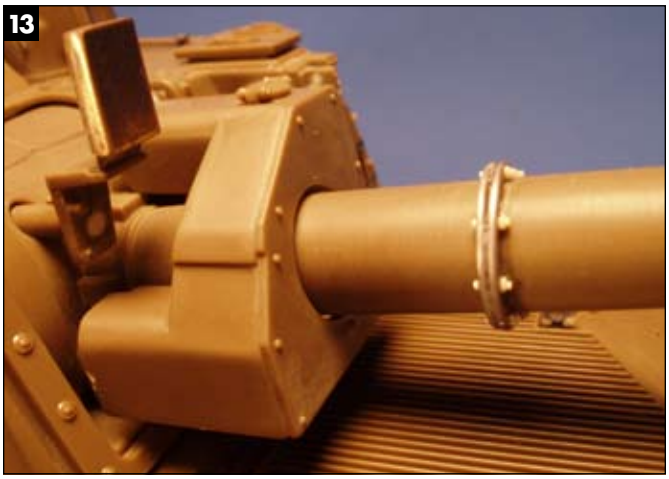
Tracks

The Italeri-supplied soft plastic tracks were adequate, but they didn't look quite right to me. So, I chose to use a set of individual-link tracks from Skybow from the M109 series of self propelled howitzers. Though the aftermarket tracks look good, they were fiddly to assemble. My main gripe is the connector pins were fragile and kept breaking. I replaced all the broken pins with brass rod by drilling into the track and supergluing in new rod, **20**. Each track link and end-connector required flash and mold-line clean-up.

The recommended 78 links per side seemed like a good fit, and even though the instructions say, "do not cement," I found it easier to use my Testor liquid cement to set the links and connectors in place. I draped the runs around the running gear and left them unconnected, so the tracks could be removed for painting.

Painting and weathering

I've always painted my armor in darker colors like panzer gray or olive drab, but considering the Paladin saw significant use in Iraq, I wanted to try a desert-sand scheme. After prepping the plastic with an alcohol wash, I pre-shaded the Paladin with a mix of Model Master armor brown and flat black. After it dried overnight, I gradually added layers of Model Master



Solder and Grandt Line bolt heads formed the two rings on the barrel where it meets the recuperator housing.

Bart had some spare Verlinden Productions resin ammo boxes and jerry cans to accommodate the photoetched mounting straps and brackets.

Bart drilled out the barrel of the commander's machine gun and added a resin ammo box and handles.

Bart added all the Eduard details to the pioneer tools in addition to scratch-built modifications.

U.S. Army/Marines desert sand mixed 50/50 with thinner. I started on the major surface panels and eventually built-up the paint on the entire model. This process allows the dark brown to show through where shadows would be. To further the shadow effect, I added Model Master flat white to the thinned U.S. sand and highlighted the centers of the panels. I gave the hull and turret sides vertical streaks.

While the hull and turret dried, I brush-painted the tracks with a base coat of Humbrol scenic track, added a wash of thinner, burnt sienna, and black, then dry-brushed subsequent layers of Humbrol dark earth, sand, and a metal mix of silver printer's ink, flat black, and brown. The links' rubber pads were painted Vallejo flat black, followed by a dry-brushed coat of Humbrol gray and dark earth.

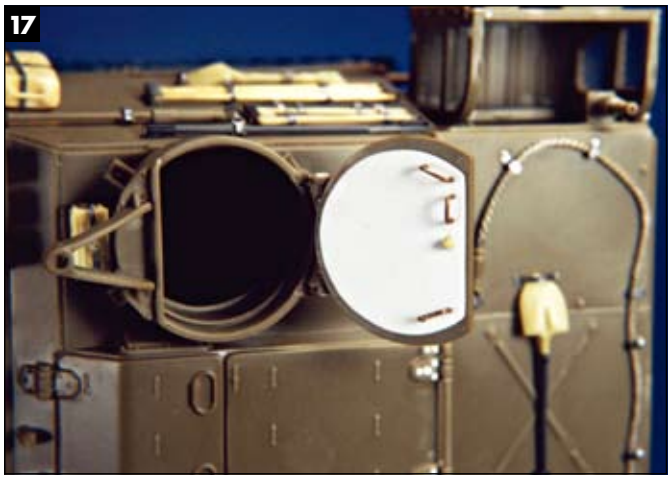
Once the painting was complete, I applied the markings, a combination of kit-supplied decals and Verlinden Productions dry transfers for stenciling and stars. After the markings were finished, I coated the model with a healthy layer of Model Master lacquer Dullcote to protect the paint from the weathering to follow.

Weathering was a tough call on this model. My limited reference photos indicated great variations of wear and tear. I did notice the sand color had a tendency to wear off on the edges, revealing the original camouflage or metal below. Since the Paladin is aluminum, rust wasn't needed. I started by giving the model a wash of turpentine tinted with burnt sienna and black oil paint. This was a light treatment since the model was a light color. I enhanced all the raised details with a pin wash of thinned dark-brown paint, then feathered the pin-washed edges with a clean brush and thinner.

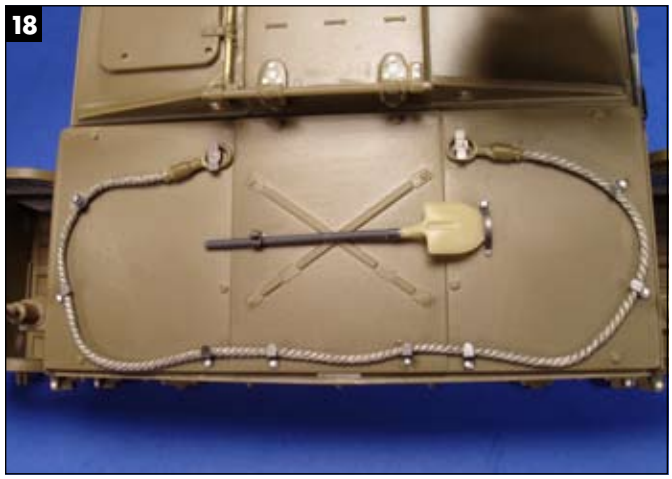
When the washes were dry, I dry-brushed the model with the original sand I airbrushed in the beginning of the process. I keep a spare bottle on hand, so I can use the particles that settled in the bottom of the bottle. Then, I dry-brushed another layer of the sand lightened with Humbrol flat white. At this point, the detail is really starting to look distinct.

To finish up the Paladin, I created a chipping effect along the edges and heavily worn areas of the tank with a fine-pointed brush and a mixture of Model Master olive drab and flat black. I topped it off with my metal mix to accent some of the paint chips. The anchor spade can be heavily weathered as it was used a lot on the Paladin, so I made sure to add more metal mix to this area, **21**. After waiting a few days to dry, I added the final touch to my model. I gave it one more coat of Dullcote and dark gray pastel powder for exhaust, **22**.

I enjoyed building this model. Despite some of the fit problems, the finished product appears accurate. It was a nice break from my usual World War II and Vietnam U.S. armor. **FSM**

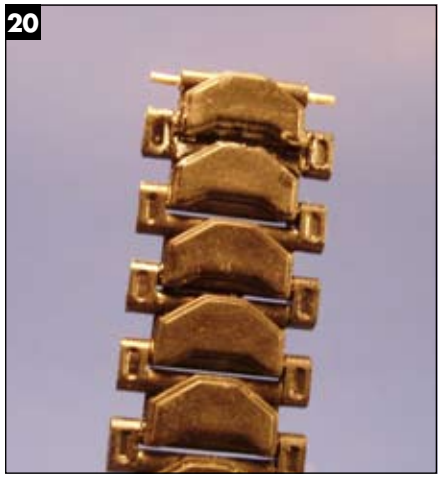


An armor plate, brass-wire handles, and a Verlinden Productions resin bolt head finished the commander's hatch.

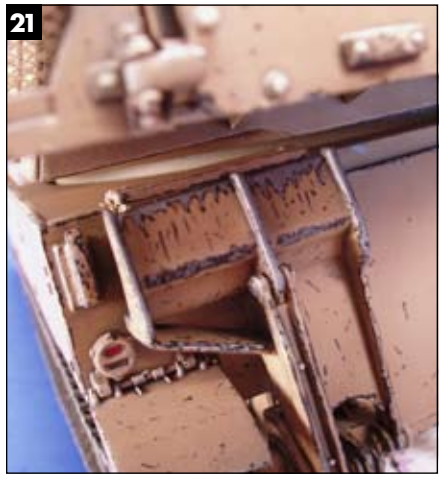


A piece of floral arranging cord was the right size for the tow cable.

A brass rod replaced the hinge on the gunner's escape hatch.



Bart substituted brass rod for the fragile connector pins.



The anchor spade was used often on the Paladin, so Bart weathered this area heavily.

Exhaust made of dark-gray pastel powder provided the finishing touch on Bart's Paladin.

SOURCES

Eduard photoetched set (No. 35-319), 420-47-611-8259, www.eduard.com
The Small Shop Hold and Fold, (44) (0)1747 825 646, www.smallshopu.com
Grandt Line Bolts, 925-671-0143, www.grandtline.com
Skybow T-136 individual link tracks (No. TP3502), 142 Nanyuan St., Tainan City, Taiwan
Verlinden Productions various resin pieces, 636-379-0077, www.verlinden-productions.com

With some photoetched parts, resin pieces, and planning, Bart completed a precisely detailed M109A6.

UP-ARMORING Tamiya's HUMVEE

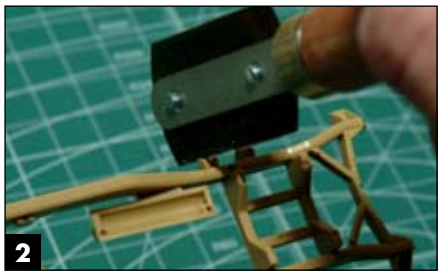
Scratchbuilding armor and other details for a 2004 Baghdad patroller

By Aaron Skinner

As the Huey helicopter was in Vietnam, the Humvee is ubiquitous in the Iraq War. Early in the conflict, many Humvees went into action with little or no armor. In late 2003 and early 2004, insurgent attacks had the military looking for ways to boost protection for soldiers. While production of the M1114 Up-Armored Humvee ramped up, kits for armoring the older, unprotected vehicles began arriving in the Middle East.

Scratchbuilt armor, detailed weapons, and extra stowage mark Aaron's model as a Humvee which served with the Arkansas National Guard in Iraq in 2004.

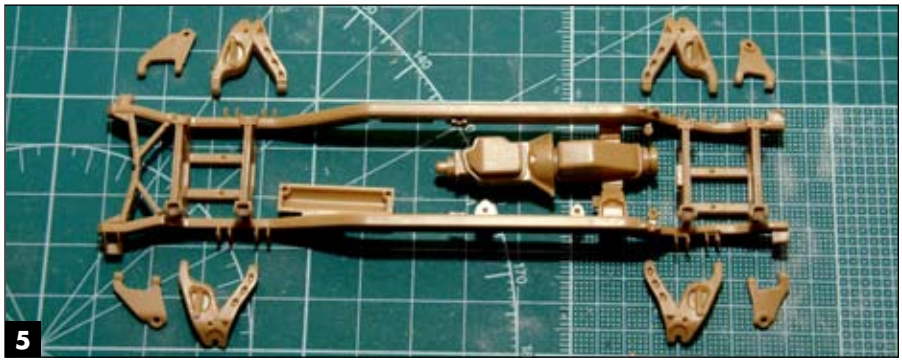
The inspiration: A Humvee of Delta Company, 3rd Battalion, Arkansas' 39th Infantry Brigade, seen here at a base in Baghdad in June 2004.



To lower the suspension, Aaron separates the suspension arms from their brackets with a razor saw.

Sewing thread completes the cut to remove the arm from the chassis. The thread is easy to control and reaches areas a saw can't.

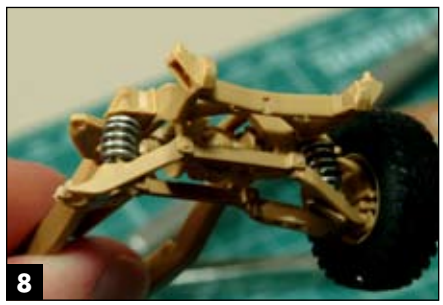
Using side clippers, Aaron removes a lower wishbone from the frame. Doing this necessitated opening a second kit for more arms.



The suspension components laid out after the modifying cuts were made: The suspension parts looked similar and were easy to confuse, so Aaron labeled each part to ensure it ended up in the right location when he reassembled the Humvee's chassis.

A 7mm section of 1/16" brass rod telescoped inside a 5mm section of 3/32" brass round to make the shock absorbers.

Paper clips, straightened then wound around a mandrel, produced scale springs that were easily compressed to fit their space.



Springs and shock absorbers in position: The bowed, unevenly compressed springs match Aaron's photos of Iraq War vehicles.

One of these was the ASK (Armor Survivability Kit) developed by the Army's Research Development and Engineering Command.

I wanted to model a Humvee of Arkansas' 39th Infantry Brigade during 2004, including ASK, extra stowage, and correct armament, **1**. Scratchbuilding seemed the best approach because the vehicle I was modeling – a four-door hardtop of Delta Company, 3rd Battalion, with *Sally* emblazoned above the windshield – had several unique features not included in aftermarket detail sets.

Setting aside my trepidation about a project this large, I commenced building, starting with Tamiya's 1/35 scale M1025 Humvee Armament Carrier (Kit No. MM-263) and Eduard's photoetched-metal detail set.

Low rider

The ASK's steel armor added 1,300 pounds to the vehicle, causing these Humvees to sit noticeably lower.

Tamiya's suspension components are molded into place on the frames. Starting with a saw, I cut between the upper wishbone arms and their brackets, **2**. After opening up holes with a small bit, I used a piece of thread to complete the cut, **3**, then cleaned up the brackets.

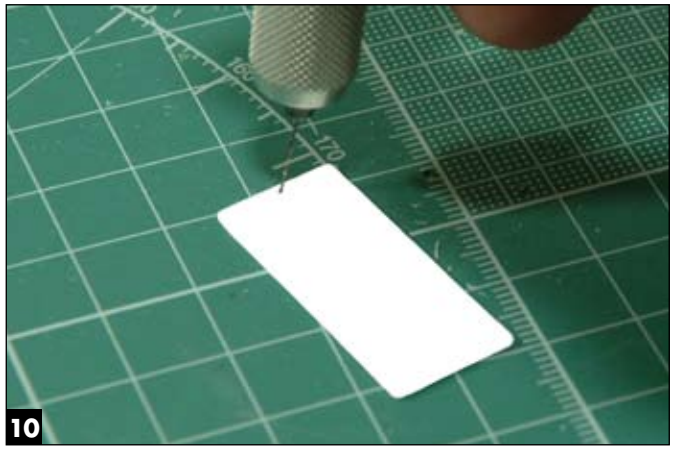
The join between the lower arms and their frames is more complicated, so I decided to sacrifice a second kit. I clipped the arms off below the bracket, **4**. This leaves two beams for front and back that are easily cleaned up before being glued onto the chassis. Lower arms were cut from the suspension of the second Humvee kit, **5**.

Tamiya molded the springs as single pieces with mounts and shock absorbers. I cut the spring from the mount, then drilled a locating hole for the shock absorber in the mount. Telescoping sections of brass round make up the shock absorbers, **6**. For springs, I wound straightened paper clips around a .10" section of Mission Models' small Multi-Tool, **7**. I cut the axles from the differentials.

I installed the new shocks, then reassembled the other suspension components around them, **8**.

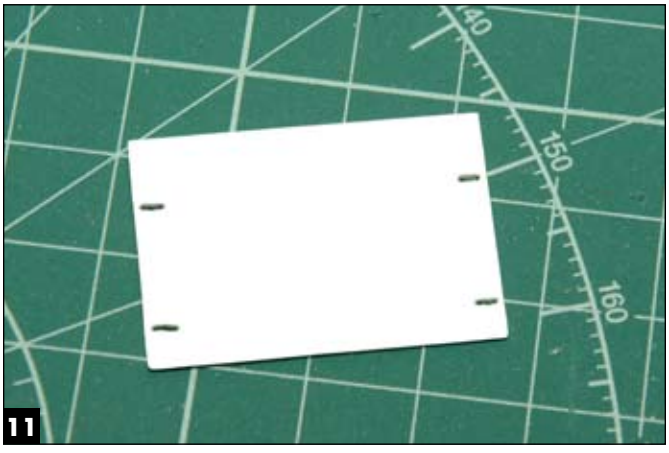
9

The Humvee's armored back wall consists of two 14mm x 33mm seat backs and a 36mm x 22mm center panel cut from .030" sheet styrene.



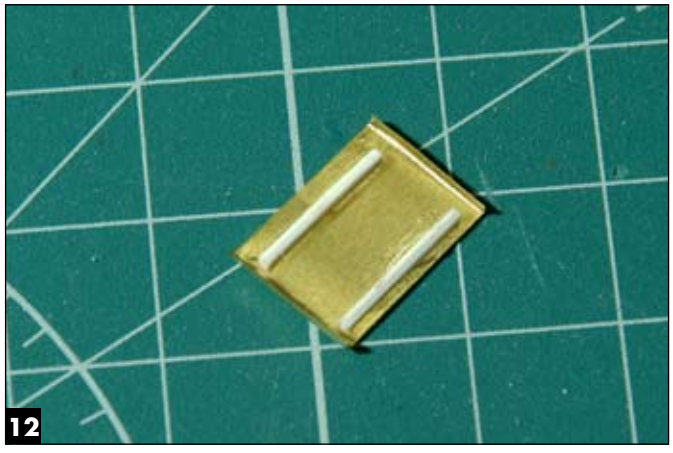
10

Referring to photos, Aaron uses a #78 bit in a pin vise to open three holes in the top of each seat back.



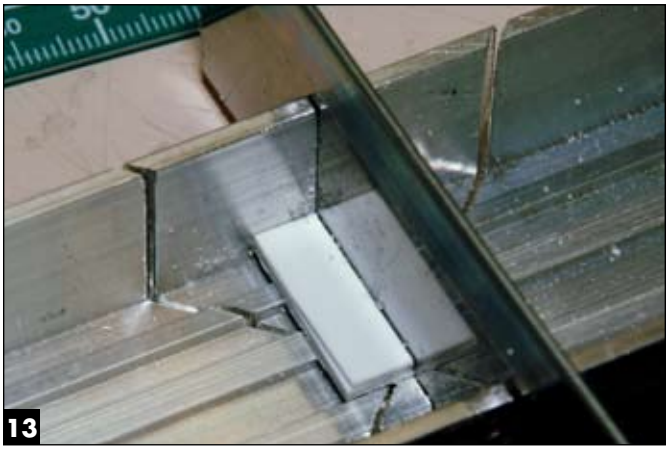
11

The center panel features mounting holes on each side made with a drill bit and opened with a knife.



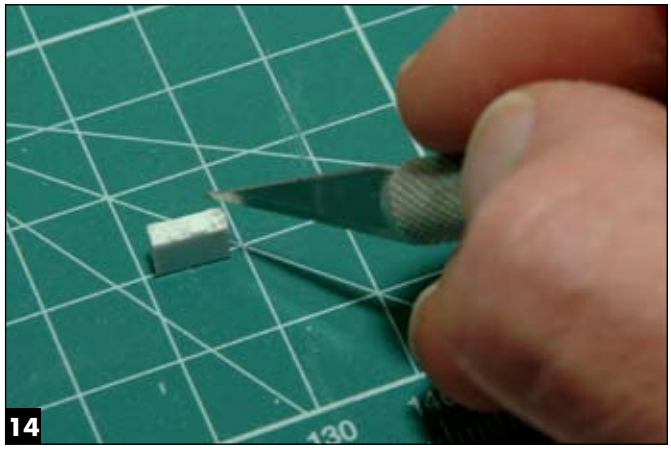
12

Aaron starts a SINCGARS radio with a brass sheet and strip-styrene base. The ends were shaped around brass rod.



13

Three pieces of .030" sheet styrene, laminated then trimmed to shape in a miter, created the body of the radio.



14

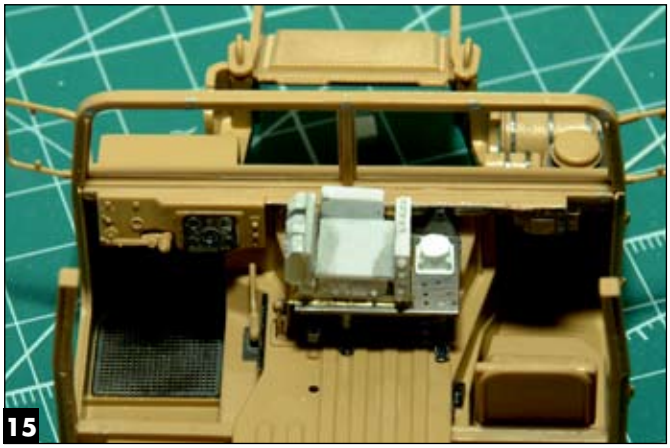
Salami-sliced styrene rod of differing diameters provide dials and sockets for the front of the radio unit.

Interior

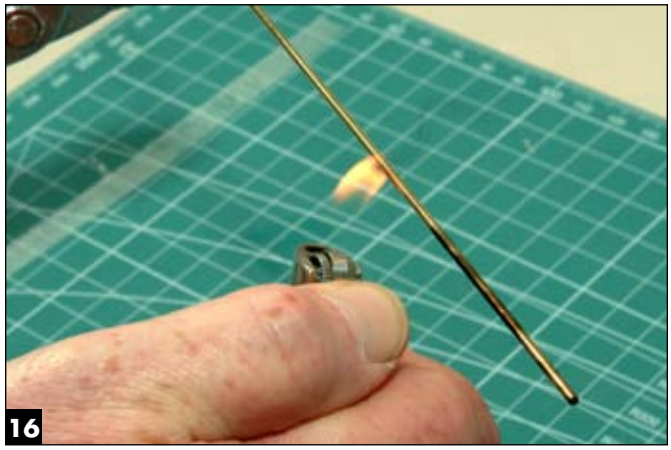
After adding Eduard details, I constructed the three-piece armored back wall, **9**. I detailed the seat backs, **10**, and center panel, **11.**

The kit radio is not the SINCGARS system currently in use. I scratchbuilt a replacement, starting with a 10mm x 13mm sheet of brass to which I super glued two narrow strips of .020" styrene, **12**. I laminated three pieces of .030" sheet styrene for the main body of the radio, **13**, and added strip- and rod-styrene detail, **14**. Laminating, cutting, and sanding produced other radio components, **15**. Later, I added a sheet-styrene hand piece and a coiled cord made from .009" solder wrapped around a #78 bit.

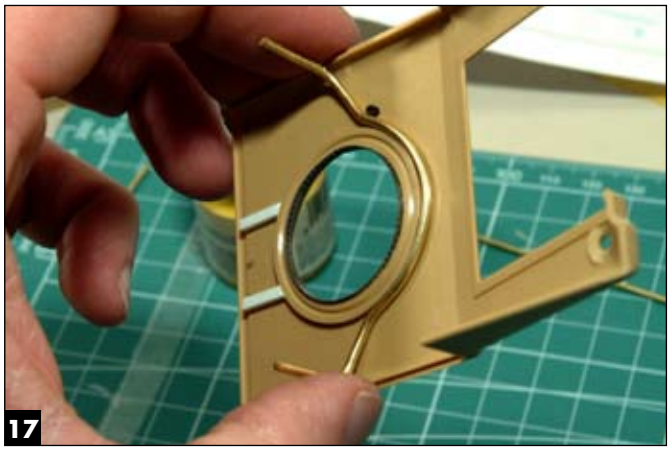
After gluing the turret ring (part No. F1) into the roof, I added square stock styrene braces from the ring to the wind-



Aaron super glued the completed SINCGARS unit, including a power supply and a speaker, to Eduard's photoetched-metal shelf, then installed it.



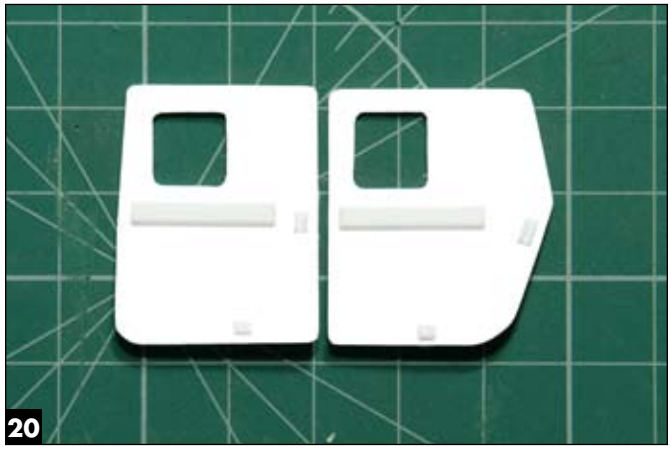
Brass rod for the turret support is annealed; heating the metal until its surface color changes makes it easier to bend.



Aaron shaped the rod with a wire-bending form and Mission Models' large Multi-Tool, then super glued it into position.

Using the kit doors as templates, Aaron traced each door's outline onto .030" sheet styrene to form the armor doors.

With the window opened by a drill bit and hobby knife, final shaping was accomplished with a small file.



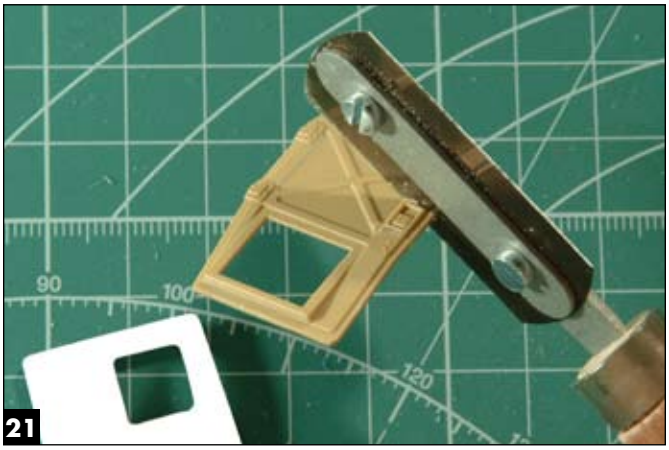
A strip of .020" styrene backed with small supports makes up the door latch cover. Smaller details were added with .010" strip.

shield. I formed a turret support with annealed brass rod, **16**, then super glued it into position, **17**.

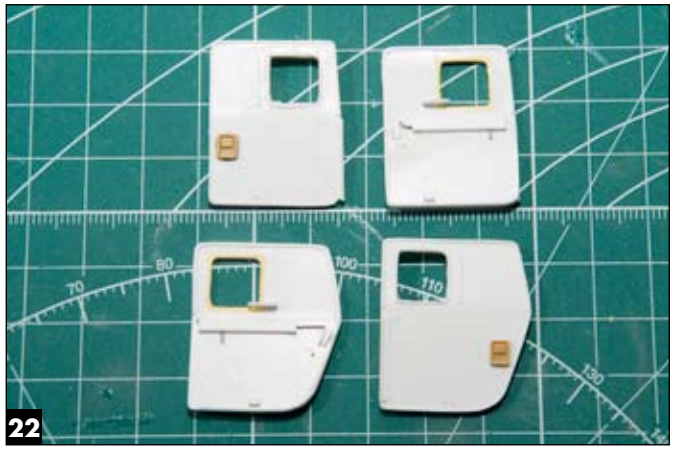
Just ASK

I traced the kit doors on a sheet of .030" styrene, then scored the plastic until I could break it free, **18**. Holding the kit door over the styrene piece, I filed the styrene to shape. Each door features a small, square window; I marked their locations based on references. To begin opening each window, I drilled through the styrene at each corner with a pin vise. These openings were followed by additional holes along the edges in between. Then, it was a simple matter to remove the center with a knife, **19**.

Strips of .020" styrene, 2mm x 17mm, form the metal bars that house the doors' latches, **20**. I built the latch as well as a

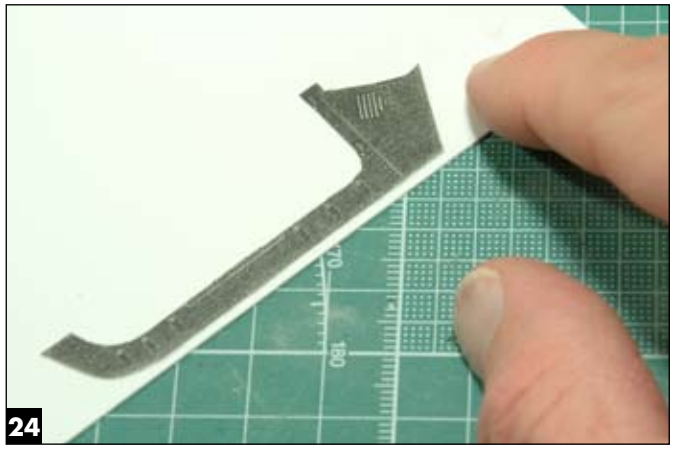


Aaron saws the handle from a kit door to move it to the scratchbuilt door. The handle was thinned slightly but should stand proud of the surface.



Final details on the doors include strip-styrene weather seals, wire handles, styrene-rod hinges, and hexagonal-rod bolts.

Aaron super glues a narrow strip of brass around the edge of one of the windows, forming the ballistic glass' frame.



A photocopy of the kit part provides a template for the rocker-panel armor to be cut from .020" sheet styrene.

small stop on the inside bottom of each door with .010" styrene. Twist-tie wire depicts the handle and mechanism.

The outside handles match the ones on the kit doors, so I cut each out, thinned it down, then glued it in place on the door, **21**. Each of the doors is fitted with a weather seal that I reproduced with a thin strip of .010" styrene glued around the outside edge of the door front and back. The window openings have a similar seal, although the inside seal is thinner. I represented it with Tamiya masking tape cut to shape, **22**.

I cut 10mm x 10mm sections of 1/16" Perspex for the ballistic glass windows and wrapped a strip of thin brass around the edges to represent the frame, **23**. The windows are glued to frames made from squares of .020" styrene.

Body armor

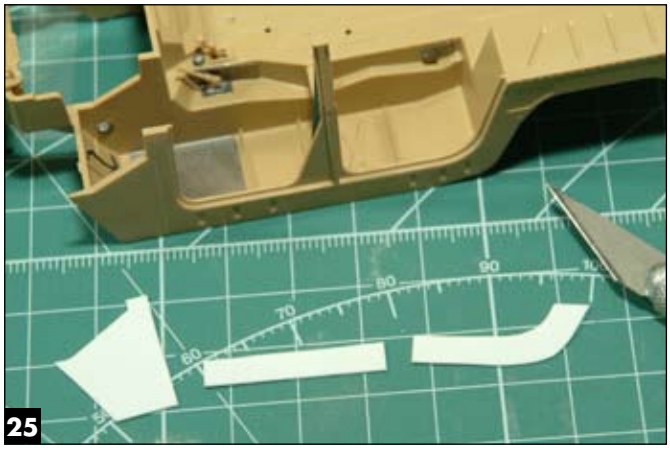
The ASK includes armor for the body of the Humvee in the area of the crew compartment. I photocopied both sides of kit part (No. B2) to create templates which I applied to .020" styrene, **24**. The resulting pieces were cut into three separate panels, **25**. Before attaching them, I sanded off raised-rivet detail on the kit part. The panels were detailed with bolt heads, **26**.

Sally had an armored windshield, including add-on armor for the frame and thicker ballistic glass windows. After removing the lip inside the frame, as well as the molded-on detail (including the hinges at the bottom), I glued strips of .020" styrene over the frame, **27**. I used the clear windshield part from both kits, gluing one into its proper location. I trimmed the lip on the vertical edge of the windshield from the second kit, **28**, then used a razor saw to remove enough of the body of the window on the other end for it to fit into the frame from the front, **29**. The window glass was sanded to shape; eventually, the outside edges were painted black to replicate a rubber seal. I removed the mirror mounts until after painting, when they were reattached (and stowed forward as on the operational vehicle I was modeling).

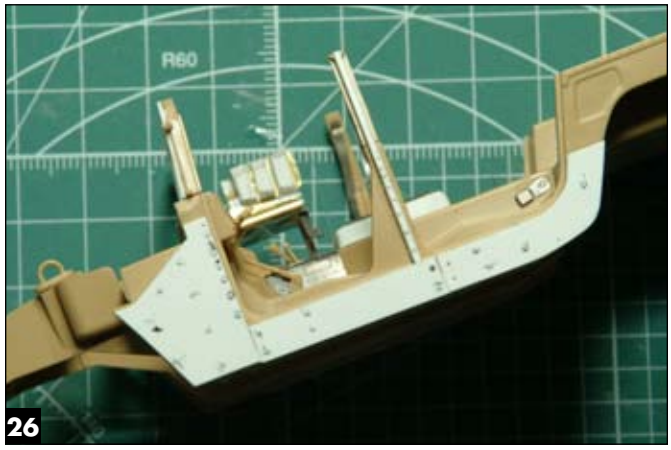
The sharp end

Delta Company's Humvees mounted either a TOW missile system, Mark 19 grenade launchers, or, in *Sally*'s case, an M2 .50-caliber machine gun. Additionally, most carried an M249 light machine gun in a retrofitted mount on the rooftop armament ring.

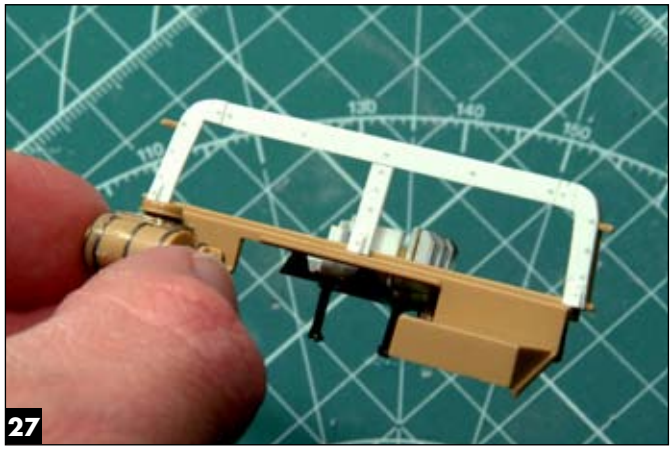
I started with the M249. The kit does not include the gun, but frequent *FSM* reviewer Tom Foti donated one from Trumpeter's U.S. Marines figure set. Following photos, I bent a 12mm length of 1/16" Z-bar styrene for the bracket, gluing it into place along the hatch opening. I shaped .020" sheet styrene for the base and added a short piece of 1/16" brass round for the pivot mount. The arm is cut from .020" styrene; I glued .030" styrene rod to either end for the pivots and added a scrap of plastic to mount the gun. The final feature is a metal support arm for the gun,



25 The side armor panel is actually three pieces. Aaron cut along the dividing lines in preparation for attaching the armor to the model.



26 Aaron recreated the prominent bolt heads on the side armor with salami-sliced hexagonal styrene rod, then sanded the bolts even.



27 Details added to the windshield include strip-styrene hinges at the bottom and hex-rod bolt heads.

28 Armoring the windshield glass, Aaron saws the locating ledge from the vertical edge of a kit windshield piece …

29 … then removes a small sliver of the body of the window on the opposite end, restoring the ledge.

30 Aaron built the M249 machine-gun mount from styrene sheet and rod. Note the FN Minimi-style open stock on the Trumpeter M249.

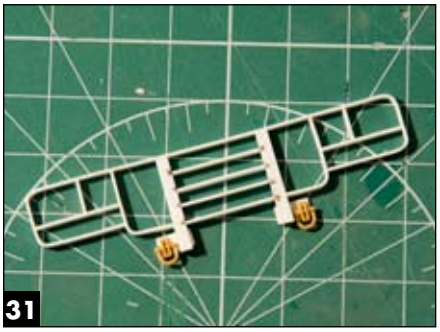
which I fashioned from twist-tie wire and thin brass sheet, **30**.

Trumpeter's M249 has the stock typical of the FN Minimi version of the gun, so I replaced it with .020" styrene cut and filed to the shape of the solid stock seen on the American weapon.

For the .50-cal mount, I added a traverse and elevation arm made from strip and rod styrene. I cut the gun shield from .020" sheet, following photos and keeping in mind that these shields were cut and welded in the field – precise corners and shapes were not the norm.

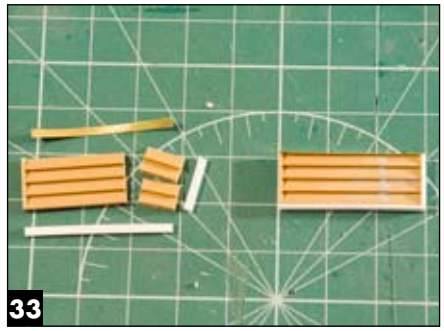
Other external details

The front end brush guard of the Humvee I modeled was different from the kit, so I built a replacement from .020" x .060" styrene strip. I reduced a front-on photo of the vehicle to 1/35 scale to use it as a template. I cut and glued continuous sec-



The scratchbuilt brush guard features sheet styrene mounting plates and the kit's tow hooks.

Aaron detailed the styrene-strip and U-channel luggage rack with hex-rod bolt heads.



Mr. Surfacer 500 fills the gaps left after Aaron kitbashed Tamiya accessories for side CIPs.

Painted desert-sand strips bear combat markings, reflecting differences on the full-size truck.

A 2mm-wide strip of .020" styrene boosts armor protection for the windshield.

Aaron made all of the markings for *Sally* using a computer and laser-printer decal paper.

tions of the structure on a flat surface, bending shapes around brass tubing of the appropriate diameter, **31**.

I built the trunk-lid luggage rack by gluing .020" x .060" strip in the groove of 1/16" U-channel styrene to approximate the shape of the rack's metal bars, **32**.

To mount Tamiya and Italeri jerry cans to the rear deck, I built racks from .010" sheet styrene. After painting, I added Tamiya masking-tape straps detailed with spare seat-belt buckles from the Eduard photoetched-metal detail set.

For the spare tire, I removed all but two of the wheel nuts from one of the extra kit's wheels. I drilled a hole in the end of the axle to take fine wire for strength, then glued the axle to some square stock. The square stock was attached to a styrene channel wide enough to fit over the lip of the kit tailgate.

Delta's Humvees bore combat information panels on the hood and on the rear quarter panels. I used an Eduard photoetched-metal item for the hood CIP. To create the long, thin fender panels, I sliced the top two folds off the door panels provided in Tamiya's modern U.S. military equipment set, then cut that remainder into two 8mm-long sections and attached them to the side of the larger piece with the rail removed. I framed them with thin strips of .030" styrene topped with a narrow strip of thin brass, **33**.

Coloring the truck

The Humvee I was modeling wore single-color NATO green camouflage, with the add-on armor painted desert sand. I airbrushed the subassemblies with acrylics, then highlighted panel centers with lighter shades to add depth to the finish. I painted areas of desert sand on the front and rear as a base for stencils, **34**.

I inserted the remaining interior detail, and added armor to the bottom of the windshield, **35**.

Delta's trucks carried a skull-and-crossed-missiles symbol during the first few months of the 39th's deployment. I found a clear photo of the symbol, converted it to black-and-white using Adobe Photoshop, increased the contrast, then reduced the image to 1/35 scale and saved it. I replicated the image, making minor changes to its outline to represent irregularities in its spray application. I used the

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U.S. Army HMMWVs in Iraq, Carl Schulze and Ralph Zwilling, Concord Publications, Hong Kong

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Resin ammo boxes, Legend Productions (LF1039), www.www-legend.co.kr

Stowage and CIP, Tamiya (MM-266), 800-826-4922, www.tamiyausa.com

Jerry cans and stowage, Italeri (No. 6423), from Model Rectifier Corp., 732-225-2100, www.modelrectifier.com

Photoetched-metal CIP, Eduard (No. 35659), 420-47-611-8259, www.eduard.cz

Photoetched-metal details, Eduard (No. 35629), 420-47-611-8259, www.eduard.cz

Styrene sheet, strip, and rod, Evergreen Scale Models, 425-402-4918, www.evergreen-scalemodels.com

Styrene rod, hexagonal rod, and channel, Plastruct, 626-912-7016, www.plastruct.com

Brass rod and sheet, K&S Engineering, 773-586-8503, www.ksmetals.com

Clear decal paper, Experts-Choice (No.123 or 124), 248-477-0813, www.bare-metal.com

same technique to replicate the *Sally* name on the top of the windshield. I produced the stencils using a freeware font called "Phantom stencil." I printed these on Experts-Choice laser-printer clear decal paper, **36**. A little MicroScale setting solution helped the decals conform to the surface.

Final assembly

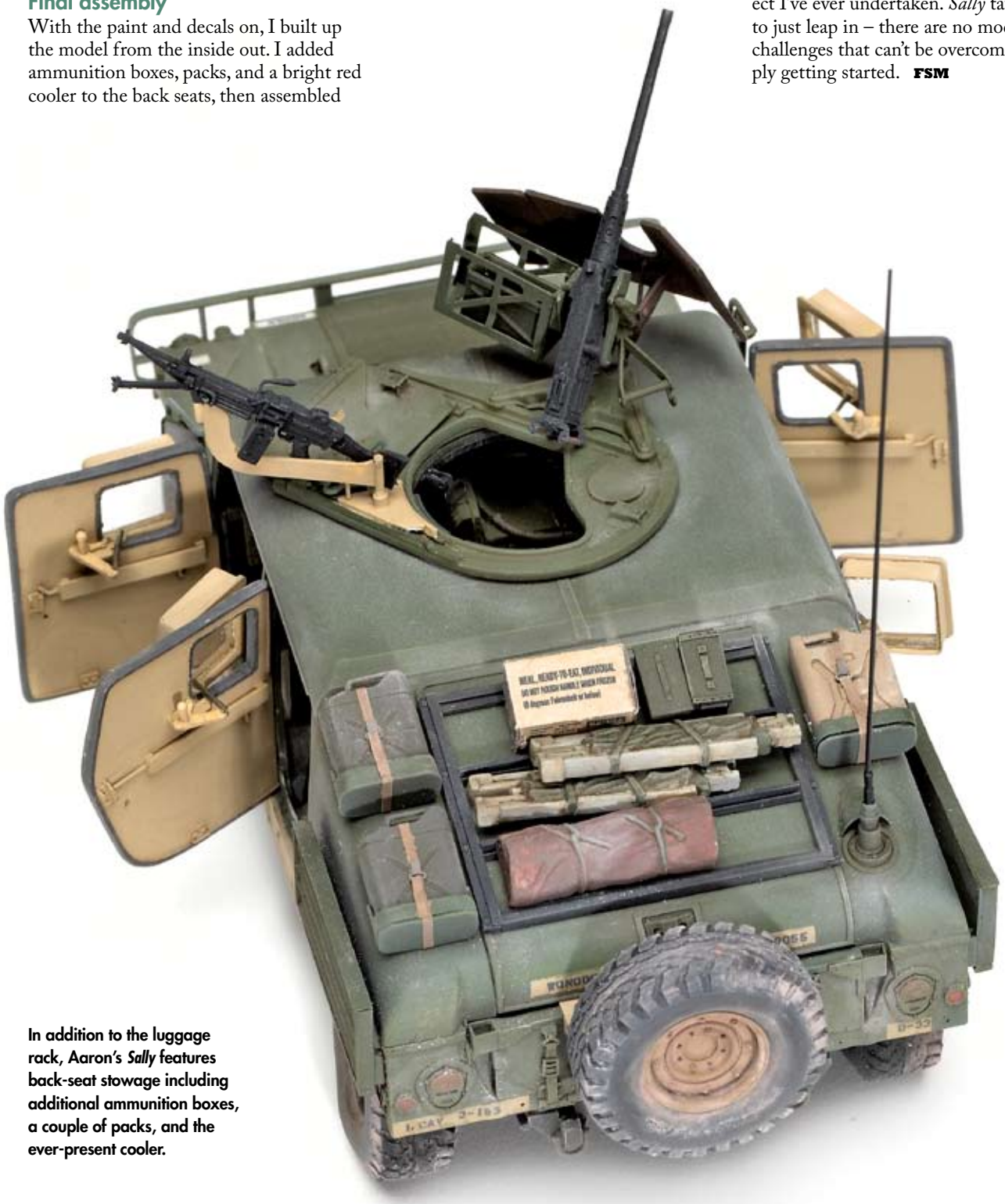
With the paint and decals on, I built up the model from the inside out. I added ammunition boxes, packs, and a bright red cooler to the back seats, then assembled the body, working slowly to prevent misalignment of the parts. I attached the chassis and hood next, weathering the tires with a motor tool before attachment.

After assembling the major components, I snapped the doors shut temporarily and shot a coat of Polly Scale clear flat.

I made V-shaped brackets and handles for the windows, then weathered the model with artist-oil washes, acrylic drybrushing, and powdered pastels, replicating the vehicle's dusty look.

To further represent the extra weight, I flattened the kit's vinyl tires slightly. I glued small sections of styrene, filed to an oval shape, inside the tires to produce an appropriate bulge in the tire walls.

This is the largest scratchbuilding project I've ever undertaken. *Sally* taught me to just leap in – there are no modeling challenges that can't be overcome by simply getting started. **FSM**



In addition to the luggage rack, Aaron's *Sally* features back-seat stowage including additional ammunition boxes, a couple of packs, and the ever-present cooler.

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