

With the right detail parts, you can convert a stock locomotive into a stand-in for your favorite prototype. Jack Burgess describes how he re-detailed two Bachmann HO scale 4-4-0s (see inset photo) to more closely match Americans used on the Yosemite Valley RR.

Re-detail a modernized **American**

Convert an HO scale Bachmann 4-4-0 into a stand-in for a Yosemite Valley RR engine

By Jack Burgess • Photos by the author

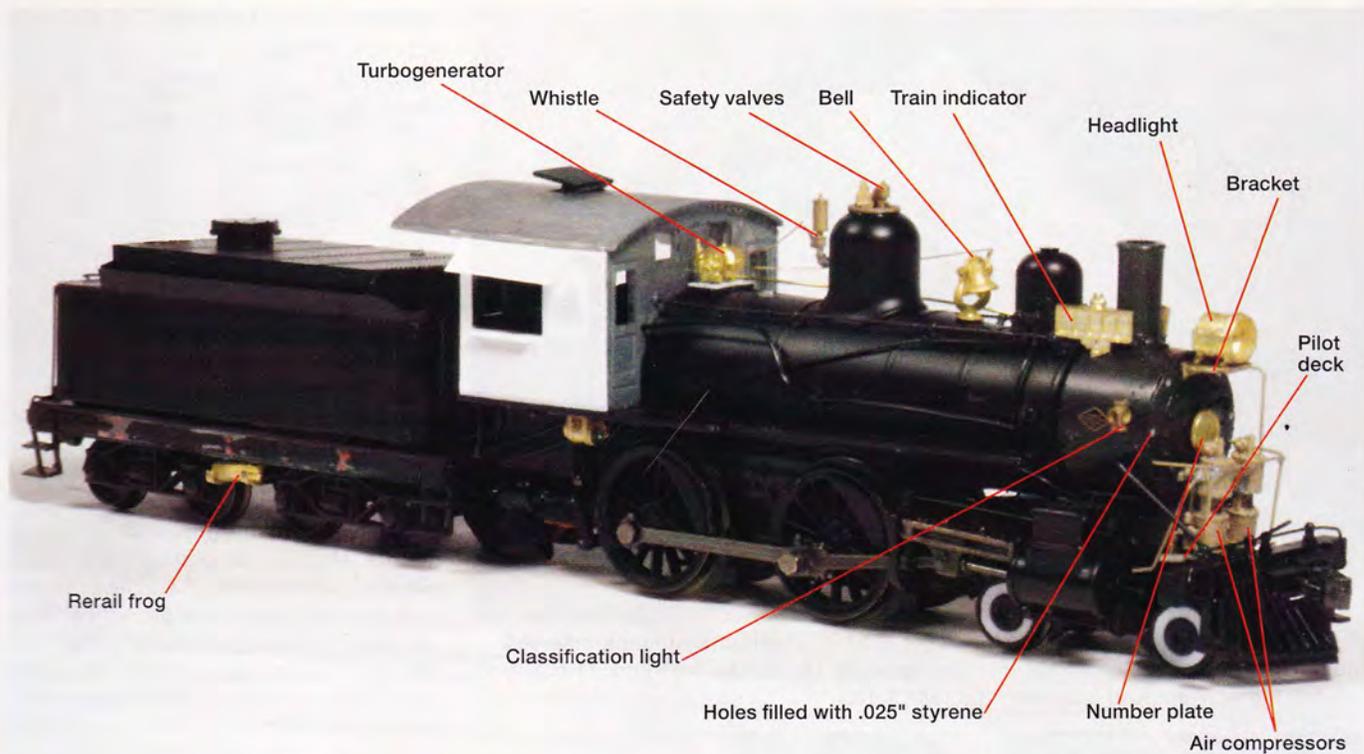


Fig. 1 It's all in the details. Jack replaced many of the Bachmann model's plastic details with an assortment of brass castings. He used styrene rod and putty to fill the holes where the original parts were removed.

Many of us have been here before. We model a railroad with a small locomotive roster. Most of the engines have been offered commercially, but there are a few we're waiting for. Scratchbuilding can take considerable time, but with a bit of effort, we can convert close enough ready-to-run engines into reasonable stand-ins of our favorite prototype. I did the latter for Yosemite Valley RR 4-4-0s nos. 22 and 23.

The two Americans on the YV saw limited duty in August 1939, the period I model. They were used occasionally in passenger service during the summer months, and in yard service. The locomotives were limited to three-car passenger trains on sections of the railroad in the Merced River canyon where the grade was 1.5 percent or greater. In later years, they were assigned to short winter passenger trains that had only a Railway Post Office and observation car.

Much like on the full-size railroad, my 4-4-0s would see limited use. The two re-detailed Americans would complete my YV roster circa August 1939, joining the five imported brass Beaver Creek Models 2-6-0s I acquired in the 1980s. Fortunately, Bachmann released an HO scale Maryland & Pennsylvania 4-4-0 in its Spectrum line. It represents a locomotive built around the turn of the 20th century and later upgraded.

After looking at the ads, it appeared that the Spectrum locomotive could be

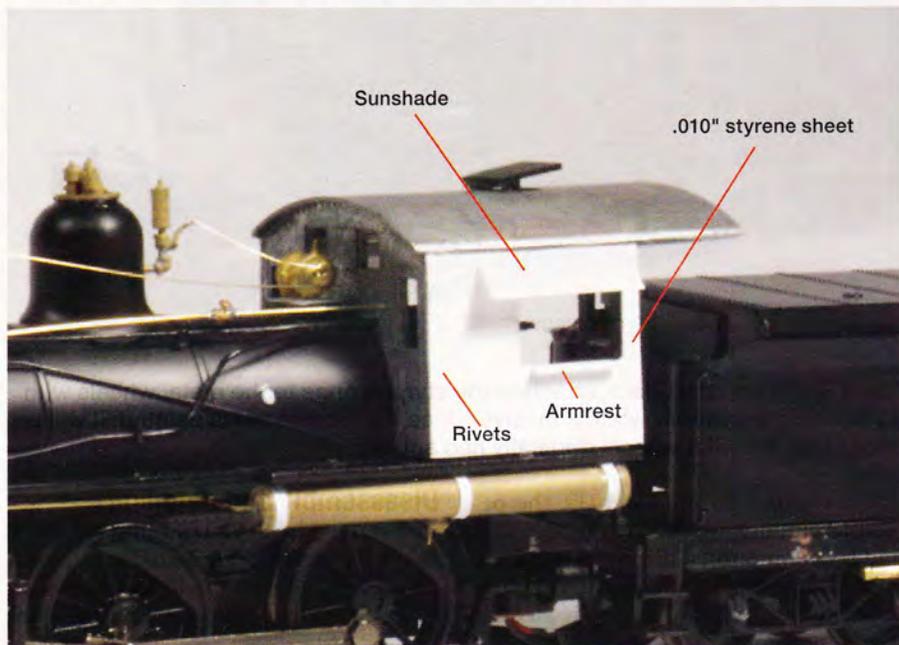


Fig. 2 Styrene sides. To preserve the weight of the die-cast metal cab but not compromise on the details, Jack made new cab sides from .010" styrene, which he detailed and attached to the sides of the original.

used as the basis for YV Americans 22 and 23. The March 1965 issue of *Model Railroader* featured plans for one of the Ma & Pa 4-4-0s. To compare the Ma & Pa engines to those on the YV, I photocopied the drawing onto transparent overhead projector film at the same scale as the drawings of YV no. 22 that I drafted for the May 2005 MR. Over-

laying the drawings revealed a number of differences between the engines, but they were close in length, wheelbase, and driver size. This confirmed that re-detailing the Bachmann model would work until I have time to scratchbuild accurate YV models.

Bachmann offers the 4-4-0 with prototype-specific cabs, valve chests,

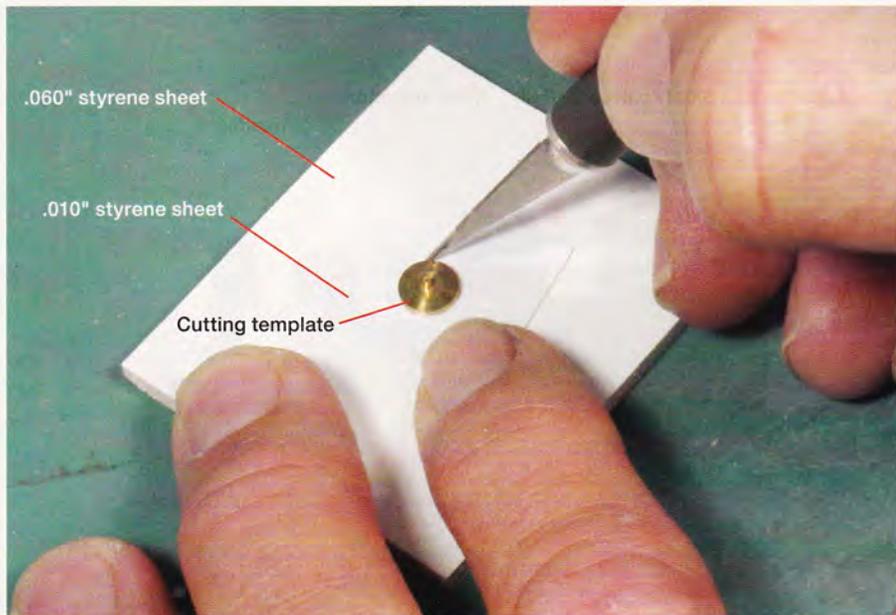


Fig. 4 Cutting the rings. With the holes for the hub in alignment, Jack inserted the narrow end of the template into the opening. He used a fresh no. 11 blade to cut out the styrene ring following the template.

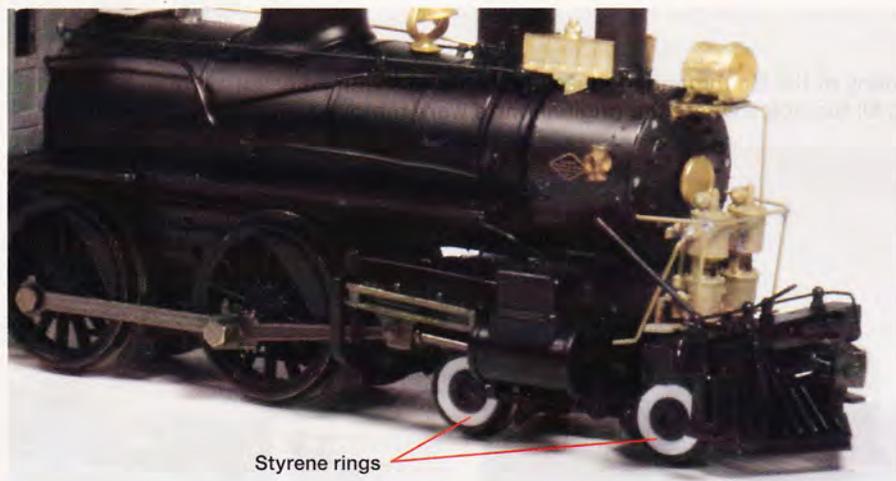


Fig. 5 Rings installed. Jack attached the styrene rings to the metal wheels with a plastic-safe cyanoacrylate adhesive. Once the locomotive is painted, it will be hard to tell the pilot wheels originally had spokes.

and air tanks. In August 1939, the period I'm modeling, the YV engines still had frame-mounted air tanks and slide valves, but sported steel cabs, boiler-tube pilots, and front and rear electric lights powered by a turbogenerator. Both engines had air compressors, but no. 23 (shown on page 40) carried hers on the pilot deck instead of on the left side of the boiler.

For my prototypes, selecting models with the correct slide valves is the most important option, since the piston-valve models also have long running boards and front ladders that are incorrect for the YV. With two Bachmann ready-to-run models in hand, it was time to start re-detailing these modernized Americans.

Disassembly and detailing

I started by disassembling the locomotives. First, I removed the die-cast metal cab, which is held in place with two screws concealed under the running boards.

Next, I turned my attention to the boiler, which is held in place by three screws. The first, located directly under the smokestack and cylinders, is easy to find. The other two screws are under the cab and somewhat concealed by the brake cylinders.

Since there are a number of different size screws used on the engine, I recommend putting each screw or set of screws in small, labeled plastic bags so you know where to put them when reassembling the model.

Finished cutting template



Illustration by Rick Johnson

Fig. 3 Cutting template. Jack made a cutting template so he could cover the spoked pilot wheels with styrene rings. Though Jack turned his brass template on a lathe, you could make it with an electric drill and a file.

With the models disassembled, I was ready to begin adding and replacing details. Most of the changes were simple, such as replacing the plastic details with sturdier brass castings and adding missing appliances, as noted in **fig. 1** on the previous page. Some of the brass parts had to be moved to match YV prototypes, which meant I needed to fill holes.

In most locations this was an easy task. However, removing and modifying the handrail posts on the smokebox front was more challenging, since the holes are close to the molded rivet detail. Instead of using putty to fill the holes, I enlarged the openings with a no. 73 bit. Then I used .025" styrene rod and styrene-compatible cement to fill the holes. Once the cement had dried, I cut the excess styrene off with a sprue cutter for a seamless repair. See **fig. 1**.

My models of nos. 22 and 23 show how the YV modified its steam locomotives over the years. In 1938 or 1939, no. 23 was fitted with a shorter smokebox, and the two air compressors were moved to the pilot deck. I was able to shorten the smokebox by cutting and filing it.

Though I didn't have to modify the smokebox braces, I did have to make the air compressors and related plumbing removable, since the boiler couldn't be reinstalled if the pumps were permanently mounted on the pilot.

I also had to make the sloped pilot deck flat using brass stock. I bent a piece of sheet brass to the angle necessary to compensate for the slope. Then I soldered brass angle to the rear of the sheet. I also soldered the air compressors to the angle plate and added the piping. To hold the assembly in place, I threaded a 1-72 screw through a hole in the pilot and into the brass plate.

Going beyond the basics

Upgrading details helps refine these models, but there were bigger changes

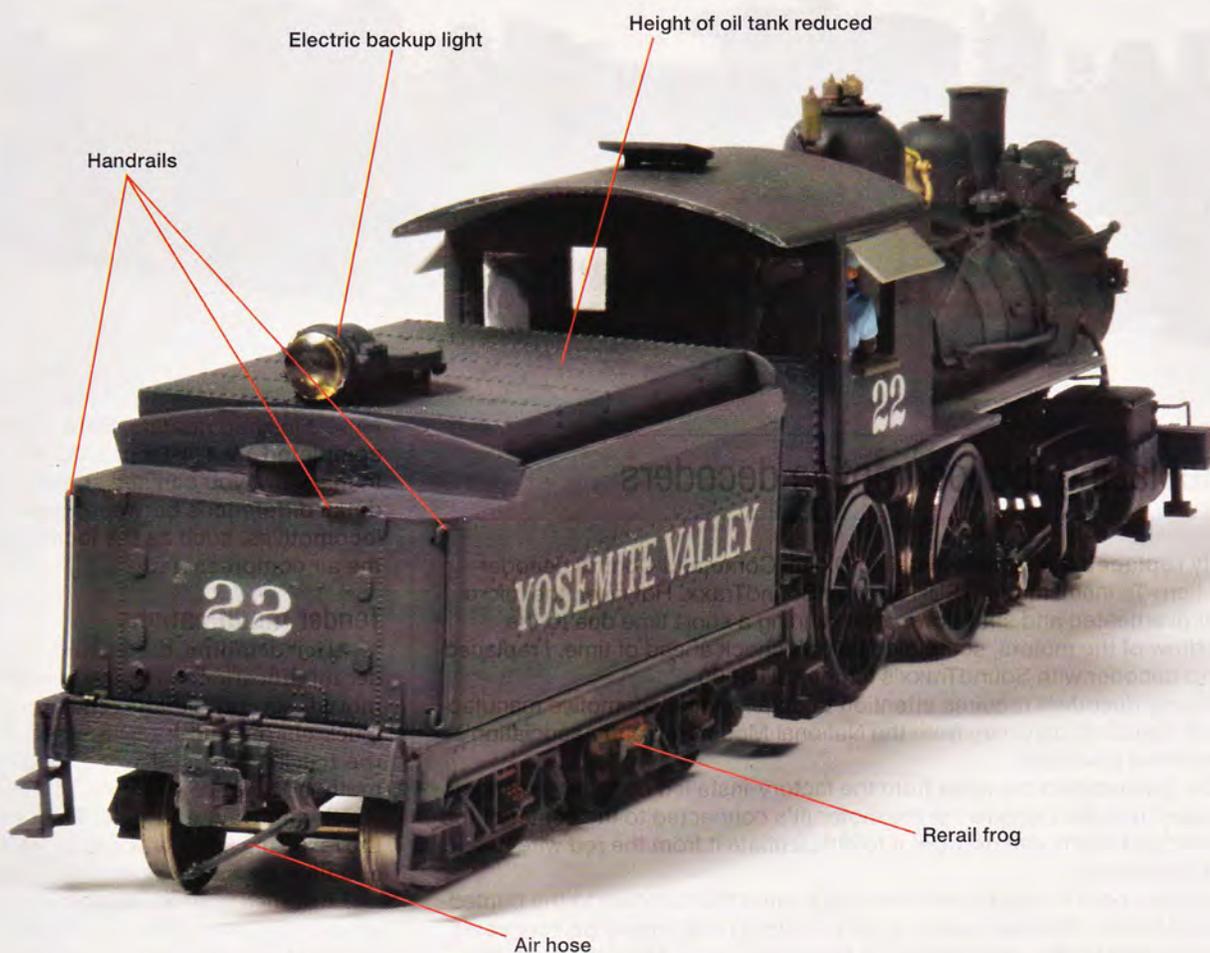


Fig. 6 Tender modifications. Jack made the tender look more like the YV prototype by lowering the height of the oil tank, placing handrails in the correct locations, and installing an electric backup light.

that yielded more authentic stand-ins for the YV prototypes.

The first of these modifications was made to the cab. The full-sized YV engines had plain steel cabs with relatively large window openings. The Bachmann American has a die-cast metal cab (and boiler) that gives the model extra weight and pulling power. I could have simply removed the window mullions or made a new cab from styrene. The former would be quite a compromise, and the latter would eliminate the valuable weight of the die-cast metal cab. To preserve the weight but not compromise on the details, I made new cab sides from .010" plain styrene sheet, as shown in **fig. 2** on page 65.

Before installing the styrene sides, I stripped the paint off the cab with Testor's Easy Lift Off [Use this product in a well-ventilated area and follow the manufacturer's instructions. —Ed.] and used a file to remove the rivet detail, sunshades, and armrests. I also removed the center post between the two cab windows.

I then used a milling machine to make the window openings on the cab slightly larger than the YV prototypes. If you don't have a milling machine, a motor tool and file will work.

Next, I laid out the .010" styrene sides and drilled holes at the four corners of each window opening. Trying to cut tangent openings in line with these holes with a hobby knife proved to be difficult. Instead, I cut short of the holes and enlarged the openings with a flat jeweler's file. I used a "blind" file, one without teeth on one edge, so I could work right up to the corner. I finished the cab sides by embossing the styrene with NorthWest Short Line's Riveter. [You could use Archer Fine Transfers rivet decals instead. Visit www.archertransfers.com to see the firm's product line. —Ed.]

I attached the finished styrene sides to the die-cast metal cab with cyanoacrylate adhesive (CA). Once the CA dried, I smoothed the joints between the top of the sides and the cab roof with a file.

To match the prototype (and protect the styrene from being damaged), I added styrene bracing to the cab interior. I completed the cabs on both locomotives by adding styrene armrests and cab sunshades, shown in **fig. 2**.

Pilot wheels

In the 1930s the YV Americans had solid pilot wheels, which meant I needed to change the spoked wheels on the Bachmann model. I initially purchased replacement wheelsets from Precision Scale Co., but they were the wrong diameter. So I cut styrene rings to cover the spokes.

To make the rings, I cut four small pieces of .010" styrene, about 1/2" square. Then I used a no. 18 bit to drill a hole in a piece of .060" styrene about the same size. I marked the center on each piece of .010" styrene with a pencil, and then placed it on a piece of wood. I covered the .010" styrene with the .060" styrene, centering the latter over the pencil mark. After I clamped the pieces of styrene and piece of wood together, I drilled the



Fig. 7 Finished models. Here we see completed YV 4-4-0s nos. 23 and 22. In this view, you can see some of the detail differences between these two locomotives, such as the location of the air compressors.

Replacing the locomotive decoders

I initially replaced the factory-installed Digital Command Control decoder with a Micro-Tsunami model TSU-750 from SoundTraxx. However, the micro decoder overheated and shut down after running a short time due to the current draw of the motors, something I didn't check ahead of time. I replaced the micro decoder with SoundTraxx's larger TSU-1000.

Replacing decoders requires attention to detail as the locomotive manufacturer's wiring colors may vary from the National Model Railroad Association's recommended practices.

Before I unsoldered the wires from the factory-installed decoder, I marked the red wire from the decoder for the motor (it's connected to the center of the printed-circuit board) with gray paint to differentiate it from the red wire used for right rail pickup.

In addition, both tender trucks have black wires that connect to the printed-circuit (PC) board. The rear truck is a left rail pickup and should be connected with the red wire for the right rail pickup from the engine. The front truck is a left rail pickup.

Since my locomotives have non-operating headlights, I didn't need the decoder's lighting wires. To prevent a short circuit, I trimmed all of the unused wires, the first one about 1/4" long and the subsequent ones slightly longer so the ends wouldn't touch. I wrapped the wires and taped them to the decoder with electrical tape.

I used Litchfield Station model SP-28R-08 round 1.1" speakers for my engines. I glued the speakers over the slots in the floor of the tender. Then I cut and cemented .040" styrene sheet adjacent to the edges of the speaker to cover any slots not masked by the speaker. I also removed the posts molded into the tender floor that held the original PC board in place so I'd have more room for the replacement decoder.

After soldering the decoder wires to the appropriate Bachmann wires, I placed the decoder into the top of the tender/oil tank and attached it (and the capacitor) to the shell with electrical tape.

Finally, I plugged the wires from the tender into the socket in the locomotive to determine how much slack would be required when they were connected. I pulled the excess wires into the tender and used electrical tape to hold them in place. — J.B.

opening for the hub through the hole in the .060" styrene.

Cutting the outside diameter of the ring was a bit more challenging. I had to make a cutting template, shown in **fig. 3** on page 66, from brass rod. Though I turned the rod on a lathe, you could mount the brass in an electric drill and reduce the diameter with a file.

To use the cutting template, I placed the .060" styrene on the workbench with

one of the .010" rings on top. I made sure the holes for the hub were in alignment.

Next, I inserted the .165" end of the cutting template through the opening for the hub, holding the brass tight against the .010" styrene. Then I used a hobby knife with a fresh no. 11 blade to cut the outside diameter, as shown in **fig. 4**. I attached the styrene rings to the metal wheels with plastic-compatible CA, as seen in **fig. 5**.

Tender modifications

After detailing the engine, the tender modifications were fairly easy. I removed several details, including the truck chains and hangers, eyebolts on the trucks, coal and wood loads, rear footboards and supports, rear full-width handrail, and pole. Then I filled the resulting holes with putty, let it dry, and filed the surfaces smooth.

I installed grab irons on the rear end sill per the prototype. Since the sill on the model is die-cast metal, you may want to use a small drill press to drill the holes for the grabs.

I made new hangers for the derail and pole using .015" x .042" flat brass, available from Detail Associates. I soldered the details to the hangers and attached the hangers to the inside of the side sills with CA. Then I added an air brake hose to the right of the rear coupler. I also reduced the height of the oil tank to more closely match the prototype. See **fig. 6** on the previous page.

Unfortunately, the flare along the top edge of the tender extends only to the rear of the oil tank. On the prototype YV 4-4-0s, the top edge was flared on three sides. I spent considerable time using a computer-aided drawing program trying to replicate this feature, but finally gave up on the idea.

Painting and lettering

I used Easy Lift Off again, this time to remove the Ma & Pa lettering. Before painting the locomotive, I disassembled the boiler and frame and removed the cab and motor assembly. I unsoldered the motor wires from the printed-circuit board, carefully documenting their locations for reassembly.

I first sprayed the cab interior with Floquil Light Green. As the paint was

▶▶ Materials List

Bachmann

83401 Ma & Pa 4-4-0 locomotive

Cal Scale

202 headlights (2)
211 generator
245 number plate
246 headlight bracket
247 safety valve
250 whistle
256 air compressors (2)
281 bell
312 classification lamps

Cary

178 train indicators*

Evergreen styrene

9005 .005" clear sheet
9010 .010" sheet
9060 .060" sheet

Floquil paint

110010 Engine Black
110011 Reefer White
110020 Caboose Red

Kadee Quality Products Co.

438 air hoses

Microscale

114 Kristal Kleer

M.V. Products

185 headlight lenses

Precision Scale

3110 rerail frog
3404 air equalizing reservoir
31046 main air reservoir (left side)
31575 pole

Testor Corp.

542143 Easy Lift Off

Miscellaneous

Brass wire and sheet
Future floor polish
Yosemite Valley decals
(www.yosemitevalleyrr.com)
*Cary train indicators are larger than the ones used by the YV, but I couldn't find a better option.

drying, I masked the wheels on the pilot truck, the drivers, and the tender trucks. I also masked the truck axles on the tender. I then painted the locomotive and tender Floquil Engine Black mixed with some Reefer White. I kept the drivers rolling while applying the paint so I wouldn't have to disassemble the frame. Once the boiler was dry to the touch, I used lacquer thinner to clean up any overspray.

I let the black paint dry for two days and then masked the cab so I could airbrush the front windows with Floquil Caboose Red. I brush-painted the armrests, pole, derail, and number plate the appropriate colors.

Once all the paint had dried, I used an airbrush to apply Future floor polish to the areas that needed decals. Though Future is a floor polish, it also provides a smooth, glossy surface for applying decals. I let the Future dry for 24 hours before adding decals. After the decals had dried, I applied Testor's Dullcote to seal them.

I installed .005" clear sheet styrene window glazing, which I cemented in the cabs with Microscale Kristal Kleer. I also used the Kristal Kleer to suggest glass in the class lights and to cement the headlight lenses in place. I then added new crew figures to the cabs, before reattaching the cabs to the locomotives. To finish the models, I sprayed the engines with a light weathering

coat. You can see the completed locomotives in **fig. 7** on the opposite page.

From east coast to west coast

The modified Maryland & Pennsylvania 4-4-0s aren't perfect re-creations of YV nos. 22 and 23. The most noticeable difference is the shape of the boiler – the Ma & Pa engine has a wagon-top boiler with a gentle taper in the second course behind the smokebox. The YV engines had a more pronounced taper in the second course.

However, by replacing and repositioning the factory-applied plastic details with sturdier brass parts and replicating signature features such as the pilot wheels and cab, it was easy to create reasonable stand-ins. Now I just need to find some time to scratchbuild more accurate versions of the YV's two Americans. **MR**

Jack Burgess models the Yosemite Valley RR in HO scale. His article on scratchbuilding a handcar house appeared in the March 2009 MR.

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Want to see the articles on the Maryland & Pennsylvania and Yosemite Valley 4-4-0s, including prototype drawings? Then visit our Web site, www.ModelRailroader.com.

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