

# BUILD A TWO FOOT GAUGE GILPIN SHAY

EXTENSIVE MODIFICATION



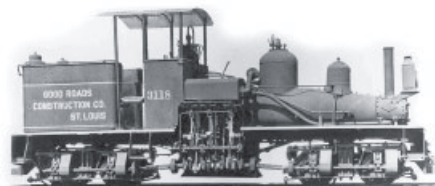
BY FERDINAND MELS  
PHOTOS BY THE AUTHOR  
1:13.7 SCALE

**R**ECENTLY I CONVERTED a 1:20.3 scale Bachmann Shay from three foot gauge to a  $7/8$ -inch to the foot, two foot gauge locomotive similar to one on Colorado's Gilpin Tram. I used tools many of you already own. It should be easy to follow my procedure or apply the techniques to other projects.

As for philosophy, I am an artist and lack the patience and desire to operate machine tools to precise tolerances. Most of my work is by eye and freehand; it is how I enjoy building models. I also wanted to keep the expense low and use as much as possible of the original model. If that approach works for you, read on.

## Frame and Boiler

I began by stripping the entire engine. The frame is metal; the plastic deck and cab hold it together. Drill and tap a  $3/4$ -inch long 2-56 screw through each side of the frame as in



LIMA LOCOMOTIVE WORKS, INCORPORATED									
LIMA, OHIO									
Class: 19-2 Truck Shay General		Built for GOOD ROADS CONSTRUCTION CO.						Road No. 3118	
GAUGE	WHEELS	FUEL	WATER	DRIVE	WHEELS	WHEELS	WHEELS	WHEELS	WHEELS
24"	20"	Coal	5"	4 1/2"	8"	18 1/2"	170 LBS.	34"	1 1/2"
WHEEL BASE		MAXIMUM TRAIL		FACTOR OF ADHESION		TUBES		LENGTH	
20"		10-0"		2.34		28		71 1/2"	
AVERAGE WEIGHT IN WORKING ORDER: LBS.									
25000		25000		4.64		70-1		25	
Capacity: Water 100 Gallons									

Photo 1. That will make the frame very square and rigid, an excellent starting point for a low cost makeover. Precise dimensions are unimportant as long as the finished model looks like a two foot gauge locomotive.

Increase the stack height as in Photo 2 by cutting the stock part in half, separating the two halves, and

Photo 1.



Photo 2.



inserting a brass tube. It should fit tightly. Apply epoxy putty around the tube, let it dry, mount the assembly in a hand drill, and shape it by rotating it over a belt sander.

The new, larger, steam dome is PVC tubing. Two feet costs about \$1.50. I used a drum sander on a drill press to shape it to the boiler. I cut a circle of 1/2-inch diameter balsam for the cap, mounted it in a drill, and spun it against the belt sander. The banding is styrene and the rivets HO scale track nails. The bolts on top are Ozark Miniatures castings. Photo 3 shows the completed, unpainted, boiler assembly.



Photo 3.

As I detailed and painted the boiler, I also overhauled the trucks. I operate only battery power so I removed all unnecessary electrical connections and completely dismantled the trucks. That enabled me to paint each part separately before reassembly.

I used a rust paint kit available at most hardware stores. The process involves applying a base coat, then stippling on the top coat. When that

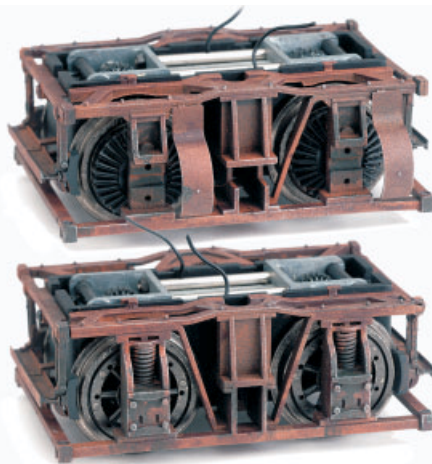


Photo 4.

had dried thoroughly, I applied a thin wash of black paint, rubbing alcohol, and water. It ran into the crevices to enhance shadows and impart a three dimensional effect. Finally I dry brushed everything with light gray and silver paint. To dry brush, wipe off nearly all paint from the brush (I use a 3/4- by 1/8-inch brush and wipe it on newspaper until 95-percent of the paint is gone) then quickly and lightly stroke the area, barely touching the surface. The secret is practice. Photo 4 illustrates the results.

Photo 5 shows the painted and weathered boiler assembly. I used the same technique as on the trucks but, after I applied the rust, I airbrushed black onto the boiler from the top down. I dry brushed the boiler only with light gray. Then, when all the paint had dried, I applied a coat of semi-gloss lacquer sanding sealer. It makes the paint more weather resistant and gives it a light sheen.

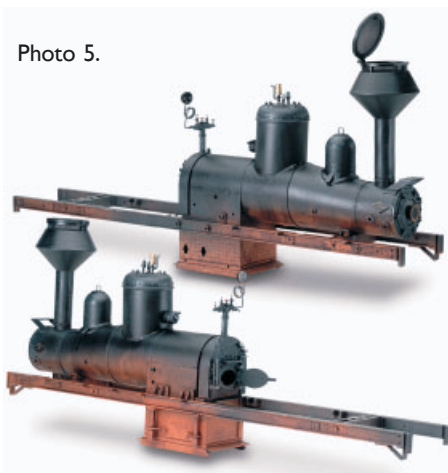


Photo 5.

## End Beams, Running Boards, and Cylinders

The new pilot beam in Photo 6 is a piece of freshly cut red cedar. You may achieve the dark coloration with a very simple natural aging technique. Dip steel wool in white vinegar and rub the cedar for two or three minutes. Leave any steel wool particles on the wood. As the cedar dries, it will turn gray-black. The wood will turn black where filaments have fallen off the steel wool. Simple and effective.

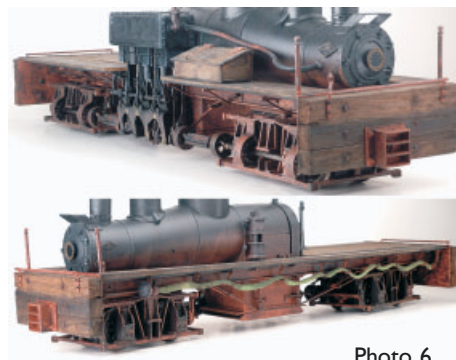


Photo 6.

In Photo 7, the cedar strips are on the frame. I retained the original plastic running boards as a base for applying new wood decking. Use a belt sander to smooth the plastic surface, cover it with marine epoxy, and clamp cedar strips to it overnight. Photo 8 shows the original plastic deck under the cedar. I tried with all my strength to pull the cedar off the plastic with no success; I estimate the finished locomotive weighs about 25 pounds so strong subassemblies are important.

I also used cedar to build up a toolbox. The hinges are plastic aircraft parts available from many hobby shops. Bend the handle from brass rod.

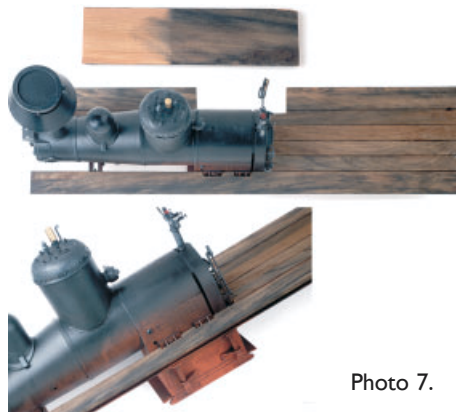


Photo 7.



Photo 8.



I used a fine tip permanent marker to draw nail heads.

The pistons are the biggest challenge because they must be about an inch taller. My attempt to cut the stock pistons and extend each by 1.25 inches resulted in an order for a new \$25.00 Bachmann piston assembly. I therefore humbly suggest you simply build a styrene box over the stock pistons to create the illusion of height as in the prototype photo.

The pipe couplers on the front are full scale rivets. The small rivets are HO scale track nails. Photo 9 shows the cylinder cover and the mounted toolbox; Photo 10 shows the cover after painting. I used the same technique as on the boiler, airbrushed on a coat of Grimy Black, then applied a wash of black paint, water, and alcohol. When the paint had cured, I dry brushed the assembly with medium gray. I also added some plumbing. (The pipe coming from the smokebox contains an antenna for the radio control receiver.)

Photo 9.



Photo 10.



Photo 11.



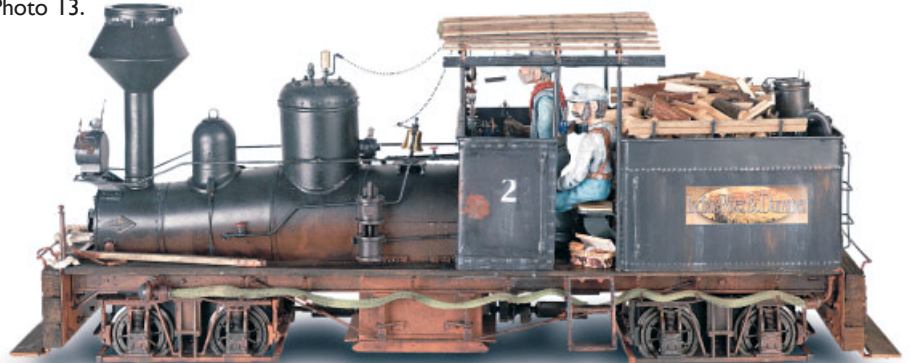
I wanted to bolt the end beams to something strong. I used a Dremel cutoff tool to flatten the end of the stock frame, drilled and tapped it for 00-90 bolts, mounted a brass plate behind, weathered it with a rust finish and, as in Photo 11, bolted on the red cedar end beams. Photo 12 illustrates the front of the Shay with its end beams and real functional bolts. The link-and-pin coupler is stock Bachmann. Four real bolts attach the coupler pocket to the brass plate through the wood end beams.



Photo 12.

Photo 13 shows the opposite side of the Shay. The water hose is fiberglass insulation I dipped in Polly Scale paint. I attached the original Bachmann siphon head to my new hose and made a mount for the rear of the loco under the tender. The new hose sags

Photo 13.



between each hook.

### Cab, Tender, and Details

I used only water based paints and only two brushes to bring Engineer Abner to life. Here is how: Paint the shadow tone first, then dry brush on a lighter tone and, once dry, add another lighter tone. Continue until you are happy with the range of shadow to highlight. Treat each item and color in the same way. Abner's rag is a piece of Kleenex I soaked in dilute white glue. I carefully positioned it and let it dry. Add paint and it's done.



Photo 14.

I fabricated the cab from sheet brass. Four posts support the roof. One view illustrates an oil can I created (from Sculpey clay and brass rod), a hose (electrical wire), Abner's coffee pot (a commercial casting), and backhead valve shutoffs (HO scale brakewheels). The second photo shows the cab in place with Abner at the throttle. Most plumbing and some detail are on the Shay.

In Photo 15 you can see the new running board. The brackets are brass stock I bolted to the end beams. They are strong enough to hold the weight of the locomotive. The running board screws to the brackets beneath.

Photo 15.



I built the tender from brass sheet and it houses a 12 volt, 4.5 amp-hour gel cell battery. The photo illustrates a jig I used in the drill press to make rivets. To keep the sheet brass flat and yield a more defined rivet, I drilled a hole in an aluminum bar slightly larger than my punch. The punch is a nail punch I ground smooth and chucked into the drill. Experiment to determine the correct degree of pressure; avoid piercing the brass as you lower the punch.

Shape the riveted tender shell by clamping the brass sheet to a screw-driver shaft and bending it around to produce a gentle curve. Solder round tubing to the top edge and angle brass to the inside. The angle will support the deck and provide a means to screw the tender to the loco frame. The battery will drop into the tender.

Photo 16 shows the tender shell with all parts attached. The two small tubes on the tender will become hinges to allow the seats to fold out of the way as they do on full size Shays. The small

upright posts will hold boards to prevent wood from rolling off the tender. After I had soldered all parts in place, I soaked the entire assembly in vinegar to clean off residual flux, oils, and other debris. Then I sprayed the



Photo 16.

shell with Polly Scale primer. When that was dry, I applied a coat of Tarnished Black, then a dilute wash of Oily Black and alcohol and, finally, a dry brushed application of light gray.

I made the decal on my computer, applied it to the tender, and airbrushed the assembly with semi-gloss lacquer to add weather resistance.

In the next photos, I have bolted



Photo 17.

the tender to the Shay and added a woodpile of hand split maple. The deck is complete and slides out so I can change batteries. The deck is thick styrene I cut to size on a scroll saw. The siphon pipe is solid  $\frac{1}{4}$ -inch diameter brass rod. I heated it cherry red and bent it to shape by hand (wearing welder's gloves). The water refill hatch is  $\frac{3}{4}$ -inch diameter copper plumbing pipe. Its base is styrene. I mounted it on a Dremel tool and ran it against the belt sander at 30,000 rpm to produce a very clean circle. I then embossed rivets.



Photo 18.

It finally was time to install the roof as in Photo 19. I bent brass strips over

Photo 19.







a nearby propane tank to produce the proper curve. The roof frame slides

down into the four posts on the cab. Photos also show the fold-down styrene and wood cab seat. The water pouch is an Ozark Miniatures 1:13.7 scale casting. To finish the cab roof, add wood slats and details. The model is complete.







# WOOD FOR WOOD'S SAKE

## EXPERT MODELING

BY ANDREAS BECKER

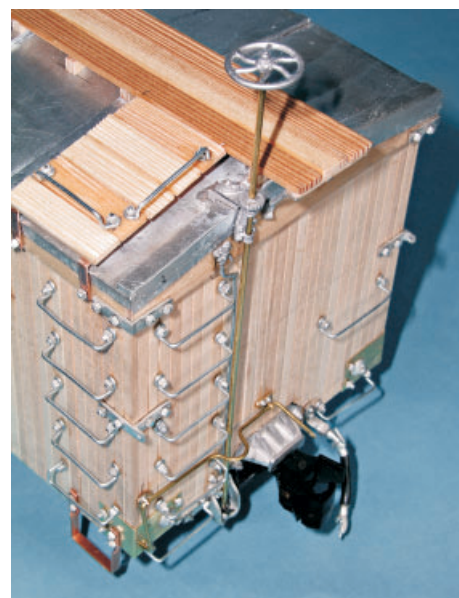
MODELS AND PHOTOS BY MICHAEL OLLFISCH

1:22.5 SCALE



WHILE READY-TO-RUN plastic models may be a wonderful time saver, the satisfaction of creating a realistic model where wood represents wood has obvious appeal. Michael Ollfisch assembled two 1:22.5 scale Modellbau Esser boxcars ([www.modellbau-esser.de](http://www.modellbau-esser.de)). Wolfgang Esser usually sells them with an optional package of Ozark Miniatures detail castings.

Michael preferred to create some hardware by hand and also used some Precision Scale parts. Plates from an offset printer represent the sheet metal cover on the boxcars' roofs. He lettered the models with Microscale decals.







# SANTA FE ALL THE WAY

## REEFER DETAILS

BY BOB UNIACK  
PHOTOS BY RUSS REINBERG

1:29 SCALE

**A**S IT COMES from the box, USA Trains' 1:29 scale forty foot reefer is very close to a Santa Fe prototype (but possibly something other than an RR-28). Even so, it could benefit from some modification. The most notable discrepancy is the direction of the ice hatches; they open outward, toward the end of the car, rather than inward, toward the car's center. Since I planned to modify that feature, it seemed reasonable to tweak a few other details. None of the seven changes is difficult. Here is what I did:

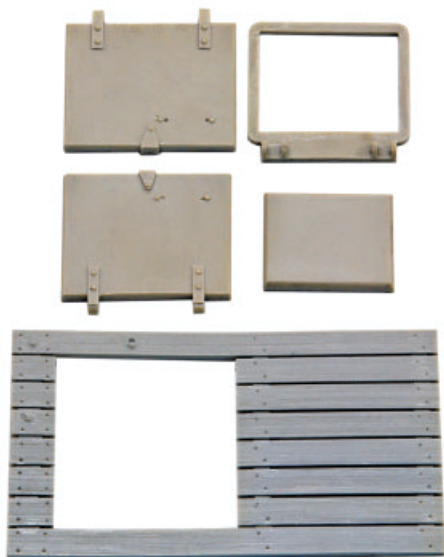
**Couplers:** I replaced the model's oversize mechanical couplers with 1:32 scale Kadee® long shank number 830 body mount couplers. They enhance the model's appearance and

make it compatible with my other Kadee® equipped rolling stock. I removed each coupler's curved magnetic trip pin.

**Cut Levers:** Most commercial standard gauge rolling stock models, regardless of scale, tend to omit coupler release bars because they may interfere with magnetic coupler operation. I uncouple my models mechanically so they include non-functioning cut levers. I bent brass rod to shape and used small cotter pins to attach each lever to the car body and underside of the coupler. The rod slides through the loop at the end of each pin so it has no negative effect on operation.

**Air Hoses:** The stock model includes an angle cock but





no air hoses. Many manufacturers in all scales leave off air hoses for the same reason as they omit cut levers. I slipped Ozark Miniatures hoses with gladhands onto the existing angle cocks.

**Ventilator Fan:** The small round fan grille beneath the Santa Fe emblem on each side of the

model is orange as the models come from USA Trains. Santa Fe commonly painted the grilles black so I did, too.

**Ice Hatches:** As you can see in the photo, I cast new resin ice hatches and platforms for my model from styrene patterns and rubber molds. That is because I wanted many parts for a string of reefers. Casting is unnecessary for a single car.

Each car needs two right-hand and two left-hand hatch covers and wooden platforms, a hinged base for each cover, and an insulated seal for the underside of each cover. Each cover also has a handle (brass rod) and a 0.015- by 3/32-inch strip brass angled hatch support. Pin and cement each support to a hatch. The serrated bars to hold open the hatches are original USA Trains moldings.

Everything except the inner seal should be black. The seal had a canvas cover and quickly became dirty.

**Roofwalk:** During the era I model, the hatch platforms and roofwalks were wood. I replaced USA Trains' "metal" roofwalks with strips of styrene I had distressed to emulate wood.

**Trucks:** John McGuyer's line of JMG detail parts includes accurate white metal Bettendorf sideframes with bolsters and 33 scale inch diameter plated metal wheelsets. I prefer them to USA Trains' trucks, wheels, and bolsters so I installed them on my model.

The modifications to my reefer are relatively minor. The result, though, is a model much more closely resembling a 1940s Archison, Topeka & Santa Fe refrigerator car. If you are a Santa Fe aficionado or merely want to try a simple kitbashing project, it is one you might consider.







# COLORADO NARROW GAUGE IN GERMANY

## A PROGRESS REPORT

BY MICHAEL WÜNSCHMANN  
PHOTOS BY THE AUTHOR  
1:22.5 SCALE



FOUR YEARS HAVE passed since my outdoor layout and models appeared in **FINESCALE RAILROADER's** September 2001 **NARROW GAUGE ANNUAL**. As some readers may recall, I scratchbuild all locomotives and many structures. As I hope should be evident from the photos, the layout represents the Denver & Rio Grande Western Marshall Pass route out of Sargents, Colorado.

At the time of my last article, I had just completed scratchbuilding my third K-36, Number 484. It now has a



new sound system and, in addition to the standard pilot, 484's unique snow-plow. I built the plow as accurately as possible from plans and photographs. I then turned my attention to a fourth K-36, Number 488. I built as precise a replica as possible from about forty photos I shot in Chama and others from my library of books.

More recently, I have built a sound equipped model of K-27 Number 461 with accurate cylinders and air compressor. That brings the total of D&RGW locomotives to five, each with sound digitally recorded in Chama and Durango by Dietz, from the village of Höfen in the Black Forest.

Last year, I scratchbuilt five fishbelly flatcars from brass and pine. They ride on modified Aristo-Craft Bettendorf sideframes with USA Trains metal wheelsets. I based my models on Robert Sloan's

drawings in the November 2001 **FINESCALE RAILROADER** and

