This 4-6-6-2 Cab-Forward is 40" long, 4" wide, and 7" tall. Bill Tompkins built it over the works of an LGB 0-6-6-0T, and the no. 1 scale model runs on the same 1¾"-gauge track as Kalamazoo and LGB trains.

Building a no. 1 scale Cab-Forward

A ⅜" = 12" articulated on an LGB mechanism

BY BILL TOMPKINS
PHOTOS BY THE AUTHOR

IT ALL began because of the Southern Pacific's Donner Pass line, that 150 miles of grades up to 2.4 percent from Roseville, Calif., east to Sparks, Nev. The railroad climbs from 600 feet above sea level to over 7000 feet at Norden, the summit. By 1909 there were 30 miles of snowsheds protecting the line at the higher elevations, and many tunnels too. When the SP first tried Baldwin 2-8-8-2 Mallets to contend with the grades, engineers and fireman were faced with asphyxiation.

The SP's answer was to put the crew ahead of the smokestack by turning the oil-burning 2-8-8-2 around, and the articulated Cab-Forward was born. My fascination with these massive locomotives began as a boy, when my father drove us through the mountains from Los Angeles to Mojave, and we watched Cab-Forwards from the road running along next to the SP tracks for miles and miles.

I've built several HO and O scale layouts over the past 18 years, but I've also been fascinated by articles on larger-scale model railroading like "A garden railroad in Spain" in the July 1985 MODEL RAILROADER. In particular the old no. 1 scale of tinplate days, lately revived as a size for scale models, has caught my interest.

In no. 1, ⅜" equals 1 foot and the track gauge is 1¾". This is a smaller scale than LGB's 1:22.5 proportion, but the track gauge is the same. A no. 1 scale engine can operate on Kalamazoo and LGB layouts, so long as it is built to negotiate the 24" radius that is the tightest standard curve from those makers.

LGB models appealed to me too, but most of them are of European prototypes. Like so many of us, I prefer American locomotives, so I set out to build my own in no. 1. There's a real pleasure in making a model in this large scale that's uniquely your own, and that's what I'd like to share with you.

Another goal of this project was to build a realistic-looking model using only hand tools. In the spirit of the late Mel Thornburgh, who told MR readers how to build locomotives with as few tools as possible and a do-it-yourself philosophy, I hope what I did will appeal to those of you without technical backgrounds or machine shop skills.

For a prototype I naturally thought of a Cab-Forward. In 1911, after success with the 2-8-8-2 Cab-Forwards of class MC-2 (*M*allet *C*onsolidations), SP tried higher-wheeled 2-6-6-2 passenger Cab-Forwards, class MM-2 for *M*allet *M*oguls. At first they derailed a lot, but that was solved with a four-wheel lead truck. I made my own simple ⅜" scale drawings and decided I could convert my LGB 2085 D 0-6-6-0T tank Mallet into an SP MM-2 4-6-6-2.

Modeling in ⅜" scale turned out to be a real pleasure. The work wasn't hard, and I found it easy to see what to do next as long as I proceeded in logical steps.

As you can see from fig. 1, my MM-2 is made up of two major subassemblies. The running gear consists of the modified LGB frame with the two motor units or "engines," pilot, rear deck, and lead and trailing trucks. The mostly scratchbuilt superstructure includes the detailed boiler and the cab with interior details.

RUNNING GEAR

To start I removed the 2085 D's superstructure: boiler, side tanks, and cab. Removing the wiring, smoke unit, and circuit boards, I wrapped them in a plastic bag for safety during construction.

Getting down to the upper frame or "footplate," I found that very little of this LGB part would be of much use for my Cab-Forward. I customized the plastic with my hand saw, cutting away everything but the flat bed which spans and connects the two engines. This became the mounting for my superstructure.

I built the forward frame extension of Plastruct square tubing and sheet styrene. It is cantilevered from the forward (originally the rear) engine and supports the pilot. See fig. 2.

The LGB plastic would not bond with styrene solvents, so I tried Pacer Technology's Plasti Zap super glue, and ended up using it for all assembly. In general I made detailed subassemblies and left everything unpainted until the last, so all the paint would match.

The pilot is scratchbuilt of styrene, and I mounted it directly to the frame extension. I added a styrene coupler pocket, brass brake pipe, and a number of nuts and bolts. The uncoupling lever stanchions are brass turnings I bought at a model shop, and the lever is brass wire.

I retained LGB's double articulation for my Cab-Forward so it can run on 24"-radius curves and turnouts. Both engines swivel under the boiler instead of just one, and the frame extension carrying the pilot swings with the front engine under the firebox and cab.

In addition, the four-wheel lead truck is pivoted from a swing arm attached to the front engine. The arrangement is very flexible, as shown in fig. 3.

The lead truck assembly is a Kalamazoo 4-4-0 part no. 1002-3 — you can get quite a few useful parts from Kalamazoo. I did replace Kalamazoo's plastic wheels with no. 1 scale brass wheels that I had made by Short Line Foundry in Garland, Tex. The two-wheel trailing truck is also made with these wheels.

The brake gear on the lead truck is made from styrene, brass bolts, and

brass wire. Both the lead and trailing trucks were weighted for good tracking.

I made the rear deck and steps from styrene and McKean Models no. 125001 styrene tread plate; the railings are brass wire. The drawbar is brass with several holes drilled in it so I can couple the locomotive and tender closer or farther, depending on the curves the Cab-Forward will be running over.

After reassembling the front and rear engines to the frame, I modified the LGB weight so I could mount the air reservoirs to it. Then I tested the complete running gear in action through short-radius switches and curves.

SUPERSTRUCTURE

For the boiler I used 2¾"-diameter PVC pipe with ¼"-thick walls. In fig. 4 you can see that I used the smokebox and stack from the 2085 D, spliced into the end of my boiler with layers of styrene strip to fit. I trimmed and notched the boiler and smokebox to fit the LGB frame and its lead weight.

The running boards are more McKean tread plate, and for the firebox sides I cut sections of the side tanks from the 2085 D superstructure. This has suitable rivet detail, and I added some styrene "reinforcing plates" with brass screw heads as large staybolts. I mounted the boiler to the LGB frame with six screws, two in front — inside the firebox — and four in back.

After being bothered about how I would make the domes, I found a very easy way to do it. Starting with 1" to 1⅜" PVC plumbing caps, I simply filed them to shape while rotating them by hand, then smoothed them off with emery paper. To match them to the boiler I first roughed in the saddle curves with a half-round file, then sanded them on sandpaper wrapped around an extra piece of the 2¾"-diameter PVC pipe.

Having completed what I felt would be the most diffcult part of the engine, I made the cab next. It was built as a separate assembly with walls of .062" sheet styrene and Plastruct angles to reinforce the corners. I used the same sheet for the removable cab roof, and for the two ribs that support it. To curve the roof I heated the styrene sheet in the oven until it was just soft enough to form to an approximate radius — be careful not to overheat the plastic. Then I covered the cab walls and roof with pieces of .025" sheet styrene with rivets punched in by hand, to give them the look of thin-walled metal construction.

The cab interior details, like the seats and other small components, were mostly built from sheet styrene. I used the LGB boiler backhead as a base for mounting my own details, including gauges, valves, throttle, brake stands, and their associated plumbing which I bent from brass wire. Figure 4 shows how I made the backhead as a separate unit, which I painted and bonded in place only after the cab interior had been painted.

I used clear acrylic for the cab windows and doors, with frames and sash made of overlays of styrene strip. The doors are hinged with wire pins to open and close. I cut off the LGB cab interior

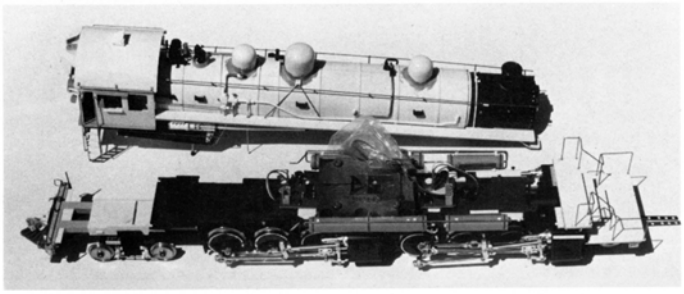
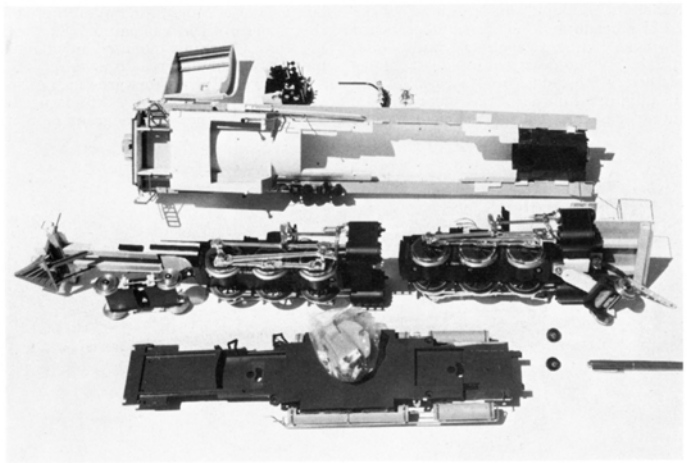


Fig. 1. SUPERSTRUCTURE AND RUNNING GEAR. These two views of the disassembled Cab-Forward show the basics of its mostly plastic construction. In the photo above the LGB weight and circuit boards are at the center of the running gear. Below, the LGB frame or "footplate," which joins the two "engines" and supports the superstructure, is upside down at the bottom of the photo.



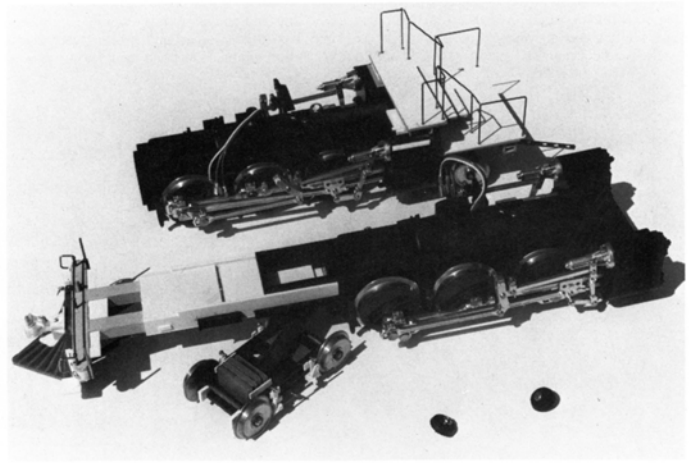


Fig. 2. FRONT AND REAR ENGINES. The front engine, the rear high-pressure unit from the LGB Mallet, is modified with a long frame extension carrying the pilot ahead of the Kalamazoo lead truck. The LGB low-pressure unit is now the rear engine with the "bandstand" platform and trailing truck.

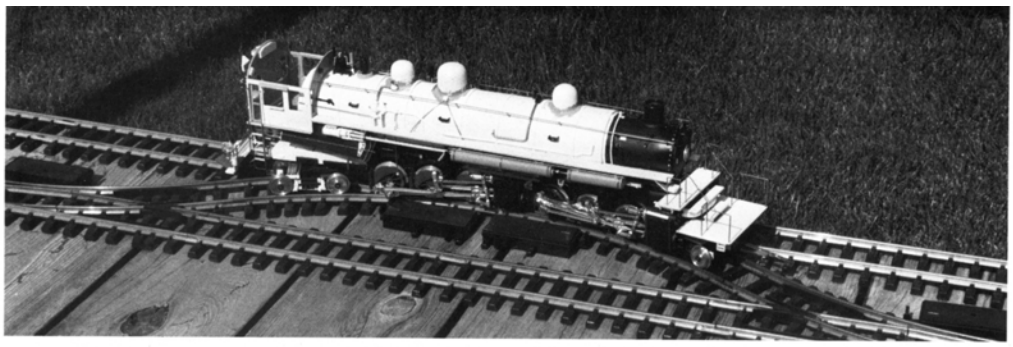


Fig. 3. DOUBLE ARTICULATION. With both engines swiveling beneath the boiler, the no. 1 scale Cab-Forward easily negotiates LGB's tightest-radius (24") curves and turnouts. You can see how the long frame extension on the front engine is free to swing under the cab and firebox.

light bracket and mounted it on top of my firebox. The roof vent is sheet styrene and the handrails are brass wire.

The headlight and its number board "wings" I pieced together from ⅝"-dia. PVC pipe and styrene sheet. Holes drilled in the sides of its case let the headlight illuminate the clear acrylic number boards. I also used clear acrylic for headlight and class light lenses, and for the large "train indicator" number boards, but of course I left all of these off the model until it was painted. The bell is a brass turning mounted in a laminated brass and styrene bracket.

Photos of SP Cab-Forwards in the November 1962 and August 1968 issues of *Trains* Magazine were a great help in detailing my MM-2. The boiler details include various materials and methods:

- The smokebox rivets are the heads of pins inserted and bonded into holes I drilled around its circumference.
- The air pumps, air reservoirs, generator, injectors, power reverse, and various valves were built from laminations of styrene sheet and tubing.
- Piping is brass wire and styrene tubing, attached with styrene brackets. Handrails are also wire, with turned brass stanchions from the Richart Co. of Escondido, Calif.
- The whistle is by Shortline Foundry.
- The boiler steps are modified LGB parts from the 2085 D.
- The exhaust splitter on the smokestack is brass wire and angle bar. This distinctively SP feature helped keep engines blasting upgrade from damaging the snowsheds and tunnel linings.

I thought rewiring would be difficult, but a small iron was all I needed to solder new wires for the rear light to the circuit board. These run to the tender backup light through a small W. S. Deans Co. connector with two gold pins.

A word of caution: by this time the model was getting difficult to handle because of its large size, heavy LGB lead weight, and relatively delicate detailing. I found that it was best to hold the

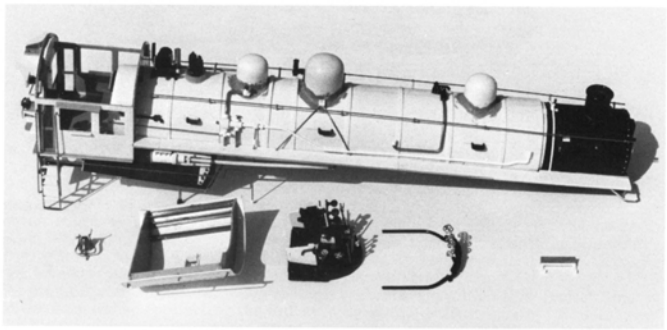
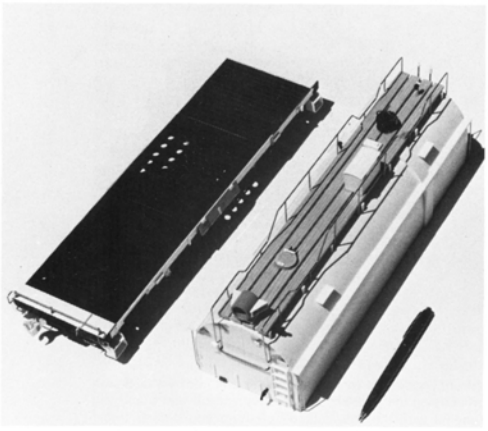


Fig. 4. SUPERSTRUCTURE DETAILS. The boiler is PVC pipe, the domes are made from PVC pipe nipples, and the cab is styrene. The black smokebox is from the LGB Mallet, as are the black firebox sides which were cut from its tank. Most fittings are scratchbuilt from styrene sheet and tube, and brass wire.



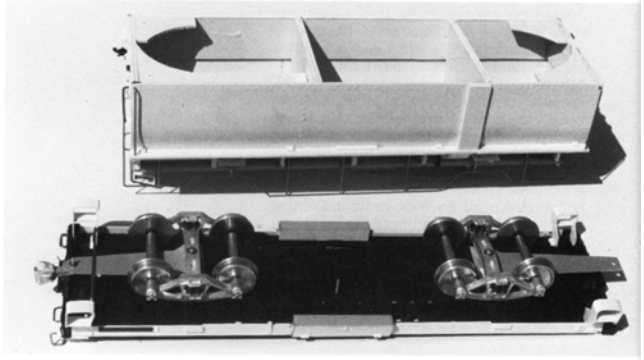


Fig. 5. TENDER CONSTRUCTION. The tender underframe is a modified LGB flatcar; it carries the scratchbuilt "whaleback" tender tank. The trucks and the coupler are no. 1 scale items from Clubhouse Models of Pittsburgh, Pa. A ballpoint pen shows the tender's size.

disassembled model under the weight, and that the assembled model was best held with both hands under the weight while taking care not to bend the handrails. Many people have handled my MM-2, putting it on the track and taking it off, but without damage because I've told them where and how to pick it up.

WHALEBACK TENDER

An LGB no. 4060 flatcar is the foundation of my tender, providing an underframe with bolsters for truck mounting. In addition to cutting apart the flatcar and resplicing it shorter, I removed the side sills, including the stirrups and stake pockets, and the truss rods. I also drilled holes for future installation of a sound system speaker. See fig. 5.

Although the body of an SP whaleback tender is really two separate tanks, I made mine as a single unit, and fig. 6 shows how. I had trouble trying to oven-heat the large piece of styrene for the inner wrapper, so I used the assembly method shown in the small drawing. When I had the wrapper bent around the frame, I clamped it between two lengths of 1 x 2 lumber with C-clamps.

When the tank was dry I was amazed at how strong it was. I added pieces of .100" styrene sheet inside the corners of the base to take the four LGB flatcar mounting screws, and covered the tank with an outer wrapper of .025" styrene sheet with hand-punched rivets.

Most of the tender details you can see in fig. 7 were made with the same methods and materials I'd used on the locomotive. The brake wheel on the front of the tank is by Clubhouse Models of Pittsburgh, Pa. The wooden running boards on top of the tank are strips of 1/16" x 3/8" pine cemented to Plastruct supports with Ambroid Le Vrai cement. I made my ladders from Evergreen Scale Models styrene strip and sheet brass.

I made the steps of sheet styrene and bonded them to the underside of the modified LGB flatcar chassis. The metal Bettendorf trucks are from no. 1 gauge kits by Clubhouse, and I added talgo-type styrene coupler arms. The arm on the front truck simply has a hole to take a bolt through the locomotive drawbar, but the rear arm carries a Clubhouse 3/8" scale dummy coupler.

FINISHING

I painted my Cab-Forward Floquil no. 130013 Grimy Black, taking care to mask and protect the windows and the electrical connectors. The cab interior is a light green, and I painted the edges of the driver tires Grimy Black to help disguise their underscale (for an MM-2) diameter.

I lettered no. 4210 with Champ O scale SP *Daylight* steam locomotive decals. These are about the right size for earlier-vintage SP lettering in 3/8" scale.

The fun of building a locomotive model in this enormous size is overwhelming. The big articulated looks impressive snaking through tight turnouts, and the "backwards" running gear paddles the locomotive smoothly along even with a heavy load of passenger cars. I hope you will discover the magic of large-scale model trains. ✪

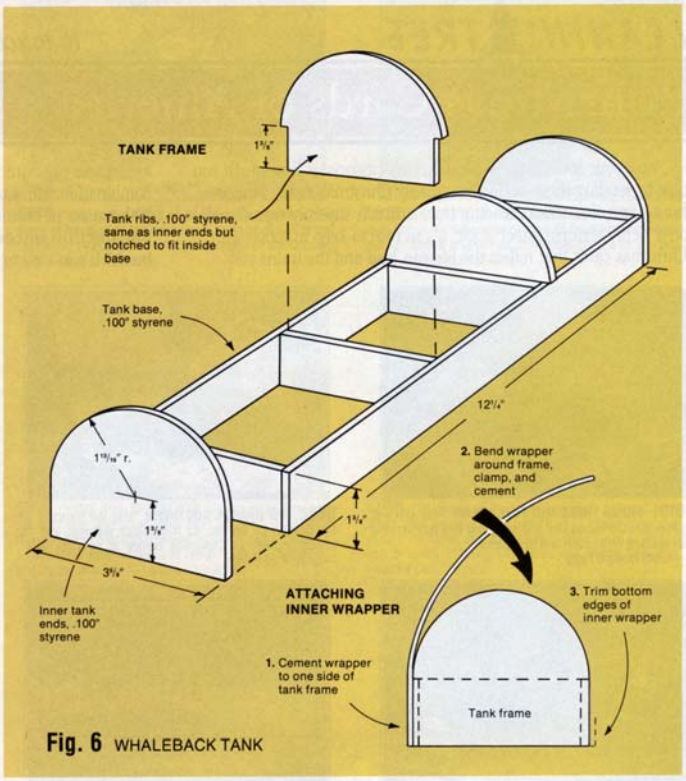


Fig. 6 WHALEBACK TANK

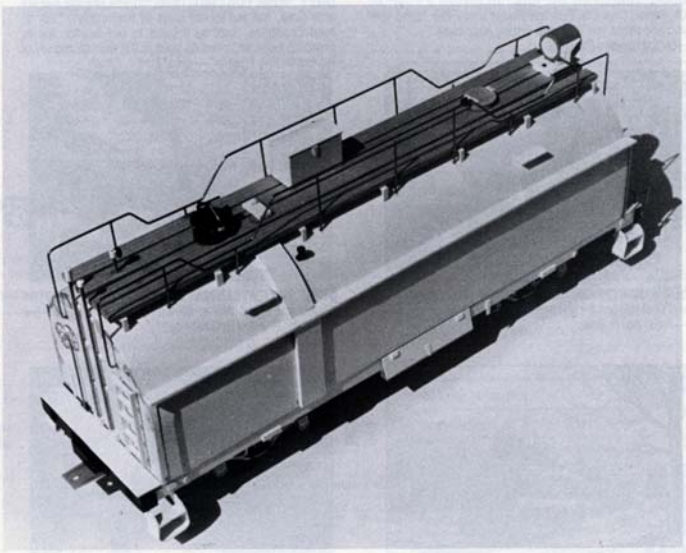


Fig. 7. TENDER DETAILS. The whaleback tender's fittings were made much like the locomotive's, although the upper walkway is made of wooden planks like the prototype's. The wide raised strip running over the top of the tank marks the joint of the forward oil bunker and the rear water cistern.