

# The Short & Narrow

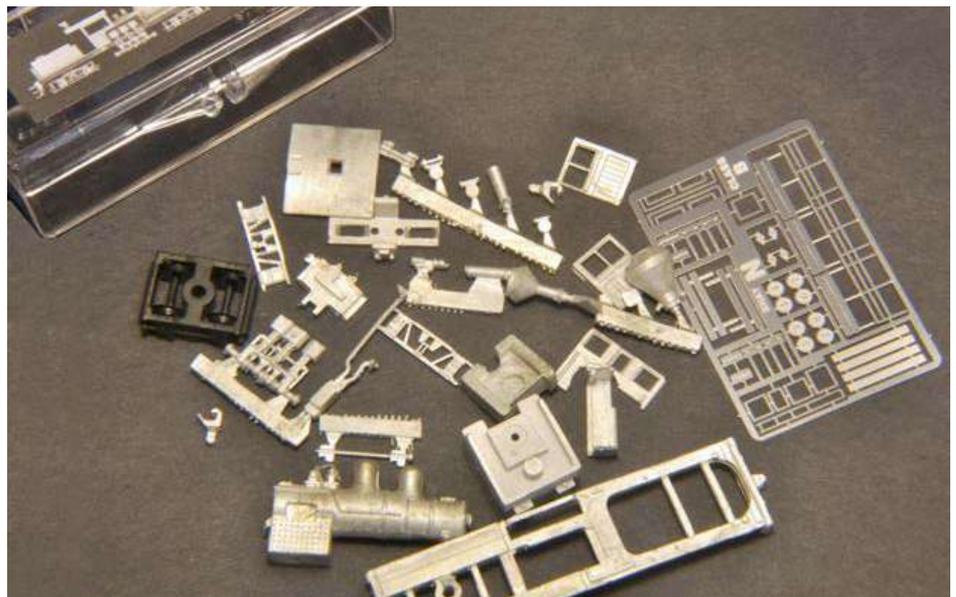
The Showcase Miniatures Class B 30-40 ton Shay

by Tom Knapp, MMR#101



**Photo 1:** "Dixiana", the 40 ton Class B Shay at the Roaring Camp & Big Trees railroad in the Santa Cruz, California mountains, (in colorful Roaring Camp livery), built by Lima Locomotive Works in 1912; the "Dixie" as she is affectionately called is a National Mechanical Engineering Historical Landmark. Photo courtesy of Joanne Hirasaki, Roaring Camp Railroads [www.roaringcamp.com](http://www.roaringcamp.com)

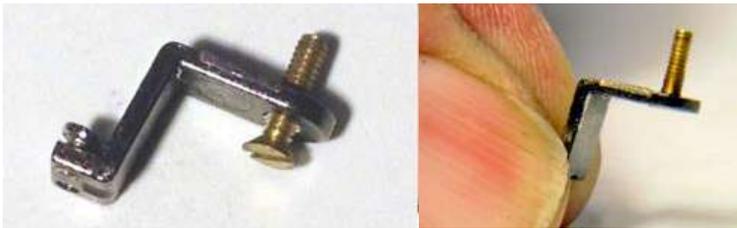
Nothing evokes narrow gauge more than a Shay. These geared locomotives were the product of the engineering genius of Ephraim Shay (1839-1916) and were built by Lima Locomotive Works to the specifications of the railroads ordering them from 1878 until 1945, ranging in size from a diminutive 6-tons to the 160-ton standard-gauge behemoths of the Western & Maryland. (After the original patents expired, Willamette Iron and Steel Works of Portland, Oregon also built Shay-type locomotives, and Michigan Iron Works in Cadillac, Michigan built "Shay Patent" locomotives.) This new kit created by Showcase Miniatures' master pattern maker and designer Walter Vail is a distillation of research into hundreds of Shays meant to capture the essence of a 30-40 ton Class B Shay. (Class A Shays have two cylinders driving two trucks, Class B Shays have three cylinders driving two trucks, Class C Shays have three cylinders driving three trucks, and the rare Class D Shay had



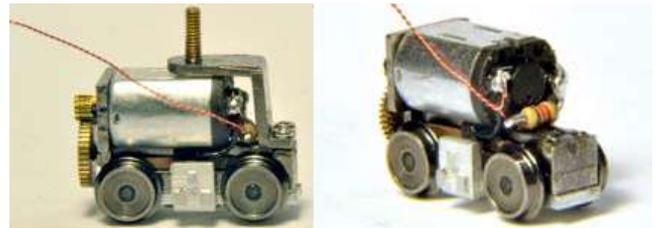
**Photo 2:** The Showcase Miniatures kit consists of white metal (pewter) castings, stainless steel etchings, an assembled truck with Micro-Trains Line wheel sets, brass wire, and screws and washers. Separate (and not shown) are two pages of exploded diagram instructions.

three cylinders driving four trucks.) Each Shay was built to the purchaser's requirements, so no two are exactly the same, especially after being on the

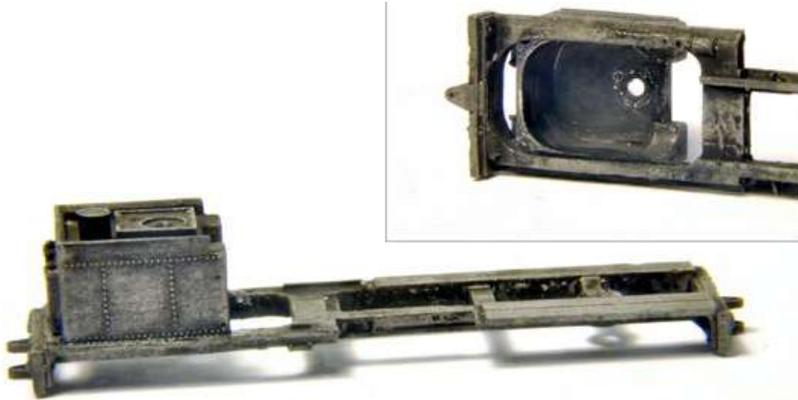
railroad for any length of time. Cabs changed, fuels changed with resulting changes in tenders, fireboxes and stacks, crews added or moved appliances on the



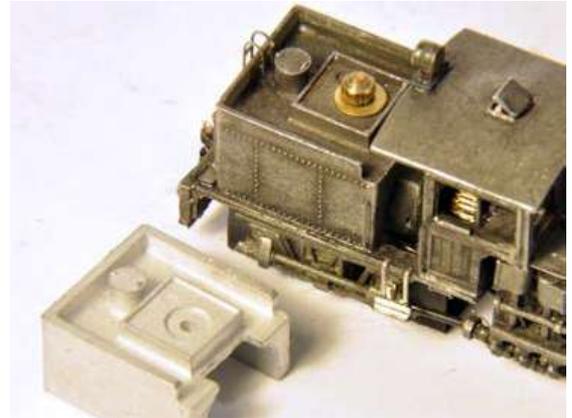
**Photo 3:** Modifying the PowerMAX!© top rotator bracket: on left, the bracket has been threaded for a 0-80 screw, then the hole countersunk; on the right, the screw has been run in tight, with a drop of CA to lock the threads, then the screw head filed flush with the bracket.



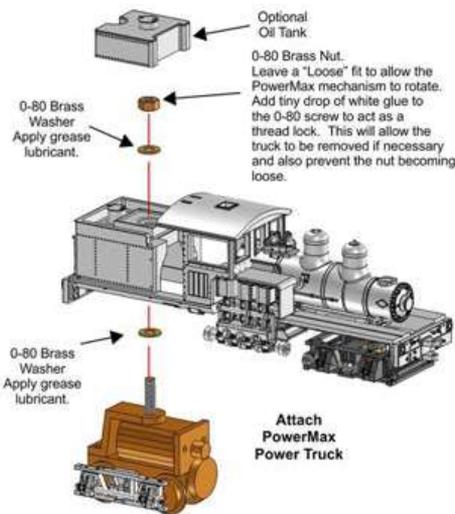
**Photo 4:** On the right, a 3.3K Ohm 1/10 watt resistor has been fitted to the for the headlights prior to attaching the bracket; on the left, the modified rotator bracket has been attached using the two screws that come with the PowerMAX!©.



**Photo 5:** The tender water tank mounted to the locomotive frame; scrape any blackening off the casting prior to gluing, and glue from the inside letting the glue wick into the joint.

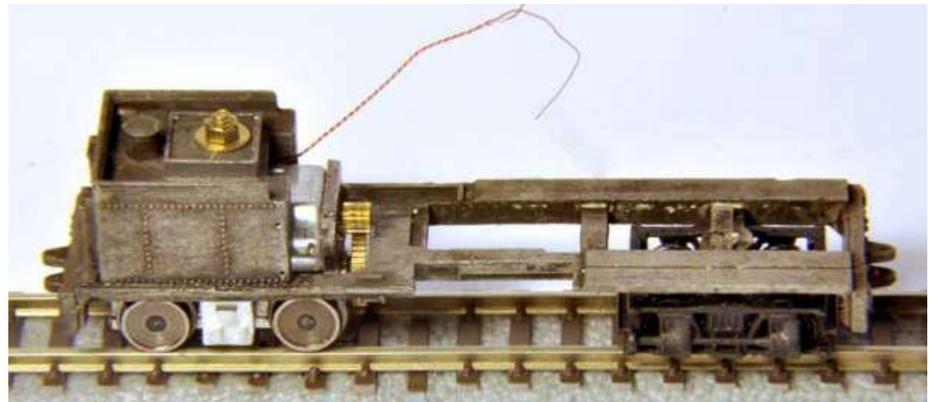


**Photo 6:** I carved a bit of the portion of the exterior tender wall which extends above the top of the tank into a taper, to visually thin these elements.



**Figure 1:** This exploded diagram shows how the PowerMAX!© power truck is mounted in the tender, after modifying the top rotator bracket. (Diagram courtesy Showcase Miniatures).

locomotive, and they usually ended up cluttered with a variety of tools, cables, ropes, oil cans and other "necessaries." This kit provides all the standard components of a typical Shay of this size, but in such a way the builder has some flexibility in the build. Be sure and do a little research to determine what you want your Shay to look like, especially if modeling a specific railroad or industry.



**Photo 7:** Testing of the chassis with the PowerMAX!© truck and front truck fastened in place; the wires will be connected to the headlights later.

You can find out about specific Shays at: [www.shaylocomotives.com/index.html](http://www.shaylocomotives.com/index.html)

The kit is composed of white metal (pewter) castings, etched stainless-steel details, some screws and washers, and a 3D printed and assembled front truck with Micro Trains Line wheel sets (Photo 2). Several stacks are provided to suit the fuel and style of the model the builder is creating. The kit is designed to utilize a PowerMAX!© 6.5mm gauge power truck RR-153S and top rotation adapter CCT-2 (not included – order at: [www.searails.com/PowerMAX!©.html](http://www.searails.com/PowerMAX!©.html)) As with most Nn3 Shay models out there,

the crank-shaft does not rotate, but this is really not noticeable. (Indeed, I built an Nn3 Class B Shay in the 1980s with an operational crankshaft and had to point out to viewers it was turning, as under normal lighting conditions the motion cannot be seen when running!) The kit is designed to use link-and-pin couplers (not included) but also includes optional white metal knuckle couplers that mate with MTL Nn3 couplers. Other coupler options are available, and are discussed later. An oil bunker is included for an oil-fired locomotive, but coal or wood loads are not provided. However,

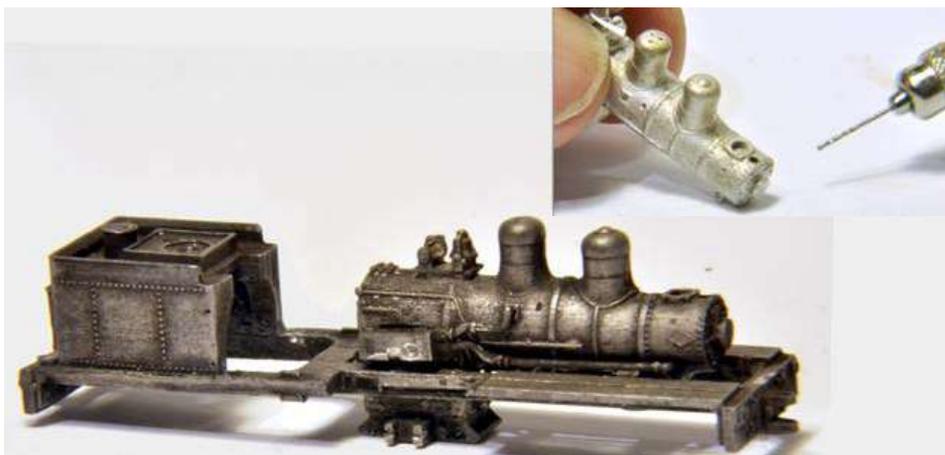
an extension railing for the top of the water tender is provided on the etching for containing tall wood loads.

The instructions recommend pre-blackening the white metal parts with a chemical blackener intended for pewter castings. A source for one is mentioned in the instructions. I used Pewter Black from Jax Chemical Company. ([www.jax-chemical.com/jaxshop/shopexd.asp?id=61](http://www.jax-chemical.com/jaxshop/shopexd.asp?id=61)) Since I intended to spray my model with Floquil model enamels after assembly, I lightly blackened the parts so if the paint rubbed through, the gray from the blackener would show.

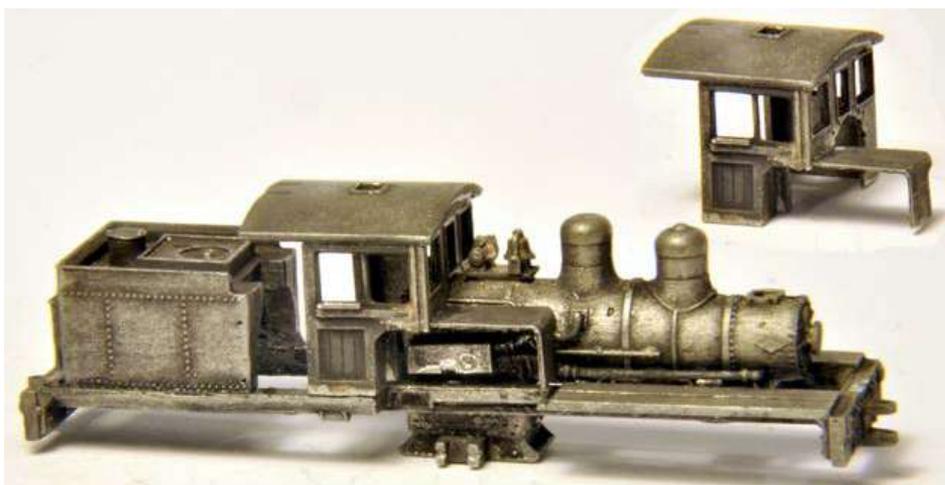
Assembly is very straight forward, and for the base assembly I only deviated from the instructions in that I drilled the headlamps and the loco boiler for wiring for operating lamps. Also, my locomotives get a lot of rough treatment, and travel a lot, so I pinned some parts together in addition to gluing to strengthen the joint.

Prior to beginning construction, the PowerMAX!© power truck needs to be prepared. Turn the top rotation adapter upside down and counter-sink for the head of a flat head screw. Leave enough meat to thread for the 0-80 screw. Run the screw in, adding a drop of CA adhesive or Loctite to the threads under the head just as you run the screw fully in. After the CA has set, file any remaining portion of the screw head standing proud of the bracket flush with the bracket. (*Photo 3*) Then fit the bracket to the PowerMAX!© with the two screws included with the PowerMAX!©. (Note: If you are equipping your loco with lights, be sure and add the wiring and resistor before fixing the bracket to the PowerMAX!© - *Photo 4*.) Then replace the PowerMAX!© bottom cover with the one supplied with the kit and intended to hold the second truck side frames. I added the side frames AFTER installing the cover plate, to make sure the side frames were level and evenly spaced out from the wheels. (I actually waited until I test ran the chassis to install these side frames, as is apparent in the photos).

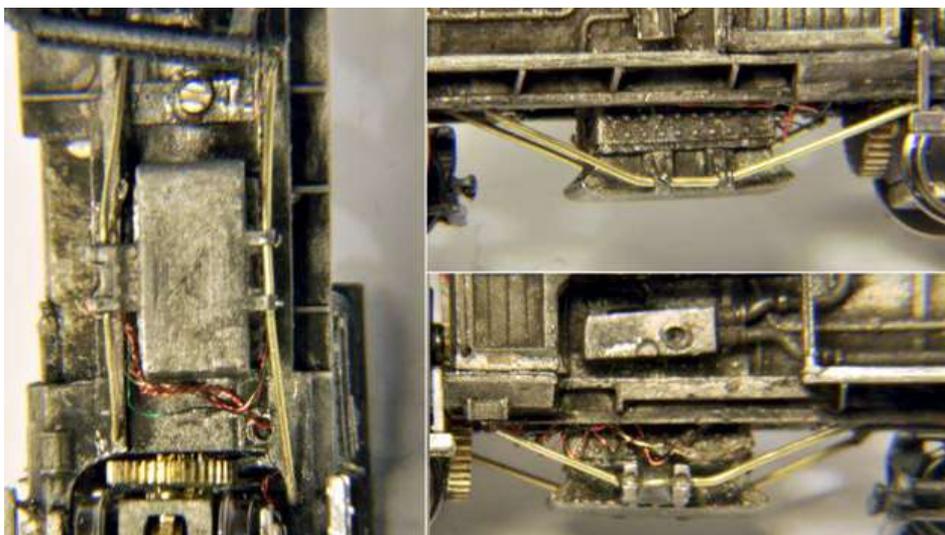
The first step in the construction is to cut the major parts from the sprues and clean up the tab locations. (I left the headlights on the sprue until



**Photo 8:** Boiler glued in place on the frame. *Inset:* hole drilled through smokebox for headlight wiring.



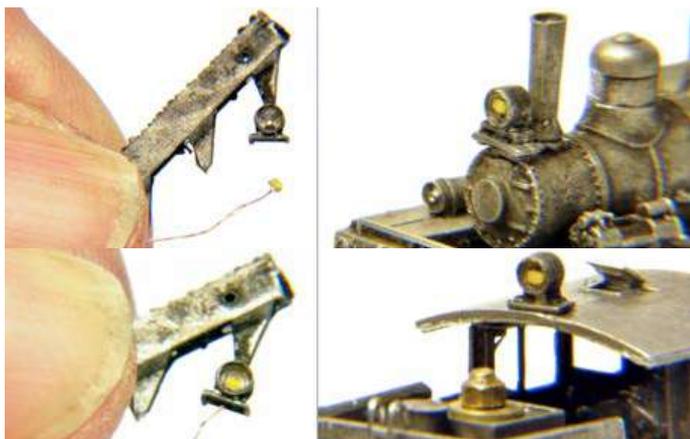
**Photo 9:** I found assembling the cab and cylinder cover separately the best way to get everything square, then mounting the cab onto the boiler and frame. If you are not installing an operating light on the cab roof, hold off on mounting the cab until after painting and adding the glazing.



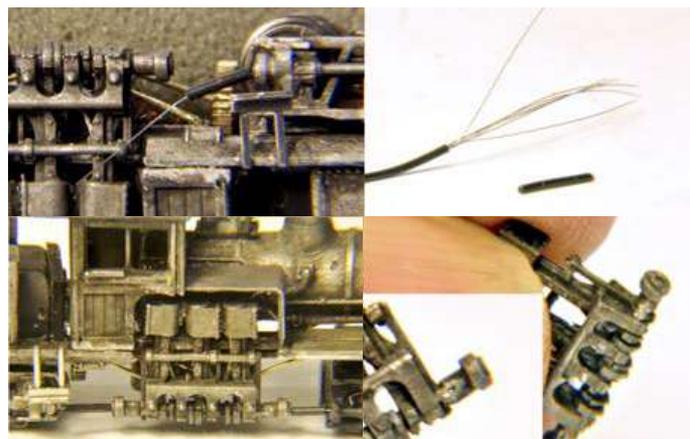
**Photo 10:** Truss rods: upper right is left side of locomotive, bottom right is right side of locomotive; left side shows view from bottom – note truss rods are terminated out of the way of the gear on the lay shaft.

after I had drilled them out a bit and drilled up from the bottom for wiring.) Next, blacken the parts with the pewter blackening chemical. I only did

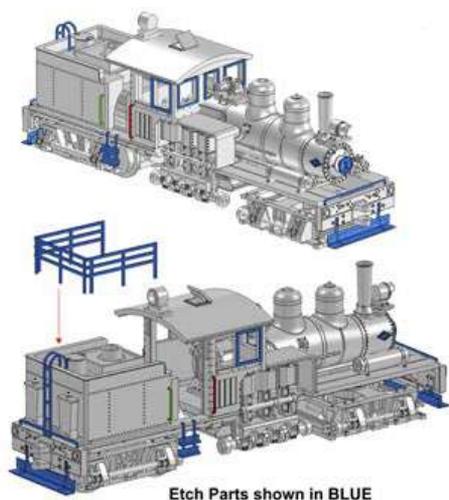
a couple of parts at a time, and only left them in the solution for a couple of minutes. I then rinsed the parts in clean water, and wiped off any residual black



**Photo 11:** Headlights: upper left shows the headlight prepared for adding the SMLED, and one of the “nano” SMLEDs from N’gineering; bottom left shows the SMLED in place inside the headlight casting; upper right is the front headlight in place, and on the lower right is the back-up headlight in place (note the wiring running down the corner of the inside of the cab.)



**Photo 12:** Drive shafts: upper right is the multi-strand electrical wire, with a portion stripped off and trimmed; lower right shows the end of the universal joint on one end of the engine, drilled out on the end. The inset shows the back of the u-joint where the #80 hole exits the casting; upper left shows the drive shaft being installed; lower left shows the completed installation of the two shafts.



**Figure 2:** The kit includes a fret of detail parts to be added by the modeler to suit the Shay they are modeling; note the “fence” like structure would be included on wood-burning Shays to contain high stacks of wood fuel. (Diagram courtesy of Showcase Miniatures).

powder that had formed on the surface with tissue. You can repeat this to get a darker finish than I wanted (or omit this step entirely and just paint later).

Next, fit the tender to the locomotive frame and add CA adhesive from the inside to wick into the joint (*Photo 5*). I used an accelerator to get a good bond. I also beveled the top edges of the water tender to get a thinner look (*Photo 6*). Now test fit the PowerMAX!© into the chassis with the 0-80 screw protruding up through the tender casting as shown in *Figure 1*. It is now a good time to fit the front truck to the chassis and check that everything sits level. If not, file the front truck bolster a bit until it



**Photo 13:** Coupler options: on the top in this photo is a Nelson Gray scale dummy coupler; next down, to the left, is the pewter coupler included in the kit which is MTL-compatible; attached to the locomotive is a shortened MTL 905 coupler; next down is a Pair Hands scale dummy knuckle coupler; below that (at the bottom of the photo) is an MTL “Civil War Era” link-and-pin coupler link, modified to fit the link-and-pin fitting on the Showcase locomotive.

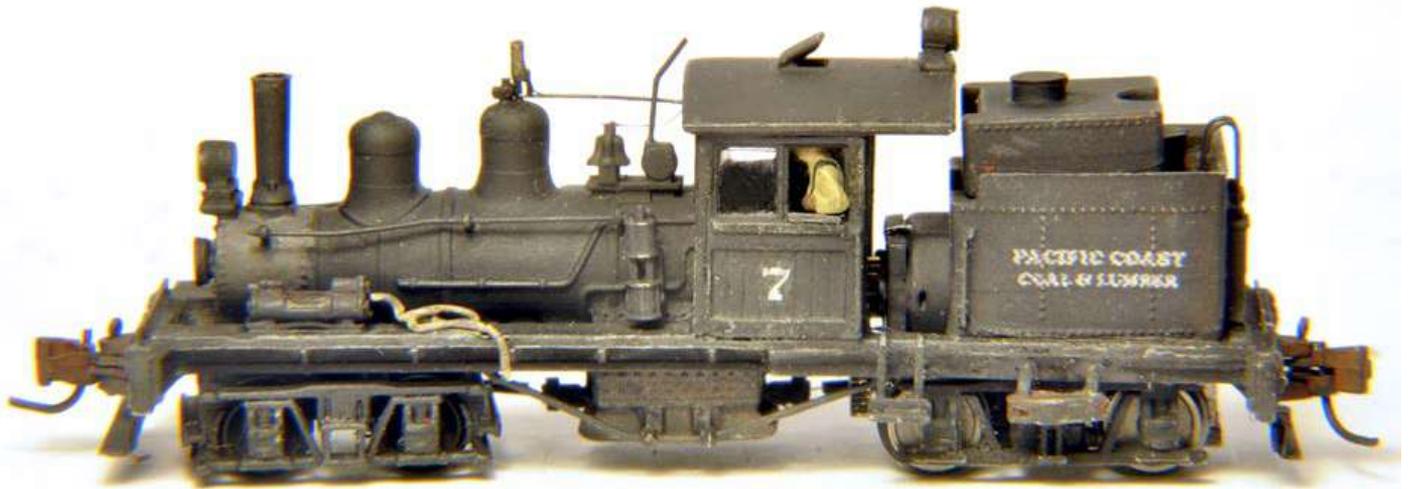
does. Then you can test run the chassis. (*Photo 7*)

I then glued the boiler in place (after drilling a diagonal hole down from the top of the boiler between the stack base and the smokebox front exiting behind the exhaust fitting under the smokebox) then glued the casting in place that has the steam supply and exhaust piping, fitting the ends of the piping into the appropriate holes on the boiler casting. (*Photo 8*) To assure the boiler casting would never come loose, I drilled a small hole up through the cross piece at the center of the frame into the bottom of the boiler and added a very small metric self-tapping

screw at this location. (Just call me “belt-and-suspenders-Tom”!)

I assembled the cab separately, then added it to the locomotive (*Photo 9*); I found this the easiest was to get the three sides, the roof, and the cover for the cylinders all tight and square. I decided to install the rear-facing headlight on the cab roof, as shown in the Showcase instructions, so needed to fit the cab to the rest of the locomotive to run wiring. If you elect to install the rear headlight on the tender, don’t install the cab until later, after painting and glazing. (This is especially important if fitting the loco with a DCC decoder). Truss rods were cut and bent from .015” brass wire and fitted to both sides of the locomotive (*Photo 10*).

As noted earlier, I drilled out the interior of the headlights a small amount to make more room for the N’Gineering “nano” SMLED lamps, and drilled up from the bottom of the headlight castings to the interior of the “reflector”. With this done, I cut each headlight from the sprue, dressed the cut, then threaded the wires through the hole and glued the SMLED in place with CA glue (*Photo 11*). Note: Before doing this, very lightly coat the SMLED back and sides with CA as an insulating coating to assure you do not get an electrical short. I then test the installation with one of N’Gineering LED testers before proceeding to the next step. With the headlights prepared and tested, thread the wire down through the holes in the boiler and cab roof, and

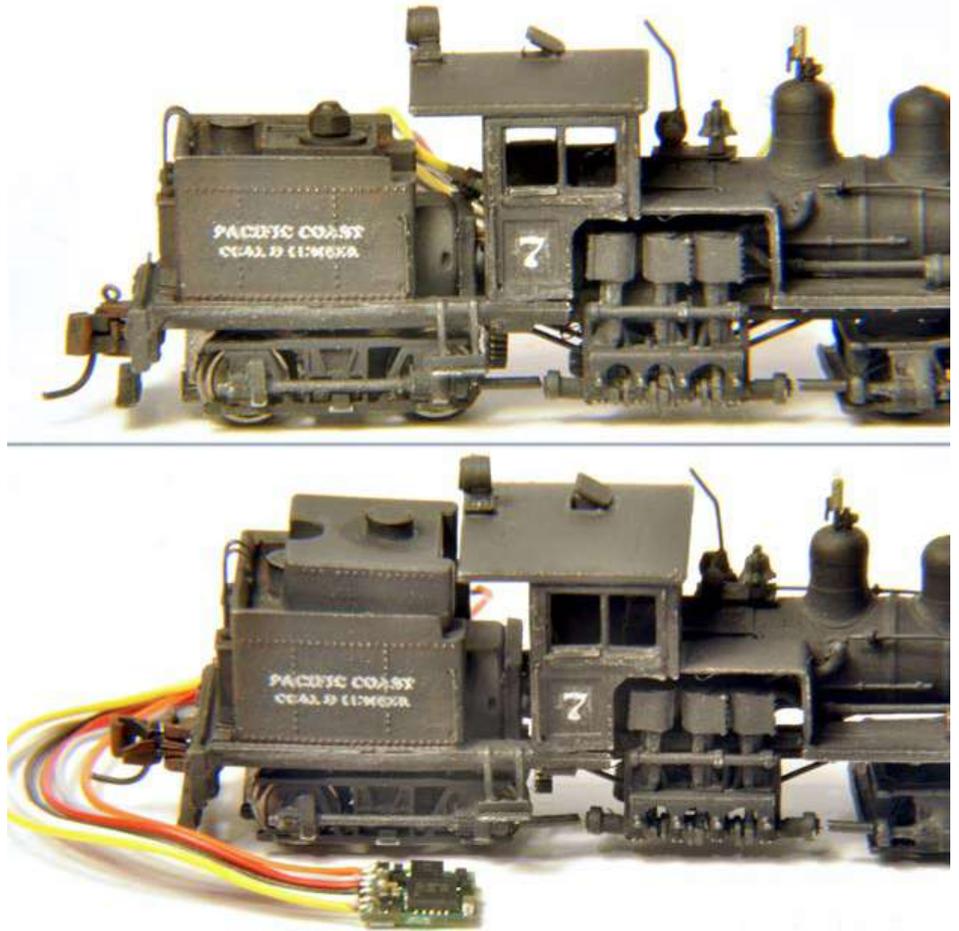


**Photo 14:** The left side of the Shay (sometimes called the “accessories” side) showing the re-rail frog and water hose I fitted; the re-rail frog is pinned with .010” brass wire in addition to fixed with CA glue.

glue the lights in place. I ran the wiring for the rear headlight down the interior corner of the cab and through a hole in the cab floor to a point under the floor behind the firebox where I could make all the connections in a relatively hidden location. I ran the front headlight wiring along the inside of the frame and through the very small gap between the firebox and the frame to the same area.

The remainder of the appliances glue into place on the boiler and running boards as shown. Refer to your own references to “customize” the location and type of appliances you are fitting to the locomotive. Pewter castings of a variety of such equipment are available from Republic Locomotive Works. I did not glue the oil bunker in place at this time, choosing to wait until after painting and additional detailing. A stainless steel fret of hand rails, pilot grab irons, steps, and other items is included (see *Figure 2*) for the modeler to install. I scrapped the blackening off the pewter castings at locations where these were to be affixed before gluing them in place with CA.

The kit does not come with drive shafts connecting the engine crankshaft to the two trucks. This will probably not be noticeable to most, and is a concession to operability and practicality. However, I fitted a pair of drive shafts using techniques I have employed on other Nn3 Shay builds. I drilled out the universal joint housing on both trucks and the engine with a #65 drill,



**Photo 15:** A CT Elektronik DCX76zD /F Sub-Micro decoder next to the Shay, and inserted into the cab (decoder is below window sills!) shows that a DCC installation in this loco is definitely possible.

then drilled on an angle within that hole with a #80 bit exiting out the back of the casting. I made the drive shafts from short lengths of black wire insulation stripped from surplus multi-strand wire from a decoder (*Photo 12 upper right*). These “shafts” need to be just

sort enough to allow for rotation of the trucks on a right-hand turn without binding on the trucks. With the engine assembled, I threaded a single strand of wire from the same surplus electrical wire through the section of insulation and the ends through the holes at the



**Photo 16:** On the author's layout pulling a string of disconnect logging trucks with logs headed for the sawmill.

#### BILL OF MATERIALS

Description	Part number	Cost
Showcase Miniatures Nn3 Class B Shay Kit	5002	\$125.00
Searails 6.5mm Gauge PowerMAX!®	RR-153S	\$89.95
Searails Top Rotating Connector	CCT-2	\$30.00
N'Gineering "Nano" LEDs	N-1038-2 (pair)	\$6.75
Detail Associates Lifting Eyes	2206 (20 for \$3.25)	\$0.33*
Detail Associates Brass Wire (.010" and .015")	DET-2503 & 2505 (4 pcs ea. pkg.)	\$1.00*
Gold Rush Models Handrail Stanchions	From 160-32 or 160-42 (150/sheet)	---*
<b>Couplers</b> (if other than supplied coupler):		
Micro-Trains Line Nn3 Knuckle Couplers, or	002 02 021 (\$7.95/2-pr)	\$3.98*
Micro-Trains Line Link-and-Pin Couplers, or	001 02 260 (\$9.40/2-pr)	\$4.70*
RLW/GHQ Dummy Coupler	GHQ-K27-17 (pr.)	\$2.00
<b>Optional:</b>		
LaBelle Engine Crew	0430-007501 or 7502	\$7.98
RLW Re-rail frog	DA-8020 or GHQ-K27-25 (\$2.60/2)	\$1.30*

\*Portion of total cost used in project

universals that would be at each end of the shaft (*Photo 12 upper left*). I bent the end of the wires at 90 degrees and snipped them off, leaving enough slack so the trucks could rotate through about 14 degrees.

As mentioned, the kit is designed for link-and-pin couplers, and mates with Nn3 rolling stock from Showcase Miniatures. I found Detail Associates metal Lifting Eyes (#2206) ideal for the pin. If you want to use the locomotive with rolling stock equipped with MTL Nn3 knuckle couplers, you have a few additional options. The white metal knuckle coupler included in the kit is dimpled for drilling out a hole for the pin, allowing the coupler to be mounted in the link-and-pin fitting on the pilot. This is in keeping with the typical prototype practice of being able to interchange from knuckle to link-and-pin couplers, as shown in Photo 13. Other white-metal dummy couplers are also available, as are scale dummy couplers and MTL link-and-pin couplers. I found mounting the knuckle portions of an MTL 905 coupler to the pocket best for operation with MTL knuckle

couplers (*Photo 13*). The 905 sits a little high but seems to mate satisfactorily with rolling stock. The MTL link-and-pin coupler is an attractive alternative for a train of cars routinely operated as a "unit train" such as log cars or ore cars. The MTL link-and-pin coupler will snap fit into a #905 draft gear box on rolling stock, while the end of the coupler being affixed to the locomotive can be trimmed and drilled to fit the fitting on the loco pilot.

For final painting, I masked the wheels and headlights and airbrushed the locomotive with Floquil Engine Black, followed by a light directional airbrushing of Weathered Black after applying decals. This was followed by very light dry-brushing with Flat Gull Gray to bring out highlights, and Rustall washes at appropriate locations. The etchings include separate window frames for all the windows. I did not install these, but did install glazing from the inside, working carefully through the back of the cab before attaching the fuel bunker to the top of the water tank. I also fitted a crew to the cab prior to attaching the oil bunker in place with

thin double-stick tape so I can remove it to service the PowerMAX!© if necessary (*Photo 14*). As mentioned earlier, these locos tended to collect a lot of junk on the running boards and top of the tender, and I will be adding some logging tools available from RLW later. For now, my added details consist of a water hose (small bit of electrical wire) and a Details Associates re-rail frog. (I drilled and pinned the re-rail frog in place as this would not have lasted long if just glued.)

This was an easy-to-build project, taking about one week of evenings (including letting paint dry for 24 hours). With the PowerMAX!© drive unit, I am able to consistently and reliably run at 15-20 scale MPH (although reliability through turnout frogs could be improved by adding electrical pick-up to the front truck – my next project!)

As a footnote, I have not yet installed it, but confirmed by trial fitting that a CT Elektronik DCX76zD /F Sub-Micro decoder will fit in the cab. The only potential stumbling block to the installation could be the wiring restricting the sideways rotation of the PowerMAX!© rear truck. If I fit one at a future date, I will let everyone know how it goes.

In the next installment of this column, I will report on the National N Scale Convention held in Sacramento this past June. I understand there will be some new Nn3 products shown there, and I will have an NTRAK Nn3 module in the modular layout. Meanwhile, please e-mail me at [thomasknapp@att.net](mailto:thomasknapp@att.net) with your comments, questions, and ideas for content. I would especially like to see the modeling of other Nn3ers out there that I could share with the readers of this magazine. 🚂