

Showcase Miniatures N-Scale Class B 30-40 Ton Shay

By David E Jones



The first Shay locomotive was devised in America by one Ephraim Shay in 1877-78, to haul timber for his logging company. It had a small vertical boiler and ran on two articulated, two-axle trucks. A parallel twin steam engine mounted vertically on its right-hand side with its crankshaft running fore and aft drove all of the wheels in both trucks via rotating universal and sliding-jointed drive-shafts and bevel gears on the axle ends. The engine and drive-train were mounted out in the open like that to make them easy to inspect, lubricate and repair in the field. With its articulated trucks, the Shay could handle tighter curves than conventional steam locos and the reduction-gear drive to all wheels gave more pulling power at low speeds and a smoother power delivery that was much easier on the lightly-built logging tracks. Ephraim Shay went into a partnership with the Lima locomotive works to build and sell Shay locos and the design soon evolved into a larger loco with a horizontal boiler. The boiler was offset to the left side of the chassis to counterbalance the weight of the steam engine and drive train. Between 1878 and 1945, the Lima locomotive

company built 2,767 Shays of various sizes, in four basic configurations:

Class A: 2 cylinder engine and 2 driven trucks (6-24 tons)

Class B: 3 cylinder engine and 2 driven trucks (10-80 tons)

Class C: 3 cylinder engine and 3 driven trucks (40-160 tons)

Class D: 3 cylinder engine and 4 driven trucks (100-150 tons)

The Willamette Iron and Steel Works built another 33 Class C 70 ton Shays between 1922 and 1929. Most Shays were used on logging, mining and plantation railways in the USA, Canada and South America. A few were exported as far as Taiwan, the Philippines and Australia. About 20 Shays are still in working condition and around 90 are on static display or under restoration in the USA. A few other Shays have also survived in the other countries in which they were used. (ref www.shaylocomotives.com www.limalocomotiveworks.com/shay_locos.html)

Class A, B and C Shays (18 altogether) were used in Australia from 1902 to 1946, in New South Wales, Queensland, Tasmania, Victoria and Western Australia. Three Shays remain in Australia, on static display, at the Puffing Billy Museum (Victoria), the Nambour and District Historical Museum (Queensland) and the Illawarra light Railway Museum (New South Wales).

Atlas sells a ready-to-run Shay, but that is a much bigger, mass-produced-in-China model of a generic, oil-burning, Class B Shay of what looks like 60-70 tons. They used off-the-shelf motor and drive components to keep costs down, and the model had to be big enough to fit that lot in and heavy enough to perform up to mass-market expectations. Cost/profit balances also limited its accuracy and detail. Commercially speaking, Atlas got that balance about right – the Atlas Shay is popular and sells well. But I wanted a smaller and better-detailed wood-burning Shay. The Showcase Miniatures Shay can be built as an oil, coal or wood-burning loco. It doesn't have the Atlas Shay's star attraction: the tiny moving drive-shafts, engine crankshaft and connecting rods. But then, it won't have the problems with those tiny moving bits that the Atlas Shay can suffer from

(defective parts/assembly and fouling by dirt, dust or hair). If you want to model in Nn3 (N-scale narrow gauge using Z-scale track), Showcase Miniatures also sells an Nn3 version of this kit, a smaller Nn3 Class B 26 ton Climax and an even smaller Nn3 Class A 16 ton Shay.

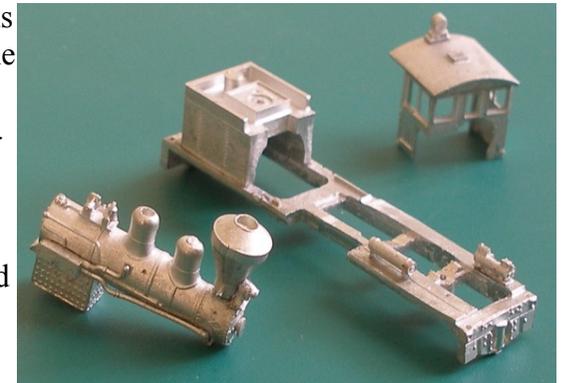
The Showcase Miniatures Shay kit comes in a clear plastic jewel case that, with a bit of foam padding, can be used to store the finished loco. There are 30 cast pewter parts, along with a sheet of brass photo-etched details, some laser-cut fibre board 'planks', brass wire, a well-detailed, 3D-printed front truck, two fox valley 28" wheel-sets for that truck, and the nuts, bolts and washers needed to assemble the loco.



The double-sided instruction sheet is well illustrated, clear and easy to

follow. There is a labelled photo that tells you what most of the parts are. However, the small parts on the three 'detail set' sprues aren't labelled. They can be identified by looking at the assembly diagrams elsewhere in the instruction sheet. Two moulded black plastic Micro-Trains link and pin draw-bars are included in the kit. These clip onto the pivots cast into the end beams of the chassis. There are also two Z/N-scale cast metal static knuckle couplers, but the knuckles were apparently superseded by the draw-bars and fitting them involves slightly modifying the end beams of the chassis with a little bit of cutting, filing and drilling. If you want to use the knuckles but don't see how to, just ask Showcase Miniatures. They'll e-mail you an instruction sheet that shows how to do it. There are three cast lanterns provided, but only two are actually shown in the instructions – one just in front of the smokestack and one on the top of the cabin. The third one goes on the top-rear of the optional oil tank, facing the rear. The metal castings are well-made from a modern, lead-free pewter and are well detailed. Super glue gel is recommended for assembling this kit. The advice given in red in the instructions to test-fit the parts before gluing them shouldn't be ignored. Most of the parts fit well enough, but some do need a bit of tidying-up or adjustment with a needle file.

I diverged from the instructions a bit in that I glued-on all of the boiler's cast detail parts to produce a boiler sub-assembly. I also glued the water tank, injector pump and air tank to the chassis to make a chassis sub-assembly. And I assembled the cabin then glued-on the cabin vent and rear light to make the cabin sub-assembly.



It's a good idea to prime and paint those sub-assemblies at this stage. Getting complete and even paint coverage will be hard (if not impossible) if you leave the painting until after everything is glued together.



The firebox and control details on the back of the boiler are, from what I can find out, correct. If you want them to stand out, paint those details before gluing the boiler onto the chassis. I also painted and detailed the engine while it was still a separate piece.

Drilling the holes for the photo-etched and brass wire details is also much easier when the sub-assemblies are still separate. The positions of the holes are indicated by cast-in marks and they are easy to drill in the pewter, using a 0.40mm drill bit held in a pin-vice.

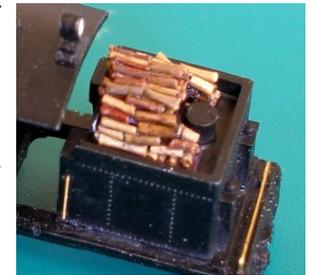
I sprayed the primed sub-assemblies with a base colour coat of Tamiya matt black XF-1, diluted 1:1 with Tamiya acrylic thinner. I then glued the primed and painted sub-assemblies together and added the engine and its cover to produce a complete body/chassis assembly.



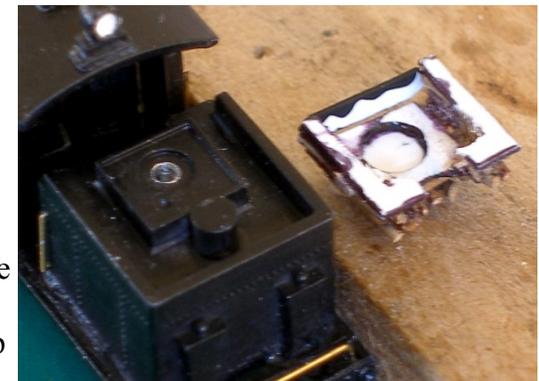
The kit includes parts to build the Shay as an oil, coal or wood burning loco, but the instruction sheet doesn't say what parts go with what type. For those who don't know: Oil burning locos didn't emit smouldering

cinders in their firebox exhaust and only needed plain, straight smokestacks. Coal and wood-burning locos did emit smouldering cinders in their firebox exhaust. On lines where that could be ignored, plain, straight smokestacks were fitted. But where there was a risk of the smouldering cinders starting fires (grass, forest or coal), spark-arresting smokestacks were used. Two spark-arresting smokestacks are provided with the kit. Coal-burning locos were fitted with the small one. Wood-burning locos were fitted with either the small or large one.

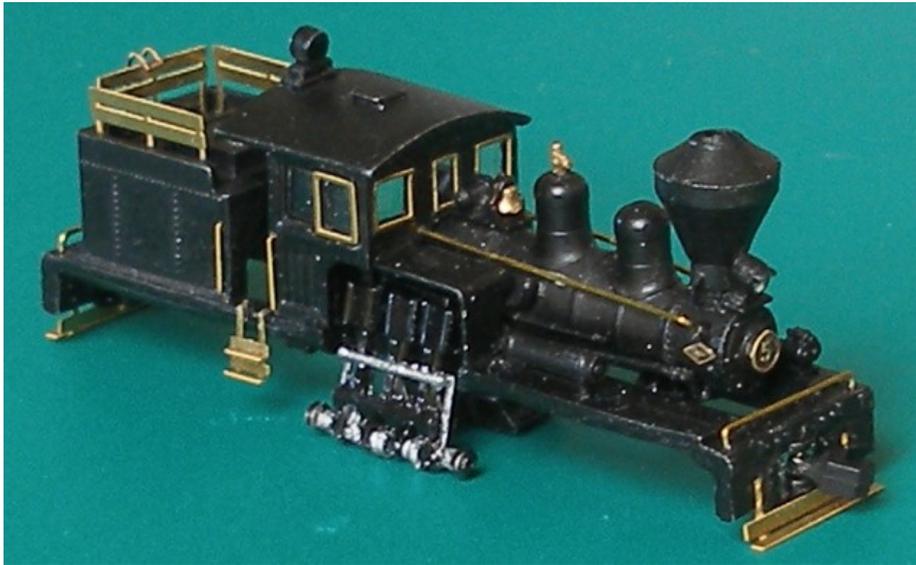
For an oil-burning loco, the fine, photo-etched handrails and the oil tank go on the top of the water tank. For a coal or wood-burning loco, put the planked, photo-etched rails on the top of the water tank and, instead of the oil tank, a pile of coarse sand (glued and painted black to look like coal) or a pile of small twigs (cut to size and glued to look like a wood pile). Make sure that the coal or wood pile has a hollow on its underside so it won't foul the drive unit retaining nut – that nut has to be clear to rotate with the drive unit as it pivots.



Don't glue the oil tank or wood/coal pile onto the water tank – you have to remove it to get at the drive unit retaining nut to adjust it or to remove the drive unit. I made a removable base from thin plasticard and glued the pieces of twigs onto that. The base fits snugly over the rectangular boss cast into the top of the water tank, which holds it in place securely enough and the wood pile can be just lifted off to get at the drive unit retaining nut if necessary.



I sorted-out the wood pile before gluing-on all of the fine brass details.



I then painted those brass details and finished-off with some 'weathering' and sprayed-on 'dirt' on the bodywork and the truck side-frames.

The sides of the front truck have to be flexed 0.5-1.0mm outwards to get the wheel-sets into the truck. The solvents in some paints can react with plastic and make it brittle. So fit the wheel-sets *before* painting the front truck and/or use a water-based paint. Cast resin and 3D-prints (especially finely-detailed ones like this) can also just turn-out brittle anyway, and the front truck in my kit broke-up before I could get the side-frames flexed-out enough to get a wheel-set in. I e-mailed Showcase Miniatures and told them about that. They replied the next day. They agreed that it is hard to get the wheel-sets into the front truck without it breaking. They're now revising the design and material to address that. They'll work-around the problem for now by supplying new orders for the kit with a fully assembled and painted front truck. They sent me an assembled and painted replacement front truck free of charge and it arrived at my place, in Australia, seven days later. Other companies take note: *that* is how to do

customer service properly! I did get the bits of the other (broken) front truck patched back together around the wheel-sets. It's not perfect, but it'll do as a spare and it has already come in handy as a test-bed to develop some electrical pick-ups for the front wheels (see later).

The wheels are so close a fit in the front truck that the outer edges of their flanges can rub on the cross-bars. If that happens, the resulting drag on the front wheels will make the loco barely capable of pulling its own weight. Before fitting the front truck, check that you can see daylight between the front, centre and rear cross-bars and the outer edges of the wheel flanges. To clear a flange, ease a 3-4 mm wide strip of 600-grade wet-and-dry paper between the wheel flange and the cross-bar, with the abrasive side facing the plastic, and slide it gently back and forth a few times.

When attaching the front truck, watch the bottom of the boiler above the chassis cross-member. If you're not paying attention, the front truck mounting screw can run-into the bottom of the boiler, jack the boiler up and break it loose. I shortened the screw by a few threads to make sure that that can't happen.



The Showcase Miniatures Shay is a body/chassis kit only. The front truck is included, but you have to buy the motor/rear truck unit separately. This kit was designed to use a Searails Powermax for that. This is one very compact motorised chassis with a 6x8x10 mm 6V iron-cored can motor. These smaller motors start and run faster than 'normal' sized N-scale motors and have much less torque. The Searails designers have allowed for that and they've equipped the Powermax with a 60:1 gearbox ('normal' model loco gearboxes are around 25:1) and that gets very good low speed running and torque out of that tiny motor. The unit is self-contained, with wheel-wiping pick-ups on all four wheels. After two mounting brackets and the cast side-frames (all included in the Shay kit) have been fitted to the Searails Powermax, it just

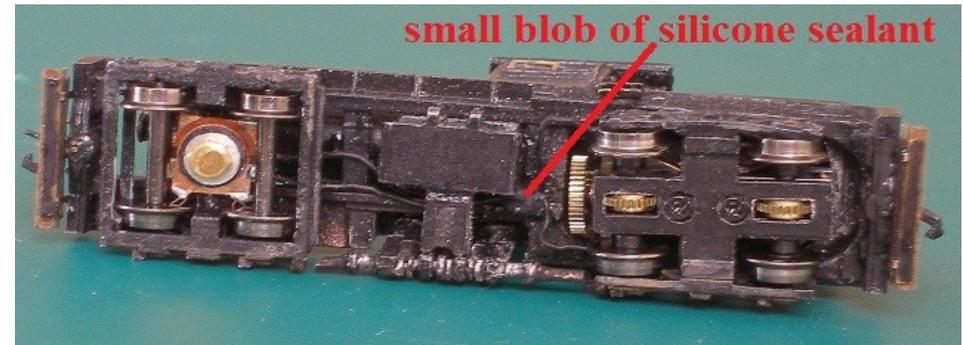
goes into the Shay's water tank with a nut and two washers and becomes the loco's rear truck. The loco is then ready to run. Before screwing the cast side-frame mounting bracket to the drive unit, check that the two slots in the bracket do actually clear the drive unit's axle gears. I had to lengthen both slots to achieve that. I also had to file 0.5-1.0 mm off the back of the cabin floor to clear the drive unit's front gears.

In stock form, this loco's electrical pick-up is through only the four wheels of the Searails Powermax, which has an 11mm wheelbase. The plastic frog in a Peco insul-frog turn-out, for example, is 12mm long. Both pick-up wheels on one side of the loco will get onto the plastic frog at the same time and the loco will lose power and stop. If you want to use this Shay on a layout that has turnouts, they'll have to be electro-frog turn-outs, or you'll have to fit pick-ups to the wheels in the front truck. Streamline Backshop DCC sells a range of photo-etched, phosphor-bronze, N-scale truck pick-ups. But I found that with this loco's marginal traction the drag on the front wheels from the standard wheel-wipers is too much of a performance hit.

I altered a pair of Streamline Backshop 4FW-440 pick-ups to make some pick-ups that have a very light touch and low drag by cutting off the phosphor-bronze wiper arms and soldering narrow loops of bronze spring wire from a straightened-out coupler spring to the base plates. The Searails Powermax motor draws at most about 80 mA. The spring-wire can handle ten times that. Note that there *must* also be an insulating washer between the two pick-up base plates. If those base plates touch, that will short circuit the loco. I made the plastic adaptor bush that insulates the pick-up base plates from the brass truck-mounting screw by drilling through an old plastic truck pivot pin and cutting it to length. A couple of drops of super-glue on the edges tied the four pieces into one solid unit and that makes it much easier to work with. Note that the front wheels may have a clear varnish on their inside faces. If so, that has to be cleaned off for the front wheel pick-ups to work. I



soldered a black 36AWG insulated wire to each pick-up base plate and routed the wires under the chassis, then cut them to length and soldered them to the motor unit before putting it into the water tank. Things are a tight fit in there and the wires must be routed to avoid fouling the motor unit's front gears and to allow the rear truck to pivot freely. One small blob of silicone sealant holds the wires in place. Note that the wires must have enough slack to allow them to flex and move with the trucks.



My Shay now trundles across insul-frogs without losing electrical contact. A 50Ω ¼W smd resistor can be fitted-in between each motor connecting wire and its motor terminal. They reduce the 0-12V track voltage to 0-6V across the 6V motor. With those, the Shay starts-up at a track voltage of 5V to a scale walking pace and it will run smoothly and reliably all day at that speed. The Searails Powermax drive unit has all-brass drive gears and they're not enclosed. Metal gears last longer than plastic ones, but they are noisier. Motor/gear noise is clearly audible at speed, but the loco is quiet when travelling slowly. Its maximum speed is a correct scale 20-25 km/h. The wheels have low-profile flanges that will run on code 55 track.

Small, accurate N-scale locos like this don't have much weight and so don't have much traction. That just comes with the territory and you just have to learn to live with it if you want to model in this league. This loco is driven by only the four wheels in its rear truck and it has no traction tyres. The loco weighs 40-45 grams but only about half of that is on the rear truck. I melted a fishing sinker down to a flat blob, then carved pieces from that to

fit under the cabin roof and around the rectangular boss on the top of the water tank and glued them into place. That only added 3-4 grams over the rear truck, but given the mere 25 grams that was originally there, that's a 10-15% increase in the weight on the driving wheels, which significantly improves the loco's performance. Even with that added weight, the Showcase Miniatures Shay is still light-on for traction. Most mainstream, 4-axle, American wagons are too heavy for it and it struggles to tow even two of them. But hey, they're too big and modern and just look wrong anyway. This Shay looks much better towing smaller, lighter, older, 2-axle, English Peco flat-cars or wagons, and it can handle 6-8 of those. My work-around for the traction problem was to use some of the small, light, resin logging-car body kits from Model Tech Studios in the USA, fitted with free-rolling, Atlas 50-ton trucks. The Showcase Miniatures Shay looks even better with those old and funky-looking logging cars and it can pull this train of them fairly comfortably on the flat:



The photo-etched brass railings and steps on the Shay are very fine and they are easy to bend or break-off. So this loco has to be handled with care and kept well out of the reach of children and ham-fisted adults. If you do lose or break something, all of the Shay's parts are separately available from Showcase Miniatures, including the photo-etched detail sheet.

The Showcase Miniatures N-scale Class B 30-40 ton Shay kit/Searails Powermax combo is not cheap at around A\$350 (or US\$270) all-up, plus

postage. To borrow a catch-phrase from one of the presenters of Canadian TV car show 'Dream Car Garage':

Do you really need a loco like this? Most people would probably say “No.” But do you *want* a loco like this?

This is one spindly, quirky, accurate and finely-detailed little N-scale loco that will have many people asking you where you got it, and how on earth you shoehorned a motor into the thing! The kit is fairly easy to put together and a good-looking result isn't hard to achieve. Even in stock form, with only four-wheel electrical pick-up, the Showcase Miniatures Shay runs smoothly and reliably and can run amazingly slowly for such a small loco. With a couple of modifications it can be made to handle insul-frogs and pull a reasonable-looking train. Take another look at that last photo while you think about those questions above. If you like small, old and unusual steam locos, then your answer can only be:

“Yeah, I *do* want a loco like this”.

If you run into a problem with this kit, Showcase Miniatures responds promptly to an e-mail. They do appreciate the feedback and are genuinely friendly, interested and happy to help – even with those of us way over on the other side of the world. I give them an A⁺ for customer service.

The Showcase Miniatures Class B 30-40 ton Shay body kit is available from www.showcaseminatures.net. Searails has decided to no longer sell their Powermax by itself and will now only supply it as part of one of their own complete kits – which will cost you a lot more than just buying a motor unit. But Showcase miniatures can now supply their own alternative motor unit for the Shay (see the Showcase Miniatures web site for details). Streamline Backshop pick-ups, insulating washers and 36AWG insulated wire are available from www.store.SBS4DCC.com. The N-scale logging cars seen above (and more) are available from www.modeltechstudios.com.