

## Converting BLI USRA Mikados to CNJ M3s & M3as Mikados

Our HO layout of Mauch Chunk PA is set in the 1945-55 period when steam was still widely use and the main motive power was delivered by 2-8-2 heavy Mikados which had quite a different look from the USRA standard. This difference was mainly due to the wider Wootten fireboxes, but also to the Elesco feedwater system and especially the Elesco feedwater heater ahead of the stack. Although we have a couple of brass (an M2 and an M3) Mikados, their cost and availability precludes fully populating the layout with these. We therefore looked to the option of modifying commercial plastic USRA heavy Mikados and particularly the excellent BLI models.

This projected was started some time ago jointly with Chris Bennett but was finished by the author following Chris's untimely passing in 2013. Our aim was not to produce perfect replicas of the prototype, rather something that would pass muster to the non-expert. Two of these modified Mikados - plus our brass Mikados (OMI) and an unmodified CNJ USRA Mikado (M1) - now form the core of the freight-hauling steam fleet on Mauch Chunk PA, alongside four 4-8-0 camelbacks.

### Background

The CNJ never had 'big steam' in the sense that most people think of US railroads. It was mainly a coal hauler and the biggest steam was the 2-8-2 heavy Mikado. However, because the Pennsylvania region was dotted with anthracite coal mines, most of the CNJ's steamers were adapted to burn anthracite. In practical terms this meant they had the wide, Wootten firebox. In earlier locomotives this resulted in the characteristic 'camelback' or 'mother hubbard' style of locomotive, but after these were banned in 1927 for being too dangerous, later steamers were more conventional.

Although the CNJ did run some USRA standard Mikados (M1) which did not have the wide firebox, later types – the M2 and M3 – had Wootten fireboxes. This project addresses modification of two plastic USRA Mikados from BLI (Broadway Limited Imports) to M3 types. The motivation for this is largely financial as the price of a brass (OMI) CNJ Mikado is frequently in the \$800 - \$1200 range – even when they can be found. A generic BLI USRA Mikado (picture to right) can be picked up on online auction sites for \$120 to \$200, even with DCC and a sound chip.



The approach of this modification was to give the impression of an M3s or M3as and the photos show that this is achieved without attention to minute detail. One main compromise is with check valves, which have been simulated with inverted stanchions where simulated at all. Others compromises are described at the end.

The following were used: (slight variations of the feedwater pump are required for M3as & M3s).

Description		Manufacturer	Number
Boiler check valve vertical x2		Cal-Scale	CV-265
Elesco Feedwater Heater System		Cal-Scale	190-2003
<i>M3s, or ...M3as</i>	Feedwater Heater Pump HD Elesco	Bowser - Cary	13-163
	Early Elesco Feedwater Pump	Bowser - Cary	13-129
Air Pump (Unpainted Brass Casting) -- 8-1/2" Westinghouse Cross Compound x2		Precision Scale	3092
Sander Valves (Unpainted Brass Castings;pkg(2)		Cal-Scale	SA-286
Washout plugs - small		Precision Scale	48213
Boiler Steps (brass) x2		Precision Scale	3301
Delta Trailing Truck - Black		Bachmann	H838X-00F01-B
Decals – Large Steam		Raritan Bay Hobbies	CNJ-29
Straight brass wire – various diameters			
Brass handrail stanchions (boat & rail)			
Fine brass metal eyebolts (single & double leg)			
USRA Long Tender		Bachmann	89831
			<b>TOTAL</b>

Other sources of most of these parts are available – Cal-scale and PSC carry varieties of most – and plastic alternatives to these brass parts can also be found. Decals can also be sourced elsewhere – including dry-rub, although these last are discontinued.

Including the unpriced wire etc., the total cost comes in at \$300-350. This is about half to a third of the price of the brass models, and the end product includes DCC and sound!

COMMENTS on suitability of parts

Description		Comment
Boiler check valve vertical		fine
Elesco Feedwater Heater System		fairly good, but even when modified, pipe connections are in the wrong place.
<i>Either ....or</i>	Feedwater Heater Pump HD Elesco	fine
	Early Elesco Feedwater Pump	fine
Air Pump (Unpainted Brass Casting) -- 8-1/2" Westinghouse Cross Compound x2		fine
Sander Valves (Unpainted Brass Castings;pkg(2)		wrong – but look OK
Washout plugs - small		fine
Boiler Steps (brass) x2		fine
Delta Trailing Truck - Black		too short if not modified
Decals – Large Steam		fine
USRA Long Tender		acceptable, but apart from its length & shape, almost everything is wrong (see below)

## Body Modifications

The main body modification required is the addition of a Wootten firebox. Firstly, all the snap-on removable parts were taken off, then the running board above the firebox was



removed with pliers and a flat-ended hobby knife. Other details were also flattened and a careful cut was made into the cab.



(purchased or home-made).

Meanwhile, back to the firebox, a sheet of black plastic-card was cut to the desired shape and glued to the firebox side with polystyrene cement – to fill some of the gaps underneath.

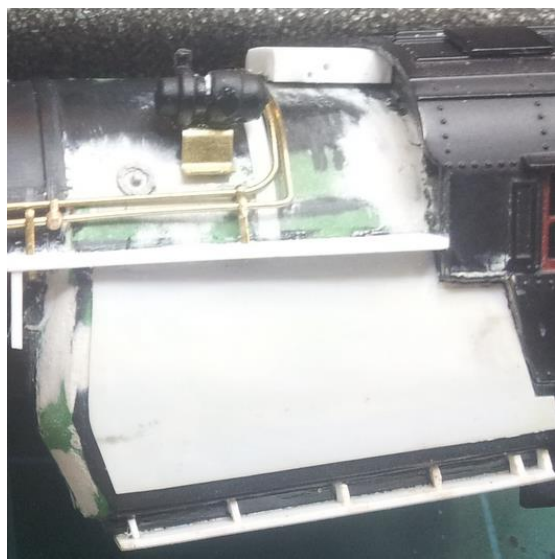


Green putty and White putty were then used to fill the gaps (above left) and give a smooth surface and this was finished with a thin sheet of plastic-card glued over the top. For this use superglue and ensure that there are no air-gaps. Other details such as boiler bands may also be added in plastic-card and MEK solvent was used for this.

A similar treatment was given to the rest of the boiler, removing surface detail that was not wanted. This is a matter of taste – some details could be retained, but this makes it hard to get an even finish for adjacent parts – or the boiler can be left largely featureless with everything: pipework, boiler bands etc.. needing to be added fresh. In both cases, it is necessary to file after cutting, and then fill with green/white putty and finally sand with sanding sticks



Layers of plastic-card were then added to build up the Wooten firebox shape as shown above right. This required splitting the shapes into two – a largely flat, bottom half and a chamfered top half. The top half was filed to give a rough approximation of a smooth curve.



### Plastic Card Details

Further detailing around the cab/boiler area was also carried out with plastic card as shown left. Ash pans were added using superglue, as was a new running board and a safety-valve turret cover. The turret cover was pre-drilled, using a hand-held pin vice, to take the pipework (wire).



A plastic generator was attached to the boiler side on a piece of pre-cut and bent brass sheet – again held with superglue.

The result is reasonably robust and certainly as strong as many plastic models. The crude running board is not evident once painted.

### **Pumps, Pipes and 'Valves'** **(M3as shown)**

The next step was to add the Feedwater and air pumps and some of the more involved pipe/wire work.

Holes were drilled in the existing running board with a powered mini-drill to take the pumps and they were attached with superglue (as were their mounts in the case of the air pumps).



Most holes are drilled, however, by hand with a pin vice and the appropriately sized drill bit. The picture also shows split pins being used to hold wire and – above the RH air pump - a three hole brass handrail stanchion, with the end cut off, used to represent a set of valves and joints. Although a little crude, this is considerably cheaper than buying sets of pre-cast valves and gives a good impression. The wire is bent and placed and rebent and replaced until it finally fits through holes and to the desired position. It is finally held with superglue applied to the minimum number of places. Superglue is applied with cocktail sticks to ensure that only just enough is used.

### **Elesco Feedwater Heater, Check Valve and Cooling Coils (M3as shown)**

Unfortunately I have no photos of the heater during assembly (ably carried out by Richard Oldfield) and mounting. The steps were as follows:

The rear pipework connections were cut off the body of the Feedwater heater and repositioned (rotated) as shown. These were then soldered on as were the ends. Note that this requires a really hot soldering iron.



A slot was cut in the top of the smokebox to take the Feedwater heater using a razor saw (laterally) and drilled with an electric mini drill to make the ends of the slot. This results in a rectangular hole which disappears when the heater is placed in it. The rather thick brass wire was carefully bent as required, positioned with eyebolts, and superglued in position. This needs to be taken to the full lengths as required and connected at both ends.

This larger picture of the finished LH side also shows the Cal-scale boiler check valve – the join to a piece of brass wire of the same diameter is hidden by an eyebolt and glued; Another eyebolt holds the end in

position. The sander valves above it have been cut about and attached to the sand dome. Please also note the remaining white putty on the boiler after filling and sanding.



The cooling coils were scratch built from brass bar and wire and soldered together by Richard Oldfield; a very rough jig was used for this. The brass bar extends up and is bent back and glued under the running board. In the picture above it can be seen that the wire is then extended to connect with the water pumps.



## The Right Hand Side (M3as)

The right-hand side was treated in a similar fashion although it was decided not to remove the boiler check valve on the M3as. As much as possible of the original was re-used on the M3as.



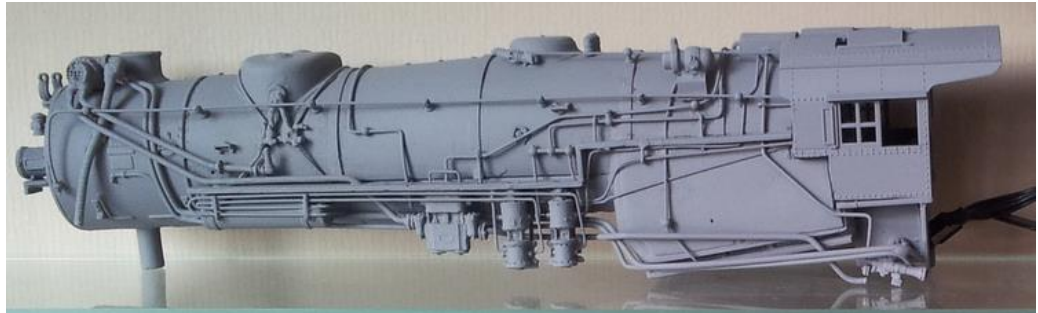
## Primed

Decals were carefully removed and the body was washed in a sonic bath for about ten minutes and then dried thoroughly. Both paint and body were warmed to around 70 F (20 C) for painting. A spray can of automobile primer was used rather than an airbrush, with several passes. The photos below show the differences between the M3s and M3as pipework. Note that although the M3s had all the details

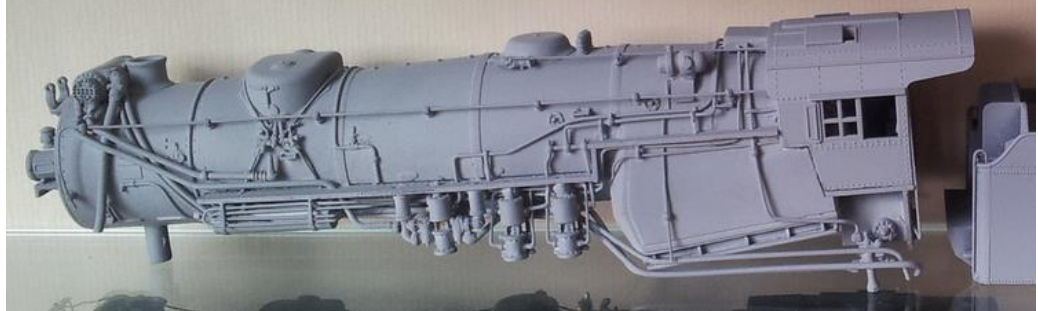


removed and then added back, whilst the M3as had as many details as possible kept, the end results have a very similar appearance.

### M3s



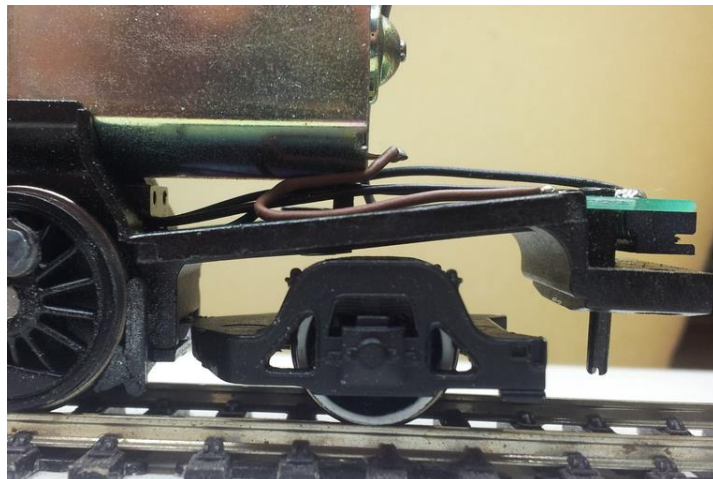
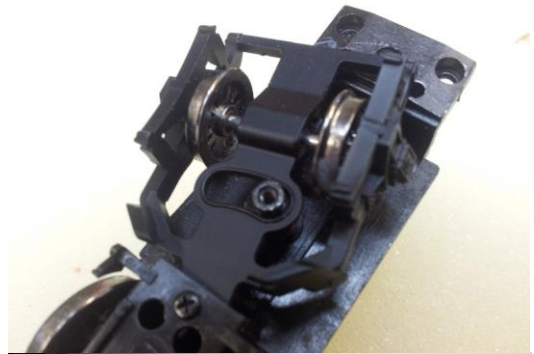
### M3as



## Trailing Trucks

The prototypes had delta trailing trucks – with spoked wheels earlier and, possibly, smooth wheels after the war (WWII). Bachmann delta trailing trucks (with smooth wheels) were used – these are about the right size but are too short. To fit one onto the USRA frame, the hole was drilled out with a rotary narrow file cone on a mini-drill, and the sides were taken back a little as well (R-centre).

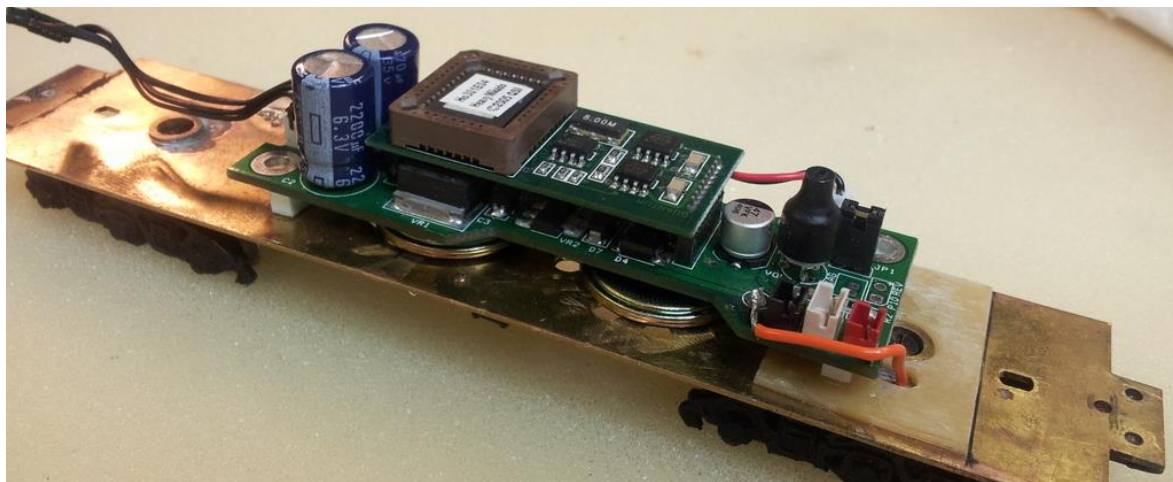
After the original truck was removed, the mounting rod was removed with a mini-drill as shown (R-below) and the new truck was fitted to the same mount. The picture below shows how the mount is really too short. No attempt was made to solve this on this occasion although it will be addressed in the future.



## Tenders

Each tender chose will have its own problems. A large brass tender obtained off an auction site and a Bachman USRA Long tender were adapted for these two models. In both cases the electrical pickups need to be worked out and connected to the BLI Sound chip boards, and holes need to be drilled in the base to let the sound out! There was found to be a considerable potential for shorting – the boards can short to the speakers if in contact and the tender to loco connector is best replaced with a non-conducting version (scratchbuilt). In fact, on one case we later had to replace the defunct sound chip and board with a simpler, and much smaller, but working chip.

The insides of these two tenders with the sound chips in position are shown below. In the case of the Bachmann tender, the base of the coal bunker had to be removed to make way for the sound chip components. The hole was effectively covered by the plastic coal load. The fit was still extremely tight and the sound as a result was a little muffled.





## The Result

This photo shows the converted M3as in front of an OMI brass model of a similar prototype. I believe the effect of the much cheaper conversion is very similar. I hope you agree.



## What is wrong with the Conversion?

Whilst we are very pleased with the overall appearance of the two Mikados, the following list itemises further areas of improvement which could be tackled in order to satisfy the most rivet-counting of modellers:

1. The Wootten firebox is a little short
2. There are only two cab roof lights – should have been three
3. The cab back is open – it should have been closed with a door
4. The delta trailing truck is too short
5. The trucks on the Bachmann USRA long tender (used on the M3s) are the wrong type
6. The ladder on the Bachman USRA long tender is on the wrong side.

For me these compromises didn't spoil the models, but points 2-6 will all be remedied at some point in the near future.

Steve Hales

Barrowmore Model Railway Group

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