MALKY'S N-SCALE S.A.R. MODELS

VR X Class Steam Locomotive

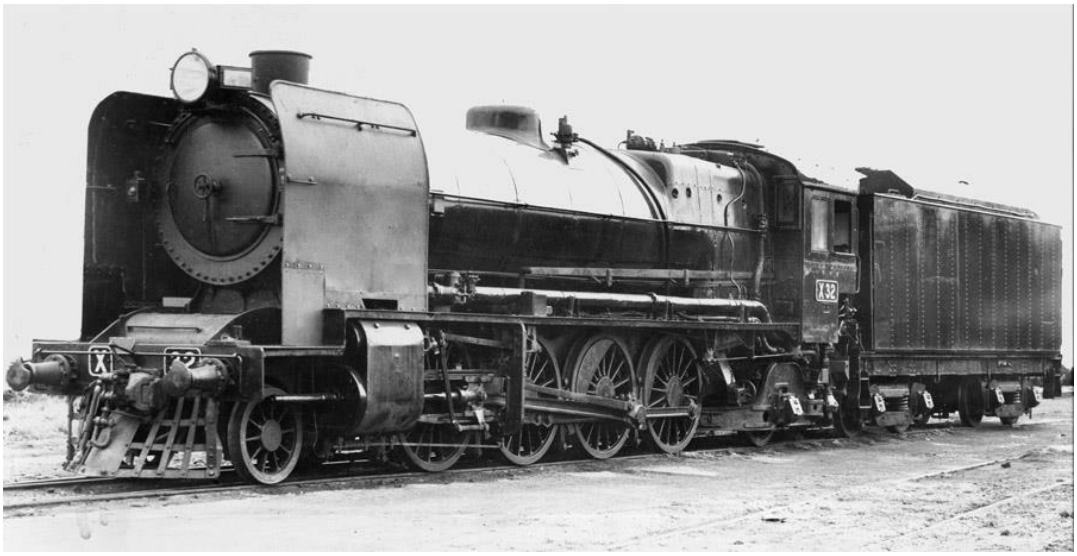


Photo Victorianrailways.net

This body kit is designed to fit on a modified Kato Japanese D51 chassis. Completion will require MicroTrains 1015 couplers and metal tender wheels of MicroTrains axle length (0.540") as well as a means of making contact with the tender wheels to conduct power to the loco.

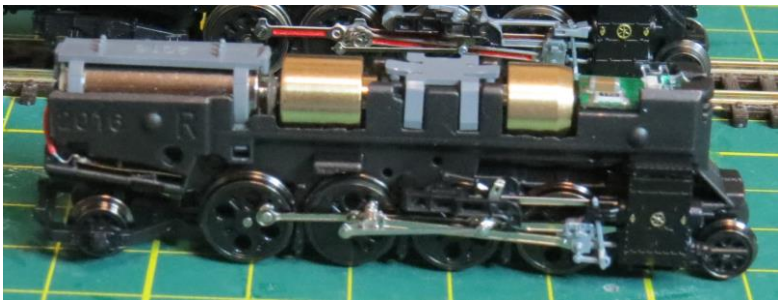
BEFORE STARTING: READ ALL INSTRUCTIONS AND IDENTIFY ALL THE PARTS.

It is best to complete the chassis modifications before starting work on the body.

The Kit: The kit is not a complete set of parts – it will be necessary to obtain detail parts and tender axle wipers from other sources to complete the model. The kit is intended to provide the basis for a skilled modeller to construct a model of the VR X class. The kit consists of 3D printed parts which can be purchased from Shapeways https://www.shapeways.com/shops/malky-s-n-scale-models and etched brass parts and decals which are available from MNSSARM https://dmjenkins.net/index.php/n-scale-models. The Shapeways portion consists of six parts: a loco body and tender body printed in Shapeways Smoothest Detail plastic and a floor/underframe for the tender which can be printed either in plastic or brass for additional weight. The body kit also includes the two tender bogies. The bar connecting the locomotive and tender is a separate part, printed in nylon. In addition, you will need Microtrains 1015 couplers, and suitable wheels for the bogies. The bogies are designed to take MicroTrains axle length (0.540") wheels.

Chassis Modification

It is preferable to complete the chassis modifications and ensure a good fit to the loco body, before proceeding to completion of the body. The unmodified Kato chassis is shown below. Disassembly and machining of the chassis are covered in a section at the end.



Body Preparation

1. Clean the plastic parts thoroughly to remove any remaining wax from the printing process. This is essential to ensure good paint and glue adhesion. Cleaning can be done by soaking in suitable solvent, such as isopropyl alcohol, assisted with a toothbrush. Further cleaning and/or sanding may be needed to produce an acceptable finish on the plastic parts.

2. Drill all holes for which centres are marked on the loco and tender bodies with conical centre marks. These are for the handrail stand-offs, the two ladders, whistle, clack valves, safety valves and the smokebox centre lock. The location of the turbo-generator is also marked on the firebox top. Depending on the detail to be fitted, a hole may or may not be required. Also carefully clean out the two slots in the front of the running board to take the two etched brass smoke deflectors.

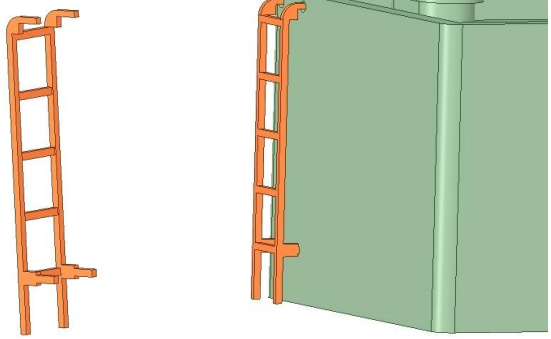
For the various details it is recommended and assumed that the details will be salvaged from the Kato D51 and/or other steam locomotive models. A cross-compound air compressor is required for the right hand running board. Refer to photographs for the nature and location of these details.

Etched Part Preparation

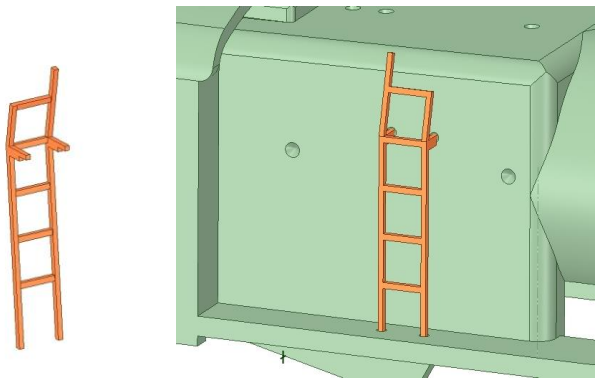
The etch fret contains the following parts: two smoke deflectors, tender ladder, right hand side footplate ladder, pilot or cow-catcher and a number of stand-offs for the handrails, with varying lengths of shaft.

Carefully remove the five major components from the brass etch fret, using either etch scissors (not ordinary household scissors!) or a sharp hobby knife blade, pressing down onto a relatively hard surface, such as hardwood. Carefully file off the remaining tabs. It is probably wise to leave the handrail stand-offs attached to their fret until you are ready to fit them. The etched parts should then be cleaned by soaking in vinegar for about five minutes, then rinsed in water and dried.

The two ladders must be folded into the required shape, see below. For 90° bends, always fold towards the half-etched fold line. It is preferable to use a specialised etch folding jig, but you can use two steel rules clamped together, or a pair of flat-nosed pliers. The tender ladder fits into the four holes on the rear of the tender. The fireman's side ladder on the loco fits into two holes in the firebox side and two in the footplate. Note that it is necessary to bend the upper portion as shown – it is not possible to design the etch with this fold in a single part component.

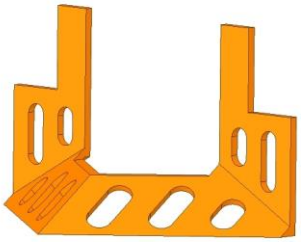


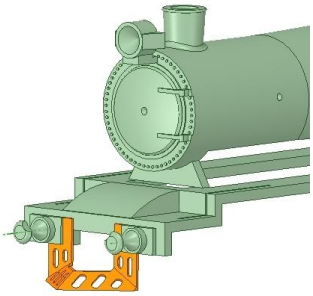
Tender Ladder form and fitment

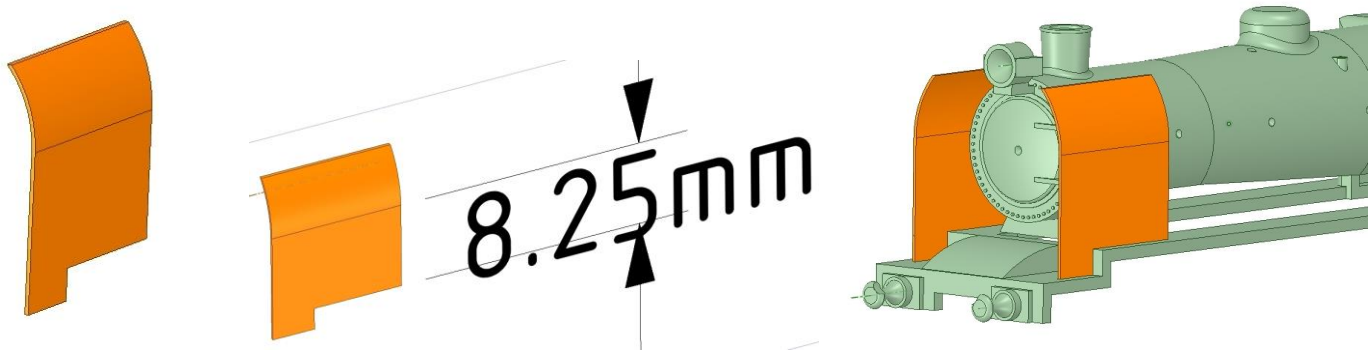


Footplate Ladder form and fitment

For the cow-catcher/pilot, first fold the front to give a V-shaped pilot, then fold back the two vertical plates until they are vertical and fit against the front buffer beam as shown.







Smoke deflector shape **Location of curve** **Smoke deflectors in place**

The smoke deflectors need to be gently rolled at the top, above a position 8.25 mm above the bottom (see location in diagram). The curve should be to a radius of 8 mm. They are then fitted into the slots on the footplate and buffer plate, and can be fixed with a bead of CN cement (super glue) on the *inside* edge.

Painting

Wash the body in warm soapy water and dry. Apply a suitable undercoat, then a coat of black paint.

Decals.

Apply the class letter and number decals to the front buffer beam and tender rear, the larger numbers to the cab sides and the small numbers to the number boards on the sides of the headlight.

Photo A.J. Hurst Locomotive Fandom.com

References

Useful information and photographs are in an AMRM article on p31 – 35, Issue 107, March – April 1981.

Useful photographs are to be found at Victorianrailways.net.

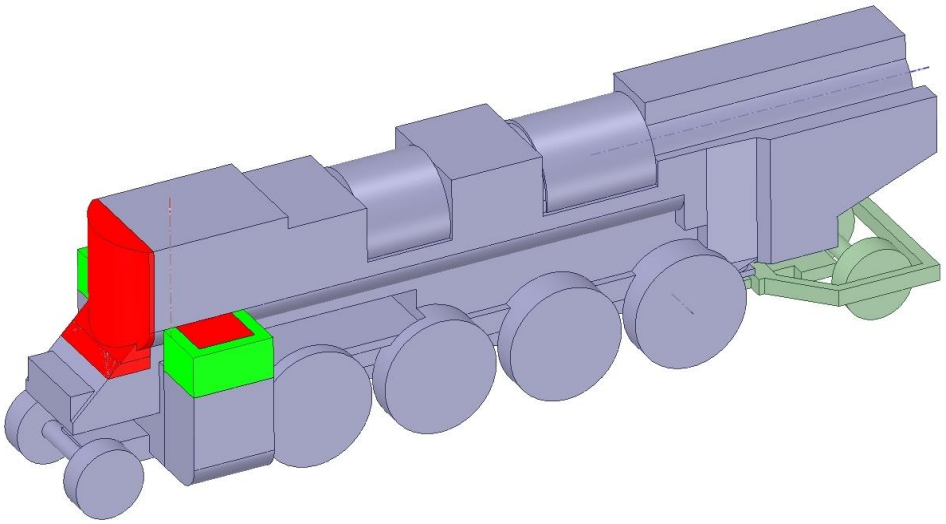
Acknowledgements

Many thanks to Paul Connor, Stuart Rees and Michael Stone, who pushed for this project to be done, and then provided heaps of information, drawings and pictures. Also special thanks to Tony Scott of the Victorian N Scale Collective for proof-reading these instructions and making valuable improvements.

Photos Victorianrailways.net

Instructions for Disassembly and Modification of the Kato D51 Chassis

In order to fit the chassis into the X class body, it is necessary to remove metal from two areas of the chassis, as shown below. The cylinders are hollow plastic mouldings which fit over metal projections on the chassis, so it is necessary to trim the height of both the metal projections and the plastic mouldings. Approximately 3.5 mm needs to be removed from the top of the cylinder mouldings and the underlying metal protrusions over which the cylinder mouldings sit.

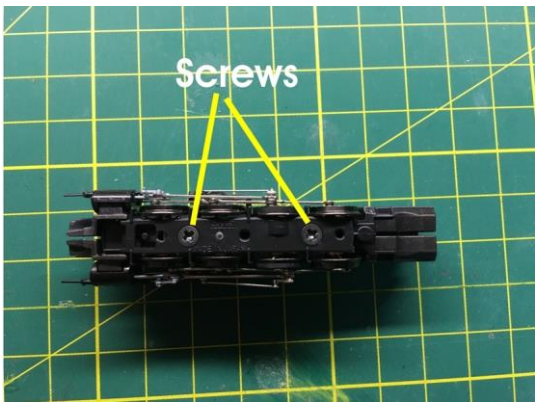


Material to be removed: plastic from top of cylinder mouldings (green) and metal from cylinder blocks (red); as well as metal from front of chassis (red)

Because it is necessary to remove metal from the chassis, it is strongly recommended that any machining or filing be done with the chassis stripped as much as possible, to avoid getting swarf or filings into the mechanism or electrical components. In any case it is necessary to remove the cylinders complete with the piston rods and motion support brackets in order to gain access to the metal that has to be cut.

1. Remove the front and rear trucks and the tender connection bar. The tender drawbar and rear truck simply pull off, being clipped in place. To remove the front truck, remove the bottom keeper plate. Undo the two screws holding the keeper plate to the chassis and carefully lift it clear. The trucks have already been removed in the picture. The front truck has to be removed from under a bar. Be careful not to lose the spring which loads the front truck down onto the track.

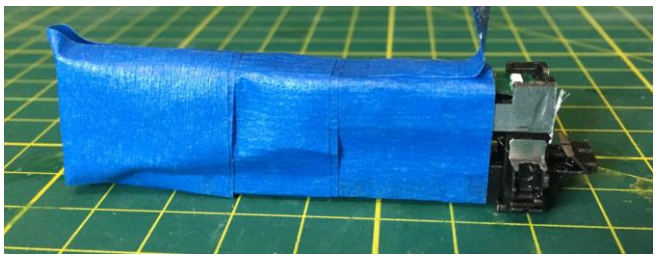
2. Now carefully remove the cylinders from the chassis. Do this by pulling the mouldings outward from the chassis, as well as slightly forward. Note that the main crank pin comes out of the driving wheel and allows the valve gear, connecting rod and motion support bracket all to come free with the cylinder moulding. The motion support bracket is a plastic component held to the chassis by two plastic pins, front and rear. These must be gently lifted out as the cylinders are pulled off the chassis. It is advisable to leave the valve gear assembled to the cylinders until it is time to work on the cylinder mouldings, then reassemble it immediately afterwards, before you forget how it all goes together.



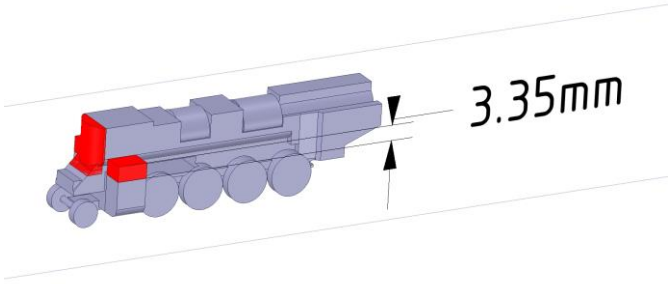
3. Repeat for the other side.

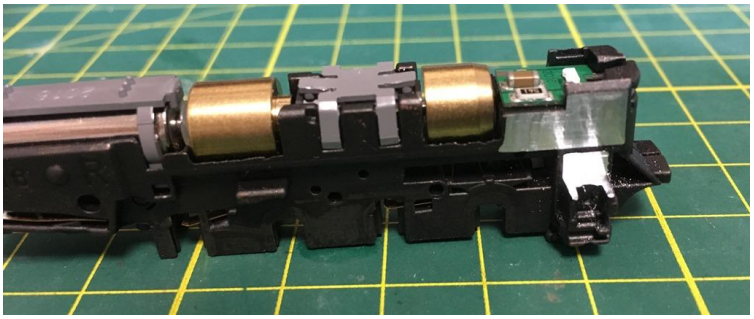
4. If you have not already removed the driving wheels, do so now, placing them so that their order and orientation will be preserved on reassembly.

5. It is not easy to disassemble the chassis further, so it is essential to protect the motor, gears and electrical parts from the ingress of swarf or filings. Wrap the mechanism carefully with tape, leaving only the front portion with the cylinder blocks exposed for machining or filing.

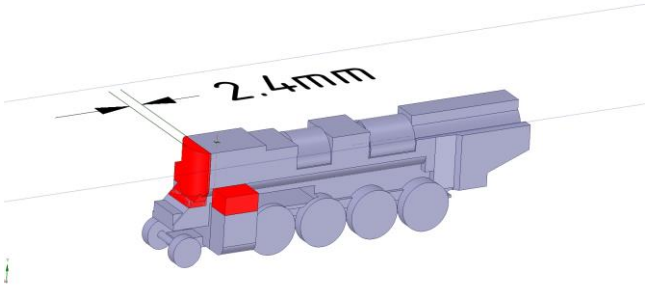


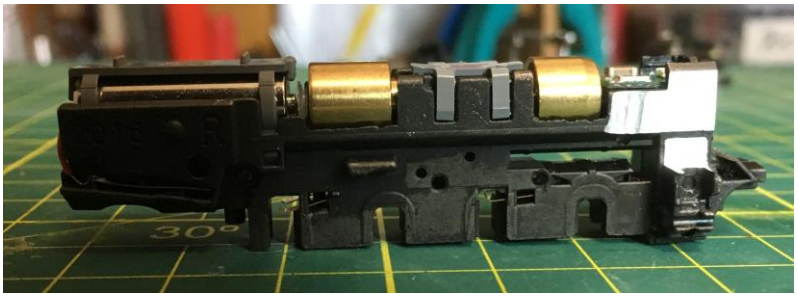
6. Remove 3.5 mm from the top of the cylinder block. Note that in doing so the two dimples protruding at the front of the chassis will also be removed. This is necessary to fit into the slot in the boiler. The similar dimples on the firebox side can remain and assist in holding the shell onto the mechanism.

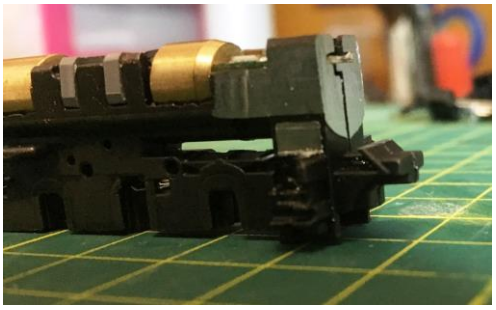




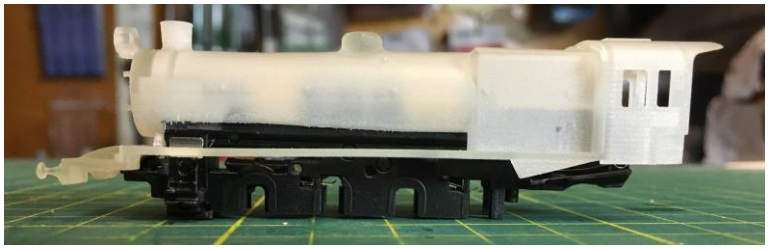
7. It is then necessary to remove material from the curved front of the chassis to a total depth of 2.4 mm. This cut should also be to the same height as the new top of the cylinders (see diagrams below). Carefully clean up the chassis to remove any filings, particularly in the slot between the chassis halves.



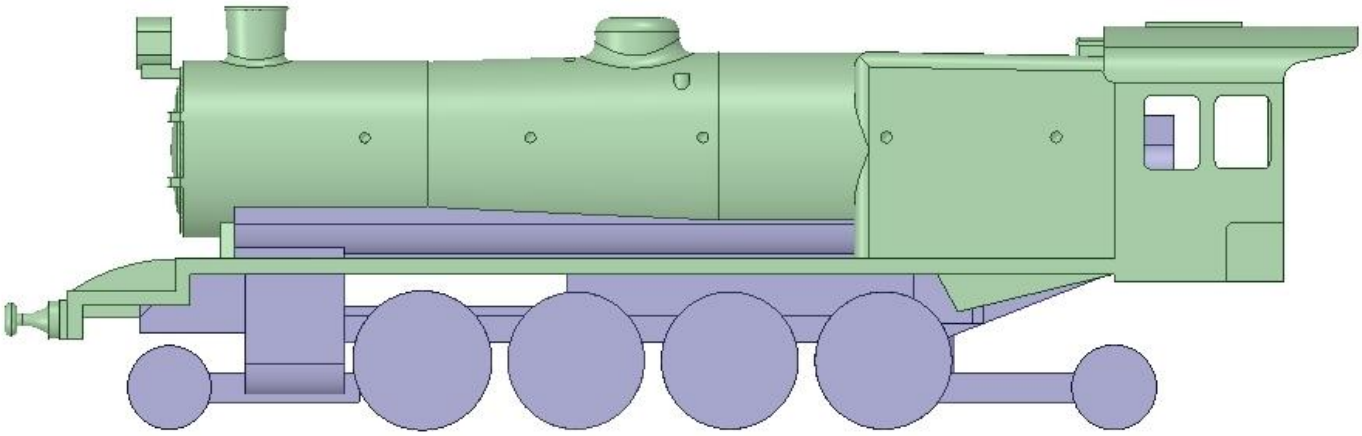




8. Before proceeding, test fit the body shell onto the chassis. Ensure that the running boards clear the top of the cylinders, allowing the body to rest on the top of the mechanism on the cross bar provided in the top of the boiler. At the rear, the front wall of the cab should rest on the top of the mechanism. Ensure that the body is supported as intended and sits level on the mechanism.



9. Next it is necessary to remove 3.5 mm from the top of the plastic cylinder mouldings. ***Beware!*** There is a small plastic keeper plate inside the plastic cylinder which holds the crosshead slide rod and the valve rod in place. This is very likely to pop off, and if you lose it, you will have to make a replacement out of 0.5 mm styrene. It is wise to remove this clip before proceeding to attack the cylinder block. Test fit the cylinder onto the metal chassis to ensure that the modified mouldings have the same level at the top as the inner metal parts. Check that the body still sits level above the cylinders. The external detail should be removed from the cylinders to give a smooth side face (see prototype photographs). In addition, the upper edge should be rounded slightly to form the valve chest (see prototype photographs). Check the fit of the body shell over the mechanism. When the chassis is fitting correctly, the combination should look like the following diagram.

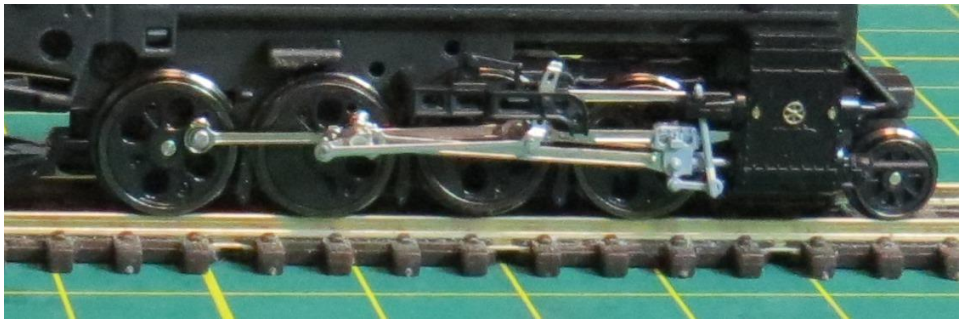


10. Note that before proceeding to complete reassembly it will be necessary to paint the newly machined surfaces matt black, as they are visible under the boiler in the completed model.

11. Reverse the disassembly procedure. Refit the driving wheels. First, relocate the axle with the driving gear on it – this axle can only go into the chassis one way. Note carefully the relative positions of the two crank holes in the driving wheels. These positions must be matched by the remaining axles as you reinsert them. This should ensure that the driving wheels are located in the correct locations and properly quartered. The keeper plate should be temporarily refitted to hold the wheels for testing and further assembly.

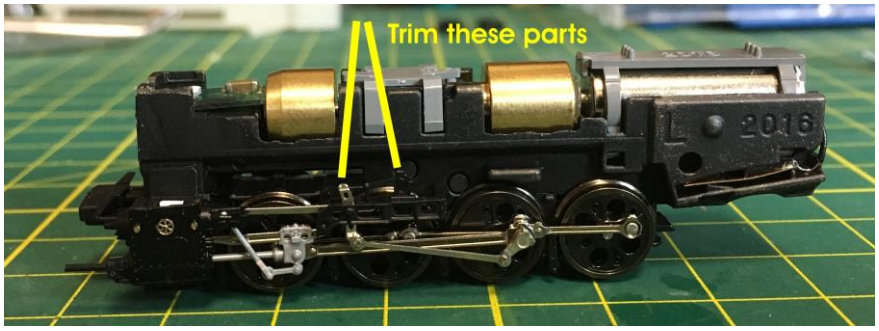
12. Refit the cylinders and valve gear, fitting the two pins of the motion support bracket as the cylinders are pressed home. Note that there is a small pin in the centre at the bottom of the cylinder moulding which goes into a hole in the cylinder block on the metal chassis. It may be necessary to hold the cylinders in place with adhesive once correct operation is assured.

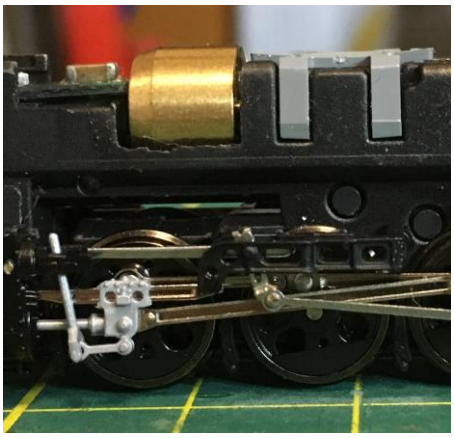
13. Reinsert the main crank pin into the third driving wheel, simultaneously fitting the rear and forward side rods and piston rod (in that order). After passing the crank pin through the three components, locate it into the square hole in the driving wheel so that the eccentric crank leads the main crank by almost 180° (i.e. the connection of the eccentric rod to the crank should be close to the centre of the driving wheel, see picture of unmodified chassis).



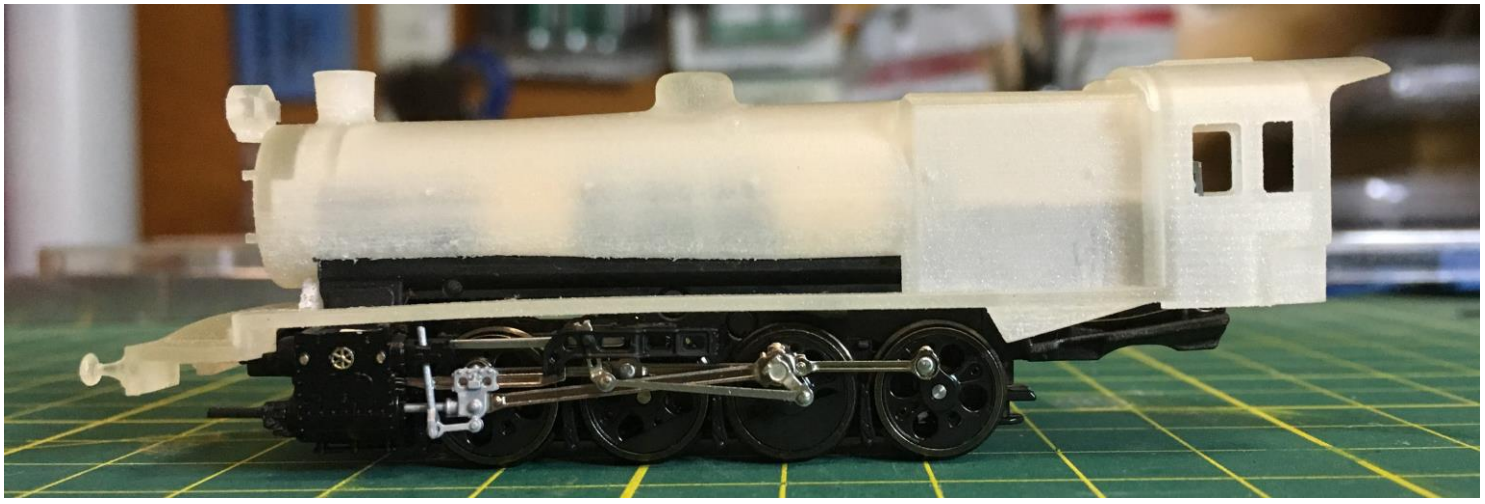
Ensure that the wheels turn freely in both directions by manual rotation of the drive train – turn the flywheels which are exposed. Then apply power and ensure free operation in both directions.

14. At this stage portions of the valve gear extend above the line of the running board of the X class. It is necessary to trim them off. The parts are the upper end of the combination lever and the moulded reversing gear which is not prototypical, identified in the picture below. The result should look as seen in the next picture.





Then make a final test of the fit of the body, which should now rest down on the internal supports, clear of all valve gear and cylinders, as shown below. Once the driving wheels and valve gear are satisfactorily working, remove the keeper plate, reinsert the front and rear trucks. Ensure that the spring pushing the front truck down is correctly located. Replace the keeper plate and secure with the two screws.

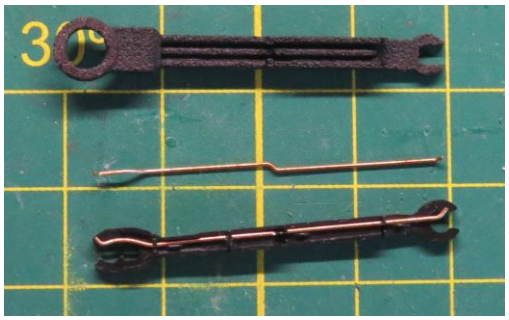


15. Next it is necessary to fit the bogies and electrical pick-up to the tender underframe. For electrical pick-up it is recommended that phosphor bronze wipers be used, such as those obtainable from Streamlined Backshop http://www.sbs4dcc.com/nscaleaxlewipers.html.

16. Arrange the axles so that one bogie has the insulated wheels on the right hand side, and the other has the insulated wheels on the left hand side. In this way, connections can be made to the left and right rails by the front and rear bogies. Note that if the brass tender underframe is used, it will be necessary to insulate the wipers from the underframe and nylon screws will have to be used to fit the bogies. 2 mm nylon screws obtainable from RS Components https://au.rs-online.com/web/ are suitable.

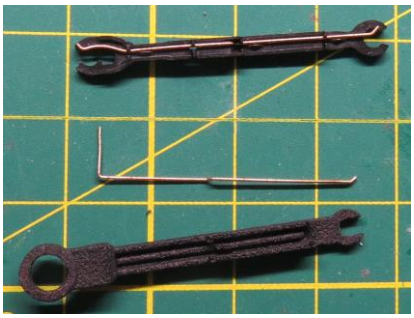
17. Take one contact wire from the original Kato drawbar in preparation for fitting to the replacement nylon part from Shapeways. Straighten the tender end of the wire, as seen in the picture. The fitment at the loco end is identical to the original.

18. Next, placing the wire in position, ***noting that the wire will be placed in the new drawbar upside down and on the opposite side from the original orientation***, determine the location for a right angle bend such that the wire will emerge through the slot and hole in the tender end of the drawbar (see fourth picture below). Then bend the wire at right angles at the tender end. Ensure your bend is in the same plane as the small bend at the loco end of the drawbar. Locate the bend so that the loco end will be identical to the original, and the extended portion will emerge through the slot at the tender end.



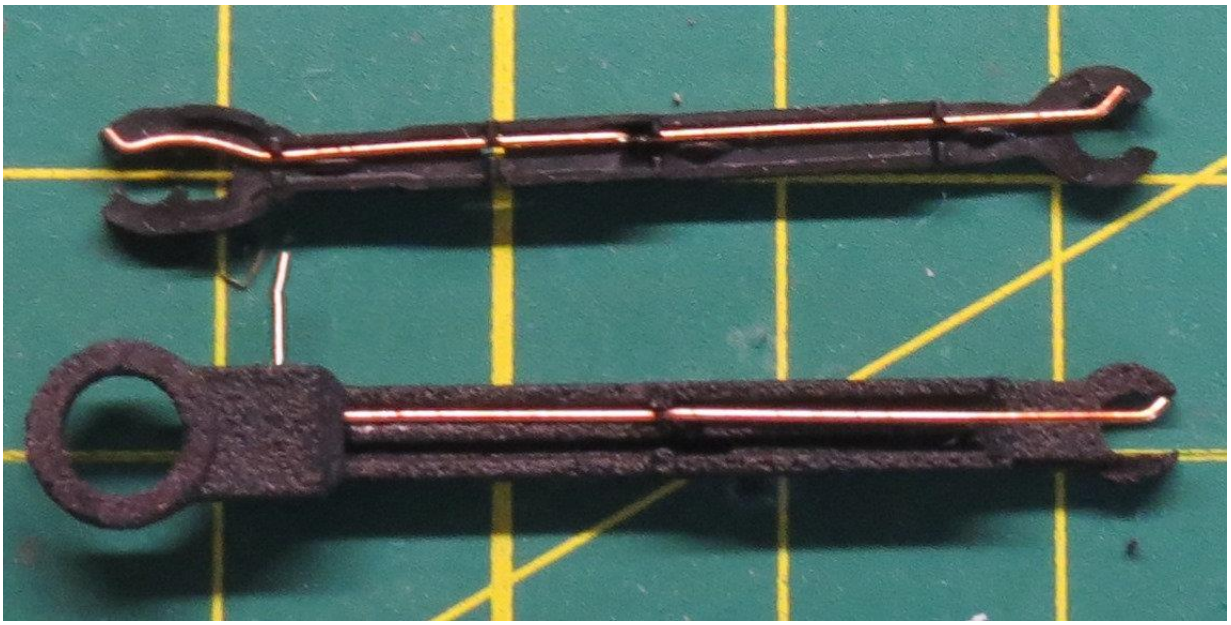
Remove one wire from drawbar

Straighten tender end of wire



Bend end at right angles

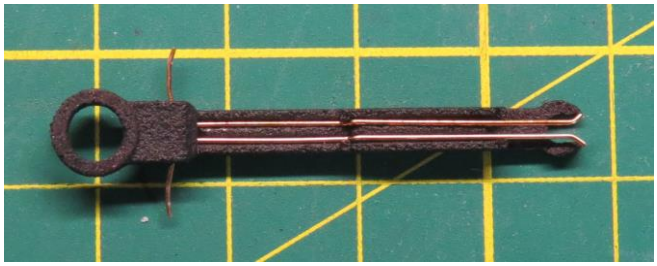
19. Then slightly curve the piece just bent outwards, curving back toward the loco end of the drawbar. This will assist in threading the wire through the hole and slot in the drawbar, so that it sits as seen in the picture below.



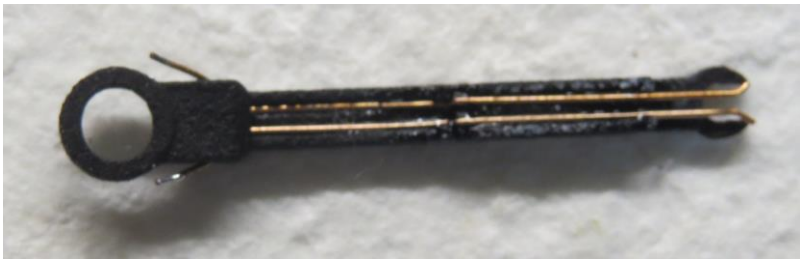
Bend slight curve in tender end to assist threading through hole and slot to enable placement in drawbar
Note insertion on opposite side from the side it was removed from!

20. Repeat for the other wire. At this stage some good old CN superglue can be added to keep the wires in place.

21. At the tender end, bend the wires backward and upward so that they can be connected to wires from above. Note that the rear end of the drawbar fits around the boss of the front tender bogie.



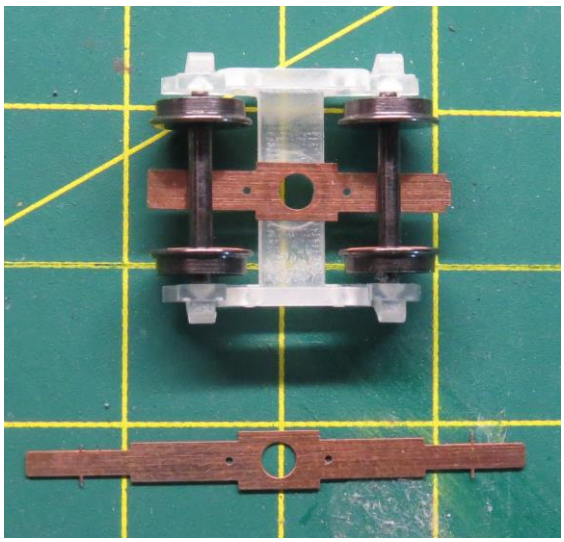
Repeat for the second wire

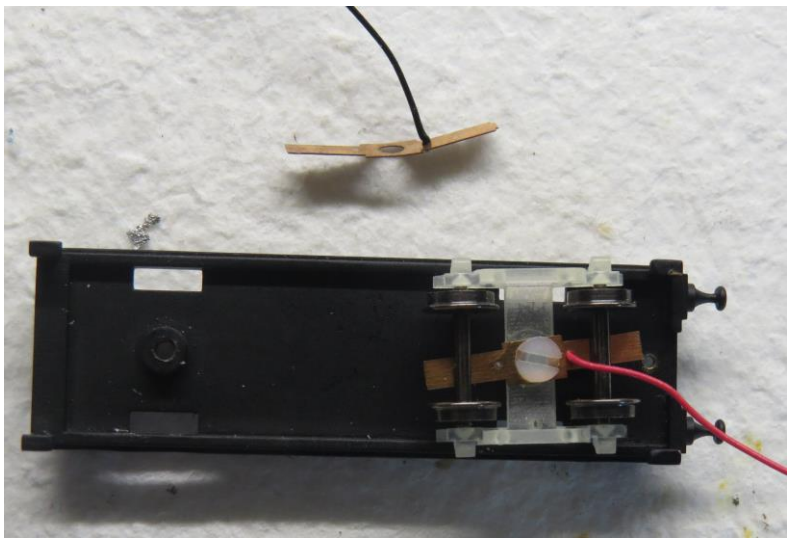


Tin the ends of the wires at the tender end

22. Take an axle contact strip e.g. Streamlined Backshop. Use the ones intended for 6-wheel bogies, to get enough length. Trim to suit the tender bogies.

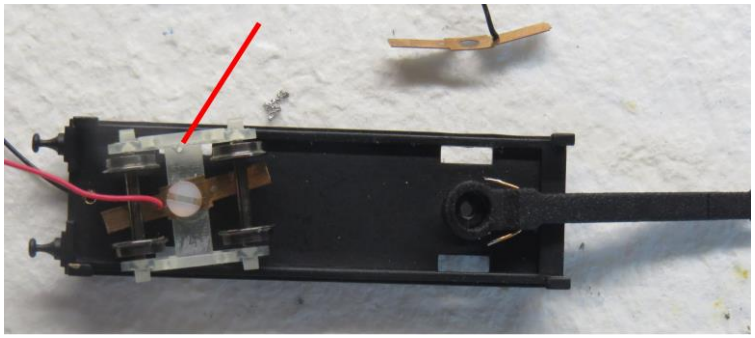
23. Once trimmed, tin the contact strips and attach a wire to each. If you align the non-insulated axles appropriately, and use red for right and black for left, then the colour code will match that on the loco.

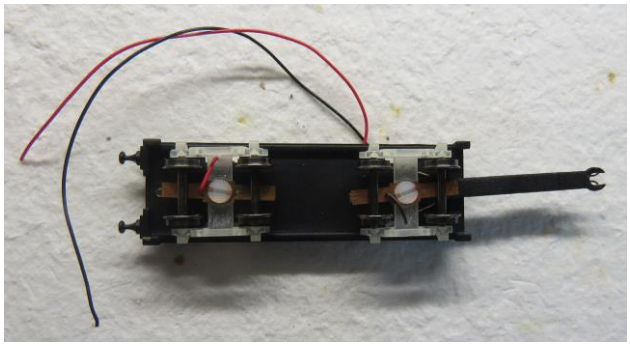




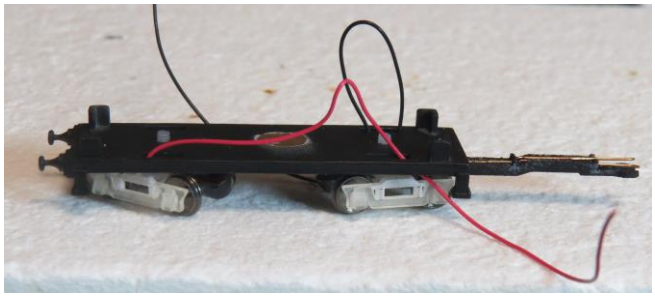
24. Next drill a small hole on the appropriate side of each bogie, in line with the slots in the tender floor.

25. Then thread each wire up through its bogie and the slot in the tender floor.

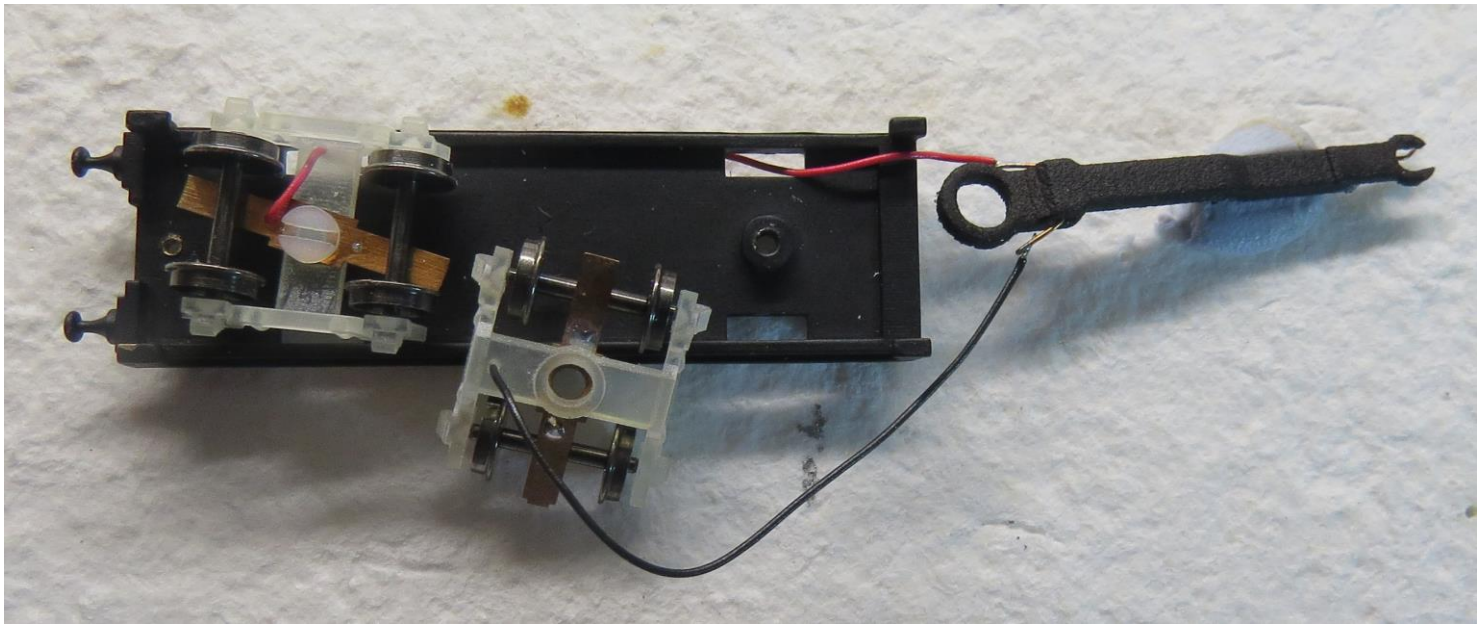




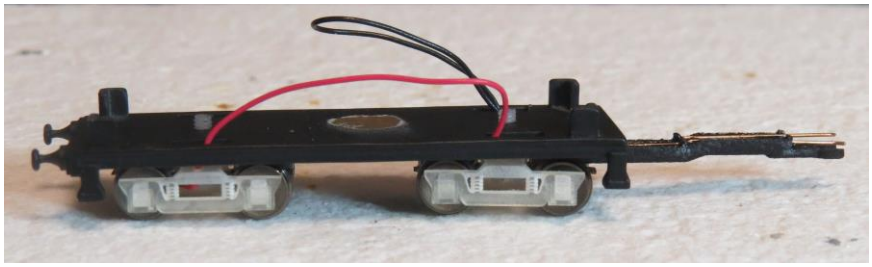
26. Then take each wire and pass it down through the front slot on the appropriate side. In the case of the wire from the lead bogie, this just makes a loop up through the slot and back down. This loop is necessary to provide flexibility so that the bogies can rotate freely.



27. Remove the front bogie temporarily and measure and cut the wires to just reach the drawbar when it is in place on the bolster boss. Tin the wires and solder to the bronze wires in the drawbar, checking that the sides correspond. Unless you have grown a third hand, Blu-Tack is handy for this step.



28. Replace the leading bogie, threading the loop of wire back up through the slot in the tender floor.



29. Connect the tender drawbar to the loco and test run the unit with the tender attached.