

WAGON SPRINGING AND UNDERFRAME DETAILING KIT FOR RCH 1923 PRIVATE OWNER WAGONS Based on an original design by Martin Finney

INTRODUCTION

These subframes have been designed to fit under Slaters, Cambrian, Parkside and Bachmann 1923 private owner wagons (R051) and Oxford wagons (R052), although they may be used for other manufacturers' and scratchbuilt PO wagons (Brassmasters produce further subframes for pre-1923 PO wagons – R041 and R042). They provide an easy to assemble sprung subframe and include full single-sided or independent double-sided brakes with a choice of brake levers and brake lever guides. They are **not intended for wagons with a cross shaft between the V hangers**. Also included for the body are coupling hooks, coupling hook plates and washers for the outer ends of the buffer housings (who hasn't managed to lose these from the plastic kits!).

When building private owner wagons, reference to 'The 4mm Coal Wagon' by John Hayes, published by Wild Swan and still available (September 2018), is always useful.

A lot of help, including drawings, has been provided by the Historical Model Railway Society's Private Owner Wagon Steward. Have a look at the HMRS website (HMRS.org.uk) and see what they have to offer you.

CONSTRUCTION

Open out all holes to the required size as shown in these instructions. For small components this is often easier to do before removing the component from the fret.

Some embossing of rivets is required and again for small components we recommend you do this before they are removed from the fret.

Most folds are through 90° and always with the etched fold line on the inside of the bend.

If fitting to a kit during construction, it may be easier to not fit the solebars to the kit until after the subframe has been fitted to ensure the solebars clear the etch.

WAGON BODY

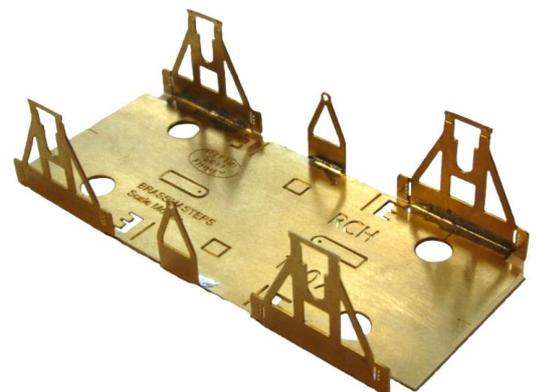


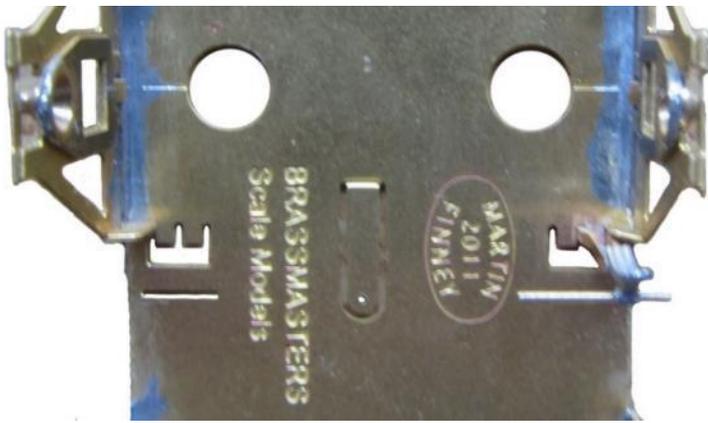
Except for Bachmann wagons, the underside of the wagon floor **must be flat**. For Slaters and Cambrian wagons this means removing all the moulded frames from the floor moulding. If building a new kit an alternative is to turn the floor moulding upside down or replace the floor with a new one from plastic card and don't attach the solebars until the subframes have been bent up to be used as a spacer. The solebars should be modified either by carefully removing the spring and axlebox moulding along with the 'W' irons, leaving the spring saddles in place on the solebar. Store the removed parts for use later. For Bachmann and Oxford wagons, remove the subframe moulding complete with wheels. On Bachmann wagons the bosses on the floor can be removed if necessary.

UNDERFRAME

Using a 0.35mm drill open out the holes for the suspension spring wires in the subframe [U1]. If you use Alex Jackson couplings similarly open out the holes in the fold up the brackets in the middle of the subframe. Open out the holes in the brake shaft V hangers to clear 0.8mm brass wire.

Fold up the W-irons and both brake shaft V hangers on the subframe [U1] and check they are at right angles to the base. Strengthen the folds with a fillet of solder. Fold over the W-iron keeper plates at the bottom of each W-iron.





Fold the eight suspension brackets at right angles to the W-irons. If appropriate fold the Alex Jackson coupling brackets and strengthen with solder.

Take the bearing carriers [U2] and solder in the four waisted bearings. For kit and Bachmann wagons, make a slight bend in the centre 'finger' of the bearing carriers shown in the left-hand photo. Cut the spring wire to a length of 15mm and solder in place. For Oxford wagons, place the wire centrally in the slot and bend over the tag to trap the wire in place as shown in the right-hand photo. Solder in place

Now assemble the bearing carriers and wheel sets as shown and check the suspension works freely. There are three holes in each suspension spring bracket to enable the final ride height

to be adjusted. Nominally this is the centre hole, but this can be adjusted when the wagon is completed and weighted.



BRAKES

Take the four brake block and hanger etches [U3], drill out the holes in the centre of the brake blocks 0.35mm and push through the half-etched holes at the joint between the brake hanger and brake block. Then open out the centre hole in the eight brake block centres [U4] to 0.35mm.



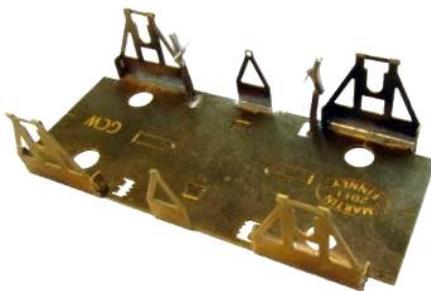
Carefully bend the brake hangers, as shown in the photo, at the half-etched marks on the inside and outside of the etch. It is essential that when a piece of 0.3mm brass wire is passed through the two holes in the middle of brake block it is parallel to the top, so don't be afraid to persevere until it is.



Take two of the brake block centres [U4] and solder them face to face. Repeat for the other 6 brake block centres.

Mount a brake block centre assembly between the brake blocks with a piece of 0.3mm wire protruding from both sides, align the brake block centre with the brake blocks and solder together. Leave the wire protruding from each side. Repeat for the other brake block hanger assemblies.

Solder the brake hanger assemblies in place in the 'E' shaped openings in the subframe floor, the outer slots for P4 and EM, the inner ones for O0. The floor will now need to be recessed to clear the brake hangers where they protrude above the subframe floor. This is done using a large drill rotated in the fingers.



Open out the holes in the end of the push rods [U5 and U6] to 0.35 mm and the hole in the centre to 0.8 mm. Decide whether the push rod packer bolts will be represented by a push through 'rivet' or by a wire and either push through the rivets in push rods from the rear or drill 0.35mm holes. Open out the holes in four of the brake shaft levers [U7] to clear 0.8mm.



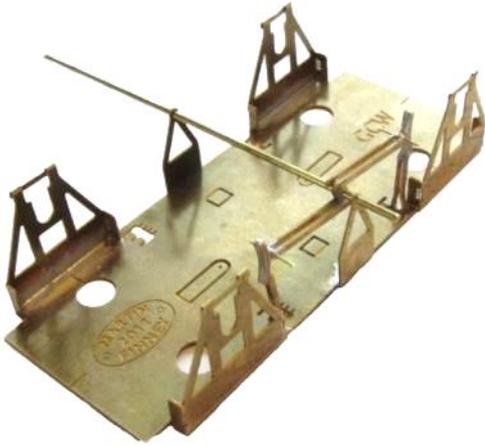
Careful thought now needs to be given to the assembly of the brake gear to ensure that it would actually work if fitted to the prototype. This means that, when looking from the side, the right-hand push rod is above the brake shaft and the left-hand pushrod is below the brake shaft. This is correct for both sides of the wagon if fitting double sided brakes. (note: this brake gear is **only for double-sided independent** brakes and **not for brakes with a cross shaft**)

A trial assembly of the brake work is now required.

Push a piece of 0.8mm brass wire through the brake 'V' hanger from one side, then through the inside push rod [U6], then through two brake shaft levers [U7], then through the outer push rod and finally through the other 'V' hanger. Turn the push rods about the brake shaft wire and engage the holes in the end of the push rods over the wire in the brake hangers (it may be necessary to bend the brake block hangers to allow this to happen).

The length of the push rods ensure that the brake blocks clear the wheels sufficiently to prevent shorting. Repeat for the other side.

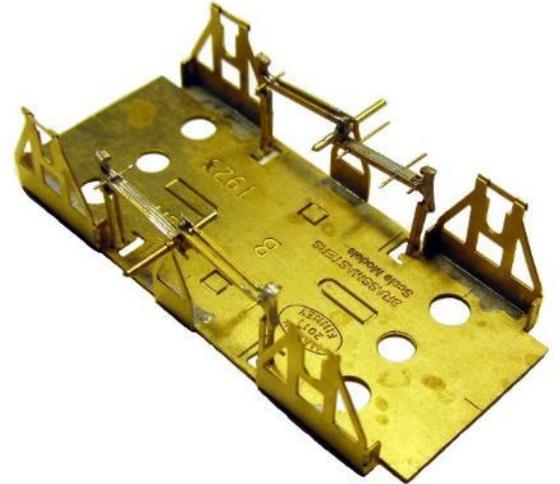
When satisfied, mount all four push rods and brake shaft levers and, holding the two push rods tight to the brake blocks at one end, solder the push rods to the brake blocks. Repeat for the other end. Repeat for the brakes on the opposite side opposite side. Finally, push the 0.8mm wire through the 'V' hanger next to the brake push rods so that at least 8mm protrudes beyond the 'V' hanger on both sides then, making sure the two brake shaft levers line up with the half-etched levers on the pushrods, solder the push rods and levers to the brake shaft on one side. Repeat for the other side.



Take two push rod packers [U8] and if using wire to represent the bolts, drill two holes 0.35mm in each. Solder together making sure the holes align. Place each packer between the push rods, hold in position (using 0.31mm wire if appropriate) and solder together. Repeat for the other three sets of push rod packers. Finally, cut the 0.31mm wire back to just clear the faces of the push rods.

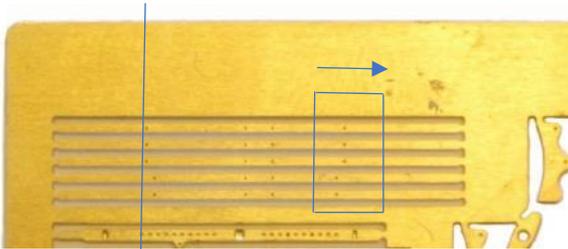


The wire between the 'V' hangers now needs to be removed. To cut off the 0.8mm wire brake shaft between the two sets of brake gear **DO NOT CUT THE WIRE WITH SNIPS** as it will distort the 'V' hangers – make the first cut with a saw. The second cut can be made with snips. The wire should be cut back to just behind the push rods.



SAFETY LOOPS

Wagons can either have vertical safety loops or also safety loops that were inclined towards the brake shaft. The safety loops provided in the kit cover both these possibilities.



Please note: something strange happened to the safety loop twist marks (the outer marks) between the original test etch and production etch. This means that, when looking from the back of the fret, the right-hand twist marks are all too near the middle (see box). Also the two lower safety loops have both twist marks in the wrong place so, before separating any of the loops from the fret, please scribe a line in the correct position for the left hand twist mark on the two lower safety loops, and, once removed, mark the correct position for the right hand twist marks on all the safety loops to match the opposite

end by turning one loop end for end.

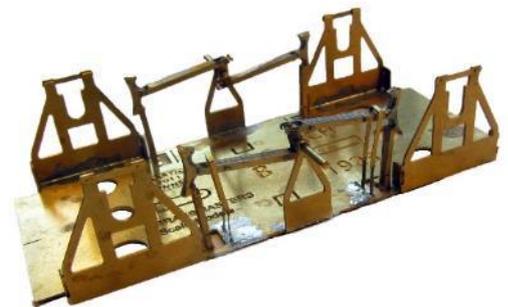
For wagons with vertical safety loops take four safety loops [U9] and bend at right angles at the two half etched marks in the centre of the loop. Hold one leg of the safety loop below the half-etched mark (or scribed mark) on the leg in a pair of pliers and twist the leg above the pliers through 90 degrees. Repeat for the other leg.



The legs on the safety loop need to be 10.5 mm long. Cut the legs to the appropriate length. Solder the safety loops into the slots in the subframe base, towards the outer end for P4 and EM, at the inner end for 00.

For wagons fitted with inclined safety loops, if only slightly angled as in the photo, simply

assemble as above and bend after soldering in place. The incline only starts from the twist which is located level with the bottom of the solebar. For wagons that have safety hangers at a greater angle than this, bend up the safety loops as before into a 'U' shape and then determine the length of the inclined section. Twist the legs of the loop at the top of the inclined section and then bend them to the required angle. Cut the upper part of the legs to 4mm from the bend (3.2mm for Oxford wagons) and then solder into the slot in the subframe floor, with the first part vertical.



Attach the subframe to the bottom of the wagon using epoxy, ensuring that the verticals of the 'W' irons line up with rivets and/or spring stops on the solebars. RCH 1923 wagon are 1" wider between the solebars than earlier wagons. On the prototype, the 'W' irons are cranked inwards behind the solebar so that the 'W' irons are the same distance apart as the earlier wagons. This was too difficult to do in the kit, so there is a slight slop, and you will have to centre the subframe between the solebars. On Oxford wagons, the solebars are thinner than the prototype, but here the ends of the subframe have been widened to locate the subframe centrally.

The outside 'V' hangers can be attached to the solebars by simply attaching with epoxy or cyanoacrylate. On Bachmann wagon, it is necessary **to fill in the slots in the solebar left when the plastic 'V' hanger is removed first**. The joints can be strengthened with pieces of wire if required. Take the 'V' hanger [U10] and either push through the rivets using the half-etched holes or, if strengthening the joint with wire, drill out the half-etched holes 0.4mm. Attach the outside V hangers over the end of the brake shaft and attach to the solebars with epoxy cyanoacrylate glue. If reinforcing the joint with wire, drill though the solebar 0.4mm, insert a piece of 0.4mm wire and trim just proud of the 'V' hanger to represent the fixing bolts.



BRAKE LEVERS AND GUIDES

There are two types of brake lever on the etch, standard [U11] and shorter [U12]. Take the appropriate lever(s) and bend to shape as shown in the diagram, using the half etch lines and dots as a guide.



Cut the brake lever guide jig [U13] from the side of the etch (see photo below). Open out the large hole to clear the brake shaft and the small hole 0.5mm.



Decide which type of brake lever guide is required, pin type [U14] or ratchet type [U15]. Bend to shape as shown in the photo using the half-etched marks. The bottom bend of the pin type should be bent first by placing in the slot in the brake lever guide jig and bending over so that both sides lay flat along the jig. This should give a nice round curve.

Now place the jig over the brake shaft, align the etched line on the jig with the bottom of the solebar and spot through the 0.5mm hole with a 0.5mm drill. Drill through the sole bar 0.5mm.



There are two common types of brake lever guide support strap fitted between the bottom of the brake lever guide and the 'W' iron. These either go to the bottom of the 'W' iron keeper plate [U16] or part way up the 'W' iron [U17]. Take the appropriate etches and fold as shown in the photos (the bends are quite severe!). When satisfied with the shape solder the straps to the bottom of the brake lever guide.



Push the brake lever through the brake lever guide, mount the brake lever on the brake shaft and then attach the brake lever guide to the solebar and 'W' iron with epoxy or cyanoacrylate glue. Solder the brake lever to the brake shaft.



AXLEBOXES AND SPRINGS

It is necessary to open up the back of the moulded axleboxes to allow the bearing to move up and down in the 'W' iron. For a new kit built wagon it is better, if the wheelbase of the plastic solebars is exactly 9ft (36mm), to leave the axleboxes and springs as part of the solebar. Other than this, and for Bachmann and Oxford wagons, cut the spring, axlebox and 'W' iron away from the solebars. Carefully cut away the 'W' iron from around the axleboxes and then carve away the remains from the rear of the axlebox and solebar to leave a flat surface. Opening up the back of the axlebox can then be done by carving out with a scalpel and file or by using a bur in a slow running mini drill. Push the axle box and spring face down into a piece of Blu-Tac before attempting to carve out the back.



If converting an already built wagon, it is easier to remove the axlebox and spring from the solebar by cutting diagonally through each end of the spring next to the spring shoe on the solebar and then cutting through the vertical parts of the 'W' iron next to the solebar. Again, the remains of the 'W' iron need to be carved away from the back of the solebar and the axleboxes and springs.

Attach the axleboxes and springs with epoxy or cyanoacrylate.

DOOR BANGS, COUPLINGS AND BUFFER HOUSING NOSE RINGS

The other parts included on the etch are door bangs [U18] coupling hooks [U19 and U20], coupling hook faceplates for end door wagons [U21], coupling hook face plate for fixed end wagons [U22] and the opposite end coupling hook face plates for both types of wagon [U23] and buffer housing nose rings [U24].



There are a multitude of types of door bangs fitted to private owner wagons including various types of wooden block, curved metal stop and spring stops. The type included in the kit is standard RCH 1923 type. In the same way as the 'V' hangers, the door bang [U18] can have rivets pushed through using the half-etched indentation or



drilled out 0.4 mm. Bend as shown in the photo (we used a 5mm drill for the larger radius and round nose pliers for the smaller radius). The large bend starts 3.25mm from the top.

To use the coupling hooks, take one of each hand [U19, U20], bend slightly along the half-etched line and solder together with the half-etched line on the outside. Round the edges of the hook with a file and taper the point of the hook towards the tip.

Decide which coupling hook face plates you need to use. It can be seen that the end door faceplate [U21] and the fixed end faceplate [U22] have the same bolt pattern. The opposite end faceplate [U23] has the opposite pattern. This is because, on the prototype, the larger bolts were stays that stretched from one end of the wagon to the other.

Bend the bent parts of the hook assembly back straight and pass the tail of the hook through the appropriate coupling hook plate with the slot towards the bottom of the plate, and solder together. Push the tail of the coupling through a 1.35 mm dia. hole/1.2 mm x 0.6 mm slot in the wagon headstock, bend over the tabs and secure with epoxy or cyanoacrylate. Repeat for the opposite end. Fit the coupling chain of your choice through the slot in the coupling hook.

(Brassmasters sell coupling chain separately – with either copper or soft iron links)



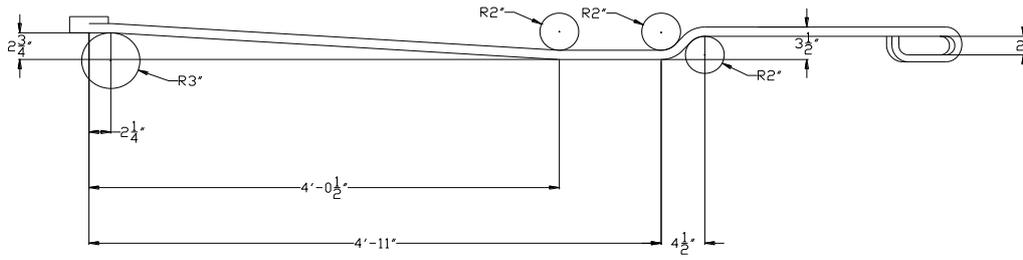
The buffer housing rings are to replace any missing rings from plastic kits. Take two of the rings [U24], drill through the centre hole to clear 1.0mm and solder together. Push the assembly onto the end of a rat-tailed file and round the edges of the rings. Mount on the end of the buffer housings with epoxy or cyanoacrylate.

WEIGHTING

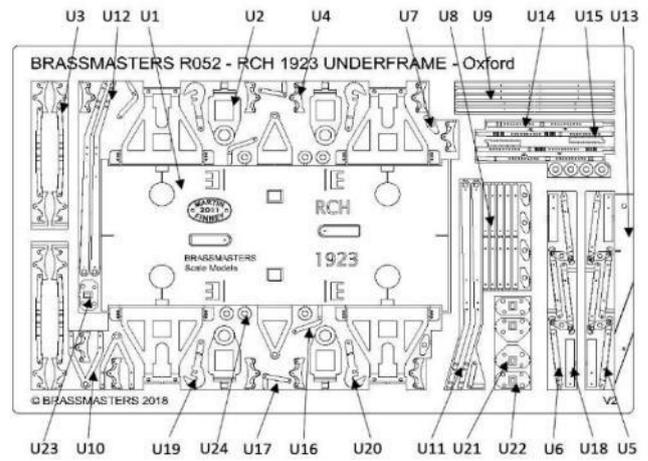
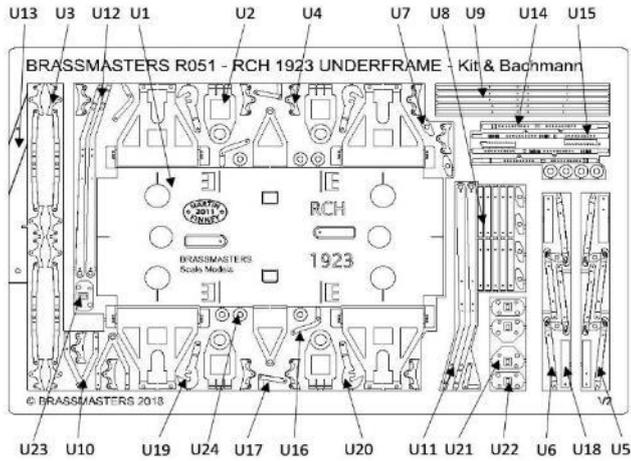
The kit/Bachmann sub-frame (R043) allows plenty of space for weighting the wagon. If Code 4 lead (1.8mm thick) is used, there is space for two thicknesses to be fitted to the underside of the wagon without it being seen. For P4, two pieces 16mm x 54mm give a total wagon weight without load of approximately 50 grams. For EM, two pieces 15mm x 54mm give a total wagon weight without load of approximately 48 grams. For OO, two pieces 14mm x 54mm give a total wagon weight without load of approximately 46 grams. Adjust the size accordingly for loaded wagons.

For the Oxford subframe (R044) there is only space for one thickness of Code 4 lead which would give a weight of approximately 36 grams but if Code 3 lead (1.32mm thick) is used there is space for two pieces 16mm x 62mm which gives a total wagon weight of approximately 47 grams with space to add more at the ends. For EM, two pieces 15mm x 62mm give a total wagon weight without load of approximately 45 grams. For OO, two pieces 14mm x 62mm give a total wagon weight without load of approximately 43 grams.

Brake lever diagram



For bending, we used a 1mm drill and a 0.6mm drill



ETCHED COMPONENTS

- | | |
|----------------------------------|--|
| U1. Underframe | U13. Brake lever guide jig – (1) |
| U2. Bearing carrier – (4) | U14. Brake lever guide – pin type – (2) |
| U3. Brake block and hanger – (4) | U15. Brake lever guide – ratchet type – (2) |
| U4. Brake block centre – (8) | U16. Brake lever guide support strap – bottom type - (2) |
| U5. Push rods outer – (2) | U17. Brake lever guide support strap – middle type - (2) |
| U6. Push rod inner – (2) | U18. Door bangs – (2) |
| U7. Brake shaft levers – (4) | U19. Coupling hook left hand– (2) |
| U8. Push rod packers – (4) | U20. Coupling hook right hand – (2) |
| U9. Safety loop – (4) | U21. Coupling hook faceplate – end door wagons (1) |
| U10. 'V' hanger – (2) | U22. Coupling hook faceplate – fixed end wagon (1) |
| U11. Brake lever standard – (2) | U23. Coupling hook faceplate – other end (1) |
| U12. Brake lever short – (2) | U24. Buffer body rings |

Other components

- Waisted pin-point bearings – (4)
- 0.2mm steel spring wire
- 0.3mm wire for the brake blocks
- 0.8mm wire for brake shaft

Components not supplied

- Wheels – 3'1½" split spoke with 26mm axles
- Coupling chain

