Brassmasters PO Box 1137 Sutton Coldfield B76 1FU email: sales@brassmasters.co.uk **R062/R063**
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WAGON SPRINGING AND UNDERFRAME DETAILING KIT FOR RCH 1932 10FT WHEELBASE MORTON BRAKED WOOD & STEEL FRAMED WAGONS

Based on an original design by Martin Finney

INTRODUCTION

These sub-frames have been designed to fit under kit and ready to run wood and steel solebar wagons fitted with Morton brakes as used by the grouping companies. Kits for these wagons are produced by 3H, Cambrian, Parkside, ABS, D&S etc. and ready to run by Bachmann, Hornby and Dapol although they may be used for other manufacturers' wagons. They provide an easy to assemble sprung sub-frame and include full single-sided brakes activated from both sides by the Morton brake system with a choice of brake lever guides and straps. They are intended for wagons with a cross shaft between the V hangers. Also included are second set of push rods for the rare vehicle with brake blocks on all four wheels and, for the body, 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!).

The difference between steel framed and wooden framed wagons revolves around the height of the solebar. Wood solebars are 12" high, steel 9". To maintain the buffer height, the bottom of a steel solebar is 1 ½" higher than a wood one, and the top 1 ½" lower. This means the body of steel underframe wagon is 1 ½" lower than the equivalent wood one. The height of the solebar above rail level is 2' 11 ¼" for a wood underframe and 3' 0 ¾" for a steel underframe.

When building wagons, reference to 'LMS Wagons' volumes by OPC, 'LNER Wagons Volume 4A', published by Wild Swan, 'GWR Goods Wagons' Touret Publishing and 'An Illustrated History of Southern Wagons' Volume 4 is always useful.

The most numerous user of this type of brake were the LMS and GWR after 1932 under both open merchandise wagons and vans.

For the test build I used a Parkside LNER steel open and a BR 13 ton open

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 90^0 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 sub-frame has been fitted to ensure the solebars clear the etch.

Some photos are of different wagons or underframes but the construction principle is the same.

WAGON BODY

The underside of the wagon floor **must be flat**. For 3H, 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 sub-frames have been bent up to be used as a spacer. In all cases the solebars will need to be modified.

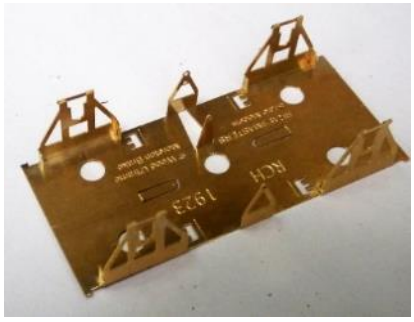
If building a new kit, it is better, if the wheelbase of the plastic solebars is exactly 9' (36mm), to leave the axleboxes and springs as part of the solebar. Carefully cut away the 'W' iron from around the axleboxes and then carve/file away the remains from the rear of the axlebox and solebar to leave a flat surface. If the wheelbase of the solebar is not exactly 9' (36mm) then the solebar can be cut through the middle and plastic removed or a packing piece added to get the correct length. Alternatively, the springs and axleboxes can be removed as for an already built wagon as below.

If converting an already built wagon, and for ready to run wagons, remove the axlebox and spring from the solebar/plastic sub-frame 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, leaving the spring saddles in place on 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.
Store the removed parts for use later.

UNDERFRAME

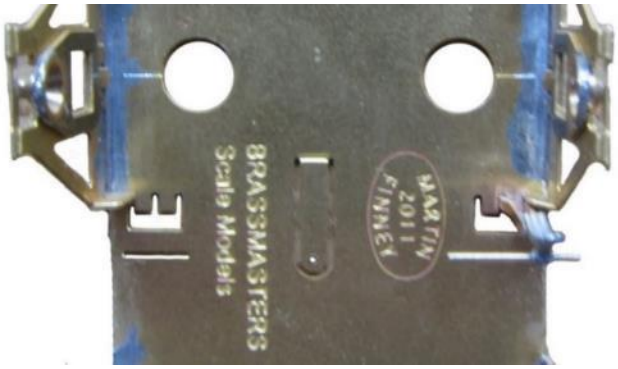
Using a 0.35mm drill open out the holes for the suspension spring wires in the sub-frame [**U1**]. If you use Alex Jackson couplings similarly open out the holes in the fold up the brackets in the middle of the sub-frame. Open out the holes in the brake shaft V hangers to clear 0.8mm brass wire.

Fold up the W-irons and both brake shaft V hangers on the sub-frame [**U1**] and check they are at right angles to the base. Strengthen the folds with a fillet of solder. Fold up the inner brake V but do not strengthen with solder as it will be removed later. Fold over the W-iron keeper plates at the bottom of each W-iron.



Fold up the W-irons and both brake shaft V hangers on the sub-frame plus the central sacrificial support [**U1**] and check they are at right angles to the base. Strengthen the folds with a fillet of solder (not for the sacrificial support). 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.



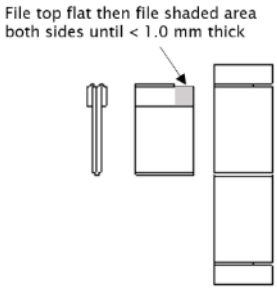
Take the bearing carriers [**U2**] and solder in the four waisted bearings. For the wooden underframe, make a slight bend in the centre 'finger' of the bearing carriers shown in the left-hand photo. For the steel underframe, the tab is folded over to retain the spring, as show in the right hand photo below. Cut the spring wire to a length of 15mm, remove any 'burr' from the ends as this makes feeding the wire into the holes easier, and solder in place. Clean off excess solder from around the bearings and suspension wire as this will impede easy movement.

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.

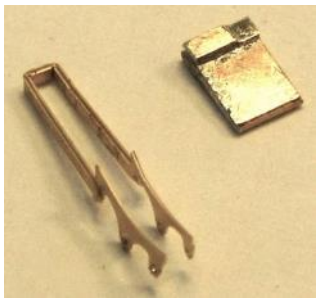
BRAKES

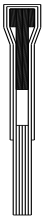
Take two of the brake block and hanger etches [**U3**], drill out the holes in the centre of the brake blocks 0.35mm and push through the half-etched holes at the joint between the brake hanger and brake block. Then open out the centre hole in four brake block centres [**U4**] to 0.35mm.

Cut the brake hanger jig [**J1**] from the etch sides along the lines indicated and then fold up and file as shown in the diagram on the right.



Carefully bend the brake hangers into a U shape at the half-etched marks on the inside and place around the jig, as shown in the photo, then squeeze the lower part of the etch to narrow the bottom part. It is essential that





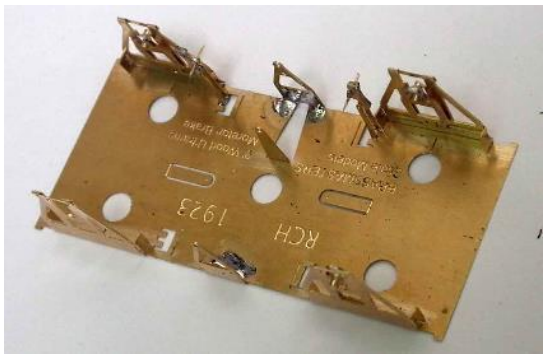
when a piece of 0.3mm brass wire is passed through the two holes in the middle of the brake block it is parallel to the top, so don't be afraid to persevere until it is.

Take two of the brake block centres [**U4**] and solder them face to face. Repeat for another 2 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. File off the cusp on the wheel side edge of the brake block assembly. A slight angle to match the taper of the wheel tread can then be filed.

For wagons with four brake blocks repeat the above for the second side.

Solder the brake hanger assemblies in place in the 'E' shaped openings in the sub-frame floor, the outer slots for P4 and EM, the inner ones for 00. The floor will now need to be recessed to clear the brake hangers where they protrude above the sub-frame floor. This is done using a large drill rotated in the fingers or a dental burr.



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**], and the washers [**U8**] & [**U9**], to clear 0.8mm.

Cut a piece of 0.8mm wire to about 12mm in length and clean up the ends. Place this between the top hole of the Morton V hanger and the sacrificial central support. Place a tiny washer [**U8**] on the wire on the outside of the hanger and position the wire so just less than 1mm protrudes outside the V hanger. Solder the wire and washer in place from behind. <u>Do not</u> solder to the sacrificial V hanger.

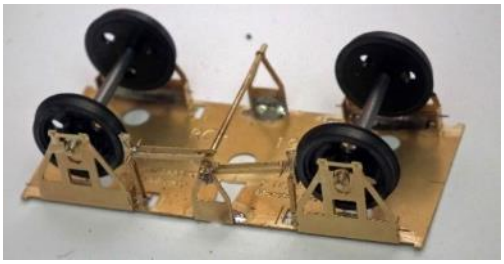
Cut the wire flush with the rear of the V hander and remove the sacrificial V hanger.

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. On Morton braked vehicles with a set of brakes on one side only, the Morton 'clutch' was on the side with the brakes. Therefore, the brake push rods were the opposite orientation to 'both side' independent brakes. This means that, when looking from the side with the Morton clutch, the left-hand push rod is above the brake shaft and the right-hand pushrod is below the brake shaft. The wheels on other side of the wagon were usually un-braked but if brakes are fitted, looking from that side, the push rods are the opposite way around to the clutch side i.e. the right-hand push rod is above the brake shaft and the left-hand pushrod is below the brake shaft. If unsure just work out logically if the brake lever is depressed will the brakes move closer to the wheels or further apart (it should be the former!)

A trial assembly of the brake work is now required.

Push a piece of 0.8mm brass wire through the brake 'V' hanger from the unbraked side, then through the inside push rod [**U6**], then through <u>two</u> 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.

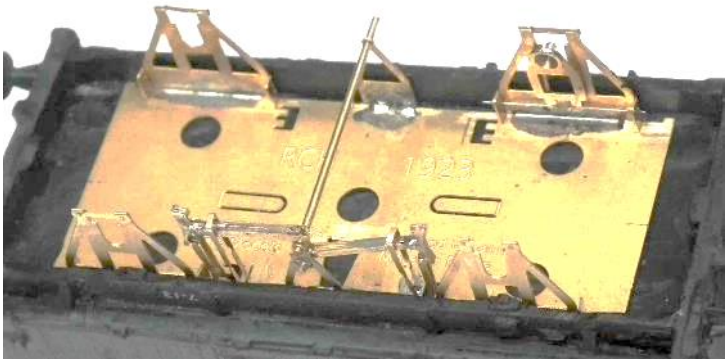
When satisfied, holding the two push rods tight to the brake blocks at one end, solder the push rods to the brake blocks. Repeat for the other end. Finally, push the 0.8mm wire through the 'V' hanger next to the brake push rods so that at least 2mm protrudes beyond the 'V' hanger on both sides then, 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. Push a washer [**U9**] over each end of the brake shaft and solder against the 'V' hanger.



For four block wagons, assembly is similar, but the second set of push rods and another 2 brake shaft levers will need to put over the 0.8mm wire after it has been pushed through the first 'V' hanger. To check the assembly is correct, when looking form either side of the wagon, both sets of pushrods will align.

Take two push rod packers [**U10**] 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 set of push rod packers. Finally, cut the 0.31mm wire back to just clear the faces of the push rods. Alternatively, the push rod packers can be glued or soldered in place between the push rods.

SAFETY LOOPS



The wood underframe and steel underframe have slightly different safety loops.

For wood underframes, examine the safety loops carefully, there are four half etched marks on the inner face of them indicating where the bends need to be. Take two safety loops [**U11**] 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 on the leg in a pair of pliers and twist the leg above the pliers through 90 degrees. Repeat for the other leg.

Open up the slots in the floor with a scalpel blade and slide the safety loop over the brake push rods and through these floor slots. There are two methods of attaching the safety loops. (i) Cut the legs of the safety loops to 10.5 mm long. Solder the safety loops into the slots in the sub-frame base, towards the outer end for P4 and EM, at the inner end for 00. (ii) Alternatively, position the safety loops just clear of the underside of the push rods and solder from above the floor. Cut off any excess and file clean.

For steel underframes, examine the safety loops carefully, there are four half etched marks on the inner face of them indicating where the bends need to be. Take two safety loops [**U11**] and bend at right angles at the two half etched marks in the centre of the loop. At the outer bend marks, bend the safety loop outwards.

There are four slots in the floor for the safety loops, the outer one and the one two across are for P4/EM, and the inner and the one two across are for 00. Slide the safety loop over the brake push rods, through the gap in the floor and into the appropriate slots. Solder in place from the top. The top of one strap will stick out the side to the underframe so cut off flush.

ATTACHING THE SUB-FRAME TO THE WAGON

For a wagon that has solebars fitted, attach the sub-frame 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 if the inside of the solebars are the scale width apart there will be a slight slop, and you will have to centre the sub-frame between the solebars.

For a wagon where the solebars are not attached, mark a line along the longitudinal and transverse centrelines. Attach the sub-frame to the bottom of the wagon using epoxy, aligning the marks on the sub-frames with the centrelines on the wagon.

The solebars, if still separate, should now be attached to the body butting up against the outside of the etched underframe. If the axleboxes and springs are still fitted, the backs of the axleboxes should be opened out first (see later section 'Axleboxes and Springs').

BRAKE LEVERS AND GUIDES

On the prototype there is, in fact, a different type of clutch mechanism at each end of the brake shaft, the straight clutch which is in line with the shaft and the curved clutch where the lever is pivoted above the brake shaft (Morton). The two types on the etch are in-line lever [**U12**] and the Morton lever [**U13**]. Take the appropriate lever(s) and bend to shape as shown in the diagram at the end, using the half etch lines and dots, which are in the middle of the curve, as a guide.

Attach a clutch [**U14**]to the back of the in-line lever [**U12**] (when you look from the front of the lever you should only be able to see the top right corner of the clutch) and then attach a brake shaft washer (U9) to the front of the lever.

Cut the brake lever guide position jig [**J2**] 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.

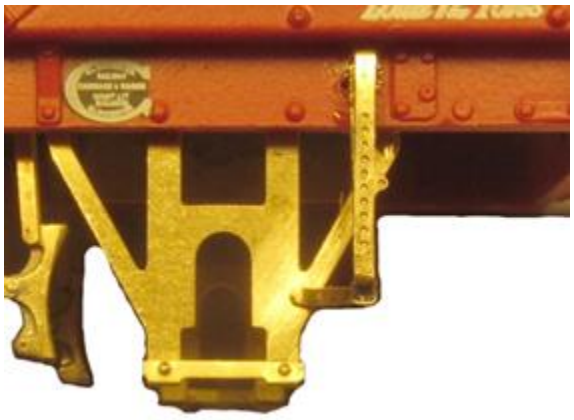
Decide which type of brake lever guide is required, the pin type [**U15**] or the ratchet type [**U16**]. Bend to shape as shown in the photo using the half-etched marks. The bottom bend of the pin type should be bent first by placing in the slot in the brake lever guide jig and bending over so that both sides lay flat along the jig. This should give a nice round curve.

On the edge of the fret there is a jig to ensure the hole for the brake lever in the solebar is in the correct position. Cut the jig from the side of the etch and clean up. 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.

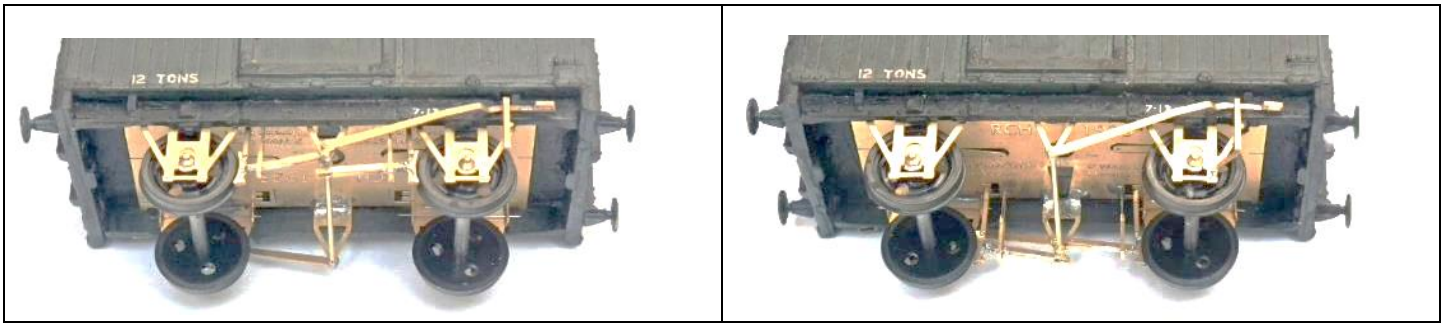
For the steel underframe, a small packing piece of plastic 0.66mm wide x height of the solebar channel opening needs to be stuck over the hole, thick enough so that the outer face is 2mm further out than the outer face of the w iron. Again, place the jig over the brake shaft, align the etched line on the jig with the bottom of the solebar and spot through the 0.5mm hole onto the packing piece with a 0.5mm drill. Drill through the packing piece and solebar 0.5mm.

There are three 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 [**U17**], horizontal [**U18**] or part way up the 'W' iron [**U19**]. 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.

To assemble the brake levers and brake lever guides, push the brake lever through the brake lever guide, mount the brake lever on the brake shaft (both shafts on the Morton side) 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. Finally. on the in-line side, solder a washer [**U9**] over the shaft on top of the lever.



Reduce the length of the brake shafts and pivots. The brake shafts should protrude 0.5mm beyond the lever and the upper pivot wire should be nearly flush.



DOOR BANGS, COUPLINGS AND BUFFER HOUSING NOSE RINGS

The other parts included on the etch are door bangs for mineral wagons, door bangs for goods wagons, coupling hooks, coupling hook face plates for fixed end wagons and buffer housing nose rings.

There are a multitude of types of door bangs fitted to wagons including various types of wooden block, curved metal stop and spring stops. The types included in the kit are the standard RCH 1923 type. On wood underframes, for mineral wagons use [**U20**] and goods wagons use [**U21 and 22**]. For steel underframes, for mineral wagons use [**U20**] and goods wagons [**U21**]. There are two mineral wagon door bangs per mineral wagon, four goods wagon door bangs per goods wagon (note those for wood underframe goods wagons are handed).

The door bangs need to be bent up as shown in the diagram at the end. The mineral wagon door bangs are fitted on the centre line, the goods wagon door bangs will align with the plates on the door or, if there aren't any, with the hinge plates. The door bangs for wood underframes are attached to the solebar but for steel underframes small packing pieces 1.3mm wide x internal solebar height need attaching in the solebar channel first. These should be flush with the front of the solebar.

The door bangs are fixed to the solebars by simply attaching with epoxy or cyanoacrylate. The joints can be strengthened with pieces of wire if required. Take the appropriate door bangs 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, drill though the solebar 0.4mm, insert a piece of 0.4mm wire and trim just proud of the door bang to represent the fixing bolts. (The photo shows the process being applied to a V hanger)

To use the coupling hooks, take one of each hand [**U23**, **U24**], 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.

Fit coupling hook face plates as required [**U25**] for steel underframe wagons and for wood [**U25a**] and [**U25b**]. The wood underframe has the two different ones because they are handed. On the prototype, the larger of the bolt heads are at the end of a rods that go from end to end.

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 [**U26**], 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.

AXLEBOXES AND SPRINGS

It is necessary to open up the back of the moulded axlebox to allow the bearing to move up and down in the 'W' iron. This can then be done by carving out with a scalpels and file or by using a burr 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. Check that enough material has been removed to allow the free movement of the axlebox.

If the axleboxes and springs are still separate, attach to the etch 'W' irons with epoxy or cyanoacrylate.

WEIGHTING

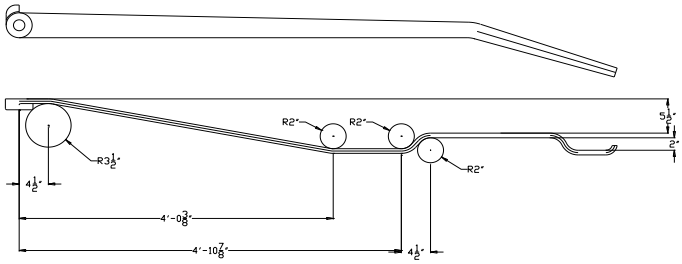
The sub-frame allows plenty of space for weighting the wagon. If Code 4 lead (1.8mm thick) is used, there is space for two thicknesses to be fitted to the underside of the wagon without it being seen. For P4, two pieces 16mm x 54mm give a total wagon weight without load of approximately 50 grams. For 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 wagons with shallower solebars or 'dropped' floors 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.

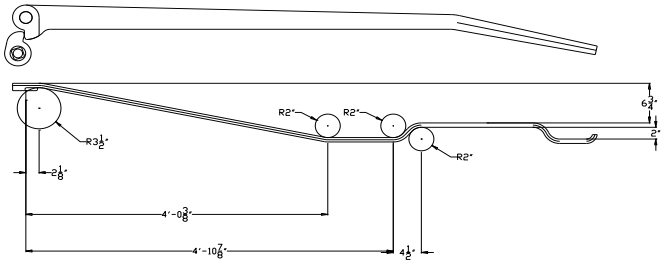
Brake lever diagram

Bends are marked with a small etch dimple on the back of the etch. This is the centre of the bend.
For 2" bends use a 1.3mm drill
For 3½" bends use a 2.0mm drill

In-line lever



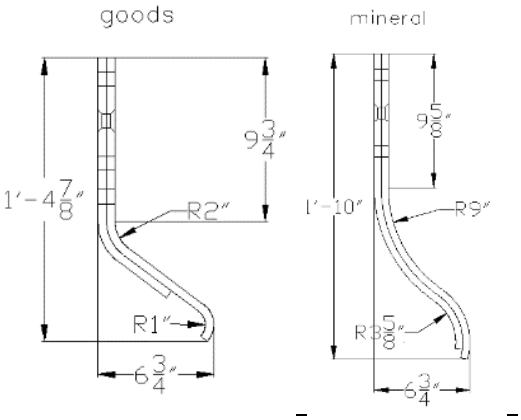
Morton lever



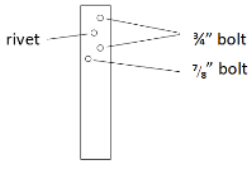
Door bang diagram

For 1" bends use a 0.7mm drill (or bend the end with pliers)
For 2" bends use a 1.3mm drill
For 3½" bends use a 2mm drill
For 3⅜" bends use a 2.5mm drill (or use round nose pliers)
For 5" bends use a 3mm drill
For 5¾"bends use a 3.5mm drill
For 9" bends use a 6.0mm drill

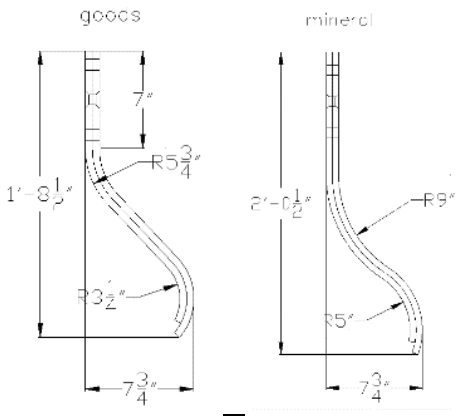
Wood Underframe



Goods door bangs
(one this way, one reverse, each side)



Steel underframe



ETCHED COMPONENTS

U1. Underframe
U2. Bearing carrier – (4)
U3. Brake block and hanger – (4)
U4. Brake block centre – (8)
U5. Push rods outer – (2)
U6. Push rod inner – (2)
U7. Brake shaft levers – (4)
U8. Morton V hanger washer
U9. Brake shaft washer – (3)
U10. Push rod packers – (4)
U11. Safety loop – (4)
U12. In-line brake lever
U13. Morton brake lever
U14. In-line clutch
U15. Brake lever guide – pin type – (2)
U16. Brake lever guide – ratchet type – (2)
U17. Brake lever guide support strap – bottom type - (2)
U18. Brake lever guide support strap – straight type – (2)
U19. Brake lever guide support strap – middle type - (2)
U20. Door bangs (mineral wagons) – (2)
U21. Door bangs wood u/f (goods wagons) left – (2)
or Door bangs steel u/f (goods wagons) – (4)
U22. Door bangs wood u/f (goods wagons) right – (2)
U23. Coupling hook left hand– (2)
U24. Coupling hook right hand – (2)
U25. Coupling hook faceplate – (2)
U26. Buffer housing nose rings
J1. Brake hanger bending jig
J2. Brake lever guide position jig

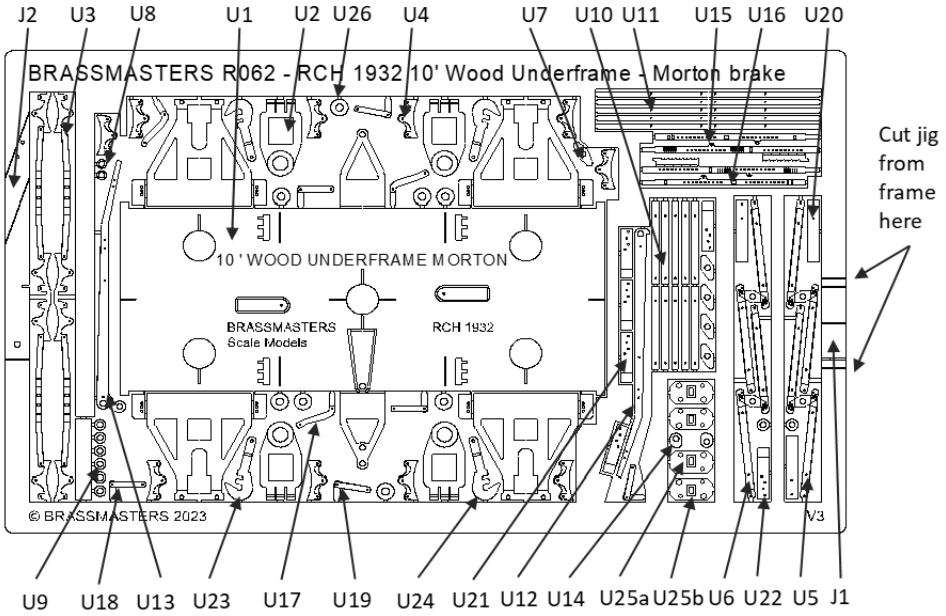
Other components

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

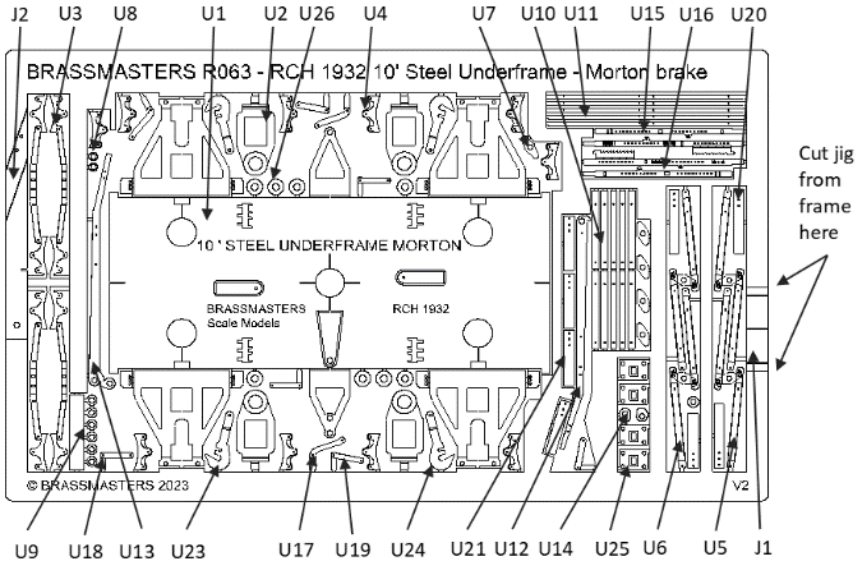
Components not supplied

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

Etch diagram for R062 Wood Underframe



Etch diagram for R063 Steel Underframe



There is no U22 in this kit