

CC15B Schlieren 2000mm wheelbase Disc Braked Sprung Bogie.

Introduction:

Safety warning.

This kit is suitable for adults only. There are small and/or sharp components. The castings and recommended solders contain lead. Observe appropriate hygiene precautions; do not eat or handle food without first washing hands. The tools and materials recommended also require the care in handling; protection for the eyes and face (dust mask) must be applied when soldering and using a mini-drill.

The model bogies have a rigid outer frame as on the prototype. The wheel bearings are located in individual support plates which can move vertically within slots in the outer frame. The bearings used are Kean Maygib waisted type and are mounted so that the outer 1mm dia. pip slides in 1mm slots in the outer frame. The movement of each plate is controlled in a vertical plane by a combination of a guide on the side-frame and the length of the spring wire. The spring wire locates and bears on a slot in the bearing plate. Each bearing plate has a hooked top to locate on the vertical guide to retain the bearings and wheels, but they can be easily dismantled to insert or remove wheel-sets by disengaging the spring wire. The springing utilises the familiar guitar spring material to give flexibility to the load characteristics. There is sufficient movement in the springing to cope with track irregularities and cant changes in excess of 1mm over the length of the vehicle.

The kit represents the Schlieren M25 disc braked type, complete with the appropriate castings. Hand-wheel types seen vary over the life of the bogies and are available on etch CC01D. The recommended wheels are 12mm dia. with disc inserts on one wheel of each axle.

The components on the etched sheets are all held in position by half etched tags. The fronts of the sheets have the identifying text and should be "face up" for cutting of tags.

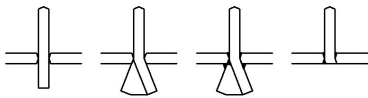
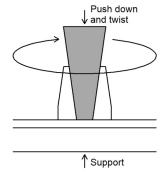
It is recommended that a small sharp craft knife is used to remove the components from the frets; Use a hard base surface, such as an off-cut of chipboard or MDF, on which to perform this cutting. Ensure that the blade of the knife used for cutting the tags is regularly changed as soon as there is evidence of wear (I use a small snap-off type knife, which is quick for providing a fresh cutting edge).

Channels for the guitar wire springs are created by laminates of two pieces with the half etched areas creating a slot. It is important that these do not become blocked with solder. This can be aided by using a solder resist applied to the half etched faces - a CD marker type pen works well. This should be applied before removal of the components from the sheet, as well as subsequently carefully controlling the quantity of flux and solder applied.

TIP: pare off small slivers of solder from the solder stick or wire; these can be selected and picked up by the tip of your soldering iron to limit the quantity that is applied.

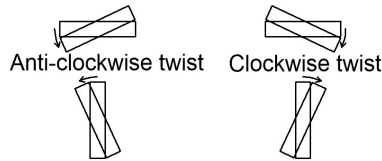
A tab and slot system is used for some of the joints, as a twisting of the tabs secures the components together for soldering. Miniature smooth faced taper (snipe) nosed pliers have been found to be the most effective as they reduce the shearing action, which can distort the strip around the slot. A 30° twist is usually more than adequate, but

this can be increased, particularly for the narrower tabs, provided it doesn't distort the area around the slot. The twisting action places a relatively high load on the pliers, which is why the high quality box jointed versions are recommended. If the T leg is supported, the tips of the pliers can be pressed against the facing strip to ensure full location when twisting the tab.



For T section joints these are made into a half-etched channel, which increases the strength of the joint very significantly. It also makes the soldering much simpler, as the capillary action of both flux and solder helps them to flow naturally along the joint being made, and stay there.

Flux is applied around the tabs. When the loaded soldering iron is applied, the flux melts, and precedes the solder through the clearances in the slot/tab, and along the channel beneath. Movement of the iron around and to the sides adjacent to the tab, above the channel, assists the solder to flow in the directions required. Finally the tab is removed and the surface cleaned up to leave a perfect T, when all the soldering has been completed. To avoid distortions, where there are 2 tabs to be located and twisted to secure individual components, the 2 tabs should be twisted in different directions (clockwise and anti-clockwise).

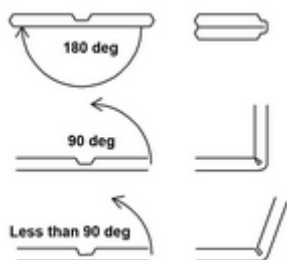


Cleanliness is important with solder fluxes, and it is important to "clean as you go". Any residues can cause corrosion of the steel springs in particular, as well as preventing good paint adhesion.

The easiest way to remove the tabs after soldering is with a pair of side cutters. Finish off with a miniature fine grade sanding disc (240 Aluminium oxide grit is ideal). It is preferable to wash off the flux residues first, otherwise the residues will clog up the abrasive surface, and significantly reduce their effectiveness. If the mini-drill is mounted in a vertical drill stand, both hands can be used to hold the assembly, and carefully guide it while performing these operations; this task must not be rushed, if a perfect finish is to be achieved. Some prefer to do the task in one go with a slitting disc, as the finish is unimportant concealed behind the final casting. Note that removal of the tabs does not allow joints to be unsoldered easily, as the twist in the body of the tab is still there, within the slot.



Do not run the drill at maximum speed as this generates too much heat and only clogs the disc up more quickly. Hold the assembly at an angle to the surface of the disc and use a gentle stroking action over the tab residue, with the edge of the disc trailing. Keep the disc moving over the surface, and by this means you will minimise the risk of excessive grooving in the area around the tag.



Folds and bends are used extensively in the kit, and these fall into two basic types:

Folds of 180° are made with the ½ etch "channel" on the outside. 90°, or less, are made with the ½ etch "channel" on the inside. Most of the bends and folds can be made either with finger pressure or with smooth faced pliers. Some need a degree of support to avoid distortions. Always take care to maintain a degree of accuracy with these folds as they can influence the final alignment of the bogie, and even the operation of the springing.

The frame cross-members on the disc braked Schlieren bogies are best formed with the "ultimate" Hold and Fold bending tool; grip to the edge, not the centre of the etched fold line as the etched line disappears in the fold as shown; other than for these items, such tooling is not necessary.

Etched sheet main components:

1. Main Bolsters (2 off)
2. Central pivot bosses (2 off)
3. Side-frame members (4 off)
4. Bolster bearer pads (4 off)
5. Outer frame cross members (D) Drop down ends (2 off)
6. Outer frame cross members (S) Straight ends (2 off)
7. Bearing mounting plates LH (4 off)
8. Bearing mounting plates RH (4 off)
9. Bearing half etched spacer washers (14 off) *
10. Pivot rotation restriction bearers (2 off)

* There are an additional 6 spare spacing washers, as they have a habit of easily being lost / mislaid. Only 8 are actually required.

All the folds except those for the outer cross members can be performed using a small pair of smooth faced taper nosed pliers, or finger pressure. For 180° folds it is important to compress the laminate first with smooth faced pliers and finish by placing on a smooth surface and pressing firmly (thumb pressure) with the face of a ruler or similar small flat tool.

The frame cross-members on the disc braked Schlieren bogies are best formed with the "ultimate" Hold and Fold bending tool; grip to the edge, not the centre of the etched fold line.

188° solder is recommended throughout, but this is not critical. Slots are generated in the folding operations to locate the springs (Guitar string wire) and it is important not to flood these with solder. The use of solder resist is a simple aid; it has been found that a fine black indelible marking pen (eg the type used for marking CD's) is an effective way to achieve this.

1. Main bolster box:

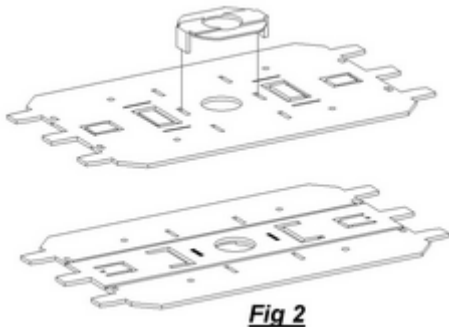


Fig 2

Remove the main bolsters (1) and central pivot bosses (2) from the etched sheet.

Support the boss centre and fold the two end tags on the pivot bosses at 90°. Insert in the slots on the unfolded main bolsters from the plain side (Fig 2); lightly splay the tags outwards from the pivot hole to retain fully in position. **Take care that the pivot bosses are not distorted; they must be flat on the surface of the bolster.** Make sure that you have the pivot boss on the surface that will be the outer surface of the box; flux and solder from the tag side. Wash off flux residues, cut off

the projecting tags, and sand / file flush.

Fold the 2 sides 90°. Fold the two spring spacers (a) 180° and compress with pliers. These are located towards the outer ends of the bolster and fold inside (Fig 3-a). The end of these spacers will pass through the side frames and must be tight up against the top securing tabs. Fold up the two rotation limiting tabs (b) 90° (Fig 3-b). None of these tabs require soldering at this stage, as this will be done at a later stage when further additions are made. The end view is shown to demonstrate the spring wire location on each side as it passes through small holes in the sides of the bolster.

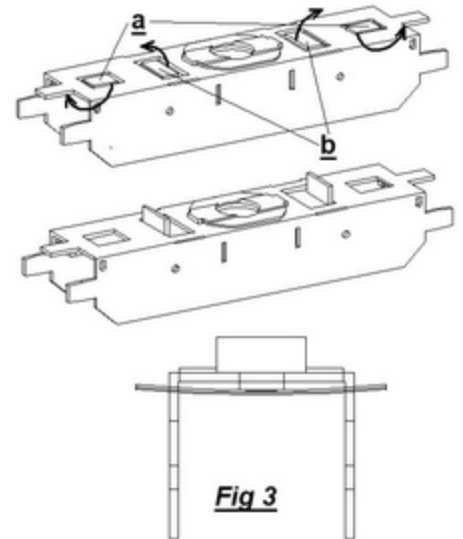


Fig 3

2. Bogie side-frames:

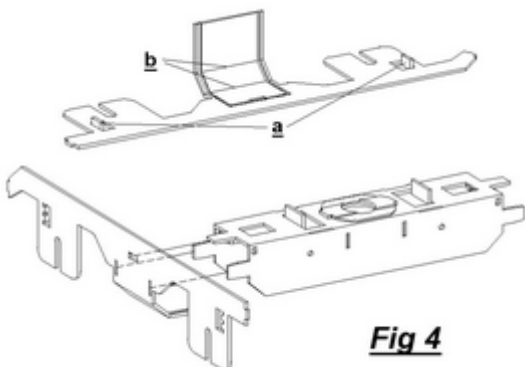


Fig 4

Remove the side-frames (3) from the etched sheet. Push out the 2 bearing guides, and carefully adjust at 90° to the inner face of each side frames (Fig 4-a). Fold the lower sides to form the base of the bolster (b) and carefully adjust so they follow the profile of the lower side of the bolster (Fig 4-b). Take some care with this, and test the location of the sides on the bolster. Carefully adjust as necessary. It is important that the side-frames sit truly square on the ends of the bolster, ensuring that the bolster mates with the half etch lines on the side-frames. Also note that they are "handed"

Fix the side-frames to the bolster by twisting the protruding tabs. Apply flux and secure with solder, both on the tabs and the folded underside of the bolster. Capillary action will draw the solder along the joints (Fig 5). Take care to avoid blocking the small holes at the outer ends of the bolster side where the spring wire will be located. Check for twist in the frame (should sit flat on a level surface). Carefully adjust as necessary.

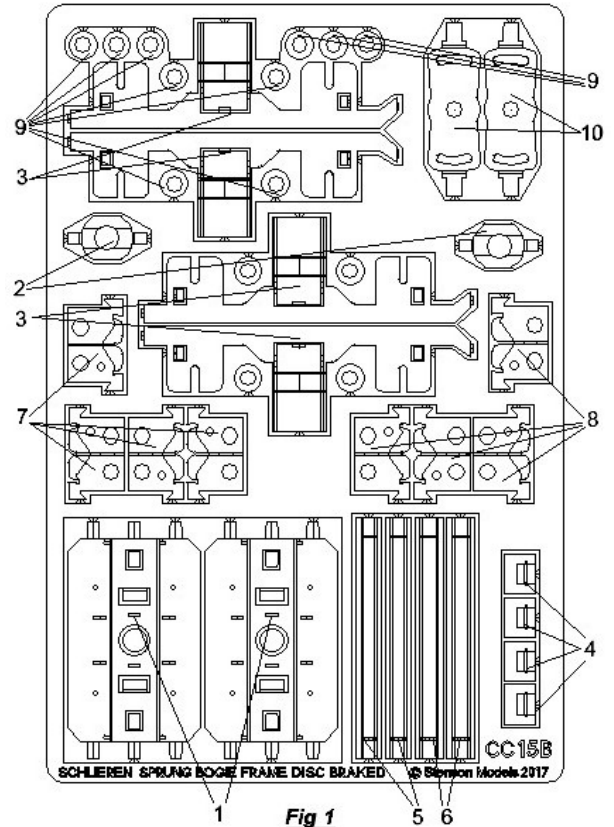


Fig 1

Remove the bolster bearer pads (4) from the etched sheet and locate over the bolster rotation limiting tabs, with the half etched end towards the centre, covering the hole from the tab fold. Flux and solder in position (Fig 5) taking care to avoid getting solder on the raised top face of the bearer pads.

Remove the outer frame cross-members (5 and 6) from the etched sheet..

Fold these 2 x 90° to form a channel section. This requires suitable bending aids in a vice, or preferably a small hold and fold tool. The sizes of these cross-members are different for the two ends of the bogie frame; to distinguish them they are marked "D" (5) for the Drop down end and "S" (6) for the Straight end. Locate the slots of the cross-members on the tabs on the ends of the side frames, hold in position, apply flux, and secure with solder from the inside.

Wash the completed bogie frame to remove all flux residues; cut off the protruding bolster tabs where the sides are soldered and finish flush with a fine sanding disc. (Fig 5)

Check that the stepped end of a pivot bush will sit correctly in the pivot hole; gently open out with a round needle file, or broach if required.

It is suggested that the cosmetic castings are not fitted until the frame has been tested with sprung bearings and wheels in position.

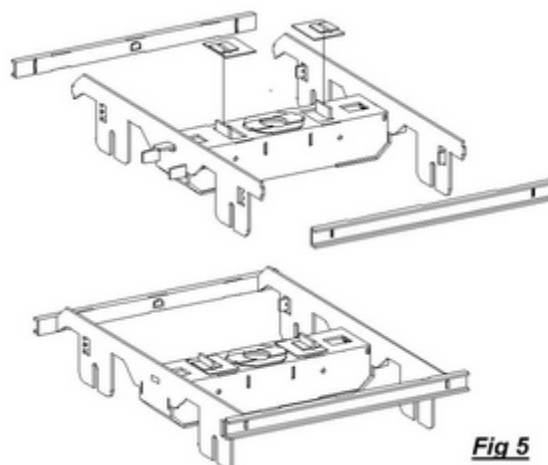


Fig 5

3. Bearing mounting plates:

The bearing mounting plates (7 and 8) are made up of two layers. The half etched areas create a slot for the spring wire when laminated. They are "handed" with 2 x LH and 2 x RH for each bogie.

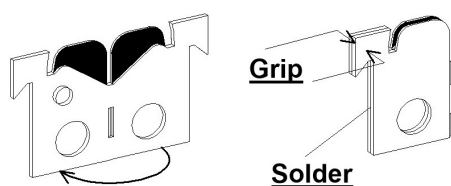


Fig 6

It is recommended that solder resist (indelible ink marker pen) is applied to the half-etched areas (Fig 6) to reduce the risk of this slot becoming restricted with solder during lamination.

Fold the two parts of the plates 180° with the half etched fold line on the outside; press firmly to ensure that they are parallel, but take care not to distort the side of the spring slot. Grip the folded plate with smooth faced pliers, to ensure the fold is maintained. Flux / solder the side below the retaining hook as shown (Fig 6) taking care to limit the amount of solder applied; it is important to avoid flooding the spring slot.

Polish the sliding face (identified with a recessed hole above the bearing hole) and the edge below the "hook (which will slide against the bearing tabs) with fine abrasive to remove any solder residues

Insert a waisted bearing in the plate from the plain side (with no recessed hole), and with a 0.15mm half etched spacing washer (7) (Fig 7). This ensures that only the 1mm diameter pip protrudes beyond the bearing plate surface. Place the mounting plate on your soldering board, with a small (1.5-2mm dia x 1.5mm deep) predrilled hole to allow the bearing to seat fully home. Use a small probe, such as the end of a needle file, to hold the bearing in place and prevent any risk of the plate lamination opening up. Apply flux and apply solder sparingly to the edge of the flange to secure.

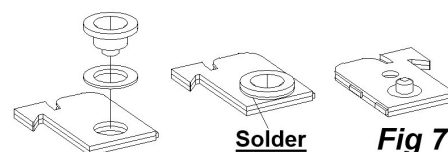


Fig 7

Wash the completed bearing mounting plates to remove all flux residues.

Finally check the fit of the bearings in each of the 1mm slots of the assembled frame. **Any hint of tightness must be relieved with a piece of fine folded abrasive to flatten the cusp on the slot edges left by the etching process.** Also check and correct that the slot for the spring wire is totally clear and not deformed; the slot should allow a piece of 0.3mm brass from the etch sheet residue to slide freely; any deformation can be opened up with the tip of a scalpel.

4. Assembly check without the castings:

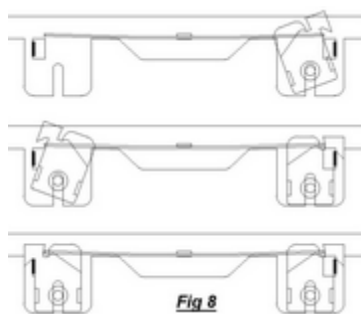


Fig 8

Take one of the spring wires** supplied (28.5 x 0.279mm) and thread it through the two small holes, underneath the bearer plate, on one end of the bolster, from the straight end of the frame. (Fig 8)

Slide one bearing mounting plate and rotate to locate the "hooked" side over the bearing tab. (Fig 8) Use the tip of a small instrument screwdriver or tweezers to locate the spring in the bearer slot, and push the spring wire until it touches the end of the slot. (Fig 8)

Repeat for the other mounting plate on the same side of the bogie.

Position a spring wire on the other end of the bolster.

Take one suitable wheel-set 12-12.5 mm dia. with 26mm pin-point axle. Locate one end of the axle in one of the bearing mounting and on the other end hold an appropriate handed mounting and slide this into position; rotate this second mounting against the bearing tab and locate the spring in the bearer slot.

The correct wheel-sets have brake discs on one wheel of each axle, and these discs are located diagonally on each bogie; as viewed from the side the discs are always towards the LH end of the bogies. The top view is shown in (Fig 9)

Repeat for the second wheel-set, ensuring that the spring wire sits correctly in both slots.

This is easier to do than explain, but can be a little fiddly to perform. Practise makes perfect, but may take a little patience initially.

Now check that the springing is working correctly on all 4 wheels. It may be necessary to adjust the side frames of the bogies with careful flexing. Equally the wheels-sets should have minimal side play which can also be adjusted in a similar manner.

Once you are satisfied with alignment of the frame and correct springing function, the wheel-sets can be removed – disengage the spring wire by removing from the bearer slots allowing the mounting plates to be rotated clear of the bearing tab - and the wheel-sets will drop out complete with bearing mounts. The cast side-frames can now be fitted:

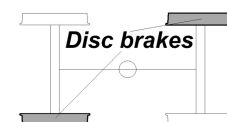


Fig 9

** Refer to Section 7 - Fine Tuning.

5. Fitting side-frame castings:

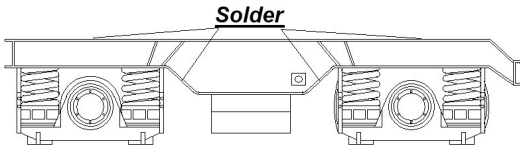


Fig 10

One bogie on each wagon is fitted with handbrake wheels and it is necessary to drill the holes through (0.5mm) in one pair of castings preferably before assembly. This can be done with a mini-drill or pin chuck; there is a spigot on each side which identifies the position. Offer up a castings to the etched brass frame and you will probably find that they are very slightly too long. Carefully remove material from each end until it is a snug fit between the two out cross members, maintaining the alignment of the axle boxes with the etched frame. It may also be necessary to bend the casting slightly to achieve a satisfactory alignment; these may then be

secured by soldering (preferred method), or adhesive (Epoxy or Contact Adhesive).

The castings are carefully aligned with the etched side-frames, and should be secured with 145⁰ solder using a temperature controlled iron (Pewter melts at approx. 200⁰). Hold the casting firmly in position (finger pressure with a pad of tissue as insulator), and when satisfactorily aligned, apply flux and solder to laminate in the positions shown in Fig 10. The casting acts as heat sink, so it can take a few seconds for the solder to flow into the laminate.

Wash thoroughly in very hot water and soak to ensure any flux within the laminate is removed. Rinse in very hot water, and allow to dry. Finally clean up the laminate joints with a fine flat needle file or small emery stick.

It is recommended that you do a further assembly check as 3 above before final painting, to ensure than the bogies are functioning correctly. It is suggested that you do not fit the handbrake wheels (separately painted white) until after painting of the main assembly. Suitable hand-wheels are available on etch CC01D. A shaft length of 2 - 2.5mm is appropriate to allow securing with cyanoacrylate in your pre-drilled holes

Remove the wheel-sets again for painting. Do not paint the bearing mounting plates and mask the inside faces of the side frames. On final assembly apply lubricant to the pin point bearings and the slots for the spring wire in the bearing mounting plates.

6. Fitting to a wagon under-frame:

The method of fitting to the wagon under-frame will vary considerably, dependent on the basic construction.

Pivot bushes, 2mm set screws, and 2mm nuts are provided (Fig 11)

For an etched brass under-frame the nut can be soldered in position, but the positioning is critical to give the required ride height.

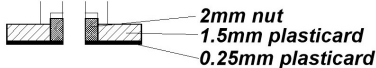


Fig 12

For example on a Lima TEA the nut can be secured (Press fit) in a small off-cut and retained with a thinner laminate over the top (Fig 12). This can then be glued on to the pivot boss. The height can easily be adjusted

by the choice of material thickness.

The rotation resist bearer (10) is held between the pivot bush and retained nut. Cyanoacrylate can be used to hold in position and prevent rotation.

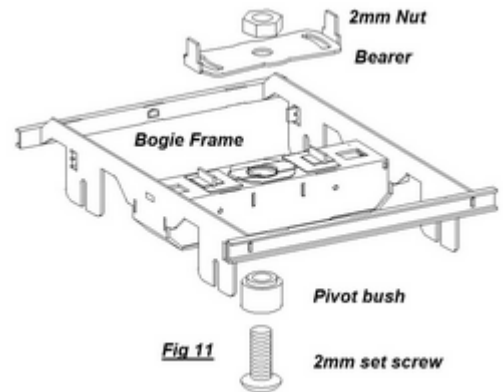


Fig 11

7. Fine tuning:

Depending on the weight of your wagon, the thickness of the spring wire (Guitar strings) should be chosen to allow at least 75% available deflection under load. Typically:

For a wagon wt of 65-80g use 0.010" (0.25mm)

For a wagon wt of 80-95g use 0.0105"(0.267mm)

For a wagon wt of 95-120g use 0.011" (0.279mm - supplied)

For a wagon wt of 120-135g use 0.0115" (0.292mm)

The length of the spring wire at 28.5 – 29.0mm is fairly critical; if they are too long it will either not seat fully in the slots or push the bearing mounts against the guide tab and restrict free movement; if they are too short they will not bear on the peak bearing surface in the slots and possibly allow one of the bearing mounting plate to rotate free from the guide – this will allow a wheel-set to drop out.

Components:

1 x Etched sheet CC15B

2 prs. Pewter side frame castings

8 x KM waisted bearings

2 x 2mm x 10mm set screws

2 x 2mm nuts

2 x pivot bushes

5 x 28.5mm long x 0.279mm dia. spring wires

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