

## **S23 & Z14 Tender Chassis Instructions**

### **The John Gardner Memorial Etches**

This J15 locomotive chassis along with the S23 and Z14 tender underframes are dedicated to the memory of the late John Gardner. John did so much for thorough and accurate G.E. locomotive histories and these detailed etches depend directly on his work.

#### **Notes**

This set of instructions covers the chassis subframes for both S23 (X.08) and Z14 (X.09) tenders chassis kits. They are both designed to be used as a modern replacement for the underframe in the Alan Gibson S23 tender kit. They include CSB suspension and cover many of the prototype variations. The chassis can be built in EM and P4 only and are designed to negotiate a 1m radius curve in both gauges using the same subframe. There is therefore only 1 set of 'framespacers' consisting of a fold up assembly complete with hornguides.

As with a lot of railway equipment of the period, the GER S23 and Z14 tenders featured several changes over the course of their build program and in service. Some of these changes are covered in this chassis kit. I will not give exhaustive prototype information here as it is covered in depth elsewhere but will suffice to say that the prospective builder would be wise to consult the Great Eastern Railway Society material (see notes below) along with the relevant RCTS and Yeadon volumes on the subject in question for the scope of these variations for. To assist the prospective builder however, the following is a list is a summary the variations covered by this kit:

#### **S23**

- Round and straight top sideframe cut outs
- Westinghouse air brakes
- Steam brakes

#### **Z14**

- Deep and shallow sideframe cut outs
- Early brakegear with the front set of brake shoes in front of the front axle
- Early brakegear Westinghouse air brakes
- Early brakegear steam brakes
- Later brakegear with the front set of brake shoes behind the front axle
- Later brakegear Westinghouse air brakes
- Later brakegear steam brakes



**Important:** All fold lines are through 90° with the fold line on the inside unless stated otherwise.

Refer to the instruction drawing as you progress.

### **Tenders for Great Eastern Railway Y14 and LNER J15 Locomotives**

The tender underframe kits were designed in conjunction with the Rumney Models J15 loco chassis. The following was written by Alan Fell as an aid if you are using these tender kits with that loco chassis. The references may be useful as well if constructing a Z14 tender for something else.

“A variety of tenders was attached to these engines, and sometimes tenders were exchanged during the lifetime of a locomotive.

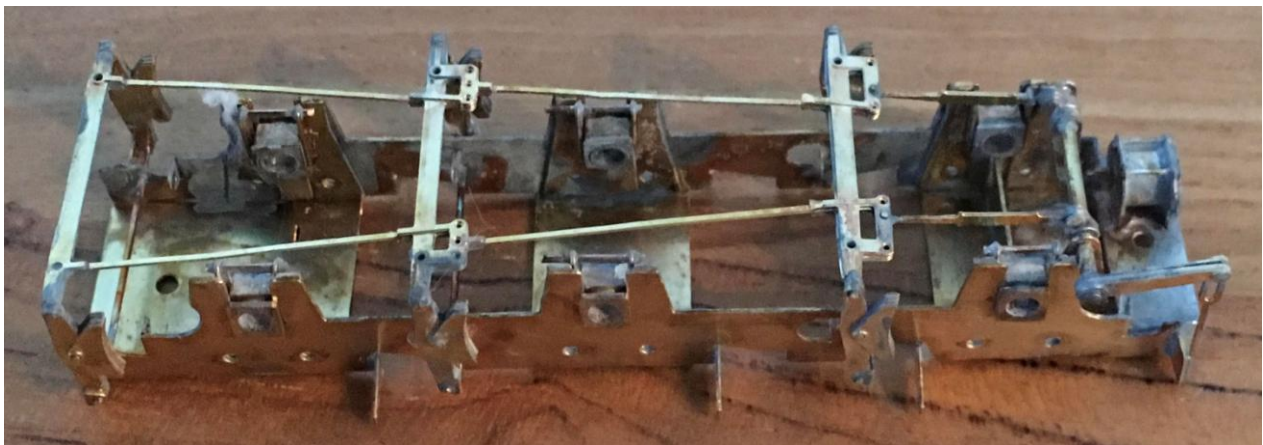
Of the 289 engines built, initially 15 had H14 tenders, 112 had earlier-pattern Z14 tenders, 10 had later-pattern Z14 tenders; the rest built up to 1893 had S23 tenders with D-shaped slots in the frames, with the later-constructed examples having S23 tenders with parallel slots.

All these tenders had the same wheelbase and almost identical external dimensions, except for the H14 where the side and back sheets were 6” higher.

The intention with the Rumney Models frame kits was that the basis of construction normally would be the Alan Gibson kit. Care must be taken to check the dimensions of the tender parts supplied in that kit against an accurate drawing, to ensure prototypical correspondence. Some small modifications may be necessary.

The fittings with the Gibson kit should be suitable, except for the spring hangers in the case of earlier tenders. Later tenders incorporated a rubber mounting in this component and this final design is featured in the Gibson-supplied casting. The older design has a much simpler appearance. The spring casting supplied will therefore need modification in this respect for all H14 and all but the late batch of Z14 tenders.

The best way to become familiar with these tenders is to refer to three excellent drawings by John Gardner: L38, L46 and L 48, detail 54, together with their associated notes. The Gardner drawings are available at very affordable prices through the Great Eastern Railway Society. The Rumney Models etches are based on these and other drawings by John Gardner, all relying directly upon Stratford originals.”



## **CSB Springing**

The kits are designed to use CSB suspension. Fulcrum points for the spring wire and carriers to attach to the High Level bearings are included. The CSB plot is set up to use 0.009" steel wire (9 gauge guitar wire) with a total tender weight of 100g. If your tender weight far exceeds this figure (which is probably unlikely) then consider using 0.010" wire. If it significantly less than the 100g consider adding some ballast to bring it closer to this figure. Care must be taken to ensure the centre of gravity is above the middle axle.

## **Materials List**

0.4mm, 0.45mm, 0.5mm, 0.8mm and 1mm wire  
4.5mm outside diameter tube for Westinghouse air brake cylinder  
4mm outside diameter tube for Westinghouse air brake reservoir (early Z14 tenders only)

12BA bolts for fixing the body in place.

High Level Hornblock bearings - 2mm diameter bearings are required. You'll only need the bearing as the guides are included in the chassis.

Eileen's Emporium are good source for wire, tube and bolts. Also they do a mixed sizes pack of wire if you don't want to buy large quantities. Contact details are as follows:

### **Eileen's Emporium**

Unit 19.12 Highnam Business Centre, Newent Road, Gloucester, GL2 8DN  
[www.eileensemporium.com](http://www.eileensemporium.com)

High Level Kits can be found via the following information:

### **High Level Kits**

14 Tudor Road, Chester-le-Street, Co. Durham DH3 3RY  
[www.highlevelkits.co.uk](http://www.highlevelkits.co.uk)

## **S23 Tender Parts Lists**

1A - Sideframes (early tenders)  
1B - Sideframes (late tenders)  
2 - Tender subframe

3 - Well tank front and rear  
4 - Dragbox  
5 - Brake shaft bracket  
6 - Westinghouse air brake cylinder former & overlay

7 - Spring carriers  
8 - Washers

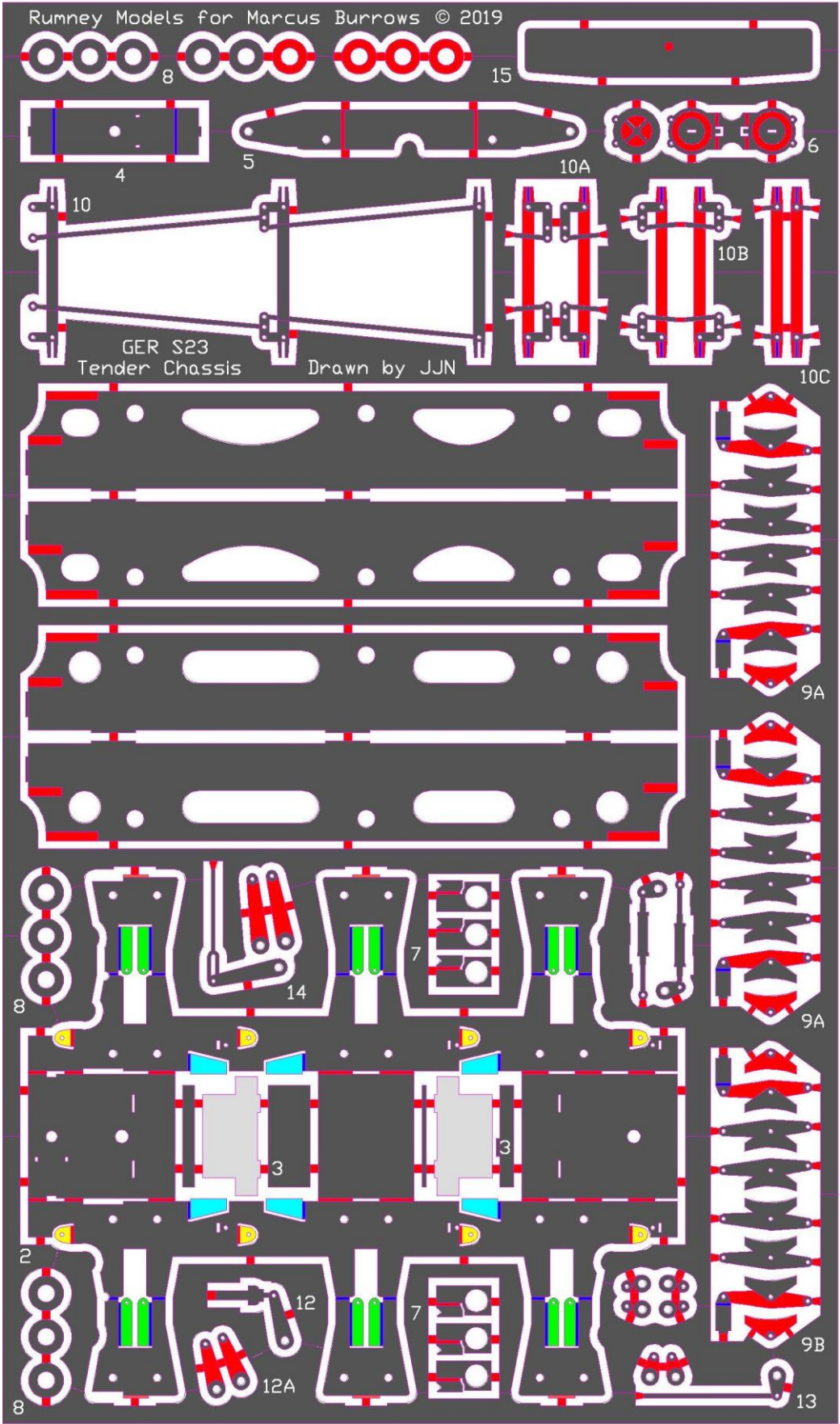
9A - Brake Shoes (front and middle axle)  
9B - Brake Shoes (rear axle)  
10 - Brake pull rods

10A - Brake pull rods (front axle overlays)  
10B - Brake pull rods (middle axle overlays)  
10C - Brake pull rods (rear axle overlays)

11 - Brake pull rod links  
11A - Brake pull rod link (crank overlays)  
12 - Westinghouse air brake links  
12A - Westinghouse air brake links (crank overlays)  
13 - Steam brake links  
13A - Steam brake links (crank overlays)  
14 - Hand brake link  
14A - Hand brake link (crank overlays)

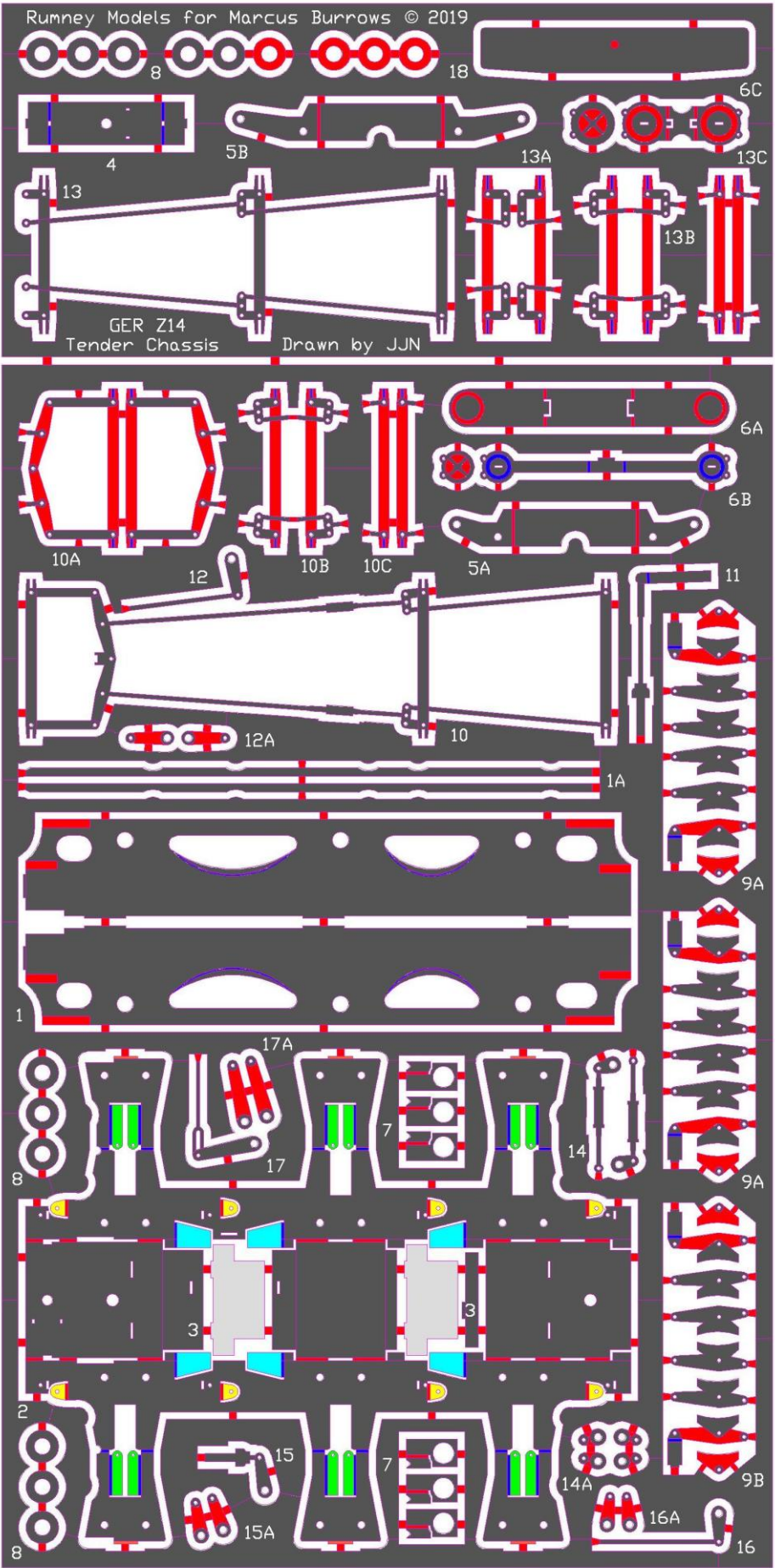
15 - Replacement tender front plate (replaces part of Gibson item 6)

S23 Parts Diagram





Z14 Parts Diagram



## Z14 Tender Parts Lists

1 - Sideframes

1A - Sideframe top overlay

2 - Tender subframe

3 - Well tank front and rear

4 - Dragbox

5A - Brake shaft bracket (early brakegear)

5B - Brake shaft bracket (later brakegear)

6A - Westinghouse air brake cylinder reservoir former (early brakegear)

6B - Westinghouse air brake cylinder former & overlay (early brakegear)

6C - Westinghouse air brake cylinder former & overlay (later brakegear)

7 - Spring carriers

8 - Washers

9A - Brake Shoes (front and middle axle)

9B - Brake Shoes (rear axle)

### Early brakegear

10 - Brake pull rods

10A - Brake pull rods (front axle overlays)

10B - Brake pull rods (middle axle overlays)

10C - Brake pull rods (rear axle overlays)

11 - Westinghouse air brake link

12 - Steam brake link

12A - Steam brake link (crank overlays)

### Later brakegear

13 - Brake pull rods

13A - Brake pull rods (front axle overlays)

13B - Brake pull rods (middle axle overlays)

13C - Brake pull rods (rear axle overlays)

14 - Brake pull rod links

14A - Brake pull rod link (crank overlays)

15 - Westinghouse air brake link

15A - Westinghouse air brake link (crank overlays)

16 - Steam brake link

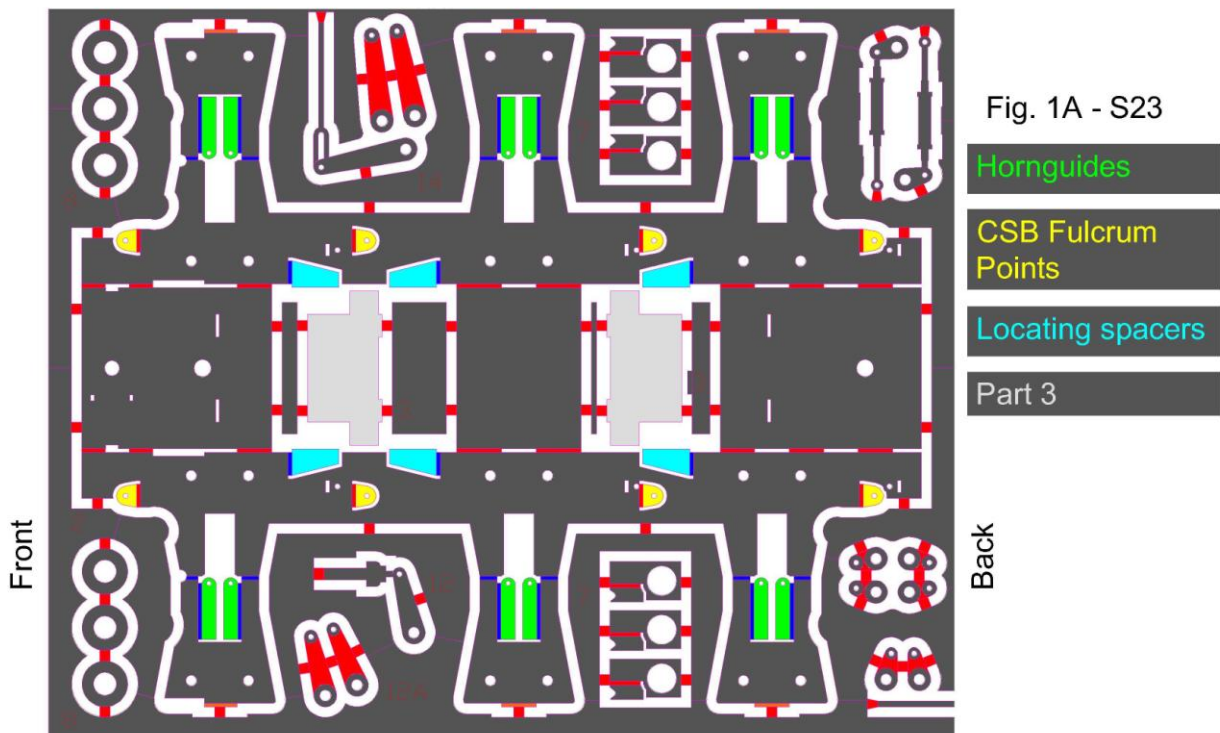
16A - Steam brake link (crank overlays)

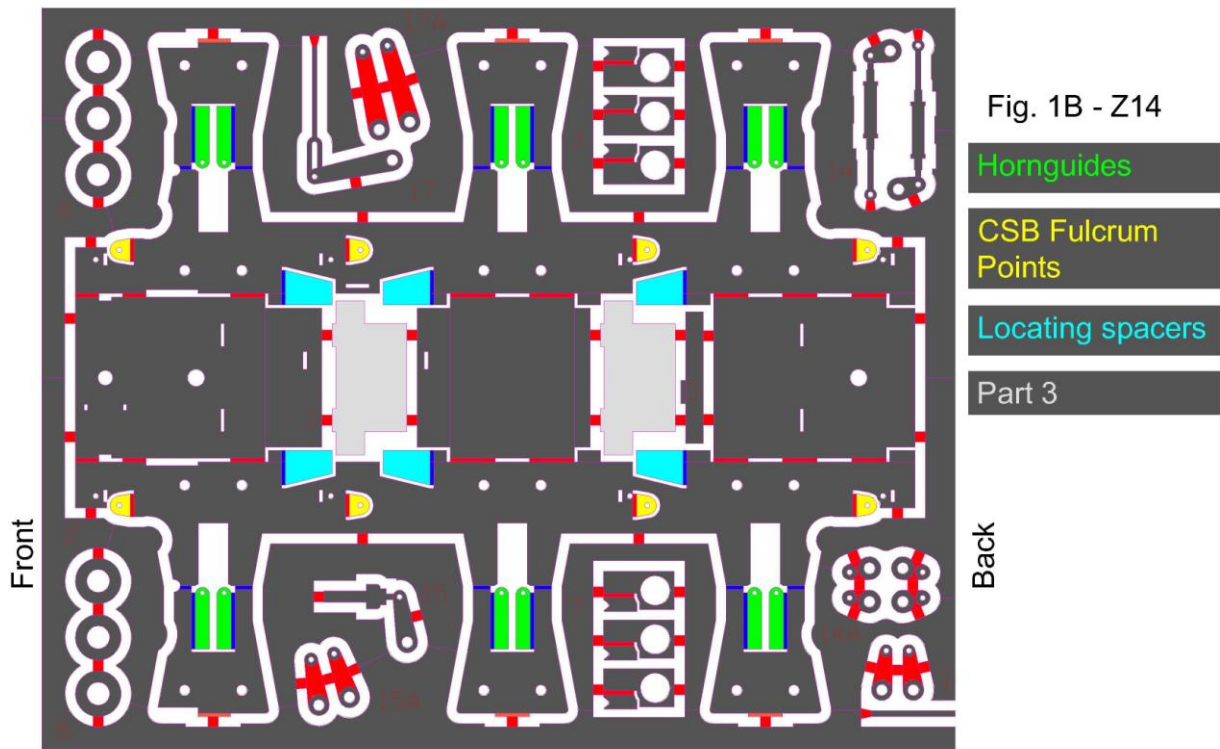
### Both types of brakegear

17 - Hand brake link

17A - Hand brake link (crank overlays)

18 - Replacement tender front plate (replaces part of Gibson item 6)





## Construction

### Overview

These kits are designed to be built in conjunction with the Alan Gibson GER S23 tender kit. Mostly it provides a sprung subframe with new brakegear but it also includes replacement sideframes with a better representation of the profile and allows for different shaped cut outs.

### Sideframes

**S23** - There are two sideframes included, an early type (1A) and a late type (1B). Check to see which sort you require and use as a direct replacement for the Gibson ones. You will need to use the steps from the Gibson kit to finish them.

**Z14** - There is only one set of sideframes included (1) but allowance has been made for two different pattern of cut outs between the axles. Some tenders had a shallow cut out for which the sideframes can be used as they are. Others had a deeper pattern. These can be created by cutting along the half etched line on the top of the cut out. Use a piercing saw. Use the sideframe as a direct replacement for the Gibson ones. You will need to use the steps from the Gibson kit to finish them.

## **Subframe**

The main part of the kit is the tender subframe (2). This comes with integral hornguides along with CSB fulcrum points all of which need to be folded up. Remove from the fret and refer to Fig.1A (S23) or Fig.1B (Z14) as you go along.

Fold out the hornguides (the small tabs shaded green on Fig.1A and Fig.1B) make sure the folds are at 90° are reinforce with solder. The axleguards (the parts that the hornguides are attached to) fold over so that they are hard up against the sides of the subframe, to do this the folds should be through 180° with the fold line on the outside. Before making these folds you will need to put a slight chamfer in the tab on the end of the axleguards (shaded orange in Fig.1A and Fig.1B) which will make life easier when folding the sides up. Fold the axleguards up. The alignment of these two parts is quite important so location holes are provided so that 1mm wire can be used to make sure everything is where it should be and then solder the axleguards to the sides of the subframe.

Now is a good time to check the fit of the High Level bearings in the hornguides. The bearings may not be exactly square so they may fit better orientated in a particular way. You can adjust the slot that the bearings go into if it's a little tight. The bearings should be a good but free fit in the hornguides. Make a note of which bearing relates to which axle and also the top of them so they can go back the right way when the wheels are fitted.

Fold out the fulcrum points for the CSB suspension (shaded yellow in Fig.1A and Fig.1B) and reinforce the fold lines taking care not to get solder in the holes.

Fold up the two sides making sure that everything is square and reinforce the fold lines with solder.

The sides of the subframe include a representation of the tank well. Parts are included for the well tank front and rear (3). For complete clarity these are the parts shaded light grey in Fig.1A and Fig.1B; they are both the same. The parts fit into slots in the spacer parts of the subframe around the front and rear axles. Solder in place.

## **Dragbox**

The dragbox needs to be removed, folded into a long C shape and fitted to the subframe. There are slots on both sides to locate it. Note that there is correct way around for the two small slots on the long flat face. These should match the two small slots on the spacer part of the subframe at the front. Solder in place. The hole in the dragbox and the corresponding on the subframe are both etched to 1.3mm which is the clearance size for a 12BA bolt. A 12BA nut will need to be soldered to the underside of the dragbox to provide a pivot for the loco to tender coupling.



## **Brake shaft bracket**

The S23 tender fret has one brake shaft bracket (5) but for the Z14 tender there are two brake shaft brackets included; one for the early brakegear (5A) and the other for the later brakegear (5B). They are all fitted the same way.

Make sure that the holes in the brake shaft bracket of choice can accept 1mm wire and remove from the fret. There is a slot in the subframe just in front of the front axle into which the brake shaft bracket should be slid. The sides can then be folded up with the bracket in situ. The bracket should be orientated so that the semi circular cut out in the middle of the spacer is towards the centre of the tender, also the holes lower down on the sides should align with the holes in the subframe sides. Make sure the brake shaft bracket is hard up against the subframe sides and solder in place.

## **Subframe spacer tabs**

Fold out the six locating spacer tabs on the subframe, these are the parts shaded cyan in Fig.1A and Fig.1B. They are designed to locate the subframe correctly between the sideframes. Reinforce the fold lines with solder.

## **S-23 Westinghouse Air Brake Cylinder**

If you are fitting air brakes to your tender you will need to make up and fit the Westinghouse air brake cylinder. This is created from a former and an overlay along with a short length of tube for the cylinders. You will need a piece of 4.5mm diameter tube 3.4mm long.

Remove the former and overlay (6) from the fret. Fold the former into a U shape and locate the 4.5mm outside diameter tubing into the rings etched on the inside. Solder in place. Fit the overlay to one end of the former (it doesn't matter which one) using the circular outline to align it.

The completed brake cylinder can then be fitted to the subframe. There are two small slots on the dragbox which will accept the tabs on the base of the air brake cylinder. Make sure that the side with the overlay attached is facing the front of the tender and solder in place.

## **Z-14 Westinghouse Air Brake Cylinder - Early Z14 tenders**

If you are fitting air brakes to your early Z14 tender you will need to make up and fit the Westinghouse air brake cylinder along with its associated reservoir. These are created from formers and overlays along with short lengths of tube for the cylinders. You will need a piece of 4.5mm diameter tube 4.3mm long for the cylinder and a piece of 4mm diameter tube 10.5mm long for the reservoir.

For the air reservoir remove the former (6A) from the fret. Fold the former into a U shape and locate the 4mm outside diameter tubing into the rings etched on the inside. Solder in place.

The completed brake reservoir can then be fitted to the subframe. There are two small slots on base of the subframe between the two front axles, slightly offset to one side which will accept the tabs on the top of the air brake reservoir. Solder in place.

For the air brake cylinder remove the former and overlay (6B) from the fret. Fold the former into a U shape with a slight angle in the top (see Fig.3A in the brakegear section below) and locate the 4.5mm outside diameter tubing into the rings etched on the inside. Solder in place. Fit the overlay to the rear of the former (again see Fig.3A below) using the circular outline to align it.

The completed brake cylinder assembly can then be fitted to the subframe. There is a small slot on the left hand side of the subframe between the two front locating spacers which will accept the tab on the top of the air brake cylinder assembly. Make sure that the side with the overlay attached is facing the rear of the tender and solder in place.

### **Z14 - Westinghouse Air Brake Cylinder Later Z14 Tenders**

If you are fitting air brakes to your later Z14 tender you will need to make up and fit the Westinghouse air brake cylinder. This is created from a former and an overlay along with a short length of tube for the cylinders. You will need a piece of 4.5mm diameter tube 3.4mm long.

Remove the former and overlay (6C) from the fret. Fold the former into a U shape and locate the 4.5mm outside diameter tubing into the rings etched on the inside. Solder in place. Fit the overlay to one end of the former (it doesn't matter which one) using the circular outline to align it.

The completed brake cylinder assembly can then be fitted to the subframe. There are two small slots on the dragbox which will accept the tabs on the base of the air brake cylinder assembly. Make sure that the side with the overlay attached is facing the front of the tender and solder in place.

### **Spring Carriers**

We will need to fit the wheels in order to make sure the brake shoes are located properly. In order to do that the spring carriers (6) will need to be fitted to the High Level bearings. Check the fit of the carrier on the back of the bearing and open out the hole using a reamer if necessary. Fold out the small tab on the carrier and reinforce the fold line with solder. The carriers should be located on the back of the bearing making sure that they are correctly orientated with how you fitted the bearings earlier, the tab on the carrier goes on the 'top' of the bearing. Solder in place.

The bearings can now be fitted to the axles along with the wheels. Spacing washers (7) are included to remove any side play from the front and rear axles. Allow a little side play on the middle axle (say 0.3mm or the thickness of a full thickness washer). When fitting the wheels, make sure the bearings go back in the correct position. The wheels can be retained in the subframe by fitting a length of 0.4mm wire through the holes in the bottom of the hornguides on one side.

### **Brake Shoes**

**S23** - Next job is to make up the brake shoes. There are sets for the front and middle axles (9A) and rear axle (9B). The difference between the two sets lies in the orientation of the bracket at the top. There are mirrored pairs for each axle and each brake shoe consists of four parts, two full thickness outlines, a layer with half etched hanger and fold out bracket at the top and a separate half etched shoe layer. These four layers need to be soldered together. You can use 0.5mm wire through the holes to align things but only solder in place the wire in the middle of the three holes.

Use lengths of 0.5mm wire threaded through the holes on the subframe along with the brackets on the brake shoes themselves to locate the brake shoes in place. Note that the brackets are to the front of the tender on the front and middle axles but to the rear on the rear axle. Solder the wire to the front of the bracket on the brake shoes and trim to represent a bolt. Leave the wire in place between the sides of the subframe for the moment. This will be cut once the brake pull rods are in place.

**Z14** - Next job is to make up the brake shoes. There brake shoes are the same for both early and later brakegear the only difference lies in the orientation of the brakes on the front axle. On the early brakegear the brakes were in front of the front axle whereas on the later brakegear the brakes are behind the front axle. There are sets for the front and middle axles (9A) and rear axle (9B). The difference between the two sets lies in the orientation of the bracket at the top. There are mirrored pairs for each axle and each brake shoe consists of four parts, two full thickness outlines, a layer with half etched hanger and fold out bracket at the top and a separate half etched shoe layer. These four layers need to be soldered together. You can use 0.5mm wire through the holes to align things but only solder in place the wire in the middle of the three holes.

Use lengths of 0.5mm wire threaded through the holes on the subframe along with the brackets on the shoes themselves to locate the brake shoes in place. Note that for the early brakegear the brackets on the brake shoes are to the front of the tender on the middle axle, to the rear on the rear axle and the brake shoes are in front of the wheel on the front axle. For the later brakegear the brackets on the brake shoes are to the front of the tender on the front axle (with the brake shoes to the rear of the wheel), to the front of the tender on the middle axle and to the rear on the rear axle. Solder the wire to the front of the bracket on the brake shoes and trim to represent a bolt. Leave the wire in place between the sides of the subframe for the moment. This will be cut once the brake pull rods are in place.

## **S23 brakegear**

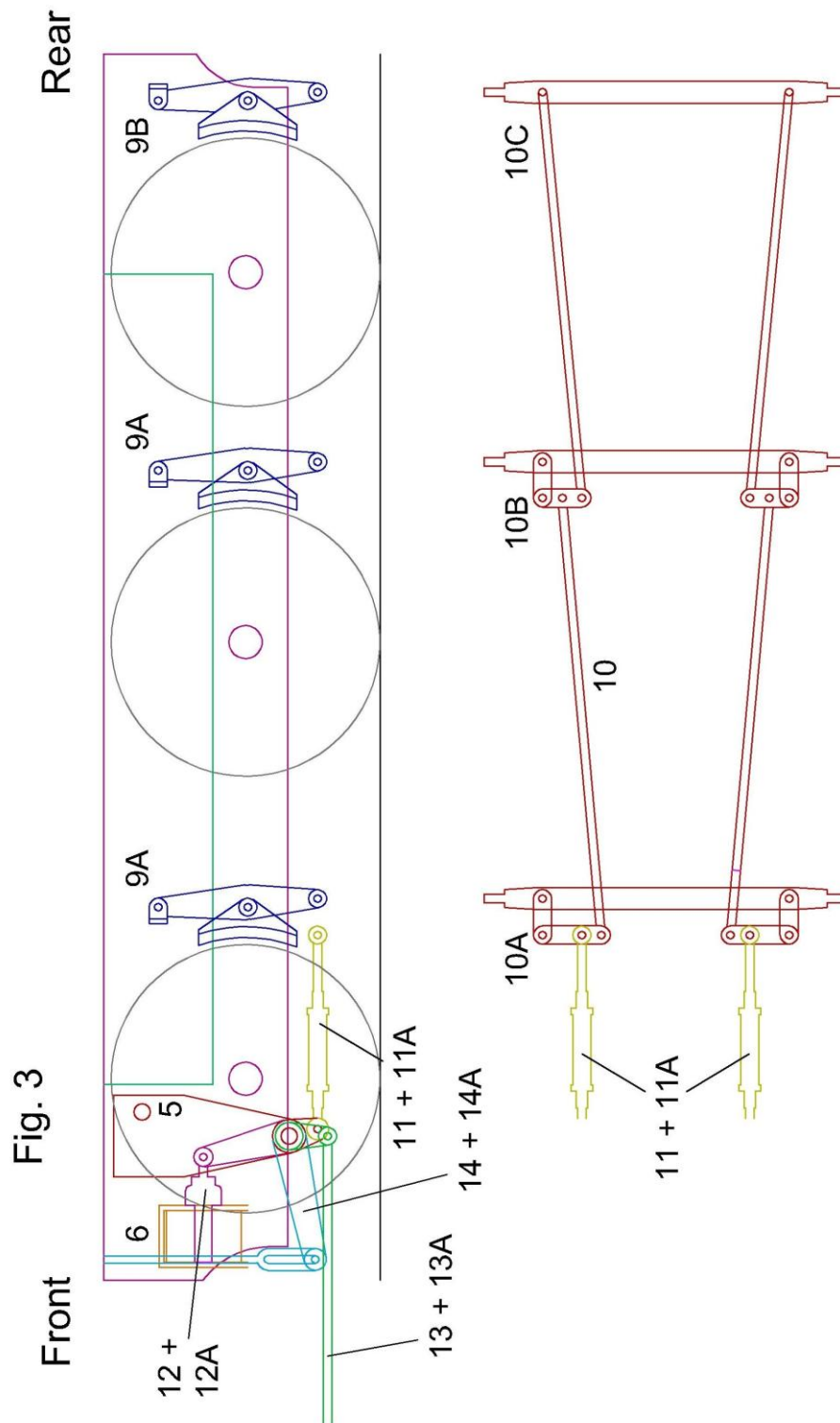
### **Brake Pull Rods**

The brake pull rods consist of main outline (10) and three sets of overlays, front (10A), middle (10B) and rear (10C). Use 0.5mm wire to align the overlays on the top and bottom of the pull rods using the all the holes save the ones on overlay 10A which will connect to the brake pull rod links, See Fig.3 below. Solder firmly in place and trim the wire to represent bolt heads. You will then need to open out the ends of the pull rods to accommodate 0.5mm wire which will locate with the brake shoes. Use a 0.5mm drill to do this and solder short lengths of 0.5mm wire in place. The brake pull rod unit can then be fitted to the bottom of the hangers on the brake shoes. Solder to the bottom of the brake shoe hangers and trim the wire so that it is just proud of the hangers.

### **Brake Links**

Remove the brake pull rod links (11) and crank overlays (11A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The ends that attach to the pull rods will need to be twisted through 90° before being fitted in place; see Fig. 3 below. Fit the pull rod links to the pull rods using the holes in the front brake pull rod overlays (10A) to align the parts. Pass short lengths of 0.5mm wire through the holes and solder in place making sure the holes in the crank end of the pull rod links align with the holes for the main brake shaft.

If you are constructing a Westinghouse air brake fitted tender remove the Westinghouse brake links (12) and crank overlays (12A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The links can be fitted by sliding them into the Westinghouse brake cylinder. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket, the pull rod links and the Westinghouse brake links. Solder the brake shaft in place to the brackets and trim leaving 0.5mm proud of the brake shaft brackets on both sides. You can solder the Westinghouse brake link to the brake shaft but don't solder the pull rod brake links to the shaft.



If you are constructing a tender linked to the steam brake on the loco remove the steam brake links (13) and crank overlays (13A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket, the pull rod links and the steam brake links (the steam brake link goes in the centre of the tender). Solder the brake shaft in place and trim leaving 0.5mm proud of the brake shaft brackets on both sides. Don't solder the pull rod brake links to the shaft. The steam brake links will need to be aligned so that they appear to join the brake links on the loco before soldering in place. It might be an idea to do this roughly for the moment and adjust it later when loco and tender are attached to each other.



All S23 tenders were fitted with hand brakes and now is the time to fit the links for them. Remove the hand brake links (14) and crank overlays (14A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The hand brake link should be fitted onto the brake shaft on the outside of the brake shaft bracket on the left hand side of the tender (looking from back to front). Solder in place.

Once the brake pull rod links are soldered to the brake pull rods and the brake shaft is in place you will have a completed unit consisting of brake shoes and pull rods that can be swung out the way so that the wheels can be removed if necessary. To do this simply cut the wire that attaches to the bracket on the brake shoes and through the subframe just behind the bracket. The brackets can be gently prised away from the subframe to disengage the brakes and then swings out the way pivoted on the brake shaft.

## **Z14 - Early brakegear**

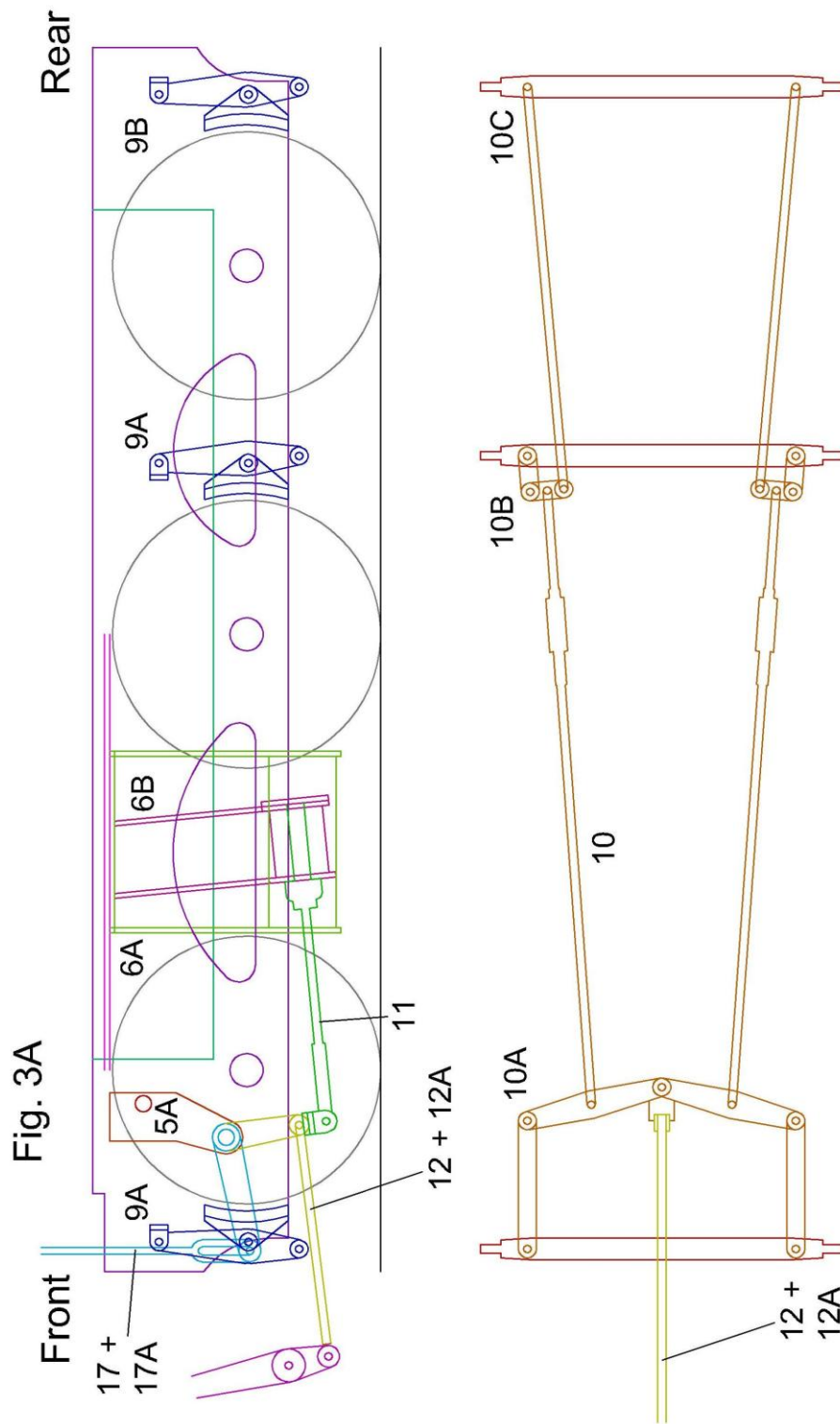
### **Brake Pull Rods**

The brake pull rods consist of main outline (10) and three sets of overlays, front (10A), middle (10B) and rear (10C). Use 0.5mm wire to align the overlays on the top and bottom of the pull rods using all the holes. Solder firmly in place and trim the wire to represent bolt heads. You will then need to open out the ends of the pull rods to accommodate 0.5mm wire which will locate with the brake shoes. Use a 0.5mm drill to do this and solder short lengths of 0.5mm wire in place. The brake pull rod unit can then be fitted to the bottom of the hangers on the brake shoes. Solder to the bottom of the brake shoe hangers and trim the wire so that it is just proud of the hangers.

Once the brake pull rod links are soldered to the brake pull rods you will have a completed unit consisting of brake shoes and pull rods that can be removed so that the wheels can be removed if necessary. To do this simply cut the wire that attaches to the bracket on the brake shoes and through the subframe just behind the bracket. The brackets can be gently prised away from the subframe to disengage the brakes and then pulled forward slightly to clear the Westinghouse brake link (if used) and dropped out or just dropped down if fitted with steam brakes.

### **Brake Links**

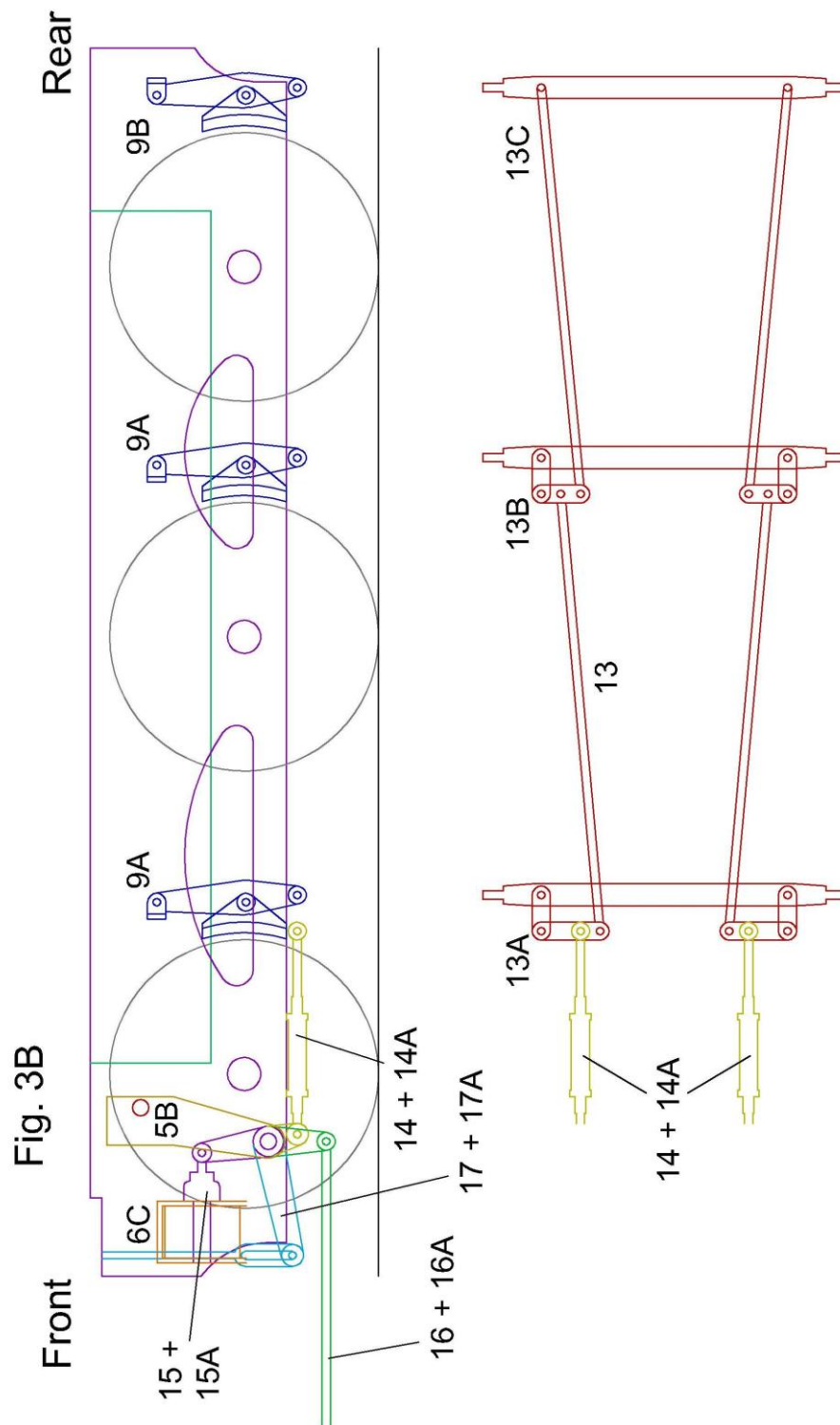
If you are constructing a Westinghouse air brake fitted tender remove the Westinghouse brake links (12). The part folds up to form an L shape. The link can be fitted by sliding them into the Westinghouse brake cylinder. Solder to the brake cylinder. Remove the steam brake links (13) and crank overlays (13A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts and then remove thin link leaving just the crank which will link the brake shaft to the pull rods. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket and the crank of the steam brake links. Solder the brake shaft in place to the brackets and trim leaving 0.5mm proud of the brake shaft brackets on both sides. You can solder the crank of the steam brake links to the brake shaft making sure it aligns with the small slot in the brake pull rods. See Fig.3A below.



If you are constructing a tender linked to the steam brake on the loco remove the steam brake links (13) and crank overlays (13A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket and the steam brake links (the steam brake link goes in the centre of the tender). Solder the brake shaft in place and trim leaving 0.5mm proud of the brake shaft brackets on both sides. The steam brake links will need to be aligned so that they appear to join the brake links on the loco before soldering in place. The crank on the steam brake links also fits into the small slot in the brake pull rods. See Fig.3A. It might be an idea to do this roughly for the moment and adjust it later when loco and tender are attached to each other.

All Z14 tenders were fitted with hand brakes and now is the time to fit the links for them. Remove the hand brake links (14) and crank overlays (14A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The hand brake link should be fitted onto the brake shaft on the outside of the brake shaft bracket on the left hand side of the tender (looking from back to front). If you are constructing a tender with the later brakegear then the hand brake link will need shortening to take into account the higher position of the brake shaft. Solder in place.

#### Z14 - Later brakegear



## **Brake Pull Rods**

The brake pull rods consist of main outline (13) and three sets of overlays, front (13A), middle (13B) and rear (13C). Use 0.5mm wire to align the overlays on the top and bottom of the pull rods using all the holes save the ones on overlay 13A which will connect to the brake pull rod links, See Fig.3B above. Solder firmly in place and trim the wire to represent bolt heads. You will then need to open out the ends of the pull rods to accommodate 0.5mm wire which will locate with the brake shoes. Use a 0.5mm drill to do this and solder short lengths of 0.5mm wire in place. The brake pull rod unit can then be fitted to the bottom of the hangers on the brake shoes. Solder to the bottom of the brake shoe hangers and trim the wire so that it is just proud of the hangers.

## **Brake Links**

Remove the brake pull rod links (14) and crank overlays (14A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The ends that attach to the pull rods will need to be twisted through 90° before being fitted in place; see Fig. 3B. Fit the pull rod links to the pull rods using the holes in the front brake pull rod overlays to align the parts. Pass short lengths of 0.5mm wire through the holes and solder in place making sure the holes in the crank end of the pull rod links align with the holes for the main brake shaft.

If you are constructing a Westinghouse air brake fitted tender remove the Westinghouse brake links (15) and crank overlays (15A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. The links can be fitted by sliding them into the Westinghouse brake cylinder. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket, the pull rod links and the Westinghouse brake links. Solder the brake shaft in place to the brackets and trim leaving 0.5mm proud of the brake shaft brackets on both sides. You can solder the Westinghouse brake link to the brake shaft but don't solder the pull rod brake links to the shaft.

If you are constructing a tender linked to the steam brake on the loco remove the steam brake links (16) and crank overlays (16A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. At this point the main brake shaft (1mm wire) can be fitted in place. This should go through the holes in the brake shaft bracket, the pull rod links and the steam brake links (the steam brake link goes in the centre of the tender). Solder the brake shaft in place and trim leaving 0.5mm proud of the brake shaft brackets on both sides. Don't solder the pull rod brake links to the shaft. The steam brake links will need to be aligned so that they appear to join the brake links on the loco before soldering in place. It might be an idea to do this roughly for the moment and adjust it later when loco and tender are attached to each other.

All Z14 tenders were fitted with hand brakes and now is the time to fit the links for them. Remove the hand brake links (17) and crank overlays (17A). Use 0.5mm wire to align the crank overlays on both sides of brake link and solder in place at the top and bottom only. Trim the wire to represent bolts. For the later brakegear the hand brake link will need shortening to take into account the higher position of the brake shaft relative to the early brakegear. The hand brake link should be fitted onto the brake shaft on the outside of the brake shaft bracket on the left hand side of the tender (looking from back to front). Solder in place.



Once the brake pull rod links are soldered to the brake pull rods and the brake shaft is in place you will have a completed unit consisting of brake shoes and pull rods that can be swung out the way so that the wheels can be removed if necessary. To do this simply cut the wire that attaches to the bracket on the brake shoes and through the subframe just behind the bracket. The brackets can be gently prised away from the subframe to disengage the brakes and then swings out the way pivoted on the brake shaft.

### **Replacement Tender Front Plate**

The last thing to cover is the replacement tender front plate. For S23 tenders this is part 15 but for Z14 tenders it is part 18. This part on the Gibson kit (Gibson part number 6) isn't particularly convincing so a replacement has been provided. Gibson part number 6 consists of three sections, the front buffer beam, a horizontal plate and the vertical part of the angle that attached the later item to the front of the main tender body. You will need to separate Gibson part number 6 into its three constituent parts and use the buffer beam and angle parts with the horizontal plate part replaced with the replacement tender front plate (15).

### **Thanks**

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Justin Newitt - September 2019