Etched replacement chassis for RTR loco bodies

Required Parts List

- Chassis etch
- Motor - for all designs the Association can motor is suitable, alternatives are shown
- Association frame spacer PCB
- Loco wheels (see table below)
- 6 x crankpins and crankpin washers
- 1 x 30:1 worm set with 1.5mm bore worm.
- 2 x gear muffs
- 2 x axle muffs
- Spur gears as appropriate (see the arrangement diagram for the specific loco)
- 0.3mm brass or nickel silver rod
- paint, solder, and tools

Table of specific parts required

Locomotive	Wheels	Alternative Motor
BR Class 03/04shunter	6 x 7mm	8mm coreless
GWR 57XX	6 x 9mm or 9.5mm	8mm or 10mm coreless
GWR 14XX	4 x 10.5mm driving,	
	2 x 7.5mm trailing	8mm coreless
GWR 2251	6 x 10.5mm driving	
	6 x 8mm tender	10mm coreless (in tender)
LMS Jinty	6 x 9mm or 9.5mm	8mm or 10mm coreless
LNER J94	6 x 8.5mm	8mm or 10mmcoreless
LMS 4F**	6 x 10mm driving	
	6 x 8mm tender	10mm coreless (in tender)
LNER J39	6 x 10.5mm driving	
	6 x 7.5mm tender(disc)	10mm coreless (in tender)
LBSCR A1X	6 x 8mm driving	8mm or 10mm coreless
LSWR M7	4 x 11mm driving	
	4 x 7mm trailing	10mm coreless

** There are two LMS 4F chassis available:

1. A 2mm scale chassis intended for the Mike Raithby etched loco and tender body.
2. An N scale loco only chassis intended for the Bachmann Farish 4F.

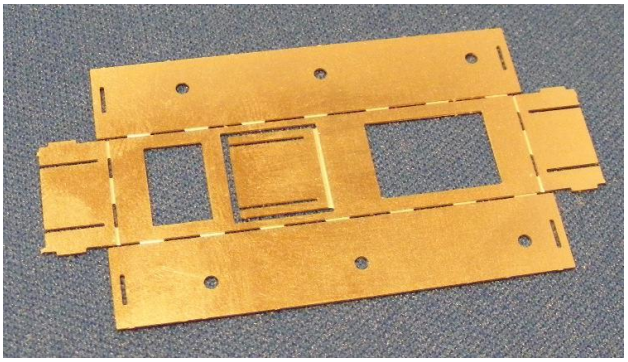
Make sure you choose the correct product.

Assembly instructions

Certain parts of the etch are very delicate, and therefore care is needed when cutting both them and adjacent parts out. Spares are provided of certain small or delicate items.

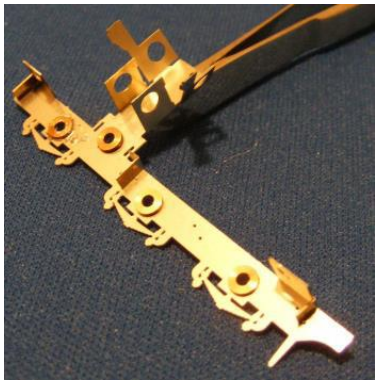
Unless otherwise indicated, fold lines for 90 degree folds are on the inside of the fold, for 180 degree lines on the outside of the fold.

An enlarged picture of the etched fret is provided for clarification, as well as an arrangement drawing showing the recommended location of frame spacers. Study these and the instructions carefully before beginning assembly. The recommended course to follow for construction is outlined within these instructions which have been written following a test build and analysis of the kit. It is not to be regarded as the definitive way to put together this or any other kit of parts in any scale/gauge combination just the result of experience in this particular case.

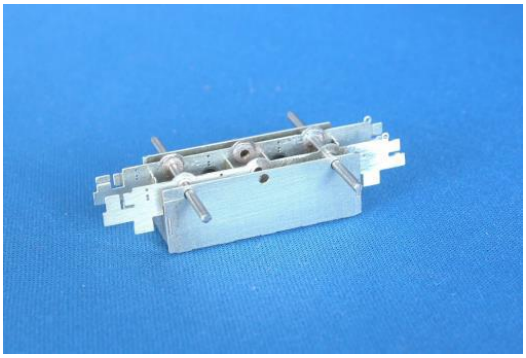


A special frame assembly jig is provided. It is recommended this is constructed now. It should be folded up and soldered. Check that the frame material will sit in the slots intended for them. Etching is not an exact science and however good a design, minor variations can occur in the etching process. It will be much easier to remove cusp at this stage rather than try to do it after the jig is constructed.

Cut out the frames and solder into place the axle bearings in the axle holes, as well as that for the intermediate drive gear. Fold over the tabs which are used as location guides for the frame spacers -folding inwards. The arrangement drawing for the loco you are building should be used to familiarise yourself with these. For some chassis, an integral gearbox is included on one of the frames. This should also be folded up and soldered at this point, and bearings soldered into both ends of the resulting gearbox.

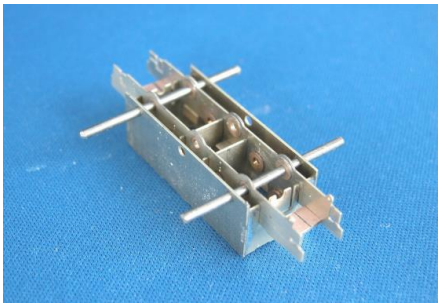


Many of the kits feature an extra set of strengthening frames. These are optional, but their use is recommended. They fit over the bearings.

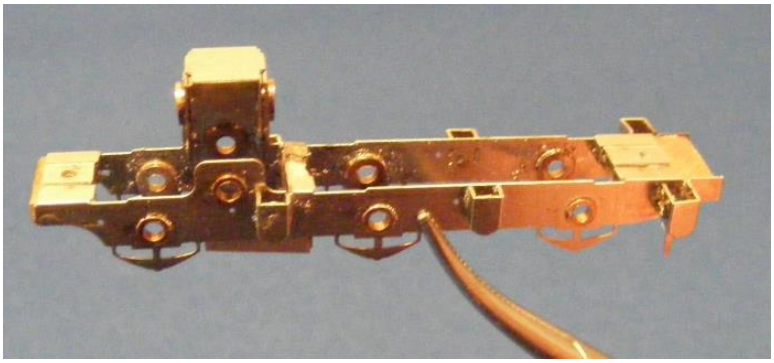


The two frames are inserted into the jig constructed earlier, where slots will accurately locate them. Axle steel can be inserted through the holes in jig and frames to lock everything in place. It may be necessary to
slightly ream the axle bearings so that the rods will pass through, but this should be done very carefully so as not to excessively enlarge the holes. The frames can be inserted either way up into the jig, according to which way you find most convenient when adding the frame spacers.

Spacers are cut from the PCB strip and soldered into place. It may be found useful to employ a steel rule as a straight edge to file the insulation gaps in the frame spacer material before it is cut to length. Be careful with the amount of heat applied in soldering, as excessive heat can cause the copper to delaminate from its substrate. If building

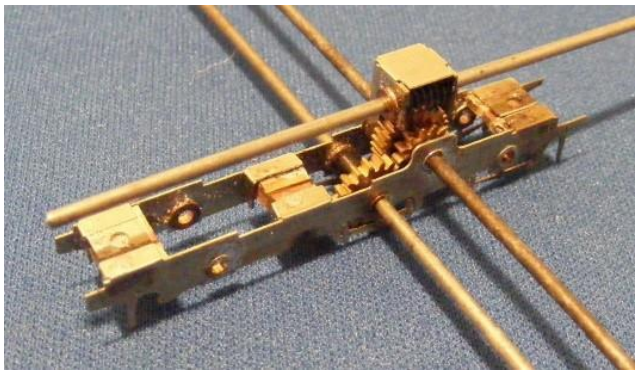


a loco which has the strengthening frames added, the 6.4mm width PCB is required, otherwise, the 7.0mm width PCB is the appropriate item.



When all spacers have been fixed, the rods can be removed from the jig, and the chassis eased out. For certain locos etched sandboxes are provided, and these are most easily assembled and fitted at this stage. There may be locating holes etched into the chassis spacer tabs, these can now be used as templates to drill through the PCB spacers.

The chassis drive are similar for all locomotive kits, with only the final drive gear size differing. All use a 30:1 worm set as the first gear stage with a second stage gearing driving onto the rear or centre axle. Now add the wheels to the chassis. The drive axles should have the final drive gear offset on a gear muff on the opposite side to the gearbox. The worm wheel stub axle should have the 30T worm wheel centralised, and a 14T spur gear offset.



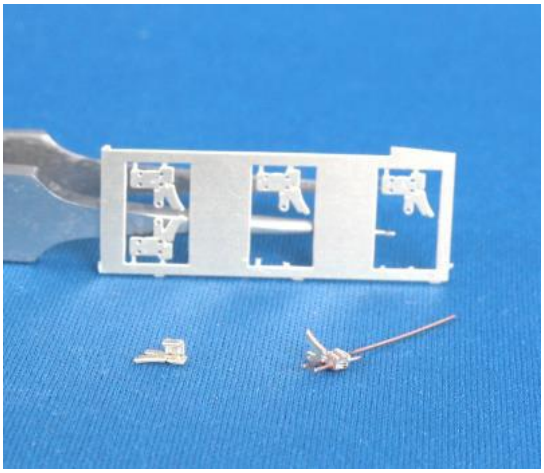
The wheels and stub axles are fitted in the usual manner – various articles in the 2mm Magazine and the Getting Started booklet cover this subject. Ensure that everything is turning freely at this stage. Remove the worm wheel stub axle in preparation for quartering and solder a crankpin into each wheel.

Cut out the coupling rods including their supporting frame and fold the three layers together, solder, and cut and file off the remaining tabs. Check the holes are a running fit on the crankpins, and ream if necessary. The wheels must now be quartered. It is essential for good running that this is accurately done. Work slowly and carefully. Apply the coupling rods back to front to each axle pair in turn, checking for free running with no sticking points. Then check with all three axles connected.

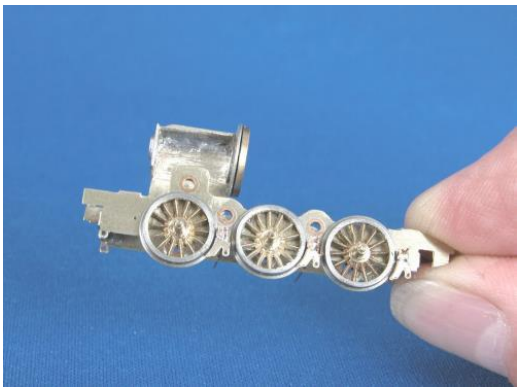
No specific motor mounts are provided with the chassis. It is intended that one end of the motor is supported by its drive shaft where it passes through the gearbox. It is necessary that the motor has a 1.5mm drive shaft for this to occur, and therefore motors with a 1.0mm or another shaft will need a sleeve for this to be achieved. It is not necessary for the drive shaft to reach all the way through the gearbox, as a 1.5mm stub shaft can be inserted at the opposite end.

3D printed motor mounts may be appropriate dependent on which motor you use. Alternatively, a simple and elegant solution for mounting the other end of the motor is to use rigid wire of sufficient size that when soldered from the motor terminals to the frames it will hold the motor firmly in place.

The etched balance weights can be added to the wheels and then add brake blocks to the chassis. In most cases these fold up into a U shape and can be added in one of two ways. Using the first method described the brakes will be removable.

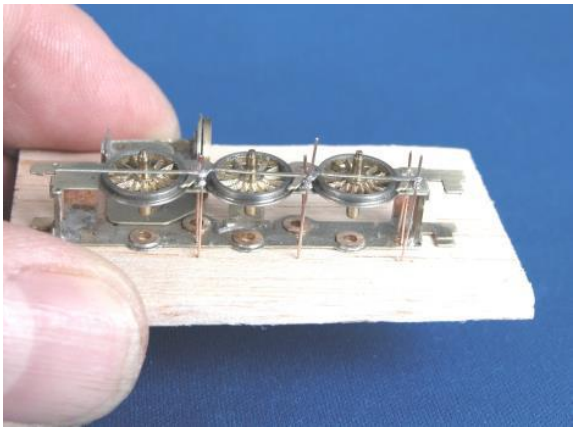


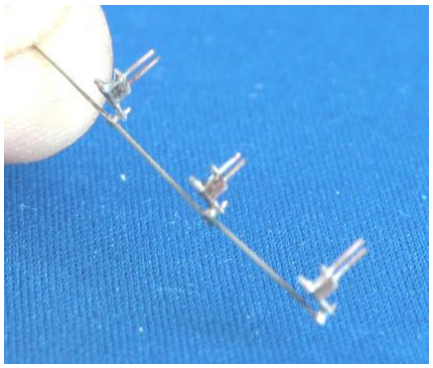
Method 1 - First fold up brake shoe etch. Once the brake shoe etch is folded make sure that the .3mm wire will go right through by running a .3mm drill through from one side to the other. Now thread .3mm brass wire through the upper etched holes. Allow sufficient wire to protrude through one of the holes in the back of the brake shoe assembly where it contacts the frame to enable it to pass through the etched holes in both side-frames.



Solder the wire to the shoe assemblies and trim back that which is protruding on the front face of the shoes. Thread the longer lengths of wire through the etched holes in the side frames which, in conjunction with the shorter length brass wire, will correctly align the shoes in relation to the driving wheels.

If the loco you are building has outside brake rigging, fix the brake rigging to the bottom of the brake shoe assembly. It has to pass in front of the wheels and not interfere with their running so is soldered on the outside face of the brake shoe assemblies. It may be found necessary to use some thin card to separate the outer face of the brake blocks and the inner face of the brake rigging to create a uniform distance between the two and ensure no fouling of the driving wheels occur when the wheels rotate.





A small piece of balsa wood may be used into which the brass wire may be pressed through the chassis which is laid on its side to give a firm base on which to carry out the operation of fixing the brake rigging. Once this has been done the brake assembly can be withdrawn from the chassis and cleaned up. Using this method of assembly the brakes can be removed for maintenance.

Method 2 - If the builder requires to permanently fix brakes in place then follow all previous steps relative to brake shoe assembly and after the driving wheels have been fitted and are running without any tightness or binding the brakes can simply be soldered to the side-frames. If the builder chooses to solder the brakes on as described in this paragraph are any subsequent removal of the driving wheels may prove difficult to achieve without causing damage.

Tender construction

For tender locos, construction of the tender chassis follows a similar method as for the locomotive chassis.