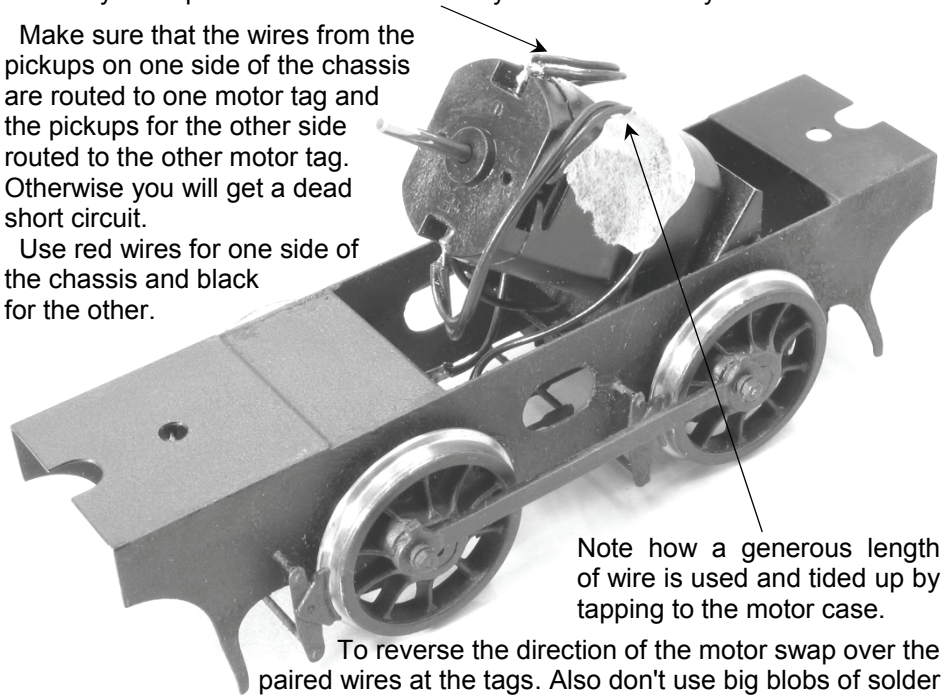
Note how a single wire is taken back from each pick up and then paired together at the motor solder tag. For a six wheeled loco you would have three wires on each tag but make sure you strip the wire insulation evenly and solder neatly.

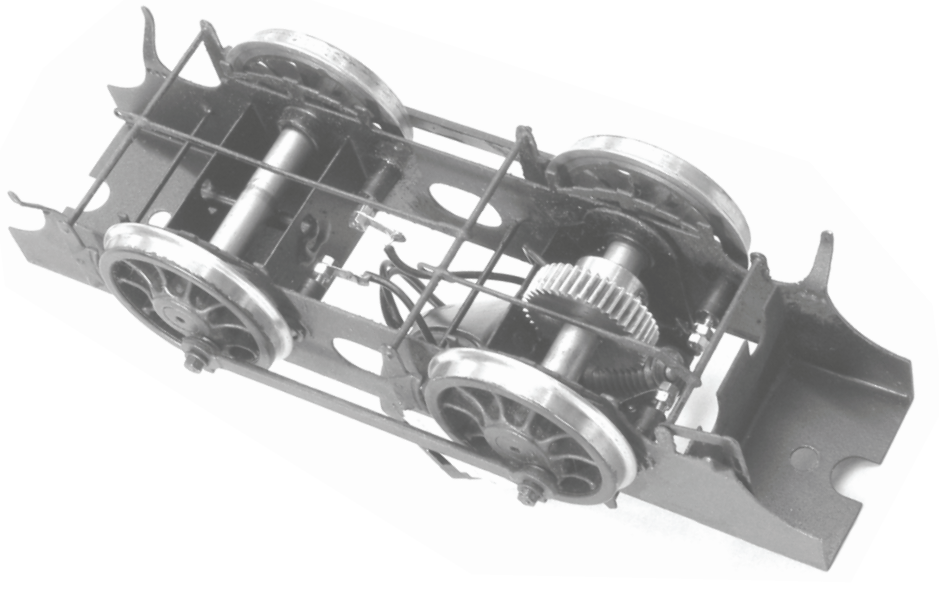
Make sure that the wires from the pickups on one side of the chassis are routed to one motor tag and the pickups for the other side routed to the other motor tag. Otherwise you will get a dead short circuit.

Use red wires for one side of the chassis and black for the other.



Note how a generous length of wire is used and tided up by tapping to the motor case.

To reverse the direction of the motor swap over the paired wires at the tags. Also don't use big blobs of solder on the motor tags as these can touch the motor case and cause a short circuit.



CONNOISSEUR MODELS

0 Gauge Etched Kit Building
Hints, Tips & Frequently Asked Questions

Website Print Out Booklet

I have been producing 0 gauge etched kits since 1988 and this booklet contains the most frequent questions that customers ask me to answer and the hints and tips pages cover the areas that customers most frequently ask for additional help and information with.

This booklet is not intended to be a comprehensive or exhaustive guide to building etched kits but it is hoped that it will provide help for the experienced modeller and newcomer alike.

Proprietor Jim McGeown
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Frequently Asked Questions ?

Question 1. What level of skill do I need to put a metal kit together, must I solder parts or can I use glue ? *Answer page 3.*

Question 2. What soldering iron do I need ? *Answer page 3.*

Question 3. What solders do I use ? *Answer page 4.*

Question 4. What flux do I use ? *Answer page 5.*

Question 5. When I have got the right iron, solder and flux how do I solder parts together ? *Answer page 5.*

Question 6. Years ago I tried to solder but I couldn't do it! Is there a book that I could read that would magically make me an expert ? *A. page 6.*

Frequently Asked Questions ?

Question 7. I tried to solder some parts together once but most of the solder just sat on the surface in blobs that I could pick off with my finger nail and what solder I did get into the joint looked like chewing gum! What was I doing Wrong ? *Answer page 6.*

Question 8. I have got an old reel of multicore electrical solder that has got flux included so I wont need to buy any solder or flux will I ? *A. page 8.*

Question 9. How do I achieve the crisp, square and beautiful solder joints with just a mere hint of solder showing that I see on the models built by the experts on the demonstration stands at shows ? *A. page 9.*

Question 10. How do I remove the etched parts from the fret ? *Answer page 9.*

Question 11. How do I fold etched parts and form curves and bends? *A.page 10*

Question 12. What general tools should I have included in my model makers toolbox ? *Answer page 10.*

Question 13. How do I fit the cast parts ? *Answer page 11.*

Question 14. Are there any specific specialist tools that I will need for etched kit building ? *Answer page 12.*

Question 15. What luxury tools would it be nice to have and that I could put on my Christmas present list ? *Answer page 13.*

Question 16. Where do I get my tools from ? *Answer page 14.*

Question 17. What motor do I want ? *Answer page 15.*

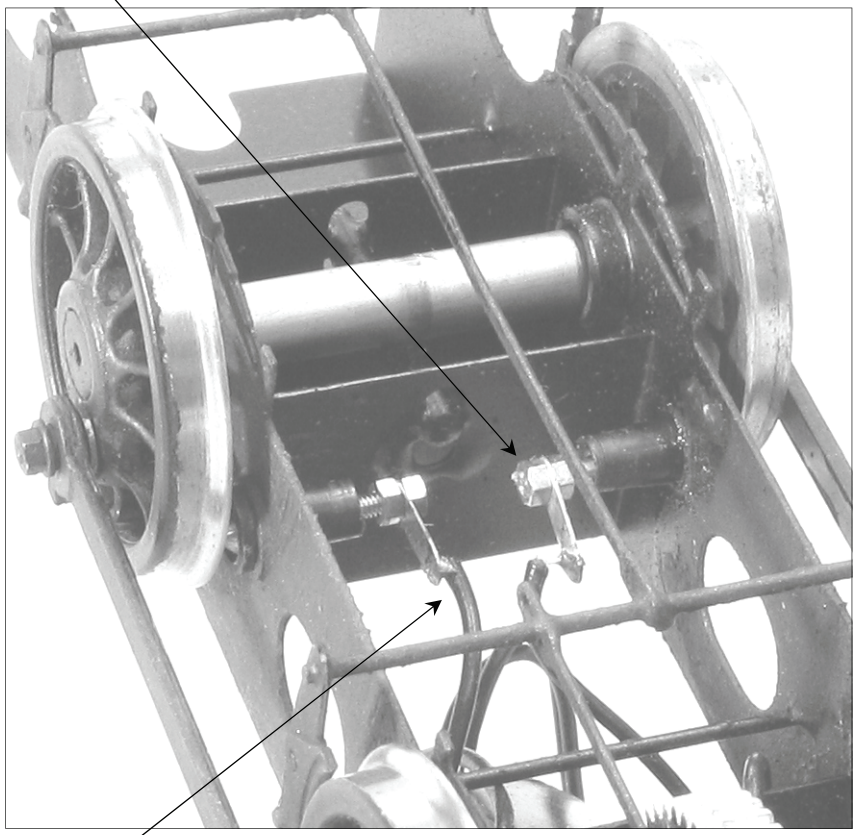
Question 18. What about wheels ? *Answer page 17.*

Question 19. How do I paint my models ? *Answer page 19.*

Question 20. What about livery and lettering ? *Answer page 21.*

Question 21. What electrical controller will I need to run my models and what about some track to run on ? *Answer page 23.*

Note how the solder tag is locked between the two nuts and how a single wire from each tag is taken back to the motor.

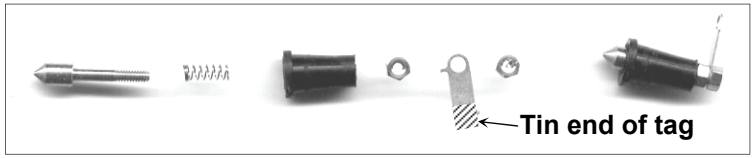


Also note how the electrical wire is gently curved so as to allow movement of the pickup

If adjustment is required I would Recommend first using a round file to move the edge of the hole away from the axle centre line by 1/2mm converting the circular hole into a slight oval. Then using a tapered broach open up the hole (making it circular again) until the moulded pickup housing is a snug push fit. By doing this we have slightly moved the pickup hole centre away from the axle centre to remove the risk of the pickup being interrupted. I fit the pickups after painting the chassis.

I have found that Slater's plunger pickups require a little care in their preparation and fitting if they are to work reliably. First the pack contains some spacing washers to be used with narrow chassis and I would suggest that you consider using these for chassis 25mm or less wide. Then drill out the back hole in the plastic housing 1.4mm. I then run a 2.4mm drill down the inside of the plastic housing twisting the drill between finger and thumb. This will remove any wisps of plastic that may jamb the plunger. By twisting the drill between finger and thumb there is no risk of the drill binding and drilling right through the end. Then fit the spring onto the plunger and fit into housing running a nut onto the back end. When fully depressed the plunger should sit virtually flush with the end of the housing. It is important that you use the etched solder tag that is locked between two nuts on the end of the plunger. If you try to solder the electrical wire direct to the plunger you will melt the threaded end into the plastic housing. This will cause the plunger to jamb in use even if it feels free before fitting (this is probably what people who don't like plungers have done). I tin one end of the etched tag with electrical solder before locking between the nuts. In this way I can solder the tinned end of the electrical wire very quickly onto the tag with no risk of heat getting to the plunger. I prefer to fit a separate length of electrical wire to each pickup and join the wires as I terminate them at the motor tags. I find that this is neater and easier than trying to link the pickups on each side together using jumper wires.

If you are a little unsure about this you can solder the wire to the tag. Then lock it between the nuts and thread the wire and plunger through the hole in the chassis. Once the plunger is fitted into the chassis I run a ring of Araldite around the housing on the inside face of the chassis side.



Slater's plunger pickup components consisting of brass plunger, spring, plastic housing, nut, solder tag and locking nut. Also assembled pickup ready to be fitted into the chassis.

FAQ Answer 1 Construction & Skills

Assembling an etched kit involves many of the skills that a scratch builder uses – the main difference is that the cutting out of the parts is already done for you. Some filing and trimming will be necessary from time to time to get parts to fit precisely in relation to each other. At all stages of assembly there is the opportunity for the care and skills of the modeller to be reflected by the finished results. It is from this that much of the pleasure and satisfaction of building an etched kit comes. Much of the satisfaction in assembling an all metal kit is derived from soldering the parts together. For many modellers to try and use any other method would feel very wrong and lack the permanence and pleasure of solder construction.

Solder assembly is quick, easy to adjust and at the worst the assembly can be desoldered, the parts cleaned up and then reassembled for a second or even third attempt. I would not like to say that it would be impossible to glue etched parts together but it would definitely make the job very hard work for inferior results. Many modellers fight shy of working in this medium but the basic skills are relatively easy to acquire. With the correct tools and materials it normally takes about ten minutes or about six solder joints to gain enough experience to dispel the fear of the process.

The soldering skills and techniques are those of the tinsmith and are slightly different from electrical soldering. Once you have learned how to form and solder brass you'll find all kinds of modelling possibilities will open up for you. Many of the cast parts have location pegs and so there is the option of using glue but there is greater speed of construction and satisfaction when soldering the majority of castings into place (see later).

FAQ Answer 2 Soldering Irons

The most important requirement in soldering is to have an iron that will maintain sufficient heat throughout making the joint. This is achieved by a combination of iron power (wattage) and size of bit (heat reservoir). The wattage will determine how quickly heat is replaced in the bit after it is removed from the joint. The size of the bit will determine how long sufficient heat will be available as you run the solder down the joint. A high wattage iron with a small pin point bit will be great for spot soldering but no good for running a seam joint. A high wattage iron with a massive bit would meet the criteria but would be clumsy and not get into the corners. So it is a case of getting a compromise and most modellers acquire a range of irons for different jobs.

If you were only to buy one iron in you lifetime then I would recommend a Weller 40 Watt soldering iron (Squires Code 186-041). This has a 6mm diameter removable copper bit. The bit is shaped like a screwdriver and has a bright coating of solder (tinned). This combination of iron and bit shape is ideal for running fillet joints and has a good reserve of heat that is so necessary for soldering small parts onto large components. Note the shape and condition of a new bit as this won't last long and will need restoring back to this condition.

It is important to keep the bit clean and in good condition as you work. Get a soldering iron stand containing a damp sponge as old oxidized solder is wiped off on this before picking up fresh solder for each joint. If you haven't made a joint for some time you may find that a hard black crust has formed on the bit. Remove this with a brass wire brush (suede brush) and then feed some multicore solder onto each side of the bit to restore a bright surface (referred to as wetting or tinning the bit). After about 8 hours use you will find the bit is in poor condition with holes and a ragged edge. File the bit back to its original shape using a hand bastard file and then polish the surfaces on emery cloth. Coat the bit with Fluxite Soldering Paste (traditionally used by plumbers Squires code FLU100) and this will prevent the bare copper oxidizing as the iron heats up. Then feed multicore solder onto the bit to form a generous coating and leave to bubble away for a couple of minutes before wiping the excess off to give a bit almost as good as new. Don't waste your money buying long life bits as with experience you will prefer to file a copper bit to a shape and angle that suits you best.

A Weller 80 Watt soldering iron (Squires Code 186-081) is also a useful addition to the toolbox for the occasional heavy jobs like soldering bearings into heavy frames or when laminating three or four layers of brass together. You will find these jobs on the more advanced and sophisticated kits in the range.

A smaller Antex 25 Watt iron (Squires Code 185-584) with a 3mm screwdriver bit (Squires Code A1/XX54) is very useful for small assemblies and detail work such as handrails, but will have insufficient heat reserve for main assembly work. The Antex has a plated iron bit and after a little use with 145° solder a grey oxide appears on the bit that will prevent you from picking up the solder. Touch the bit to some multicore solder and it will flash over the bit (known as wetting the bit) so that you can continue picking up 145° solder. I have found no problems with mixing the two solders in this way. You will find that this iron is ideal for electrical work such as wiring up the layout and soldering electrical wire to the side of the rail using 60/40 electrical solder.

FAQ Answer 3 **Solders**

I use 145° solder for virtually all assembly work. I prefer it in wire form (Eileen's Emporium) but it is also produced in stick form by Carrs. I find that its lower working temperature helps to give a quick clean joint and limits the build up of heat, which may cause distortion in components. I find that I can hold parts together with my finger ends and make a joint before heat reaches my fingers or other etched parts drop off.

I use 60/40 tin/lead fluxed multicore electrical solder (melting point about 190° Squires Code 185-609 or 185-610 for reel) mainly to keep the iron bits in good condition. As it gives a slightly stronger joint than 145° I sometimes use it for small spot joints on handrail wire, lamp brackets etc, but still use extra liquid flux.

The normal alternative to wiper pickups is sprung plungers. This system consists of a bullet nosed, spring loaded, brass, plunger, in an insulated plastic housing, fitted into a hole in the chassis so that it rubs onto the back of the wheel tyre. Power is then taken from a solder tag on the back of the plunger to the motor using thin flexible insulated wire. I have tried to make provision for accommodating this system in my chassis designs by including pilot holes in the correct positions for mounting the plungers. The idea is that if you are using plungers you open up the holes until the plungers are a nice push fit. If you are using wipers the pilot holes will not be noticed because the wheel tyre will cover them.

For myself I am a great fan of plunger pickups and have used them almost exclusively on all my locomotive chassis. I prefer to use Slater's plunger pickups and if you are considering your first locomotive I suggest you give them a try first. Then if you don't find that they suit you can experiment with wipers using the materials included in the kit.

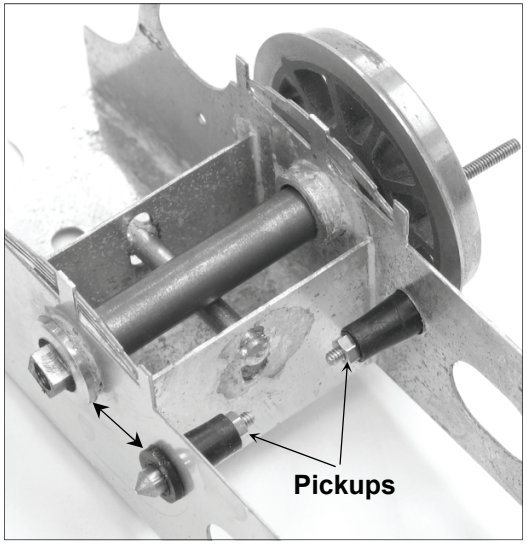
Full details of the Slater's range can be found at www.slatersplastikard.com

I have found that Slater's plunger pickups require a little care in their preparation and fitting if they are to work reliably.

Hints and Tips For Using Slater's Pickups

As with most components a little time spent preparing Slater's plunger pickups will be rewarded by preventing potential problems. When fitting plunger pickups it is a good idea to first check that the mounting holes in the chassis are in the right place.

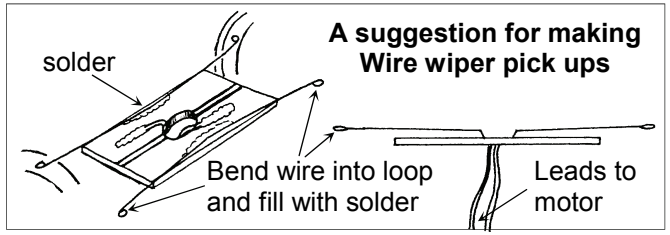
In theory the holes should be undersize and centred in exactly the right position for the pickups to bear onto the centre of the back of the wheel tyre. In practice when using Slater's wheels I find that some have a little of the plastic centre intruding into the tyre very close to where the pickup runs. I would suggest that you fit a wheel onto an axle and make up a pickup so that you can offer them into place and check that the positioning will be correct before you open up the mounting holes. As the plastic moulded body of the pickup is tapered you should be able to gently fit its end into the undersized mounting hole. As the pickup holes require opening up by about 1/2mm you can adjust slightly the hole position if required.



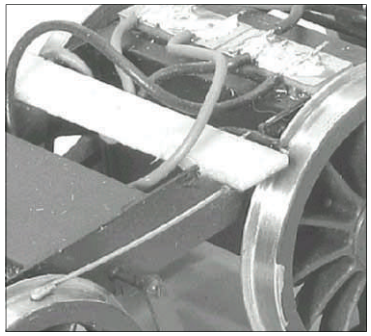
Hints and Tips For Electrical Pickups

With an electrical powered locomotive we have to find a way of taking onboard the electrical power from the track and transmitting it to the motor (in effect a power pickup system). In 0 gauge there are two main options, sprung plunger pickups or wiper pickups. The choice of which is very much down to personal preference and modellers seem to be equally divided between those that like plungers and those that have a very strong dislike for them, reckoning that they always jamb or put too much braking pressure on the wheels and would never use anything other than wipers.

As the steel wheel tyres (rims) are touching the track these are electrically live and we need to take the power from the moving wheel tyre to a fixed point on the chassis. With a wiper system lengths of spring wire or strip are soldered to insulated mounting plates on the chassis and made to bear onto the wheel tyre (tread or wheel back depending on preference and circumstance). So that as the wheel turns they wipe the surface collecting the power. The wiper needs to be of a length such that as the wheel sets move across the chassis (side play) or even wobble slightly there is still sufficient movement and spring pressure for the pickup end of the wiper to remain in firm contact with the wheel tyre. Fine insulated electrical wires than transmit the electrical current from the insulated mounting plates to the terminals of the motor.



Included in all my loco kits is material to make a wire wiper pickup system. This consists of lengths of PCB (printed circuit board, thin copper sheet bonded to fibreglass board) to make the insulated mounting plates that can be glued (Araldite) across the chassis. Lengths of 0.45mm half hard spring brass wire for making wipers (form a loop in the end of the wire and fill with solder to make a good wiping surface). And fine, flexible, red and black insulated electrical wire to take the electrical current to the motor. These materials are relatively inexpensive and so including them does not raise the cost of a kit significantly. I occasionally use wipers (mainly for additional tender pickups on tender locos) and have had successful results fabricating them from these materials.



Wire wiper pickup system consisting of PCB strip glued across the chassis. Wiper wire made from 0.45mm brass wire (note how end is formed into loop to provide a good contact area on the wheel tread) and insulated electrical wire to take electrical power to the motor.

FAQ Answer 4 Flux

For all brass and nickel silver work I use Carrs green label liquid flux (Eileen's Emporium will provide a suitable flux for 145° solder). You will soon get the feel for how much to use but more problems are caused by too little flux than too much. Solders and fluxes are available from a number of tool merchants at exhibitions. Many are from the same source and they just stick their own labels on the packet but I would recommend getting your first lot from Eileen's and then you know that you are starting right.

A small tin of Fluxite Soldering Paste (traditionally used by plumbers Squires code FLU100) will also be found useful for when you have to file and reshape your soldering iron bits.

FAQ Answer 5 Soldering Parts Together

Before soldering components together thoroughly clean both surfaces along the join line with a glass fibre burnishing brush (Squires code 060-210). Using your fingers, tweezers or a knife blade etc, hold the parts together in the correct position and with an old paintbrush run some flux along the area to be joined. Still keeping the parts correctly aligned, pick up a small quantity of solder on the tip of your iron and carry it to the joint (unlike electrical soldering when you feed solder into the joint). Hold the iron against the joint just long enough for the solder to flash between the parts. Don't let go of the parts until the solder has cooled – this takes from five to ten seconds. To run a fillet of solder along a joint, wait until the solder flashes between the parts and then pull the molten solder along the joint with the iron tip. Don't load the iron tip with a lot of extra solder work the joint in 1" lengths bringing in small quantities of solder.

Brass is a very forgiving material and if you get something out of alignment use heat from the iron to desolder the joint before starting again. For complicated assemblies it is a good idea to only tack solder parts together. You can then make adjustments by desoldering until you are happy with the location of parts and then solder solid.

When you need to laminate two or more layers of brass together align the parts then carefully clamp them together either in the vice or by holding them with miniature crocodile clips. Run flux around the edges and then go around with the soldering iron. Clean up thoroughly afterwards.

To fit small parts and overlays on to a larger assembly, such as strapping to a wagon side, when you need to prevent finely detailed areas such as planking becoming clogged up with solder tin the back of the small component first, then hold in place on the model and apply flux. Carefully wipe the tip of your iron on a sponge to remove any solder from it (dry iron), and then touch it against the parts to be joined. After a few seconds you'll see molten solder bubbling from the edges. Still holding the parts in place remove the iron and allow the joint to cool.

An alternative is to use solder paint (I would recommend Carrs 188 solder paste). As the name suggests this is a flux and solder in one. Simply apply a thin coat of solder paint to the back of the component instead of tinning. Still apply a small amount of liquid flux before you solder the part into place.

FAQ Answer 6 & 7 **Soldering Problems**

Answer 6. If you have tried unsuccessfully to solder in the past then hopefully the answers to the F.A.Q. will highlight where you went wrong and provide all the information required to solder successfully. You don't need to read any books on the subject just jump in and have a go. You should find that the magic has always been in your hands it just required the right tools and materials to release it.

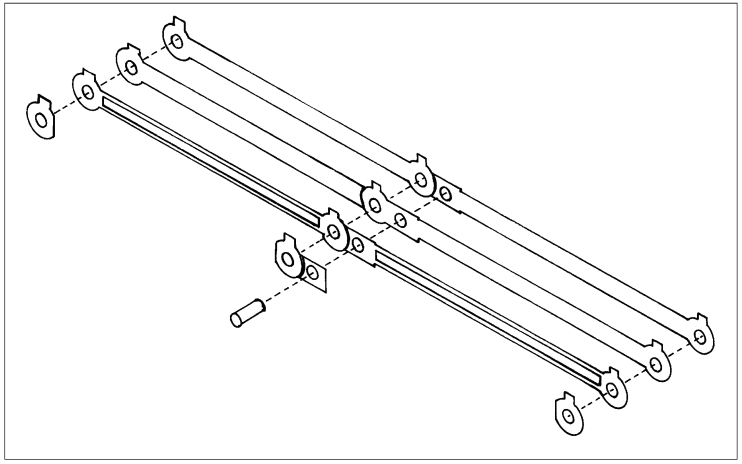
Answer 7. I tend to hear an almost identical tale of woe about unsuccessful soldering at each exhibition that I attend with my sales stand. The Funny thing is that it matches exactly my experience when I first tried to solder brass together.

When I first tried to solder some brass together I didn't think that I would have any problems because after all I had soldered electrical wires and circuit boards together for years. So I took my 18 watt soldering iron, placed the tip of the bit into the joint between the two pieces of brass that I had propped up in position using blocks of wood and started feeding the wire multicore solder into the joint at the point that the tip of the iron bit touched the brass. The solder melted into a ball around the soldering iron tip bridging the gap between the two pieces of brass. I removed the iron, let the solder cool and removed the wooden blocks that were holding the brass parts in position.

The two pieces of brass promptly fell apart leaving the flat piece of brass with a flattened ball of solder on it looking like a water droplet on a newly waxed car bonnet. This ball of solder could be picked off the brass with my fingernail. What I had managed to do is make a dry joint. This is where the grease and oxide on the surface of what looked to me like clean brass had prevented the solder from impregnating and spreading out on the surface of the brass (known as wetting the surface). The molten solder had just formed a ball held together by its surface tension.

I asked a plumber friend for advice and after he had finished laughing he gave me a pot of Fluxite paste to apply into the joint first to act as a wetting agent and prevent oxidisation as the molten solder flowed. Armed with this I repeated the procedure and after much smoking and bubbling of flux the molten solder puddle flowed and flattened out on the surface of the two pieces of brass forming a nice radius between the two parts. I then started to pull the molten solder along the joint with the iron tip to form a seam. I got about ¼" along the joint but the molten solder had turned into something like chewing gum on a hot school radiator and making the soldering iron bit stick to the work. I had managed to make a good spot joint but my iron was to small with insufficient reserve of heat to run the spot joint into a neat seam joint.

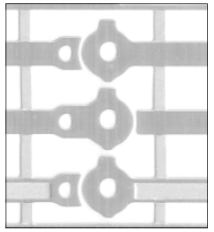
Clean off the tabs so that the three laminates will fit together flush along their length. I then use three miniature electrical crocodile clips, one in the centre and one at each end just inside the crankpin holes, to hold the laminates together. I then pass drill shanks through the crankpin holes to line up the three laminates. Check by eye that the drill shanks are parallel and square to the rod.

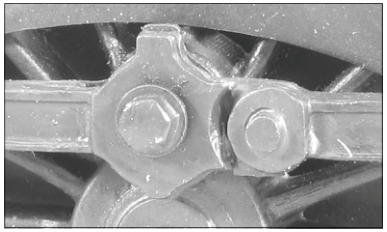


Then using plenty of flux, solder along the top edge of the rod. Start in the centre and work out towards each crankpin hole. By working from the centre outwards this reduces the risk of the laminates distorting and bowing apart with the heat. You should find that some solder has run between the laminates to the bottom edge (if it starts dripping out the bottom you are using to much solder). Reposition the crocodile clips and solder the bottom edge. Only use a little solder on the iron and you should find that it pulls any excess solder from the top edge through the laminates to the bottom edge leaving you with a neat top and bottom edge. Remove the drill shanks from the crankpin holes and reposition the crocodile clips so that they clamp the end bosses tightly together. Then solder around the bosses until a little solder bubbles out into the centre of the crankpin holes. Now gently clean up the rods and file all the edges so that the cusps of the laminates blend in to give the impression of one solid piece.

This is not the only way to make up the rods. Some people tin all the surfaces (or use solder paint) of the laminates. Then using a rod as a guide drill through the crankpin holes squarely into a block of wood. They then use the drill shanks to peg the three laminations together before sweating them solid.

On six coupled locos the rods are laminated in such a way as to produce an overlap articulated joint that pivots on the centre crankpin. The Knuckle joint of the prototype is represented by a length of rod soldered through one section but this joint is only cosmetic.





At this stage don't worry about slight tight spots. If you can push the chassis along the bench without the wheels skidding along then all is OK. As the wheels are best removed for painting the chassis the chances are that they will not go back on in the same place. The correct point to make final adjustments is after painting and fitting pickups but before fitting the motor. If you have filed a crankpin hole in the rods oval it is worth marking this wheel so that you can match them up again on reassembly. Remove the rods and place safely to one side.

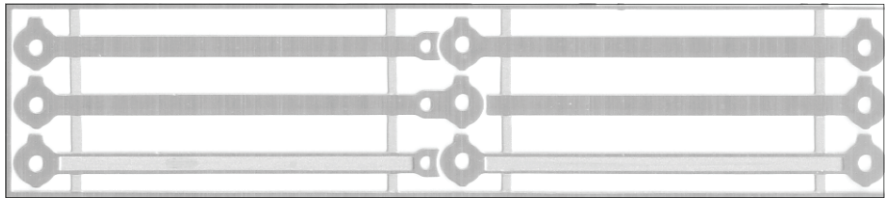
I prefer to paint and weather my wheels. Have a look at a real loco on a preserved railway and see how much dirt and gunge covers the wheels and then think how unrealistic clean spokes and shiny steel wheel rims will look on your model. You don't want paint on the back of the flanges to interfere with electrical pickup so place wheels, back side down, onto a flat surface and spray all the front of the wheels generously with primer. I slip a length of plastic sleeve (strip a short length of insulation off some electrical cable) over the crankpin screw to prevent the threads from being clogged by paint.

Once primed you can paint the wheels to taste. I stipple in a rusty, dirty, sludge mixing a little talcum powder in to get a textured finish. Once the paint is dry and hard you can scrape off the paint from the tread and tyre using a knife blade and then polish the surface using a fibre glass brush. This will also remove any rust. Some people mess about trying to mask off the tread but I have found this a waste of time and normally achieves a Sharpe edge to the primer that is vulnerable to chipping off.

When the completed chassis is painted and runs like a Swiss watch you can snip off the extra length of crankpin screw and dress back flush with the face of the nuts using a flat file. This should create a slight burr on the thread at the nut and this will help to keep the nut locked into place. If required in the future a slight twist of the nut with pliers will break off the burr allowing you to remove the nuts.

Hints and Tips For Making Up Coupling Rods

Coupling rods are built up from a number of layers to represent the thickness of the prototype. Normally three layers are used for the rods with separate bosses to represent the increased depth at the crank pins. They require laminating (soldering) together and this is a straightforward operation but one that many customers are doubtful about. The way I do it is to separate the three laminates of one rod from the etch at a time. They are normally grouped together on the etch so that they can be separated and laminated together in the correct order.



I decided to make the best of my successes and joined the two brass parts together with five good spot joints. I was very pleased with myself and at the strength of the joint. That was until I realised that the two parts were joined together out of square. Although the parts were propped in position with blocks of wood I had managed to move them out of position when I was feeding the solder into the joint with my left hand.

I learnt a lot from my early efforts and this is how I would now do the job properly. First I would hold the two parts together and in the correct position with the fingers of my left hand. Then using my right hand I would place a blob of liquid flux at one end of the joint using a small paintbrush. Then I would pick up my 40 watt soldering iron with my right hand and after wiping the bit I would load it with a small amount of 145° solder from the end of the length of solder wire that is secured to the bench. I would then place the tip of the iron firmly into the joint where the blob of flux is. I would then allow the flux to draw the solder naturally off the iron bit to form a neat spot joint between the two parts. I would then remove the soldering iron from the spot joint and allow the joint to cool and solidify so that I could remove the fingers of my left hand just before the build up of heat got to them.

With the single spot joint holding the parts together I would check them to ensure that they are square and correctly positioned. If they are slightly out the single joint will allow the parts to be gently bent and tweaked with a pair or long nosed pliers until they are spot on. If they are drastically out of position more flux can be applied to the joint and the joint reheated with a dry iron (bit wiped but not loaded with solder) to allow repositioning.

When I am happy I would make two more spot joints one in the centre and one at the other end of the parts. I would then check again for position and make any adjustments. I would then brush a line of flux from the joint at one end to the centre then loading the iron bit with a generous amount of solder I would reheat the spot joint at one end and draw the solder down the joint to the centre forming a neat seam joint. I would allow time for the joint to cool so that the solder turned solid at the end I started at and then I would apply flux and the reloaded iron tip to complete the other half of the seam joint. By working the joint in stages you are allowing the solidified solder to hold the parts in exact alignment and you can steady the parts with your fingers by holding at the opposite end to the heat from the iron.

FAQ Answer 8 **Multicore Solder & Electrical Connection Soldering**

Despite the fact that specialist model makers solders have been readily available for years some people still persist in using Electricians 60/40 multicore solder for etched kit building. I think that there is something of the attitude that they bought a big reel of it for twelve shillings and sixpence in 1968 and they will be dammed if they are going to buy any more solder until they use it all up.

Multicore 60/40 solder is designed for electrical joints where the flux is required to be passive and non-corrosive after the joint is made because you cant really dunk your television into the sink and give it a good scrub to kill the flux. Because of this it is not very powerful. To achieve a good joint the electrical components are pre tined (that is they are already coated with bright clean solder by the manufacturer).

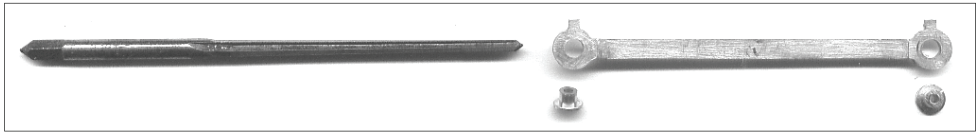
If you think about soldering a wire to the solder tag of a small on/off switch on your layout control panel. The tag on the switch is bright silver even though it is made of brass because it has been pre tined. When you strip the insulation from the wire the copper conductors are silver in colour because they have been tined. You will hook the wire through the solder tag to mechanically secure it and then place the dry soldering iron tip (no molten solder bubbling away on it creating oxide) into the joint and feed the solder wire into the joint, normally on the opposite side of the tag to the iron tip (note the big difference of solder being fed into the joint with electrical soldering and not carried into the joint on the iron tip for etched kit soldering).

A good electrical joint is achieved because the surfaces of the parts to be joined are already wetted with solder by being pre tined. But ask any electrician about dry joints and the problems they cause. Even with electrical work a separate rosin based flux is sometimes used when soldering heavy terminal lugs to cables or soldering to plain brass terminals. So for soldering plain metals a separate flux must be used!

If you use an active separate flux you can successfully build etched models using only 60/40 multicore solder but because of its higher melting point you will have to use bigger soldering irons. In my experience a job that can be successfully completed with a 40 watt iron and 145° solder will require a 80 watt iron and you cant hold the parts together without burning your fingers. I would wager that even the most experienced modeller who builds only with 60/40 solder would find something close to a 50% improvement in the quality of their work if they switched to 145° solder. Keep your 60/40 solder for keeping your iron bits in good condition and the occasional small job like reinforcing lamp irons and loco steps. As my miserable old master electrician used to constantly shout at me when I was an apprentice “don’t make hard work for yourself use the right materials and tools for the job”.

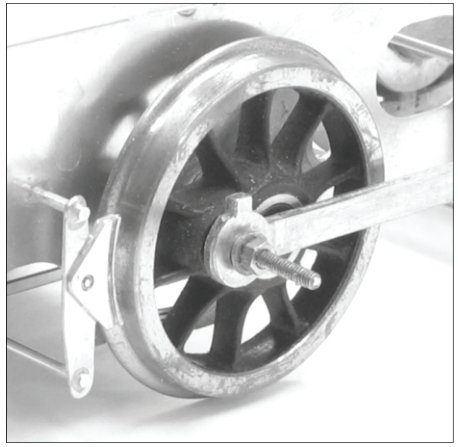
One problem that you will find with Slater’s wheels is that they are prone to going rusty when you are working on a chassis particularly if you use an active liquid flux. I have found that the best thing to do is ignore the rust if you can and clean it off before painting. As long as the rust is only an oxide on the surface there is not a problem but don't leave the wheels for days on end or you will find heavy spots of corrosion that will pit the surface of the wheel. Once you have finished working with the wheels clean off the rust using a fibre glass brush. I find that after the wheels have been abrasively cleaned a couple of times the surface of the tyre changes and the wheels don't seem to rust in service.

Included with the Slater’s wheels are brass bearing bushes that should be slightly larger in diameter than the holes in the coupling rods and longer than the thickness of the rods. So open out the crankpin holes in the rods to accept the brass top hat bearing bushes. This is best done with a tapered broach or tapered engineers reamer (I have one that tapers from 3mm to 2mm and is 40mm long (see yellow pages for a good engineers tool merchant they are not cheap but will last a lifetime). With the reamer gently work from both sides of the rod until the bush is a smooth free fit into the hole.



We now have to reduce the length of the bush to prevent sloppy side play in the rods. Place a bush onto a block of wood then place a coupling rod face down over the bush. By pressing down on the rod with your finger you should be able to gently file the bush until it is 0.010” to 0.015” proud of the rod. These bearing bushes are not soldered into the rods but locked onto the crankpin with a nut and washer. So it is important that they will revolve freely in the holes in the rods.

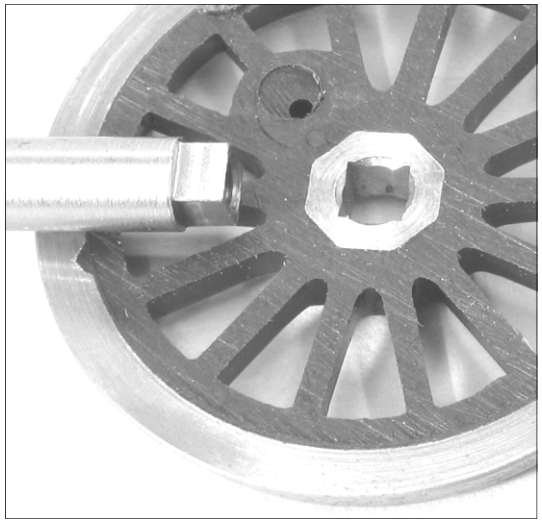
Now fit the bushes onto the crankpin screws and fit the coupling rods gently locking them into place with the washers and nuts. Check that the wheels will turn without binding. If you do have a problem gently revolve the wheels with your finger tip until you hit the tight spot then check the rods. You should find that one rod still moves freely on the crankpins and this side is OK. You should find that the rod on the other side is tight on the crank pins and this is where the problem is. Normally the problem is a crankpin screw that is not square in the wheel (unless you have reamed the hole in the rod out of square). With a round file gently file oval the hole in the rod until it fits freely onto the crankpins and then refit the rod and check the chassis again.



Hints and Tips For Using Slater's Wheels

As with most components a little time spent preparing Slater's wheels will be rewarded by preventing potential problems. Remove any plastic flash or moulding pips from the backs of the wheel by rubbing them flat on a piece of fine emery cloth (this flash can sometimes interfere with the plunger pickups). The crankpin screw head needs to be flush with the back of the wheel (it may interfere with the shoulder of the bearing otherwise) so it will be necessary to drill a countersink hole. Use a 2.5mm drill in a hand held pin chuck. Drill gently and keep checking with the head of the screw until the hole is the correct depth. The screw is designed to self tap into the plastic and then lock itself. I don't trust this and prefer to screw it in until the head is just proud of the wheel back. I then fill the countersink hole with Araldite and then screw it in until it locks. Leave the wheels until the Araldite has set and then clean of any excess Araldite by rubbing the wheel on the emery cloth. This should leave the screw head embedded in Araldite and prevent the potential problem of the screw turning when you are trying to undo the crankpin nut.

You may find that the square axle end is a tight fit into the centre of the wheel and this needs correcting. With a fine flat file gently dress each of the four sides of the axle end. I find it helps to lay the bottom flat of the axle end onto the edge of a block of wood. This helps me keep the file parallel as I file the top flat. Offer the axle end into the wheel centre and repeat if necessary. You are aiming to get a gentle push fit but with no rocking or movement on the square. A good guide is to get it so that you can remove the wheel from the axle with just your finger nails around the steel tyre. If you have to grip the tyre with your finger ends to pull it off you will find it difficult to remove the wheels to paint the chassis. Once happy fit the wheel sets into the chassis remembering to quarter the wheels (the crankpins on one side should lead the other by 90degrees).



FAQ Answer 9 Cleaning Up Solder Joints

The art of solder construction as with many of the model makers craft skills such as painting is as much about dodges for cleaning up and correcting mistakes as it is about making the initial solder joint. Many potential kit builders look at the beautifully polished models on the demonstration stands of the experts at exhibitions. They have crisp and square solder joints with just a mere hint of solder showing and the assumption is that this was achieved as an initial joint. The potential kit builder goes away disillusioned by their own efforts at soldering not knowing that nobody makes joints like this. The experts are just very good at cleaning up afterwards!

I like to have a cleaned up sample model in brass on my sales stand at shows. When customers ask how to achieve the neat solder joints I will hand the model to them and point out the scratch marks where I have scraped out the surplus solder from the joint with a knife blade and the scuff marks where I have abraded the surplus solder from the surface with a fibre glass brush. I then tell them to turn the model over and look at the untouched joints on the underside. I love to watch the customers face light up as if night was turned to day and they exclaim "those joints aren't much better than what I am achieving".

The main trick is to make as many of the joints as possible on inside faces or from the underside so that they wont require cleaning up and then put plenty of effort into cleaning up any joints that will be visible and may effect the crispness of the paint finish. Next time you are inspired by an experts model at an exhibition just ask them how they clean up to achieve the result.

Any surplus solder should be removed using a craft knife, I find No 10 curved scalpel blades ideal (Squires Code SMH003 handle & SM10 blades), then burnish clean with a glass fibre brush. With practice you'll learn how to use the minimum amount of solder to do the job correctly but limit the amount of cleaning up required. You will also learn lots of dodges for pulling excess solder out of a joint with a hot soldering iron and how to clean out planking lines that you flooded with solder because you was not watching what you were doing.

Flux is corrosive so after each soldering session give your model a good scrub with washing up liquid or Jif. After a day or two any remaining flux residues will show as a green film which should be washed away.

FAQ Answer 10 Removing Etched Parts From The Main Fret

To cut parts from the fret use a sharp pointed scalpel blade (Squires code SM10A) on a block of softwood. Dig the point of the blade into the softwood in front of the half etched tag and rock the blade backwards cutting through the tag. In this way the softwood will support the part as you cut through the tag and prevent any distortion. Remove tags and burrs with a fine file.

FAQ Answer 11 **Folding & Forming Parts**

Three-dimensional etched parts are formed by folding. On an etched brass kit the fold lines are normally half-etched on the inside of the fold. You'll be able to fold most parts using smooth-jawed pliers or a smooth jawed bench vice. For longer parts such as the long channel solebars of a wagon a set of folding bars are desirable. Folding bars make the job easier but don't have to be sophisticated and are not essential. A couple of heavy steel rules tapped together would just about get you by. Folding bars will come into their own as you build more sophisticated kits but you can do without them on the simpler kits that I recommend for beginners.

The boilers in my loco kits are pre-formed and I have also passed the roofs of my coach and van kits through the rolling bars, other forming is best achieved as construction progresses as this enables the parts to be adjusted to each other. To make a tight curve at full metal thickness, such as tank front, bunker rear etc, take a piece of rod slightly under size of the curve required (a drill shank is ideal). Place roughly on centre line of bend, holding in place with thumbs and pull upwards with fingers, forming approximately 30 degrees of the bend. Check with eye and adjust if necessary before forming 60 degree of bend then offer part to model. Final adjustment of fit is easily made on last stage of bending to form the full 90 degree.

To form shallow curves, splasher tops, smoke box wrappers etc, use a piece of pipe or broom handle. Diameter is not crucial, a piece of one-inch water pipe covers cab roof to smoke box wrapper. Place part over tube and hold in place with finger and thumb of one hand. Work the metal in stages over tube with finger and thumb of the other hand until correct radius is formed.

A technique you may find useful in working metal is to soften and remove the spring from the metal by heating (called annealing). The part is held with pliers and heated in a gas flame. (The gas cooker is ideal). Alternatively use a pencil torch that runs off lighter fuel. Heat part until a purple band appears close to the edges and then remove from heat. Do not overheat the part, as it will then become too soft and unworkable. Remember you can reheat if not workable. Allow part to cool naturally in the air.

FAQ Answer 12 **General Tools Required**

Useful tools include a bench vice, a good pair of tweezers, a set of Swiss files (get a full set of cheap ones and then buy quality replacements for the three that you use the most), a pin vice with a selection of drills from 0.5mm to 2.4mm plus a few larger sizes that you use regularly (2.6mm for axle bearings etc), some square-nosed pliers and some very pointed-nosed ones, preferably with smooth jaws and a pair of flush cutting side cutters (wire cutters). Pliers are like gentlemen's underwear, buy them in person and check for comfort! You will know the right ones for you when you pick them up. Buy cheap tools first and duplicate the most used ones with quality.

You should find that the rod on the other side is tight on the crank pins and this is where the problem is. Normally the problem is a crankpin screw that is not square in the wheel. Gently file oval the hole in the rod with a round file until it fits freely onto the crankpins. Refit the rods and check running again.

By getting the chassis running in three stages it helps to highlight a problem area. Now that the motor has some work to do in moving the chassis you can make final adjustments to the gear mesh.

If the mesh is too tight the gears will be noisy and will wear quickly. If too far apart they will be quiet but go very noisy under load as they try to climb out of mesh. This will knock the tops off the teeth and strip the gears. You are looking for a sound like the purr of a contented cat that is the same for each direction of running. Now oil all moving parts. I use light oil for the motor bearings, axle bearings and crankpin bushes. For the worm and gear wheel I prefer heavier oil that will cling around the teeth and I find that car engine oil is very good for the job. Half an hours running in each direction with a train of six or seven wagons should then run everything in nicely. Check that the gears are not wearing. You will probably see pronounced semicircular marks on the brass gear wheel but if you wipe off the oil this should turn out to be bright brass that has been polished by the steel worm and not wear.

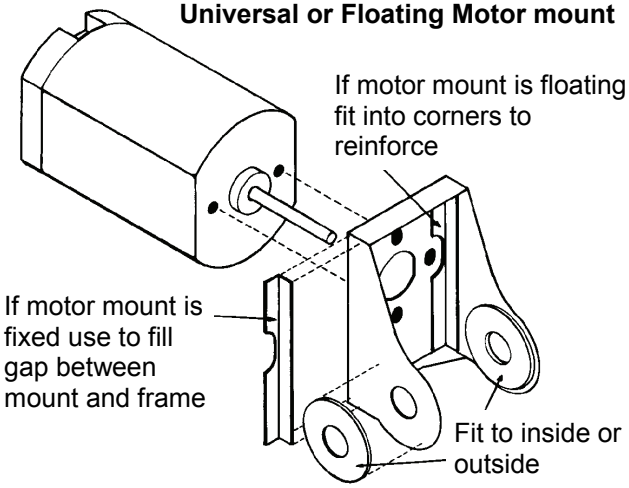
There is a bit of a tradition of running in a chassis on the workbench for a number of hours with toothpaste on the gears. This should not be necessary with this quality motor and gear set.

The only slight problem you may experience is with the worm fixing. By necessity the grub screw is very small and the motor shaft is hardened steel. It should provide satisfactory fixing for most locos on most layouts but it is not unknown for a worm to be pulled off a motor shaft when pulling a heavy train. An alternative is to push the worm 1/3 onto the shaft. Then pick up some superglue on a piece of wire and coat the inside bore of the worm. Then push the worm home. The problem is that the worm will then be on for life so I would only recommend this if you were having problems

Floating Mount

If fitting a floating motor determine motor position and then fit strip across chassis and secure motor with a blob of silicon.

Universal or Floating Motor mount



Fit plunger pickups and then fit wheels and axles into the chassis with the brass gear wheel mounted centrally on the driving axle. Some people file a flat onto the axle to allow the grub screw to get a better grip. Don't fit the coupling rods yet.

Fit worm onto motor shaft with grub screw nearest the motor body and leave about 1/2mm gap between worm and motor bearing so that you can get some oil down onto the bearing. There should be a little end float (in and out movement) on the motor shaft. Fit the motor into the mount using the two small screws. You may find that a small jewellers screwdriver that has been magnetised by stroking with a magnet is helpful in picking up and holding the screws.

Wire up the motor to the pickups. Loosen off the grub screw and slide the brass gear out of mesh. Place the chassis on the track and apply a little power. Hopefully the motor should be turning over evenly and smoothly. Now push the chassis along the track, through curves and points, lifting the front or back wheels until you have proved all the pickups. Any hesitation in the motor running will highlight a pickup problem.

Gear Meshing

Centre and screw up the brass axle gear. Slacken off the motor mounting screws and press the worm with your finger down into the teeth of the axle gear. Re-tighten the motor screws. The gears should be hard in mesh with no movement between them. But it is important to have a little movement (backlash). So slacken one mounting screw and slightly twist the motor until there is a little free movement between the teeth of the gears. Then re-tighten the screw. The traditional way of producing backlash was to fold a cigarette paper in half and place this between the two gears as you pushed them together. When the paper was removed this provided the correct amount of gap. I have never bothered with this but it does provide a very good mental image for the sort of clearance we are looking for.

Place the chassis back on the track and apply power. Hopefully the driving wheel set will now be slowly and smoothly revolving with the gears emitting a quiet even noise. If it is a Connoisseur 0-6-0 driving on the centre axle the wheels are lifted just clear of the rail. Or if the drive is on the back axle lift the rear of the chassis up so that the wheels can turn freely. If you notice hesitation of the wheels or a marked rise in gear noise at one point in each wheel revolution back off the gear mesh slightly.

Adjusting A Running Chassis

Now fit the coupling rods and place the chassis on the track. Hopefully it will run like a Swiss watch. If there is any hesitation first check that the rods are not binding. Reduce power until the chassis stalls at the tight spot. Prod the chassis on to make sure that it stalls at the same point on the next wheel revolution and then check the rods. You should find that one rod still moves freely in and out on the crankpins (crankpin bushes should be slightly longer than the thickness of the rods). This side is OK.

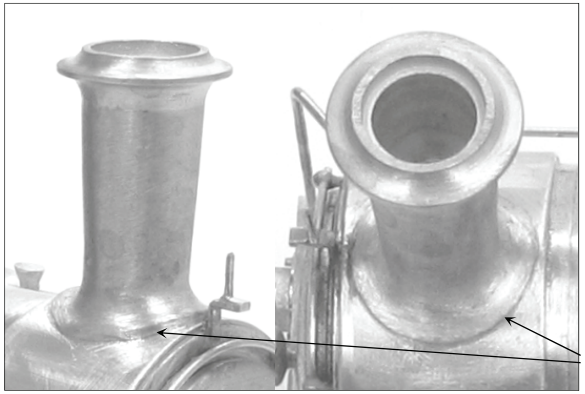
Bench vice - Squires code 020-502 or 020-503.
Tweezers - Squires code TW59P.
Files - Squires code FLN010.
Pin vice - Squires code PV0022.
Drills - Squires code DSM050 for a set 0.3mm-1.6mm then Squires code MD/ size for larger individual drills, so MD/2.6 is a 2.6mm drill.

FAQ Answer 13 **Fitting Cast Parts**

Try to complete all high-temperature soldering before attaching any of the cast whitemetal parts. These can be attached with two-part epoxy resin such as Araldite Rapid. Ensure the surfaces to be glued are clean and free of grease.

A better alternative is to solder your white metal castings using Carrs 70 degree low melt solder and Carrs red label white metal flux. The iron should be run at a much lower heat so that you do not melt the castings. I have a domestic light dimmer switch and plug socket fixed to a piece of wood, wired up with a lead and standard mains plug fused at 3 amps to the input side of the dimmer switch and the output of the dimmer switch into the plug socket (remember to continue the earth). Plug your 40 Watt iron (25 Watt iron won't work) with a clean and freshly tinned bit into this and experiment with adjusting the switch until you find the range of temperature at which the solder melts but a scrap casting does not. Note as the iron is running at a lower voltage it will take longer to heat up, so when you think the adjustment is correct do check a few minutes later on another scrap casting to see that it doesn't melt. Then scribe a mark on the switch knob to indicate this position.

When attaching white metal fittings to brass the surface of the brass must be tinned with 145° solder to allow the solder to grip. The surface of the casting at the joint should be burnished bright. The casting can then be soldered into place with 70° solder and fillets of solder run into any gaps with no risk of melting the casting. Virtually all castings will be improved by a little extra fettling work. Flash can be cleaned out using a sharp pointed knife blade, part lines removed by scraping back with a curved blade and then blending in using a fibreglass brush. The casting moulds tend to distort when metal flows in so check castings for square and even thickness.

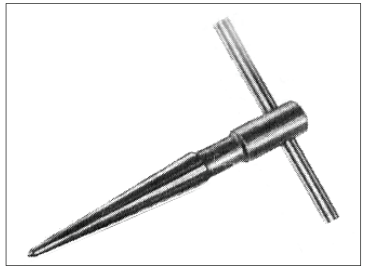


The chimney has been soldered into place with a generous fillet of 70° solder run around the base. Then using a curved scalpel blade the excess solder has been scraped back from the brass smokebox and a fibreglass brush worked around the base of the flange to reveal a distinctive circular edge to the casting and feathering the solder into the brass.

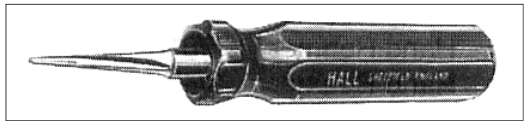
FAQ Answer 14 Specialist Tools For Etched Kit Building

Most tools required for etched kit building are general to most model making but there are a few tools that are specific to working with thin sheet metals. Because of the thickness of the metal it is not a good idea to try and drill holes of a diameter much more than 2mm. There is a risk of the drill snagging and tearing or distorting the material. Again with trying to open up pilot holes with a drill there is not enough meat in the material for the drill to centre itself so the hole may lose its centre (move its position relative to other holes). For opening up holes in thin material tapered reamers are used. For opening up holes very gradually in thicker materials (coupling rod holes and bearings to ease the fit of an axle) tapered broaches are used.

The etching process can never guarantee a hole size (hole centres are constant but diameters will vary). Holes will normally be undersize, for example the turned brass bearings will not fit into the holes in chassis sides. So working on the principle that a hole can always be opened up to a precise fit a simple fitting operation is required. The best tool for opening up holes of this size is a cheap tapered reamer (Squires code 060-065). By rotating this gently in the hole you quickly open holes to correct size, without risk of tearing the metal. By trial and error on the first hole you will soon establish how much material requires removal. For smaller holes, such as those for the location of casting's etc these can be enlarged by twisting a small round file in the hole but are best opened up using a micro drill reamer (Squires code TR005).

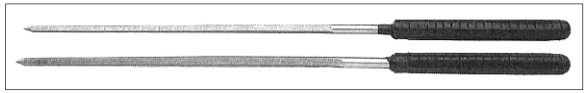


Large Tapered Reamer (Squires Code 060-065)



Micro Drill Reamer (squires Code TR005)

For holes in the thicker coupling rods that must be opened up to provide a precision fit over the crankpin bearings a cutting broach is used. This has a very gradual taper over a long length and so the hole is slowly opened up in such a way that the inside of the hole is given a polished bearing surface and is in effect virtually parallel throughout its depth. The broach can then be used to very slightly open out the holes to give a good running clearance and remove any tight spots when finally setting up a running chassis. I would recommend a set of six broaches to open up from 1.2mm - 3.2mm (Squires code BRC372). I would also recommend that you get a single broach 4.1mm - 5.5mm (Squires code BRC317) this will cover easing out loco axle bearings.



Motor Position and Angle

I suggest you build a locos body and chassis together. As construction progresses you can fit the two together to check clearances and spot potential trouble. The best point of construction at which to determine the position of the motor is when you have a basic chassis with axle bearings (unsoldered) and wheels fitted and the body at the point where the boiler is made up but not yet fitted.

Remove the driving axle and bearings. Offer the flat motor mount to the front of the motor to check that the slotted fixing holes match the holes in the motor and that the fixing screws will be easy to fit. If necessary slightly widen the slots or remove any etching cusp with a fine round file. Temporarily fit the worm onto the motor shaft and check that it will pass freely through the hole. If not file a nick into the hole to clear the grub screw. Open up with a tapered reamer the holes in the wings so that the axle bearings are a snug fit. Fold up the motor mount and temporarily screw the motor into place. Slip the motor mount between the frames and secure by fitting the axle bearings and a lightly oiled axle.

Offer the body and chassis together. You should now be able to rotate the motor/mount around the axle bearings until you find the correct angle for the motor. With the boiler removable you should be able to check that the back motor shaft and the pick up leads will not foul the underside of the boiler. With some locos it will be necessary to shorten the back motor shaft. This is best cut down with a slitting disc in your mini drill. Clamp the front shaft of the motor in the vice and make small nibbles (as if you were chopping a tree with an axe) into the back shaft with the slitting disc. In this way there is less risk of the disc snatching and shattering compared to trying to cut through the shaft in one go.

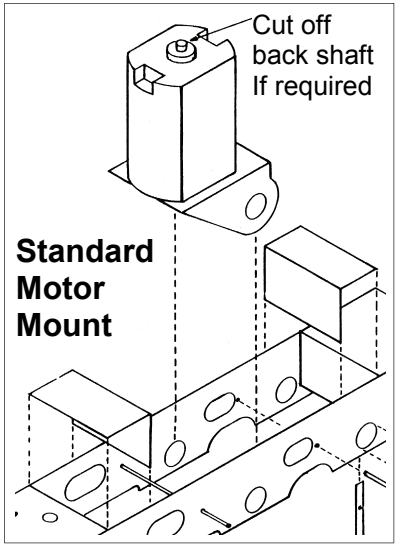
Once you are happy with the position of the motor. Spot solder the mount to a side frame to prevent it moving and then remove the motor. Now solder the axle bearings into place. You will need to reduce the side play on this driving axle to about 1/2mm to enable the gear wheel to stay in mesh. Some kits include packing washers to pack out the bearings from the chassis sides but I find these a little fiddly to use. I prefer to slide the bearings out on the axle and then solder them proud of the chassis sides. If you use plenty of flux the solder will flow through the side frame holes and secure the motor mount. Then solder the top of the mount to each side frame with a seam of solder. As construction progresses ensure that the chassis can be pushed along with light finger pressure without the wheels and coupling rods binding up and skidding. There should then be no problems with fitting the motor and pickups after painting the chassis.

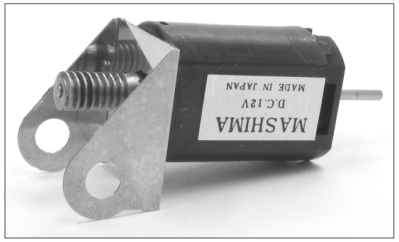
Fitting the Motor and Gears

First stand the motor upright and put a spot of light oil (many tool merchants sell small hypodermic tubes filled with sewing machine oil) onto the front bearing and leave to soak in. I find that when the motor is new this bearing requires oiling two or three times over a short period and then it seems to hold the oil and only require oiling occasionally.

Hints and Tips
Motor Installation & Sweet Running Chassis

Setting up a motor and gear set to run sweetly is something of a black art that is mainly done by feel and experience. Knowing this is not a lot of use to you if it is your first loco, I hope that the following notes will be helpful.





Motor Mounts

Etched motor mounts tend to come in two different types. The fixed type are designed to be soldered solid between the frames and in effect become an extra frame spacer that gives rigidity at the most important part of the chassis. The majority of Connoisseur loco kits use this type.

They have fold down wings with holes in that fit over the bearings. The purpose of these wings is only to set the flat motor mounting plate at the correct distance away from the axle. It is important to solder the flat mounting plate to each chassis side with a good fillet of solder (if the mounting plate is slightly narrower than the chassis, fit a length of brass wire or waste etch to bridge the gap).

It is important that the mounting plate is as solid and rigid as possible. Some people just secure the motor mount by soldering the wings at the axle bearings. The problem with this is that the mount can flex when the motor has a heavy load applied and the gears try to climb out of mesh. An indication of this is when the loco runs sweetly in one direction but makes a loud grinding noise in the other direction. The gears will soon strip (the tops of the teeth will soon be knocked over or chipped off).

The other type is the floating or axle hung mount. This is narrower and designed to fit between the axle bearings, secured by the axle passing through it and the motor is restrained by a blob of silicon bath sealant on a strip fitted across the frames. The idea is that the sealant allows the motor to float and gives quieter running. I have never been convinced about this and prefer to solder this type of mount solidly to the side frames using strips of brass angle to bridge the gap. But some people swear by the floating motor method. Some of my Claymore kits use this type of mount.

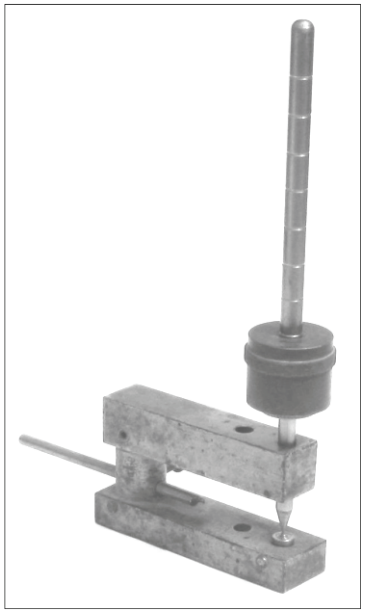
I will describe the procedure for setting up a motor using my standard fixed mount, but most of the procedures are relevant to using a floating mount.

On many etched kits some bolt and rivet head detail is represented by embossing using half etched holes on the inside face of the part (often referred to as push out rivets). To achieve this you can use a Machinists scriber (Squires code SCR030) with the point rounded off slightly on an oilstone. Place the part face down onto a block of softwood and firmly press the point of the scriber down into the half etched hole. Work your way along the row of rivets. If you find that this distorts the parts slightly. Gently correct this by bending back with finger and thumb pressure about every six rivets. With my kits I tend to use a separate overlay that is half etched so that the rivet detail stands proud if there are a lot of rivet heads in a small area (smokebox wrappers on locomotives etc). If there is a small amount of rivet detail on a large area I will tend to use embossed rivets. I try to select the method that will produce the best result for the least amount of work. An Engineers scriber (Squires code ECL222) will also be found very useful for marking out light guidelines.

A tool that I find indispensable is a Fibreglass Scratch Brush (Squires code AB0080). The scratch brush is like a propelling pencil holder into which a fibreglass refill is fitted (Squires code AB0092) and which will give a vigorous abrasive action. I find this tool indispensable for cleaning up and removing solder. One very useful tip is to soak the refills in dilute PVA glue (Evostick resin W wood glue let down 50/50 with water and a spot of washing up liquid) and then drill holes in a block of wood and stick the ends of the refills in the holes while they harden off. This will make the refills much more abrasive and longer lasting and also stops the fibres breaking off and ending up in your fingers. You will need to give the refill a good rub to get it started but if you use green label flux you will soon have plenty of rusty tools that need cleaning.

FAQ Answer 15 Luxury Tools

There are many tools that are not essential but can make working easier and will really come into there own as you progress onto more sophisticated kits. A couple that I would recommend considering are:

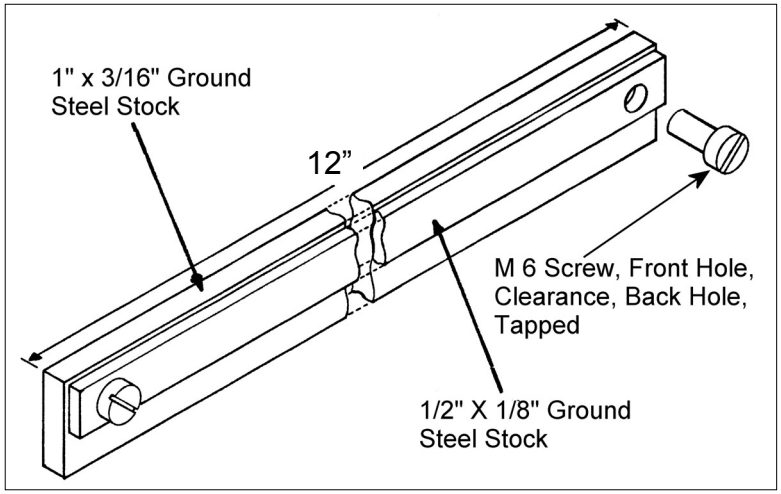


Precision Mini Drill, once you have one you will wonder how you ever worked without one. Useful for not only drilling holes but with slitting discs for cutting down the back shafts of motors, grinding wheels for shaping metal etc. There are many types available to suit all budgets but I would recommend going for the best you can with a keyed chuck and a variable speed transformer. The one I use is Squires code MB8571S.

Bolt Head and Rivet Forming Tool. Although a very reasonable job can be done with a scriber point, a rivet forming tool is very desirable if you are going to do a lot of kit building.

These are produced by a number of different people but I use and would recommend the one produced by Dick Ganderton, Graskop, Dewlands Road, Verwood, Dorset, BH31 6PN, Tel 01202 822701. It is available with a number of different sized punches and anvils but if you were only going to get one size then I would recommend the 7mm scale 1½" diameter. I have got ten years hard use out of mine so far so this is an ideal tool to put onto your Christmas present list.

You will find a set of folding bars very useful and here are details of the set that I have made for myself, in fact I have made three sets of different sizes. The dimensions or materials are not critical so make yourself a set to suit the materials you can get hold of. The important thing is that you can clamp the part along its entire length, with the etched fold line just above the front bar. Then clamp the bars in the jaws of your vice, a couple of 1" G clamps are also useful for long folds, and laying a steel rule at the back of the part to help transfer the pressure from your fingers evenly, pull forward to make the fold. Once the fold is close to 90° you can finish by pressing down on it with a block of wood and moving the block along the fold with a stroking action or by giving gentle taps with a small hammer on the wood block. Occasionally it is necessary to emboss bolt heads onto a part before folding, by lining the face of one of the bars with two or three layers of masking tape, you can still clamp the part without crushing the bolt heads but you wont get such a tight fold, so deepen the fold line with a triangular file.



FAQ Answer 16 **Tool Suppliers**

If you have a good engineers tool merchants locally then they are worth supporting for what tools they can supply but they will probably only stock the more expensive British and European manufactured high quality tools. Engineer's tool merchants are getting few and far between nowadays and your extra little bit of business will be most welcome.

Although the choice of which type of transfer to use is very much down to your personal preference. My personal recommendation for getting yourself started is a sheet of pressfix transfers for your chosen period to suite your first model. So if you are modelling a wagon in the BR era between 1948 and 1970 a sheet of Historical Model Railway Society No 25, BR revenue wagon, will cover virtually all the wagons you are going to build over the next five years and also provide a useful source of quality lettering for other modelling projects. The same is true if your first model is a loco in the LNER period etc.

HMRS pressfix transfers are my personal first choice the exception being for locomotives requiring full livery with lining. For this Fox Transfers waterslide are preferred as they can be cut and spliced to provide straight lines and corners and on a gloss paint finish they can then be moved about and prodded into position until everything looks right. So if you are using waterslide for the lining you are probably as well to use waterslide for the numbering and lettering to maintain a uniform finish.

FAQ Answer 21 **Controller & Track**

You will require a transformer and controller power supply to run your model for testing during construction and then to impress your friends with after completion. My advice is to get a very basic one to get yourself started even if you plan to eventually have a complicated electronic control panel or even DCC on your layout. You will still find the basic power supply useful for testing on the workbench.

As the modern Mashima motors are very efficient you wont require a power supply of more than 1 amp. A basic Gaugemaster 1 amp combined (in one case) transformer/controller will serve you for many years. You don't want any fancy pulse control or electronic feedback as these can cause problems with the efficient Mashima motors. Gaugemaster Controls plc, Gaugemaster House, Ford Road, Arundel, West Sussex, BN18 0BN, Tel 01903 884488. www.gaugemaster.com

An ideal alternative source of a suitable power supply is an old but sound unit from a 00 gauge train set. I still use my Hammant and Morgan "Duette" that I bought with my Christmas money when I was 15 to provide sophisticated control for my Triang locos. These can often be picked up second hand at swapmeets etc.

You will require some track to run and display your models on and to get yourself started I would recommend the PECO range. They produce flexible track that can be curved to any radius in yard lengths and a range of basic pointwork. With three yards of track and a point you can really start to enjoy yourself and see the potential of 0 gauge. PECO track is stocked by most model shops or for mail order Tower Models, 44 Cookson Street, Blackpool, Lancs, FY1 3ED, Tel 01253 623797. www.tower-models.com but you may have to buy a full box of 12 yards of track for postal reasons.

WATER SLIDE. These are the traditional type that was used in Airfix Spitfire kits etc. With this type a carrier layer (varnish) is first printed onto a carrier film and then the transfer character is printed on top. A section of backing sheet containing the characters required is cut out and placed into a saucer of water. When thoroughly wetted the transfer can be slid off the backing sheet onto the model and moved around into its precise position until the water evaporates. The transfer should then adhere to the model. For best results the paint used on the model really needs to be gloss or at least satin and a varnish coat is required to protect the transfer. Also there is a tendency for the character to be surrounded by a shadow like outline of the carrier layer but this is less of a problem with modern higher quality precision printed transfers.

DRY RUB DOWN. These use the same principles as the Letraset rub down transfer lettering sold in newsagents and art shops. The characters are printed in reverse on a clear film. The film is laid onto the model with the required character in position and a soft pencil is rubbed over the character transferring it to the surface of the model. These transfers can be difficult to apply over raised detail and can tend to break up if not rubbed over with an even pressure. They require a protective varnish coat and are best applied to a matt paint finish. They can be deliberately distressed to very effectively represent faded and peeling paintwork on weathered wagons and buildings. The production process is probably the most cost effective for small volumes and so some of the more obscure and specific liveries and lettering are only available in this form.

I would recommend the following three sources for your transfers :

Historical Model Railway Society (HMRS). This range of transfers is produced in Pressfix and Methfix types and are sold by the society to help raise funds for their charitable work in archiving and making available historical railway information. They are available from their volunteer transfer sales officer, 8 Gilpin Green, Harpenden, Herts, AL5 5NR. Please send a SAE for a combined price list and order form or visit the HMRS website, www.hmrs.org.uk, from which you can print off a price list and order form and see the range illustrated before you buy. The transfers are also stocked by a number of specialist retailers such as Tower Models, 44 Cookson Street, Blackpool, Lancs, FY1 3ED, Tel 01253 623797. www.tower-models.com.

Fox Transfers. This company produces a very wide range of high quality water slide transfers and promote themselves as the livery people (a description that I would not argue with). Fox Transfers, 138 Main Street, Markfield, Leicestershire, LE67 9UX, Tel 01530 242801/01530 245618. www.fox-transfers.co.uk

Powsides. This company produces a range of rub down transfers and specialises in small sheets dedicated to providing a full set of lettering for some of the more unusual prototypes. They are particularly useful for some of the specialist wagons that had large blocks of loading instructions in small letters. Powsides, Poplars Farm, Aythorpe Roding, Dunmow, Essex, CM6 1RY, Tel 01279 876402. www.crtkits.co.uk

For most people the best option is to use one of the model maker's tool merchants that specialise in a very efficient mail order service. The two that I would recommend not only provide a very friendly service but also are very knowledgeable about model making so if you are unsure don't be afraid to describe the job you are trying to do and let them recommend the best tools to help you. They are:

Squires Model & Craft Tools, 100 London Road, Bognor Regis, West Sussex, PO21 1DD, Telephone 01243 842424, Fax 01243 842525. Give them a ring and ask them to send you a free catalogue. Don't be afraid to mention that I have recommended them as the proprietor Roger Lewis has built some of my kits and so has a good idea of what tools to recommend.

Eileen's Emporium, P.O. Box 14753, London, SE19 2ZH. Telephone/Fax 020 8771 3366, Workshop Telephone/Fax 020 8766 6696, E-Mail info@eileens-emporium.freeserve.co.uk Send around £3.00 (1st class stamps would probably be best) for catalogue. Again don't be afraid to mention that I have recommended them, as Roger is an experienced modeller and will also know what tools to recommend.

Squires are a very good all round model makers tool merchants covering general tools for everything from railway modelling to boat building. Eileen's Emporium specialises in specific tools and materials for model railway kit and scratch builders. Between the two they should be able to meet all your requirements and where there is an overlap in tools Eileen's Emporium generally provides the more expensive quality alternative. You will probably find that Squire's provides most of your initial requirements and then as you get more sophisticated with your projects you will use Eileen's Emporium the most.

FAQ Answer 17 **Motor Required**

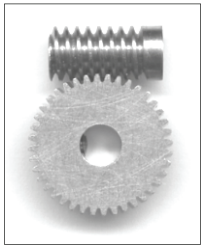
I design all my kits to use a Mashima 1833 motor and 40/1 gearset. These can be obtained from myself although other alternative motors and gears can be used.

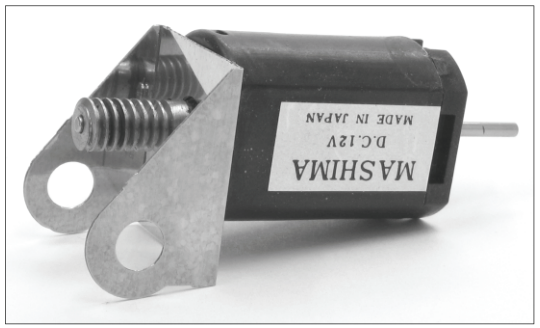
In common with the majority of 0 gauge kit producers I do not include a motor in my kits. The reason for this is that many modellers either require a certain type of motor to meet the work requirements that they want there locomotive to perform or they have a particular manufactures motor and gearbox that they prefer to use and they have standardised on for all their locomotive fleet.

For example the modeller with a large garden railway who wants a 4-6-0 passenger locomotive to run continuously at a scale 70mph pulling ten coaches for three hours will possibly wish to fit a large German manufactured high power motor with a low reduction gearbox. Another modeller may want absolute precision control at low speeds (they want to impress their friends by having the locomotive take a full minute to crawl along a yard of track) and they may wish to fit one of the Swiss manufactured coreless motors with a very high reduction gear train drive. Both these options are relatively expensive but by not including a motor with the kit the modeller is free to make this choice.

There is also a bit of a myth in 0 gauge that the only way to achieve good running is to spend a lot of money on a ready assembled, precision machined, self contained motor and gearbox produced by a number of manufacturers. These are undoubtedly very good but then they should be for the money. On a number of occasions I have enjoyed a day at a 0 gauge group running session and when running one of my locomotives on the running track. A modeller has said to me “that runs like a Swiss watch, you must use the motor units produced by DEF gears, just like I do”. They always look slightly disappointed when I pick up the loco and show them the basic motor and gear set that I fit into all my locos.

I design all my locomotive kits to use a Mashima 1833 motor and 40/1 gears and I fit these to all my own locos. I find this combination meets all the requirements of the majority of modellers with the sort of indoor layout that most of us have the room to build and gives the best performance against cost.





Mashima 1833 Motor and Quality Cut 40/1 Gear Set
Comprising of a stainless steel worm with grub screw fixing and wide brass gearwheel also with grub screw fixing.

With this combination of motor and gears fitted to say the 0-4-0 starter loco with its 3’6” diameter wheels you will find that with a basic proprietary speed controller the loco will trundle around a goods yard at a scale 5mph and then buffer up to a wagon with a precision that the buffer heads just kiss each other with a satisfying little clunk without moving the wagon. The loco will also pull away with a train of about 30 wagons and on full power jog along on the main line at a scale 25mph. This is pretty much what a real tank loco could do.

Fitted to say the LNER Class B12/3 with its 6’6” diameter wheels the loco will back down onto a train of coaches at a scale walking pace and stop with precision for coupling up. It will then pull away with a train of four or five reasonably heavy but free running bogie coaches and jog along on the main line at a scale 45mph. This is about what the prototype loco would do on a cross-country stopping passenger or parcels train.

An etched motor mounting plate is included in all my kits as part of the chassis design. This mounts the motor at the correct distance for gear mesh etc.

Based on my previous failed experiences of many years ago with airbrush painting. I would state that if you buy an expensive airbrush and mess about with silly little tins of compressed air you will get nowhere. If you buy a cheap airbrush and an industrial compressor and spray at low pressures (20-30 pounds per square inch) you will do wonders. Then if you find that you have a real artistic talent for airbrushing you can buy expensive airbrushes knowing that you have a compressor that will match their abilities.

For paints Squires stock and can supply by post the full range of Humbrol enamel for general colours, Railmatch Authentic Colours for specific railway colours and Phoenix Precision Paints for even more specialist railway colours. For the easiest paints to use for brush painting I find Humbrol the best and then Railmatch. I find that Phoenix can be hard work for the ham-fisted like myself but is often the paint of choice for those whom painting comes naturally to.

FAQ Answer 20 **Livery & Lettering**

For lettering and livery I would recommend using transfers. The production of quality transfers is a specialist job as much of the cost is in the setting up for a print run so the volume produced needs to be reasonable to keep the cost down. They also have a shelf life (I find about five years for them to be at their best) so turnover needs to be reasonable for them to remain fresh. Because of this you are far better obtaining transfers direct from the producers.

There are basically four types of transfer commonly available and which type to use is very much down to personal preference.

PRESSFIX. The individual characters are printed as a mirror image onto a transparent backing sheet and coated with a tacky adhesive. The required character or block of lettering is then cut out from a backing sheet using a sharp knifepoint and lightly positioned on the model. Once the location is correct the transfer is firmly pressed into position. The backing film is then wetted with water using a small paintbrush and this separates the backing film from the transfer and activates the transfer adhesive. The excess water and adhesive is then moped off the transfer using a cotton bud and during this operation the softened transfer is gently pressed into any plank lines and formed over surface detail. Once dry these transfers adhere to the model very well and are very flat on the surface and there is no slight shadow of a carrier film. A light coat of varnish or weathering mix over the lettering is recommended just to protect against rough handling.

METHFIX. These are similar to the pressfix type but the adhesive is not initially tacky and is activated by methylated spirits. I find that these are not so easy to use but are often preferred by the professional painters. They do have a very long shelf life and I have successfully used some that must be more than twenty years old.

For the best results you want to spray at room temperature (25°C) on a dry day, avoid cold, damp or humid days. I find it helps to warm the model to about 30°C (put it in the airing cupboard overnight) and I warm up the paint tin by putting it onto a radiator (about 40°C, but use your common sense as I don't want anybody blowing themselves up). I find it best to prime the model in two light coats, about 15 minutes apart and then leave for 48 hours to harden off (in the airing cupboard in a dust-free box).

I brush-paint the majority of my models with Humbrol enamel. For years I just stirred it up and painted straight from the tin but I was never completely happy with the results. Recently two things have transformed my painting. The first was a copy of Martyn Welch's book, The Art of Weathering, Wild Swan Publications, ISBN 1 874103 11 9. Even if you were not planning to weather your models I would still recommend this book for the general guidelines on painting. One of the most significant benefits that I found from this book is the confidence it gave me to remove and modify paint once it was on the model. As with most things the real knowledge about painting is not how to do it right in theory but how to modify and put right your mistakes.

The second thing is to mix the paint in the tin and then transfer it to a palette (a sheet of clean plasticard) with blobs of lighter and darker shades of paint surrounding the main colour. Then work the paint with the brush on the palette, slightly varying the tones of the paint. This seems to totally change the texture of the paint and the way it goes on and covers on the model.

I do use an airbrush for some work on my models but this is either for spraying an overall base coat of black on wagon underframes, loco chassis and bodies but a black car aerosol will do almost as good a job for this. Its main use is for spraying coats of very thin weathering mix (10% paint to 90% enamel thinners) over the entire model. This weathering mix will only just discolour a white sheet of paper and I use it instead of an overall matt varnish coat. I find that it blends in the different paints used to provide an overall uniform finish and flattens down and protects transfer lettering. By building up more coats on underframes and roofs it provides subtle weathering without requiring any artistic skill.

Although an airbrush is not essential if you wanted to try using one I would recommend initially buying a cheap bottom feed, external mix, airbrush kit (Squires code A25989 would be ideal and is what I use). Spend most of your money on the air compressor. Don't bother looking at the expensive little hobby compressors but get the smallest industrial type "Clarke Air" compressor from an industrial tool supplier like one of the Machine Mart Shops that are throughout the country (see your local yellow pages) they also sell airbrush kits very cheaply. You want a compressor with an air reservoir, adjustable air valve and pressure gauge and moisture trap. By going for an industrial type you will get a lot more sophisticated compressor for your money compared to a hobby one. Don't forget to get an air hose adapter (Squires code 200-001) to convert the industrial M5 pipe fitting on your compressor to the small hobby fitting on your airbrush hose.

The Mashima motor is a very efficient (about 0.5amp current consumption on normal load) and smooth running even at slow speeds. Personally I have never found a need to fit a flywheel onto the back motor shaft.

As is normal with traditional worm and gear sets a little time running in and then a final slight adjustment will achieve the sweetest running and provision for adjustment is designed into the mounting plate. Full instructions and guidance are included in the motor pack.

Slightly cheaper motor and gear sets are available from a number of suppliers and these can also provide satisfactory running but may require a little more adjustment and work in setting up and may not be quite so smooth running at slow speeds.

You may find it useful to look at the hints and tips for achieving sweet running chassis. You may find it helpful in deciding your choice of motor and gears. Also if you have already built a loco and have not managed to achieve the smooth running you were hoping for it may help you to put your finger on the problem.

FAQ Answer 18 **Wheels Required**

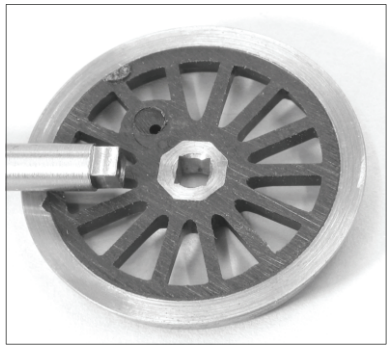
I design all my kits to use Slater's wheels although other alternative wheels can be used. In common with the majority of 0 gauge kit producers I do not include wheels in my kits. There are two main reasons for this. Some modellers have their own preferences as to which manufacturers wheels they find best suited to their needs. For example the more traditional garden railway runners often prefer a cast iron wheel with quite a wide tyre and deep flange. Reckoning that they stand a better chance of steamrollering over the odd garden snail or other garden railway obstacle without the train derailing. These wheel standards are often referred to as coarse scale.

Other modellers wish to spend a year or so building and detailing a model to a standard that would grace a museum showcase and therefore they will use a steel wheel that is an exact copy of the prototype and a thing of beauty in its own right. These may cost up to three times more than some wheels but if you are spending a year on a loco then the cost is probably justified. These wheel standards are often referred to as scale 7.

Most modellers want something in between but by providing the kits without wheels modellers are able to choose the wheels they wish. The other reason for not including wheels is because the wheel manufacturers are also small businesses and so are not able to provide us kit producers with much of a discount. So tying up large amounts of money by including wheels with my stock of loco kits with only a small potential for profit is not really practical.

The wheels that I use and recommend for all of my kits are produced by Slater's. These are probably the least expensive option and are relatively easy to use. They are to a standard that is often referred to as 0 gauge fine scale and is the standard that about 80% of 0 gauge modellers use.

These wheels will give you the maximum compatibility when running your locos on friend's layouts and running tracks at 0 gauge group meetings. These wheels are normally available off the shelf direct from Slater's and the range is comprehensive enough that you should be able to meet all your future requirements from the one manufacturer. I include full details of the Slater's wheels required in my instruction sheets and this information can also be used with the other wheel manufactures to select an equivalent wheel from their range.



Slater's wheels consist of a turned steel tyre and the spokes are injection moulded glass reinforced oil resistant nylon. The moulded spokes are keyed into the tyre so that there is no risk of the tyre working lose in use. Moulded and keyed into the centre of the wheel is a brass insert that has a square machined hole for most of its thickness and a round countersunk hole on its outside face. With nylon spokes the locomotive chassis and body will remain electrically insulated (dead) with relation to the live wheel tyres.

The axles have machined shoulders set 29mm apart and then the axle end is a machined square. The axle ends are bored out with a taped thread. The wheels fit firmly onto the squared axle ends hard against the shoulders and these set the wheels at the correct gauge (back to back measurement). The squared axle ends accurately quarter the wheels (set the crankpins on one side of the loco to lead the other side by 90°) The wheels are secured to the axle by countersunk machine screws (Allen or hexagonal key type screw) seating in the countersunk hole in the centre brass insert. The great advantage of this fixing method is that the wheels can be fitted and removed from the chassis as many times as you want during construction and painting and remain removable if required for servicing the loco during its running life.

Included with the Slater's wheel pack are the crankpins. These consist of a threaded screw that fits through the wheel from the back. A shouldered turned brass coupling rod bearing bush is then fitted and a washer and nut then retain this. Again this has the advantage that the coupling rods can be removed and replaced as many times as required. Each wheel pack contains all the parts required for each axle of the loco.

The only additional thing required is a 0.050" across flats hexagonal Allen key. Slater's can supply one of these in a fancy packet but for the same price you can buy about half a dozen from a good tool merchant (Squires list it separately in their catalogue).

I would recommend purchasing the wheels direct from Slater's. They provide an excellent mail order service and will take orders with a credit card over the phone. If you quote the reference numbers that I give for each kit and say that you want them for one of "Big Jims Kits" then they will be delighted to hear from you.

Like most components you will get the best from Slater's wheels if you do a little extra preparation work and I would recommend that you refer to hints and tips section.

Slater's Plastikard, Temple Road, Matlock Bath, Matlock, Derbyshire, DE4 3PG, Telephone 01629 583993. For more information about Slater's and their wheels: www.slatersplastikard.com

For modellers who want a wheel to match a specific profile, they may have a collection of modern Bassett Lowke locomotives produced by Corgi or the modern continental tinplate produced by ETS, which have a course scale type wheel profile. Then the range of cast iron wheels produced by Walsall Model Industries may be an alternative. They provide a bespoke wheel turning and finishing service so if you told them that you wanted to match up with some Bassett Lowke locomotives they would provide finished wheels to the appropriate profile.

They also provide wheels finished to fine scale 0 gauge standards or just blank castings to be finished by the modeller. These wheels may be an attractive alternative to customers who are experienced model engineers and would find a cast iron wheel something they are more familiar with.

Walsall Model Industries, Unit 7, North Street Industrial Estate, Walsall, West Midlands, WS2 8AU, Telephone 01922 633718

FAQ Answer 19 **Painting Your Model**

Painting is a vast subject that cannot be covered fully here. The important thing with a metal model is to get a good base coat of primer. Hopefully you have been cleaning up and washing the model at the end of each modelling session but it will still need thoroughly cleaning before painting. I give my models a good scrub with a stiff-bristled paint brush in a sink full of hot water, as hot as your hands can bear, and cheap washing up liquid (the expensive stuff that's kind to your hands has an oil in it that will stop the paint keying to the metal). If you know somebody who works in catering and can scrounge you some industrial-strength liquid this is better still. Then rinse the model a couple of times in clean warm water and place in a dust-free box to dry. I use car aerosol primer and Halfords grey primer is one of the best.