Soldering - The "Black Art" de-mystified: Part 2

As we said in Part 1….

You can solder! All you need to become as good as anyone else are the right tools & materials and a little guidance. Take it one step at a time, and don't rush at it. You'll soon be an expert!

Part 2:

Cleanliness, fluxing, tinning and post solder clean-up

We have already spent a lot of time covering the tools, materials and resources that can make or break a soldering job. However there are a few simple rules that must be followed if you are to enjoy soldering and get a consistent result. Nothing hard, nothing complex… Read on.

Let's start with the basics: Good work doesn't happen in a messy work area! Mess leads to mistakes and loss or parts - most importantly… it greatly increases the possibility of accidents, so clean it all up!

Clear up the area you in which you will work … If it's a work-bench put other things to one side and give yourself a clear area to work in... If it's on the layout, clear away stock and tools and clean up the area you will be soldering in.

If you will be soldering under the layout move stuff away to give yourself a clean space and also add somewhere for tools to sit, plus adequate space for a good work-light.

This may sound a bit pedantic but to solder well you have to have the Iron at the correct angle to the work – and you also have to sometimes hold things at strange angles so your fingers don't get burned. This takes clear space, and if you do not make a clear area to work in you do risk knocking things over, spilling the flux, burning or damaging things or becoming frustrated.

Clean up the work surfaces…. and the material you will solder.

If it's the parts of a loco or wagon kit, or even bits of wire and tube/sheet for a scratch-built model, file the edges square to remove the cusp that's left from the etching process. Clean the surfaces to be soldered with a fiberglass pencil or a DCCconcepts cleaning block. Bare wire is best cleaned with a strip of wet and dry emery paper (between 600 & 1200 grit is OK). Insulated wire should be freshly stripped. If it's a length of rail, clean it with a fiberglass pencil or strip of wet and dry paper (or a needle file if you can get it under the rail web) Clean metal should really shine.

Now clean the Soldering iron tip and get it ready to use…

Clean the soldering Iron tip (A DCCconcepts brass wool tip cleaner works really well. Do not become tempted to file or sand the soldering Iron tip. If you do that you will shorten its life considerably – the plating that helps tip life and heat transfer is **very** thin. If it isn't evenly "bright silver" all over after cleaning it and wiping it on the damp sponge held by your soldering Iron stand, , then it may need re-tinning.

If so - Use the tip re-conditioner to re-coat the tip with clean solder.

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TECHNIQUE:

How to use the tip re-conditioner to re-coat the tip and make it ready for use.

Turn the Iron off, and let it cool about 60%. Turn it on again and gently roll the tip on the surface of the tip re-conditioner. As the Iron heats it will melt the re-conditioner material and sink slightly into it.

As the iron reaches full temperature, the flux will start to smoke a little. Remove the iron and wipe it on the sponge.

The tip should now be perfectly tinned. Now, turn the iron down to a low temp setting (or turn it off) until you are ready to solder.

OK... now we can move to the workbench...

Soldering job and Iron are ready to go, lets look at flux. We already reviewed fluxes in depth, so we will presume you've chosen the flux needed and have it ready.

TOP TIP FOR FLUX USE:

Flux gets knocked over often if you aren't careful… and apart from being expensive, its not good for many materials if spilt everywhere, so do think about sticking the base of the flux bottle to a bit of wood or some other form of wide base. You WILL be glad you did, believe me!

WHEN TO USE FLUX:

If you are doing electronic or electrical work you should not really need much flux at all as the solder such as DCCconcepts "Sapphire 179" already contains enough for some electronics tasks…

However, until you are an expert, we do recommend that you add some anyway. The solder flow is simply that much faster when you use it, and joints can be made more quickly.

Fast joints transfer less heat to the part being soldered…and having less heat during soldering is very good for the survival of electronics parts!

Soldering electronics or PCBs: Use DCCconcepts "No Clean" flux or at the very least, a flux that is not acidic. Acid fluxes will destroy Integrated Circuits, component leads, PCBs and copper quite quickly.

Soldering Wire or Nickel Silver rail: Again, DCCconcepts "No Clean" flux or an easy clean type as it's a pain to remove excess flux from rail joints, especially if the track is already laid. For other materials please refer to the flux information provided already (although DCCconcepts "No Clean" flux will almost always work for you).

Flux can be applied in several ways:

- For PCBs – A cotton bud or flux pen (excellent for crowded PCBs that need a no-clean flux).
- For rail joints – With a brush or cotton bud. A brush is probably best as a little more flux is good!
- For wires to be tinned – Flux with a brush or dip the ends into a small pot of flux if you are doing many at one time. The flow will be amazingly good if you dip the ends!
- Brass kit or brass details – with a brush. Be generous and add more if you need to rework.
- Making track – Liquid flux applied with a syringe or cotton bud is best (goes only where you put it) For flat-bottom rail always use liquid flux as it'll flow under the rail & pull solder into the joint nicely.
- For White-metal – With a brush (add a generous amount to really wet the area. The flux acts as a heat shrink and as long as flux is bubbling away and boiling, white-metal cannot melt!).

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When to pre-tin the items to be joined:

Always tin wire and rail before attempting to unite them,

For most work in brass (etc.), tinning isn't always essential as long as we're talking about a simple joint. It only needs to be very clean and well fluxed.

Tin during kit assembly or any job where a speedy joint might be important, such as where too much heat will damage plastic or adjacent parts, or where there are other parts that could possibly become un-soldered if heat is applied too long,

Always tin where there's a fine bead that needs to be sweated onto the edge of a sheet, where parts are to be "laminated" as in inner and outer halves of a coupling rod, or where an overlay has to be allied to a tender side, etc.

It is also sometimes very helpful to pre-tin tiny parts such as lamp irons. Then, if the footplate is tinned as well, all that is required is a little flux and a quick application of the iron and the job is done with no need at all for any additional solder. (Much neater than adding solder while its in place)

To summarise, always pre-tin for:

- Any item that will be damaged by excess heat - or any joint close to other parts that may melt.
- On all of the wires before soldering them to the rail or any joint between power bus and droppers.
- Any steel, brass or nickel silver if white-metal solder is to be used (low temperature solder will always stick really well to solder, but it will not stick to steel, brass or nickel silver).
- Pre-tin PCB's and the solder pads on surface mount LEDs.
- Pre-tin anything that is near to something else that is soldered.

When soldering any two pre-tinned items together, add flux again, and the joint will be made in a very short time. As a guide, we estimate a wiring dropper should take no more than 1 second to solder.

Don't linger on the joint with the Iron any longer than absolutely necessary.

Once the solder has flowed, the job is done! Remove the iron immediately.

With brass and NS sheet or larger items you do need to make sure the joint flows well but this will be quite obvious from the actions of the flux and solder itself.

Once it has flowed remove the iron and let it cool. Then examine, and if you think it is needed, re-flux and then re-heat any area to improve the solder flow within the joint, or on any area you think is needing improvement.

A good joint is a quick joint… and less is more when it comes to solder!

Too much time and too much solder will both make for a bad result and can damage parts.

If it takes longer than a second for you to make the final step in joining wire to rail, or if there is always a lot of solder on your joints, you really do need to look at the technique being used, the soldering tip, the iron you are using and your solder and flux choices... or perhaps get in some practice to get that right.

If you just can't get it to work for you, maybe we need to discuss it in detail with you and refine your techniques. Iif so, feel free to drop in, email or call us if you'd like some "one on one" advice or help.

On the next page… we move on to some tips and basic advice for brass kit construction

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Some basic advice for aspiring kit builders

Preparing parts and soldering metal kits

Building a brass loco kit is often made to seem hard by those who do it, and in fact a badly designed or less than perfectly etched kit can certainly try the patience of even the best builder of models.

However, it isn't often like that, and you can have an easy and pleasant time if you follow these tips.

GENERAL TIPS

Choose a brand of kit that has a good reputation. Not all kits fit together well.

It's important because, working with a bad kit may be OK for an expert, it will only dishearten a new kit builder! If you need advice on this, feel free to email us and we can point you in the right direction.

Kit-building is a "One step at a time" process. Before you start (it sounds obvious) you need to carefully examine both the instructions and the fret, and pre-identify the parts before taking Step #1.

This is important as sometimes an "identifiable" part is created from two parts that may be of uncertain purpose and there may be similar but not identical parts for other areas of the model. Confusing these may lead to an error not obvious until it's too late.

- Wash your hands before touching the nice shiny brass sheets. (You will be surprised how much corrosion the acid in fingertips can add! If you do not you will have fingerprints "etched in".
- As stated, read instructions carefully and simultaneously examine the parts, so you can relate "words and kit-bits", think - through and practice the assembly sequence.
- Ensure your work area is clean and well lit with plenty of room to lay out the parts. A planned work flow is important, and often, things must be done in the right order! You need space for parts, instructions and in all within a clean work area.
- Following the instructions carefully and prepare / pre-test the fit before you even turn the soldering iron on. This includes a thorough cleaning of the part and any neatening of the parts edges (removal of etching "cusps" to be done just before the soldering iron is picked up).
- Do only as many as you can handle in the next hour or so at a time. You can't clean the items hours before as oxides and contamination happen fast and they will affect soldering quality.
- Take it one step at a time.
- Double check each step before and after for neatness and accuracy of placement.
- Be honest with yourself: do not compromise. Is it right or not? Is it really as good as it could be? (Corrections are easy with soldering… but only if they are done before other parts are added!)
- Take frequent breaks from assembly. Have a cup of tea or coffee and a break, then re-examine the work so far before recommencing.
  (It's surprising how errors that you would miss during a long work session will simply will leap out at you as you come back to the bench after a break)
- Don't be afraid to unsolder a joint, clean the parts and re-do the job. Perfection pays off, and being fussy at each step is much easier than correcting errors or removing excess solder later on.
- Keep the whole job clean. Each time you take a longish break from it, make the last task of that session a gentle scrubbing with "Cif (aka Jif)" or Cillit "Bang" and an old toothbrush. It's surprising how much more pleasurable it is working on a clean sub-assembly.

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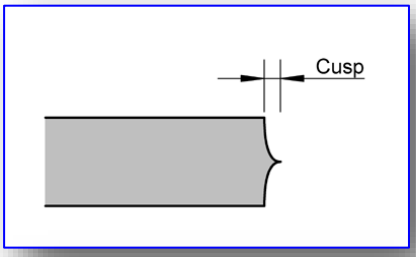
Don't get too far ahead of yourself. Only cut the parts from the kit for the current work session.

We recommend DCCconcepts shears or "Sprue Cutters" for this purpose. They are by far the best way bar none to cleanly cut brass or NS parts from an etched fret ! The shears are even able to cleanly cut the edge cusp from brass sheet if you have a good eye! To look or buy, please click on the images.

Clean up the "cusp" that is on the edge of the parts (see image).

A cusp is created on the edge of every etched part by the acid etching process.

It is a small peak at the centre of the edge. Use a sharp fine-cut file or appx 500 grit wet and dry mounted on a balsa, styrene or shim brass strip. This will make a great tool to let you get into awkward places.



(By the way - files need to be new and sharp for brass and nickel silver. Files good enough for steel may not be good enough for brass!)

By cleaning off this "cusp" a much neater edge will result, and fine tolerance parts will fit better. Your creation will look better as a result!

Clean any surfaces to be soldered… and tin them

We use a fiberglass brush or, for large areas, we often use some 600 to 1200 grit wet and dry paper.

(by the way - *cleaning time* is also good *thinking time*, to plan the assembly that comes next).

When you are sure they are the right parts, and you know how they fit together, turn on the iron and check that the tip is clean and well tinned. Flux the surfaces of the parts and tin areas to be soldered if necessary. DCCconcepts Sapphire 179 or Sapphire 145 are the best tinning solders.

"**Less is more"** Add too little rather than too much. A thin layer is all that's needed. Run out excess with the iron or remove it with solder wick if there's too much. Tinning should be as thin as a paint coat.

Hold the pre-fluxed parts together and re-flux.

Put a small amount of solder on a clean iron tip and apply if possible to the back of the joint. Run the iron along the joint as the solder melts (it will be obvious). Do this in a steady process and remove the iron as you get to the end of the seam, but do not linger too long. If it needs more than a few seconds, remove the iron, re-flux after its cooled and then rework the joint. Do not let heat build up too much.

When its done, do not allow the joint to move for several seconds. I routinely count-down 3 seconds for every joint: this is long enough for all solders we recommend to harden after removal of heat.

Now look over the joint. If you followed advice, it will be perfect. If it isn't, re-heat and adjust until it is.

or….Add more solder and re-flow (don't forget the flux)..

or….Remove excess with the solder wick dipped in flux.

Relax… then repeat the instructions above for the next part….and the next….

SMILE – I am guessing you found it easier than you dared hope, and you are doing something special that very few modellers will ever achieve. You're developing a new skill and with it will come a level of pleasure & pride in the hobby that few people really ever manage, simply because they didn't try….

Best of all, now you can solder one bit of brass to another with confidence, you can now have the added pleasure of being able to create something special, truly unique, truly yours!

In Part 3, we will cover white-metal and specialised soldering.