THE DJH BR 2-10-0 9F

DJH provide their kits in enormous boxes with all the parts packed carefully in foam. So what does one find when we open the box. (What's that I hear you say? "Take the money!")

So what is there? Bags and bags of castings, many of which are lost wax (goody!), what seems like acres of etched brass, several parts already cut from the sheet and pre-formed; motor and parts for the gearbox.

The instructions appear very comprehensive with a large (A3) series of colour pictures and exploded diagrams. Do study them with care, it is easy to miss important things as I found later to my cost in time and frustration. There is also the usual basic history, list of required parts not supplied and instructions relating to the exploded diagrams. There are itemised parts lists and - most welcome - diagrams of the etched parts with numbers, which are also etched on or near the parts. Pictures of the lost wax casting sprues with the parts identified is another really useful innovation. This could usefully be extended to the white metal parts. I wasted far less time searching for parts than with the Black 5. I began this time, unusually, with the engine chassis.

The locomotive chassis goes together relatively easily using overlays on some substantial frame bases. Use the axle bushes to locate them accurately. Once the frames have been soldered solid to their spacers there is no need of the turned spacers (where the screw heads are visible) and so I removed them. The wheels were blackened using Casey gun blue.

The next job I tackled was the coupling rods. They are very finely etched with no waste so once they are laminated, care is needed to clean and polish them. There are three joints in the rods that are fixed by bolting using lost wax cast bolts. You will need to tap the rear portion of each
rod part 12BA and then use a 12BA die to clean up the threads on the bolts. The threading did not go back far enough on the bolts and I had very carefully to tap them further back so that they would make a close fit against the rod boss.

When removing the items for the rods from the etch, take care to leave the joining tabs projecting from the tops of the oil baths. With care they can then be filed up to make neat a representation the corks. Ensure also that the shank of the holding bolts clears the holes in the front part of the rod. Nominally they are 1.6mm but the casting process cannot be that accurate so make them 1.7 or 1.8 so they do not foul the holes. I learned this the hard way!

It seems a lot of work to make fully functioning jointed rods when the chassis in solid! If one wishes to compensate or fit springs, some careful thought and surgery would be necessary. Fortunately, my client wants a solid chassis and, given the weight of the parts, it will probably iron out any defects in the track anyway!

Get the chassis running true and easily before going any further. I began by setting up the gears to drive on the rear axle. The gearbox is capable of either this or the Delrin chain drive to the middle axle. I wanted to get the axles and rods run in and setting up the Delrin is a real fiddle so this was a quick way. The motor and gearbox are simply to assemble; take care aligning the gears. I bushed the rear axle until there was only about 0.1mm clearance. This ensures that the work and spur gear wheel mesh properly and then tested the chassis with the motor running. Here it is running in. I am impressed with the motor, which is virtually silent and appears very powerful. I have not used worm and spur gears since my 4mm days 25 or more years ago and so was pleasantly surprised with how smoothly and quietly the whole gearbox runs. All down to good design and engineering.
Having got the chassis up and running successfully, it is now time to finish fitting all the parts to complete it prior to dipping in a bath of chemical black. In fact this was not very successful; I need to find a better cleaning regimen for the future.

Things to watch out for:
These are not criticisms since the instructions are excellent. They simply point out that it is all too easy to miss things out. Part E44, where the cylinders are bolted to the frames; needs to have four M2 nuts soldered on the underside. Though the instructions do say this, it is far from clear since there is no indication on the drawing/picture. I missed this and had the fiddle of having to solder them on in situ. However, you also need to solder a pair of M2 nuts on the underside of part E45. This is so that the nice, lost wax cast brackets can be bolted to the frames. I had to take part E45 out, not easy, especially as I had already soldered in the cast white metal part that fits up against it, and solder some nuts on before replacing. The moral? Dry run. Dry run as much as possible.

The motion, cylinders and slide bars cleaned, polished and made ready for assembly. However, I elected to add more parts to the chassis before continuing this, to wit, some of the miles of piping these engines have on show. I wanted to get the chassis complete so that it could be chemically blackened and painted before fitting the plunger pickups, wheels and motion. This turned out to be not a good idea. The mass of pipes under the cab is easily damaged during subsequent work on the chassis so I would counsel leaving them off until much nearer the end.

One good thing about Victorian style prudery resulted in engines having most, if not all, of their plumbing, out of sight. On the other hand, it is a
challenge! These are parts of the major pipe runs under the cab. What a pity all the castings are not brass.

This picture shews them finally fitted to the chassis as are now the brake blocks. (They are nice lost wax castings that fit into holes in the chassis but need careful opening out to ensure a good fit.) The white metal castings, I think, would be better in lost wax to make soldering up all this pipe work less fraught.

The photos in the instructions are invaluable for detail work and the drawings useful. However, it takes some time and careful study to figure out just which pipe goes where. The heavy weight pipe in this complex unit actually comes as a white metal casting. I scrapped it and used a piece of 2mm rod instead; otherwise it is all as described in the instructions.

Sand pipes were next, fabricated from 0.7mm, 0.5mm & 0.4mm wire.

At last the chassis has, I think, reached the stage where I can consider the chemical blacking. Fitting the sand pipes was a real fiddle and I had to make two new ones when they came unsoldered. Next thing to start on was the motion.

This picture shews the chassis with the sand pipes fitted standing on my steel RSU plate. The brass-like cylinders are rare earth magnets, my second pair of hands.
I decided not to use the Delrin drive. I found it was noisy and it is very
difficult to take up the slack. It runs perfectly well on the rear wheel and
is a lot easier to set up.

These pictures shew the chassis largely complete and painted.
Now for the
slide bars and cylinders. The fold up nickel silver etch fits into a slot in
the white metal cylinder cover. Clean up the slipper and slide bar slots
first. I filed down some brass bar to fit, tinned it and made a tight fit from
the inside. Checked it for square and soldered it with low melt. As you
can see from the picture, I have also used a couple of lengths of brass
tube telescoped together. They are
soldered to the cylinder cover to act as a guide for the piston rod and
give more support so that the slipper is not overloaded. It is important to
ensure that the slipper and piston are very free running once soldered up
but before fitting to the cylinder block.

Once the excess bar is cut off and cleaned up a
matching hole was excavated in the cylinder block with a dentist's burr in
the mini drill.

The lost wax casting for the top of the slide bar was then soldered on
from the inside and the connecting rod fitted with a 12BA nut. The nut
needs thinning once it is locked; it is a good idea to solder the bolt in
place and then thin the head down to a wafer so it does not foul the rods.
This picture illustrates it.

And here are the cylinders made up and most of the motion. The
instructions, as usual, suggest using 14BA nuts and bolts to assemble.
I chose instead to use 1mm nickel silver rod soldered in from the back of
each joint. However, it is necessary for a couple of nuts and bolts, one on
the slipper and one on the reversing lever or it would not be possible take
the motion down. As it is one cannot disassemble the slipper from the slide bar.

I discovered much later when wondering why the motion would not run that I had constructed the slide bars incorrectly. They had to be taken apart and reconstructed with the top plate ‘inside’ the slide bars. Later still I discovered that the top plate needed to be filed flush with the front, as in the picture above, of the slide bars or it fouls the motion. Moral? Study the instructions, and particularly the pictures, more carefully.

The 12BA screws that come with Slater's wheels failed to produce an adequate set of working motion. The return crank refused to stay fixed
and various parts of the motion itself were sloppy causing intermittent binding. On the advice of Bob Alderman I took it all down (again!), drilled and tapped the centre driver 10BA and fitted a longish bolt therein. It ought to have been countersunk but I had only cheese head and so, once tightened, filed the head down. A Slater's bush was then tapped 10BA and screwed on tight.

The coupling rods are fitted and another bush tapped and screwed on tight. The bushes have to be very slightly longer than the depth of the relevant rods of course to give an operating clearance. The first picture shews the second bush in place ready for the connecting rod. However, it then fouled the coupling rods and so I turned-up and tapped a phosphor bronze bush 1.4mm thick to take up the slack. The second picture shews this with the temporary nut holding all in place.

Success! At last the motion runs true without binding. Here it is being run-in.

The finished motion both looks good and works well. To connect the rods that make a right angle in front of the motion the kit provides lost wax castings. It is the smallest I have ever seen and, after I had lost two (there are three in the kit) to that threshold to a parallel universe, the floor, I gave up. Instead, I flattened the end of each piece wire, drilled a 0.5mm hole and joined them with wire and solder.
The cab proved to be both complex and difficult. The basic box comes as an etch that folds up from the base to make all four sides. Not intrinsically difficult, except that the front and sides have numerous compound curves, many of them close to openings and so not easy to bend anyway. It took several attempts to get it right and in the process one side and the back become detached. I would suggest that removing the back completely until the rest is true and soldered up would be a good idea and I would do that if I were to build another of these.

Also, the roof must fit too but
cannot be fixed yet since there is no way the backhead will go in otherwise. All in all, there is a great deal of careful bending and edge soldering to do and a third hand is essential. My rare earth magnets came to the rescue again.

The backhead has a great many parts to fit, all of which require some work as many of them require pipes and or extra parts adding. The first picture shews it partially complete with many of the remaining parts waiting to be added. The complete unit looks good but is a very tight fit through the roof of the cab once all the delicate fittings have been put on.

The instructions call for fitting the smokebox/boiler/firebox unit to the footplate and chassis using M2 bolts in nuts soldered inside the smoke box. The wall of the smoke at this point is actually quite thin and the holes required are in the form of a cross. For the two along the axis of the barrel this is not too much of a problem but for the arms of the cross, getting the nuts square is a problem.

At least it was for me. I do not like soldering to white metal and so decided that fitting a thick piece of brass, drilled and tapped would be far stronger and easier. I found an old lock plate in the scrap box (but any old chunk of thick brass would have done) and used a piece of that by bending it in the rollers to fit the curve of the smoke box thus:
This was araldited in place using the old-fashioned stuff left on a radiator to cure properly before being drilled through from the bottom of the smokebox. Since this was now a nice, strong base for bolts I used 6BA for the long bolts from the chassis and a single 8BA for a bolt to hold the boiler barrel to the footplate along the centre line of the smokebox. You can see how it works. The 8BA bolt is there simply to hold the boiler in position until the 6BA bolts are fitted, which are what really hold it all together.

This is the piping that fits on top of the firebox. The thick ones are provided as white metal that is meant to be softened in the hands and tweaked to shape. As usual I wanted something stronger and so soldered wire wound guitar string in place instead. The other ends are soldered into various other castings on each side.

THE TENDER
The chassis is fairly standard and very similar to that for the Black 5 and should present no problems for the average builder.

This is a view of the base of the tender prior to fitting the sides. It is bolted to the chassis using bolt holes tapped into the metal. However, I did not think the metal thick enough securely to hold the bolts over time and so modified it by soldering some 2mm thick pieces of brass bar, appropriately drilled and tapped for M2 bolts.
The sides and end come as one piece with the curves already made, well almost. Those for the base are underdone and those for the top, overdone on my example. However, the main work is done for and all that is needed is some careful work with fingers and some brass bar to get the curves just right.

It will pay to take time over this and constantly check by dry running the fit to the base. To do this effectively needs the tender front building too so that the fit of all four parts - base, sides/ends, coal space and front - can be checked for true.

The front is built up from a large number of parts. A steel square is essential in ensuring that the verticals are at $90^\circ$ to the horizontals. Do not, under any circumstances, assemble these four components until you are happy that they fit accurately. Finally all the sub components were assembled and it is ready for the paint shop, pity I did not notice the ladder top being bent. How unforgiving the camera can be but it is easily fixed.
There were no problems in building the tender, which goes together nicely.

What I would like to see changed in the design of this kit?
1. The slide bars made to fit in deep recesses in the cylinder so that they can be accurately and securely fitted.
2. All the castings that go to hold the mass of piping under the cab floor in lost wax so that a stronger unit can be made up. I fitted all these parts when building the chassis but they were damaged during further work due to their fragility. There is a case to be made for not fitting them until near the end of the process anyway.

Here are the final pictures of the complete engine, less roof and cab fittings, awaiting a trip to the paint shop.

Overall a nice kit of a popular, interesting and highly impressive prototype. While not for the beginner it is certainly within the abilities of
that mythical creature, "the average modeller", prepared to give it the
time and care necessary.

Response from DJH's Senior Tool Maker.
"Comments from Trevor Bailey our Senior Toolmaker as follows.

1. Part E44 M2 nuts for cylinder fixing - We actually supply the etchings roll tapped to M2, we had some feedback that customers didn't think the tapped threads would be strong enough alone, so we now include M2 nuts which if preferred can be soldered in place for additional strength.

2. You would like to see more parts lost wax cast. We give priority to those items where the finesse or strength of brass castings gives most benefit. The process and material is expensive and you have to stop somewhere, so not all items can be made in this way.

3. Drive - You have opted not to build the drive assembly as designed, preferring to drive on the rear axle. We do not agree with that choice, the drive is definitely better and more balanced with the centre wheel driven, which is why we developed a gearbox for that specific purpose. We also disagree that a Delrin drive is noisy; our experience is to the contrary. Some slack in the chain is also desirable, and it can be adjusted by removing links.

4. You had difficulty fitting the cab detail, and decided to leave the roof off to facilitate fitting? We agree that the fitting of the cab detail is awkward, but it is certainly possible, we have built a number of 9F's in house without the need to adapt as you have done?

Overall the kit is well built and you have added some nice additional super details, and whilst we try and provide a comprehensive and authentic model there is always room for that. We are not aware of any major defects or customer complaints on the general design or fit, function and as such no Tooling amendments are being considered at this time."