GWR Dia E77 Dreadnought Composite
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Introduction.

This is not a kit; there are no instructions, history, pictures or diagrams. It is a sheet of etched parts by the late Carl Legg and represents a set of parts for the scratch builder. They arrived from CPL Products carefully packed between two large sheets of hardboard. Even the rather poor picture here illustrates well the standard of the draughtsmanship and etching. Fortunately, John Lewis's book GWR Official Drawings No 3 contains detailed information about this very vehicle with excellent photographs and 7mm scale drawings.

Further pictures are in various Russell books as well. There are also the remains of an all-third awaiting restoration at Didcot; the last surviving example of a Dreadnought as far as I am aware.
Exactly how it will go together was then yet to be figured out but I had made a start in taking the parts from the sheet and cleaning them up. In my usual fashion, as much will be done as possible "in the flat" before any assembly is begun. The standard of the etches is really first class. The recessed doors in the ends fit into half etched rebates at the edge of the end as you can see on the right hand edge of the end. The fit is perfect and the joint is next to invisible once made.

To go with it are lots more of Carl's etches for the working corridor connectors; luggage racks, picture holders and mirrors, etc., to go in each compartment and a host of lost wax castings.

My client wants a fully fitted interior and the carriage finished in pre "shirt button" livery with just a little weathering. What a change, so many people seem to want run full trains of "ex works" vehicles these days.

The scissors corridor connectors work (in fact 7mm to the foot scale people could walk through them if one uses the paper inserts provided) and I have shewn the unassembled one with the cross arms in different positions to illustrate the point. Not nearly as fiddly as one might think and, unlike the coach
etches, are available as a set, together with instructions, from CPL. It will also make up into the later suspended version and, the instructions claim, produce an LNER type too; beautifully etched and relatively easy to construct.

Fit as much as possible while the parts are in the flat so, all the bolection mouldings and droplights are next. Then form the turn under. I used a long length of brass rod and my fingers. Check constantly against one of the compartment sides until it is a reasonable (i.e., near perfect!) fit. Fitting the compartment sides will then be far easier.

This shot shews one side with bolections and droplights fitted and the other awaiting those parts. I found that if the centre doors are fitted early on, they strengthen the sides at a point that is particularly delicate and therefore, a potential area for serious damage.

The centre doors have to be folded with the fold lines to the outside and they can then be soldered into the doorway. Ensure that they are central. Once soldered up they will also hold the turn under for the fitting of the compartment partitions.
As with so many parts, fit all you can while it is in the flat, so hinges and door handles should be in place before fitting the door. The hinges are particularly fiddly, good thing there are only six doors. It would have been a good idea at this stage to have fitted the commode handles too.

The corridor crossed over between the first and third class compartments (indeed, crossover corridors were a feature of the Dreadnought compartment stock).

Some care is required because most of the outside of the corridor side of each partition is about a millimetre thick.

However, getting them square and level is not difficult. Solder the straight section first then, holding it against the bench on the curve, solder in the turn under. Lastly, bend in the top by holding it tight against the bench and solder in the top curve.

Fix them all on one side first, soldering them from the middle outwards. Once you are happy that they are square and level, solder on the other side, again, from, the middle outward.

Make very sure that when the second side is soldered up, it is dead square with the first side or the end vestibules will not fit correctly.

The next shot shews the corridor side as far as the centre vestibule. There is little material on the corridor side as you can see so care is required; on the whole though it is not a difficult job. So far as I am aware, Carl designed these etches for his own use and I assume he intended the whole thing to be as easy as possible commensurate with producing an accurate
model. So the fiddly hinges came as a surprise, he must have had really good eyesight and nimble finger.

The Vestibules.
One fitted and the other awaiting fitting to the other end. The parts fit virtually perfectly, all one needs to do is ensure that they are soldered on a flat base and checked for square.

Next will be the under frame, which may prove "interesting" and then I shall concentrate on the compartment fittings.
The Underframe
The time had come to start on the under frame but I discovered that the sole bar etch is too long by a scale 16". These two pictures illustrate it well. Since I had not linked the word "errors" with the name Carl Legg, this was somewhat confusing but, careful examination of the drawing in John Lewis's book identified where the error was.

All the spacing's for the cross beams, as shewn by the bolt heads, were spot on except for those where the bogie centre line was. It looks as though the 8" beam that is fitted there on the real thing was been allowed for twice at each end.

It was simple enough to cut out a piece of the sole bar and join it up again at the etch line beside the bolt heads. For the sole bar beam I used some lengths of brass channel (Eileen's Emporium, usual disclaimer) that just takes the etched sole bar overlay.

This picture shews one etch cut, one unmodified and a section of channel. The under frame parts shewn above have the sole bar etches soldered into the channels.

Construction is relatively easy so long as one keeps the parts well clamped to a flat, hard, surface, topside down allowing for the protrusions on the buffer beam. The buffer housings are from the CPL range and solder into the holes easily.

This close-up shot shews how the parts are fitted together. It is important to start by soldering in the two buffer beams, ensuring that the frame is absolutely square. It is then an easy matter to fit the remaining parts by measuring from each end to get the spacing correct.
Cleanliness here is vitally important, since there is not a large area available for soldering we have perforce to make the best of what there is.

The Interior

The luggage racks and base for pictures and mirrors comes as a very fine set of etched parts. This picture shews the etched parts and the finished article ready for fitting inside the compartment. These parts are available as separate components for a variety of corridor and non-corridor stock. There are enough parts in the left of this picture to make up the backing and luggage racks for one compartment.

For the compartments in this carriage, multiply by eight. Soldering the parts together is made easier with an RSU and solder cream. I think using a soldering iron would be quite difficult, but no doubt someone will tell me otherwise in due course. The arms for the rack are tiny and the mesh very delicate. Is it tedious? Yes. Is it worth it? Definitely. The inside is now beginning to look a little like a series of compartments. The seats will be added later. The compartment side
comes as a single etch each for the first and third class sections but would not fit as single items.

I cut each compartment side to size and soldered them in prior to soldering in the luggage racks, mirror and picture frames.

It needs care to ensure that they all line up so that the corridor side does not look like a dog's leg.

Now for some detailing; here you can see the lost wax brass commode handles fitted. There are far more on the sprue than this carriage needs, the others being intended for the brake. The one on the vestibule door fits perfectly but for the centre door the holes are not correct.

The Seats.
I had a choice of Blacksmith or Slater's for the seats and chose the latter because there are add-on parts to make the armrests needed for first class.
Here are a couple of compartments worth. Simple plastic mouldings, all they need is trimming to fit the compartment.

I still have to cut one of the armrests in half to fit.

The third class use the same basic melding but the seat is a good deal less deep and there are no armrests. Next job is to fit all the seats in the compartments.

The seats were glued in, I tried Loctite 480 but of course it has no "grab" so used UHU, which gave plenty of time to adjust the seat in their correct positions.

The Bogies.
A start was made next on the bogies for which I am using Carl's fully sprung units. These come as a separate kit together with excellent and comprehensive instructions. They look complicated but in fact are quite simple to put together. You do however need some piano wire of different gauges for the springs. The units are designed for cosmetic side frames to be fixed to them and the wheels run in inside bearings.
This is the basis on which the whole system works. The slots allow one to produce bogies with a wheelbase between 6 to 11 foot centres in 6-inch increments. There is a way to allow for 3-inch increments too.

Most of the parts have been assembled on the basic frame with some temporary guitar wire as the first set of springs in until my order from Eileen's arrives.

The horseshoe shaped fitting on top are the locating holes for the bolster springs. The same unit upside down with the wheels temporarily dropped in. The two bolt heads hold the clamping plate for the wheels springs. This picture shews it right side up with the wheels in temporarily. The next shot shews how the wheel units are constructed while the other illustrates an almost completed bogie ready for the cosmetic side frames to be fitted.
The completed bogie ready for fitting to the under frame. The bolster plate is loose and is fitted on the bogie pin so that the bolster springs operate. Height is adjusted via a toothed device that fits above this on the pin as shewn in this picture. The whole bogie is held in place by an 8BA nut. A bogie fitted to the under frame. The first without side frames to illustrate how the parts go together and the piano wire springs. The second completed and awaiting the body (to push the axle boxes down) and painting.
The Brake Tell Tale.
The Tell Tale comes as a very fine set of lost wax castings on a single sprue thus:

- This is one set of parts that should have been fitted before the ends were soldered to the body. Poor planning, they are not easy to fit to the body after it has been constructed.

- The sprue arrives with a 7mm scale drawing of the end of a Dreadnought, which helps greatly in establishing just where the parts go on the end.

- The advice is to assemble the part before fitting the whole to the ends. Sound advice, I set them up on the drawing on the RSU plate, making sure that there was some direct contact and soldered them easily. Here is the completed unit ready for fixing to the coach end.

- While fitting to the end was more difficult than it ought to have been, it was not impossible.

Body Fixing Points.
The body needs fixing points fitting so that the under frame can be bolted to it. There are a number of points where this can be done but the important ones are the ends and the centre.

- This is one of those jobs that ought to have been completed before fitting the interior, poor planning again. However, to ensure that there are firm fixing points at the ends I soldered in, from inside of the vestibule, a piece of brass bar 19x4.5mm section, 51.9mm long.
Next the under frame was offered up the holes for one end marked. The holes were drilled and tapped 8BA. Next the under frame was bolted to this end and the other was marked up before drilling and tapping.

This gives a secure fixing but the centre needs fixing points too to prevent it bowing and leaving an unsightly gap. A piece of brass strip was soldered across the centre as here.

The under frame fixed in place again and the holes marked up and drilled for 8BA clearance. A simple matter then to bolt a couple of 8BA nuts in place with a little oil in the thread and solder them to the inside. I had to remove the seat to do this and to cut away part of the front support to clear but it will be invisible once the seat is re-fitted.

Queen Posts
One important set of parts that is not available from CPL are the queen posts. George Pring used to do a nice set of this type (I used some to convert a Connoisseur to a Diagram J11 a couple of years
ago) but they seem unobtainable now from Graham Bone who took them over.
The beautiful brass castings shewn here are from Ian Young (Sanspariel, usual disclaimer) based on masters made by David Sweetland.

The lower part of each post has a cast nut and is threaded 12BA; so needs only cleaning up with a die and a 12BA nut fitting.

The trussing needs careful handling. Firstly, each piece had its cusps filed off to give neat, square edges.

I then polished the whole truss with a No: 4 cut file. The etched holes for the queen posts need to be opened out with a taper broach and it would be easy severely to damage them so care is needed here also.

Once the holes were the right size, the raised edges were filed flat again. I put the twists in following the drawing, taking care that they are all in the same place and the same length. The position of the centre of the twist is marked on the truss and two pairs of pliers held close and equidistant from the mark. It is then a matter of gently twisting through a right angle. Again, using the drawing, I put the bends in; taking care that the bend does not come at the hole, there should be a distinct gap between the hole and the bend.

The outer trusses were then bolted to the queen posts. Using this sub assembly it is then an easy matter to line it up on the frames and solder in place.
Here the queen posts are in place with all trusses fixed and waiting to be cleaned up. The brake gear has also been fitted with the pull rod being fixed to the base of the bolster plate. One of the nuts had to be soldered but the rest are simply bolted. The excess thread is then cut off and filed flat.

**Gas Cylinders & Foot Steps**

The gas cylinders were made up from brass tube with ends soldered on and filed to shape. The straps were fitted and then a piece of brass bar 4x2mm section was soldered into the straps.

The whole unit was soldered to the chassis by the brass bar, which holds the cylinder at the right depth for the sole bar.

The footsteps were made from 5x1mm brass strip filed down to 4.5mm wide, cut to length and then one side and two ends were rounded off to represent the thick wooden steps that were fitted to these vehicles. The fixing holes in the sole bar were drilled out 0.7mm and small lengths of 0.7mm rod were soldered in and cut down to project no more than 4mm.

The flat side of the step was smoothed off, solder cream very sparingly applied to it and the wire supports and then soldered in place. Relatively simple since there are only six steps.
The chassis is now completed. However, the buffers heads will have to be changed for the round type. Though built with oval buffers, they had been modified by the 1920's.

**The Roof.**

This has been a problem. My original idea to use a tinplate roof did not work so I used the Blacksmith made to measure roof in brass. Keeping it to the right shape along its length requires a number of formers to the exact profile of the roof as in this picture.

The two end formers have been modified to clear the back of the steps on each end. The intention being that the end formers are to be a tight fit with the ends.

On reflection, it may have been a good idea to have cut the tops off some of the compartment partitions before basic construction started and used those. If I do any more of these carriages I will certainly experiment with the idea.

The next picture shews one of them fitted 2mm from the end of the roof, to allow for the overhang and fit as a sliding fit inside the ends. The roof must also be the right way round so that the ventilators match up with the first and third class compartments.

The remainder of the formers were fitted at intervals along the roof after the holes were drilled for the ventilators but before fitting them to ensure one does not foul the other. In fact the formers were all put close to compartment sides to hide them.
When originally built there were two rows of ventilators down the roof but later pictures shew only one ventilator over each compartment off centre. So far as I can tell from pictures in Russell, the ventilator for the lavatory was on the centre line of the roof.

Still to be fitted are the water tank tops and rain strips. The roof fits quite well but still needed some form of fixing to keep it tight against the sides. Here is how I achieved it (making it all up as I went along of course!).

A "U" shaped piece of brass holds an 8BA nut soldered to its inside. This is in turn soldered into the roof. A length of brass rod was then threaded 8BA at both ends.

One end is fitted into the roof mounting plate and fixed with nutlock. The other end is bolted to the under frame using a piece of loose fitted flat brass. This allows for some adjustment and flexing. Not the greatest piece of engineering but it works.

It was not possible to hide the rod inside the lavatories unfortunately because they needed to be on the centre line but, suitably painted, it will be practically invisible in the vestibule.

You can see here that there is a floor fitted. 2 pieces of Plastikard either side of the centre under frame member. They are tucked into the side turn-under and so can be removed. All that remains to be done is fit the cantrail and the rain strips but that cannot happen until Eileen's return from their long summer break as I have nothing long enough in stock for the job.
Permanent couplings also have to be fitted (which is why the screw couplings have disappeared). Then it will be off to Dennis Morley's paint shop.

It has now returned from the painters and I am working on fitting the windows and lights. Here is shot with the lights on.

Lessons?
So what has been learned from this exercise? The compartment partitions need to be cut down significantly before assembly if lights are to be fitted and the cut-offs used to make formers for the roof, with suitable shapes worked into their inside edges to allow for the light fittings.

The corridor connectors ought not to be fitted as part of the basic shell but painted separately and fitted after the body is painted, this allows for the bellows and top shroud to be fitted accurately.

The cantrail must be fitted as part of the "in-the-flat" construction of the sides to ensure that the soldering is really strong.

Better planning to allow for batteries and charging points to be established.
Experiment with other bogies that do not have knife-edge bearings.

Considerable thought should be given to finding some way to make the interior extractable for ease of painting and fitting, though I suspect this is wishful thinking.

The buffer housing stops should not be bent up or the springs fitted until after painting. It may be necessary to use more than one LED for compartments since these modern carriages had better lighting than earlier vehicles.

Fit all commode handles, door handles and brake telltale before assembly.

Plan how the underframe, body and roof will be fixed more carefully.

Fit a brass floor, not Plastikard.

**What was Used?**

List of parts and materials used:

Etches: Dreadnought etches for sides, corridor partition, ends and underframe; mirrors, bogies, corridor connectors, compartment interiors, destination board holders.

Lost wax castings: Square shank buffers; Brake telltale; Dreadnought commode handles; Doorknobs; Steam pipes; Vacuum pipes, Queen posts. Springs and 10BA nuts for the buffers.

White metal castings: Vacuum cylinders, bogie side frames, roof vents.

Maunsell wheels; coach seating; arm rests, brass roof section.

8 & 10BA nuts and bolts; brass sheet, strip, channel, wire, tube and rod; piano wire, lighting kit, Plastikard.