CONTINENTAL MODELLER

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FEATURING RAILWAYS FROM AROUND THE WORLD EACH MONTH

Lijn 11 – Hague trams in HO

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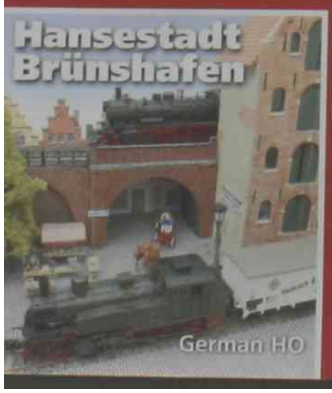


Hansestadt Brünshafen

German HO

Advanced scenic techniques

Peeling paint

Stow Creek

US On30

Latest Reviews ... and much more

Francis Samish shows how he built and modified a Model Loco whitemetal and brass kit to represent a specific example of the American-built standard gauge machines supplied to the Railway Operating Division (ROD) during the First World War.
Photographs by the author.

'Pershing' 2-8-0

Variations on a theme by Baldwin

Most people thinking of Baldwin locomotives in the First World War immediately call to mind the narrow gauge trench railway 4-6-0 tanks, of which nearly five hundred were built and several have been preserved.

However, the standard gauge superheated 2-8-0 'Pershing' class used by the Americans from 1917 onwards was ultimately more numerous. Several survived both world wars in Europe, and as well as a couple in France, there is even an operable example in Romania. What is less known is that this design had been developed from a saturated steam version built for the British forces.

Producing a Railway Operating Division version demands a number of detail changes. Fulgurex have offered a high quality limited edition brass model in HO which was available in various European railway administration liveries, but as the thought of attacking one of these exquisite models with a hot soldering iron and a file – even a Swiss one – would make most sensible people blanche, it is fortunate that there is also the DJH / Model Loco kit as an alternative.

Chassis

One of the first things noted when opening the box is that DJH have gone to the trouble to jig drill and tap the main frames and other allied drive train components. Credit must also be given for providing machined brass frame spacers, which allow you to start with a square chassis from the outset before adding various soldered-in plates and component mounting points. This makes initial assembly so much easier, especially where the reduction gearing system is an integral part of the chassis.

I departed from the kit's instructions in that the two shafts for the worm gear and spur idler gear are made removable – both gears being free to rotate on their shafts rather than being Loctited on. This meant making a couple of 'kidney-shaped' shaft retaining plates from brass shim, secured with 12BA screws to the outside of the frames. Should the gears ever need to come out, it will now be a simple matter of sliding the shafts out from the side after first dropping the axles.

All the additional drilling and shaping was done in the flat, and only when I was happy with the fit and running qualities

Above
The completed model.

Below
Assembly of the chassis in progress. The axle slots in the frame have been scraped clean of any stray paint before the hornblocks and wheelsets are inserted.

of the gear train did I apply a touch of solder around the frame spacers to fix everything in alightment.

While the wheels are the popular Markits RP25 profile items, these have brass threaded bushes pressed in for crankpin screws rather than the screw-in Markits variety.

The third coupled wheelset has an extended bush with a slot to take the Walschaerts return crank; this mates with a lost wax cast nickel-silver return crank that comes as part of the pre-assembled valve gear.

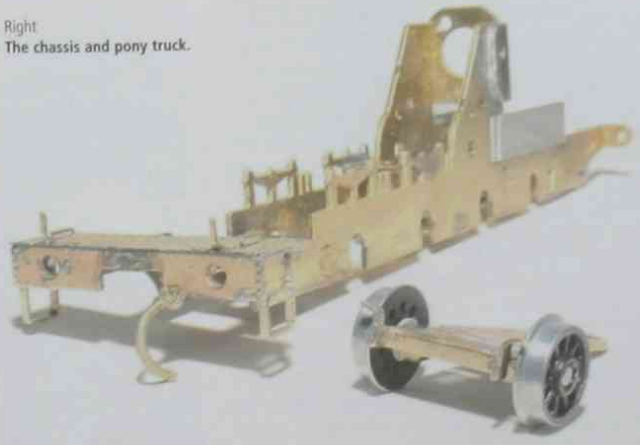
Each wheelset was assembled together with its square axle boxes, which fit into the U-shaped slots in the frames, the keeper plate screwed home, and then everything was tried with the coupling rods for freedom of rotation.

Only one of the holes in the rods needed to be eased at this point. The bind was identified by rocking the wheels back and forth around the tight spot with the thumb whilst examining each crankpin in turn through a jeweller's loupe for free play – or in this case, the lack of it.

Now it is one thing to have a free-rolling chassis on the bench, and quite another when it is on the track, current wipers fitted, and the torque from the motor winding up the drive train, even if it is a simple worm and gear. Worm gears on the final driving axle will tend to shift the wheels to one side or the other when under power, and even a spur gear, as here, will have a tendency to climb out of mesh. This problem manifested itself quite late in the build, and meant that two brass packing pieces had to be soldered onto the keeper plate under the driving axle bushes to maintain engagement of the main driving axle and idler gears.

Ideally, all side play on mechanically driven axles should be tightly controlled but this is not always possible if you want a large 'main line' locomotive to go around anything but large radii curves. For this reason, I now tend to pack out the geared axle for minimum side play and allowing any movement to take place at the outermost axles of the model.

In this connection I have a short bit of Hornby OO second radius code 100 set track on my workbench – it is probably around 18" radius. Leaving aside front overhangs and bogie swings, I aim to get at least the rigid wheelbase of any 16.5mm gauge locomotive I build to at least squeeze round this – not so much to allow a model to run regularly on a layout built to these tight standards, but because of the leeway it allows in case the track proves to have hidden doglegs or S curves that could otherwise lead to a derailment.



Right
The chassis and pony truck.

Left
The pony truck needed to have its pivot point moved 1mm further forward to bring the front back to be level with the front of the buffer beam.

Above
The keeper plate, with brake shoes and pickup wipers attached.

Left
Painted wheelsets ready to go back into the chassis. Even though these come in a black finish, the etched metal counterweights provided in the kit need to be painted. Note the spacing washers on the axle to control side play, and those shiny wheel treads. The brown ring visible on the wheelset at the back is rim insulation.

Left
The crankpin screw on the second driving axle, left side. Unfortunately, it is not possible to make out that the screw head is tilted and not parallel with the face of the wheel – which is what was causing the coupling rod to bind on that side. The black crescent shape at the top of the picture is an etched brake shoe.

Current pickup

How much of an effect current pickups have on the delicate relationship between wheel, track, and motive forces is a moot point. Side acting pickups could potentially restrict some of the side play, whilst vertically acting wipers are now virtually impossible to arrange given the requirement for models have at least some representation of brake gear. Top wipers could in theory be seen to have an infinitesimal springing effect given the working clearances our locomotives have in their axleboxes, but if used with springs they would need to be matched on both sides to avoid the model becoming lop-sided.

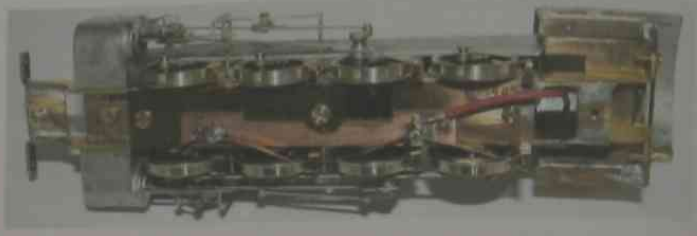
For the Pershing, DJH recommend in their instructions the 'American' pickup system, which essentially means one side (+) from the loco and the other (–) from the tender, with an insulated drawbar, or in the case of this kit, a current-transmitting drawbar with an insulated bush on the locomotive. I opted to make the locomotive self-contained, however, and fitted wheel-scrapers soldered into slotted brass pins let into copper-clad paxolin. The little pins are lathe-turned to be a force fit into a 1.5mm hole drilled into the copper-clad. The slot is cut with a razor saw whilst the pin is held in a pin vice of the appropriate range. To assemble, the shaped copper clad strip is screwed up to the chassis – or in this case the keeper plate – strips of phosphor-bronze are slipped into the slots bent so as to be sprung off the backs of the wheels, and a touch of solder applied *et voilà!* – the slots stop the phosphor-bronze flying off, and the pins cannot unsolder themselves either as they are held in their holes by friction. Best of all, the whole assembly can easily be taken off and put safely to one side for painting with no risk of it getting bent during the rest of the build.

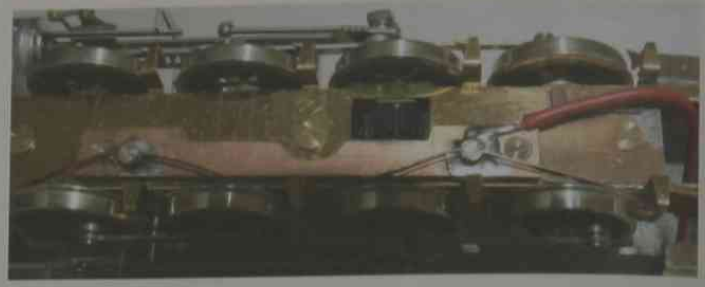
Boiler and cab

With the mechanical bits of the chassis mostly complete, it was time to start looking at the 'cosmetic' side of the model. Well, not quite. The relationship of the cylinder block to both these elements is quite critical, as not only will this determine the position of the valve gear and crosshead guide bars but also the height of the body off the frame proper. In fact, it seemed more sensible to move on to assembling the key elements of the superstructure next, which meant folding up the cab etch and fixing this together with the roof to the cast boiler unit.

An M2 brass insert was first made up to replace the existing tapped mounting hole under the smokebox. I do this now as a matter of course when working with whitemetal parts that may need dis-assembly in the future, as it removes any fear and risk of stripping threads in this all-too-soft metal. The smokebox could then be tightened down to the cylinder block and bare chassis, whilst the cab was offered up to the firebox.

The boiler to cab joint is soldered with low melting point solder, as is the cab roof, to make for a structurally rigid 'backbone' to the engine. There is plenty of room to get an iron in from the back of the cab, and I added L-shaped flitch plates made of shim brass between the upper firebox sides and the inside back of the cab to give some much needed rigidity in this area. This proved to be my undoing later on, as when it came to mate the chassis and boiler/cab assembly with the motor already mounted and ready to go, there had to be much grinding away with a motor-tool to get everything to fit.





Above
Electrical current collectors on the loco. Note the brass slotted 'pegs' in the copper-clad paxolin that hold the phosphor-bronze strip wipers.

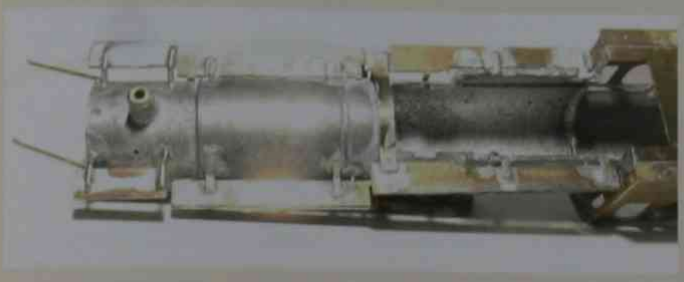
Cylinders and valve gear

Valve gear on Model Loco kits comes partly assembled – a mixed blessing, as for a 'proper job' (as they say down here in deepest Dorset), any remaining cusps on the various etched links and rods should still be carefully filed off.

The crossheads are cast brass, and to get a good running fit on the slide bars I opened out the top and bottom guides with a razor saw as a precaution against the piston rods binding in the cylinder casting at the end of their travel. Rather than solder the rearmost ends of the slide bars into the motion plate as DJH suggest, I left them free. This allows the cylinder assembly to be easily removable, and also for the crossheads themselves to come out together with their associated combination links and valve rods, which all now stay together as part of the valve gear assembly.

This unit in turn can be further broken down, as I used 12BA screws and bolts to pivot the curved links of the Walschaerts gear off the support cradles. A touch of Loctite on the nut secures everything against untoward unravelling. The supporting cradle for the expansion links is a fold-up assembly, and needed to be carefully bedded down into the top of the chassis, between a pair of etched springs that

Below
Starting to look like a model loco – the chassis assembled with Walschaerts gear but without motor and gearbox to check that everything is rolling free, with the body mounted and mounting holes eased where required to get the boiler+cab unit level when on the track.



were part of the sideframes. If I were going to do another one of these engines, I would probably pack the cylinders up about 0.5mm to give more clearance here and still have everything remaining horizontal. As it was, the weigh shaft across the engine needed to be curved downwards to clear the boiler – a dodge that was employed on not a few real locomotives with low-set boiler lines, so I am not going to lose any sleep over it!

Body construction

One of the problems the builder of American-type locomotives needs to consider is that there is no logical break between a model's superstructure and the chassis, in the form of the running plate that is found on most English or European engines. The footboards on most modern US locos are usually in several sections, set at different levels, and on a model really have no visible means of support. Ready-to-run manufacturers get around this by moulding the footboards integrally with the boiler – or half-boiler, if they are feeling conscientious.

DJH provide etched parts for the footboards but they are located by very small 'pips' into corresponding 0.5mm holes that need to be drilled into the boiler casting. In the case of this loco, each board also needed to have a chequer plate overlay added as omitting the outside steam pipes revealed a 'non-etched' area on the front footboards. The overlays were made from a Scale Link N scale fret. These two front footboards also needed to be relocated further down the smokebox to match the pictures I had of the ROD engines.

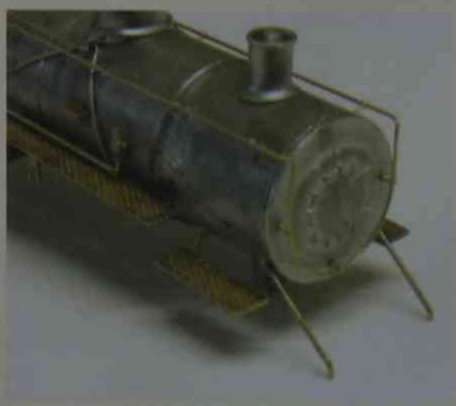
To ensure that the whole arrangement would be robust enough to stand handling, the footboard boiler mountings were beefed up with brass strip brackets soldered on once the correct height had been determined with the aid of surface plate and scribing block. I dispensed with the etched brackets for the ones on the smokebox and made new securing straps from 1mm brass rod, filed flat on the top surface.

The characteristic stays from smokebox to pilot beam are fixed to the smokebox, and locate in holes drilled into the top footplating. Because of the risk of wandering – and the chance of the drill breaking through and then catching on underlying brass components – this is very much a pin-vice job by hand rather than something that can safely be entrusted to the pillar drill.

Some nifty soldering with the aid of clamps made from paper clips was required to produce a sufficiently strong front buffer beam. Glue could not really be used here, as anything in this area will take quite a hard knock in the event of a derailment. The etched steps provided with the kit are very delicate, so these were replaced by ones bent up from 0.3mm strip, which, whilst a bit on the heavy side, are an acceptable compromise, I think.

Above
New footboards fixed to the boiler for the saturated steam version, and the steam pipes between the smokebox and cylinders removed. New chequer plate overlays were added to all footboards to match those fitted to the smokebox pair on account of the fact that the kit components are not etched at the location of those outside steam pipes, which are not fitted to this version.

Right
Smokebox front with handrail attached. The join with the boiler handrails will be hidden ...



Right
... within the first handrail knob on the smokebox side.

Top right
Chassis front end complete with air pipe added but still awaiting buffers. Footsteps fabricated from strip replace the etched components which can be vulnerable.

For what it is worth, most of the low-melt soldering for the support brackets for the front footboards and the stays was carried out from inside the smokebox to avoid the chore of trying to get a decent finish on the outside of the whitemetal casting. The inside locating flange of the smokebox front was cut out accordingly to clear any protrusions.

American locomotives tend to have their injectors sited prominently either side of the cab above the footboards, and the Pershing is no exception. I used the lost wax castings that came with the kit as being acceptably near the prototype, first drilling 0.75 mm holes where the various water, steam, feed, and overflow pipes would be fitted later. The pipes themselves are brass wire rather than my usual choice of fuse wire because there are some long unsupported runs on this engine and brass is less prone to marking as it is bent to shape with the pliers than soft copper. Loctite 401 superglue applied with a pin is used to secure the various pipes to the engine superstructure and the injector casting. The various pipes really need to be made to fit 'on the job', and the risk of marring the job with low melt solder at this stage of construction I considered too great.

However, I did use low-melt solder to fix a pair of rectangular washers about 1.5mm x 3mm each side, pierced with holes for tender feed and injector overflow, beneath the footboards. This makes for a stronger job I feel than just using a fillet of solder where the pipes run through the footboards.

Routing the various pipes for the Westinghouse brake system demanded some thought, especially in the case of the air tanks and their associated cooling coils. In the end, I compromised by securing the main air line from the pump to the boiler proper, and adding short stubs of wire to the individual tanks to represent the air feeds. Note that the Westinghouse system has two tanks, one fed from the other, with at least 25' of pipe run before the first tank to allow the compressed air to radiate some of the heat it has acquired during compression in the pump.

Due to the position of the reach rod on the right-hand side, it did not prove possible to run the air line from the tank all the way back to the driver's brake valve in the cab, so another compromise was in order here by connecting the right-hand air tank directly to the equalising reservoir. This is a brass turning rather than the whitemetal casting provided in the kit, filed down to half its depth to sit atop the boiler side footboard.

The air tanks have had the original cast on detail removed, and new strapping added in c.0.15mm brass strip. These pieces were cut over-long, with final bending up of the brackets to suit the underside of the running boards taking place once the complete assemblies were offered up to the superstructure. All the pictures of these engines I have seen show clearly a curved pipe dropping from smokebox to the front platform, which appears to be the main train air brake line. Fixing this to the smokebox would have meant having a rather delicate and easily-bendable piece of wire hanging rather vulnerably in the wind during both final construction and any subsequent removal of the superstructure. I therefore attached this section of pipe run with low-melt solder into the angle formed by the underside of the front platform and chassis, leading the free end up to locate into a hole in the lower edge of the smokebox.

Tender

The tender is quite a complex fold and tab construction, made the more problematic by the fact that you cannot fold up the base tabs until the corners have all been rolled around a former. I use the nearest undersize drill shank to the finished radius for these.

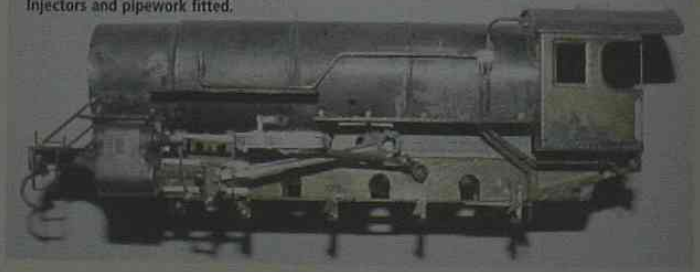
Above left
After adding the etched chequer plate overlays, the reverser rod did not quite fit – in any case it had to be mounted detail face inwards on the other side because the American engines were left-hand drive. A new one was made up from a piece of scrap etch and fitted with a separate crank to match up with the weigh shaft.

Above centre
The reverser rod crank also needs to be slotted so that it will drop over the weigh shaft and expansion link die block valve gear assembly when the body and chassis are brought together.

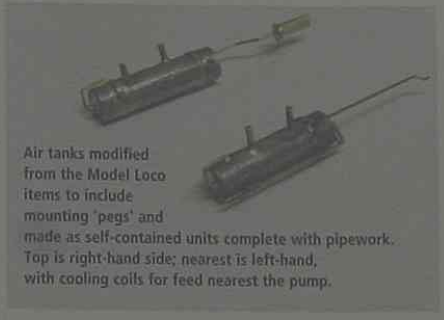
Above
The bracket to hold the injector overflow pipes before soldering to the underside of the chassis keeper plate.

Below left
Injectors fitted and tender water connections in the process of being bent up. Just visible behind the rearmost brake hanger is the support bracket soldered to the chassis keeper plate. This should keep them safe.

Injectors and pipework fitted.



The Westinghouse pump.



Air tanks modified from the Model Loco items to include mounting 'pegs' and made as self-contained units complete with pipework. Top is right-hand side; nearest is left-hand, with cooling coils for feed nearest the pump.

The kit has a pair of whitemetal inserts to go inside to support the tender inner top, but these are no use if you want to solder the structure together, so I opted to make up a pair of tapped spacers to hold everything at the right distance apart.

If I were doing one of these again, I would probably make a 1mm thick false bottom for the tender tank – by tracing round the kit's top part as a pattern – then assemble the superstructure around this as a separate unit. The underframe would be bolted to this later.

With everything together into a more or less rigid 'box', the detailing could begin. As the footsteps are etched as part of the side beams of the underframe, more than the usual amount of care is needed to stop them from being bent during the rough and tumble of assembly. I found that the fold-up angles for the rear of the tender provided by DJH prevented the back of the water tank seating flush on the etched platform. However, after several trial fittings I managed to break them off, but their absence is hardly noticeable on the completed model.

On the original ROD engines, there is a coal space divider a little way forward of that on the French rebuilds, and none at the front. Pictures of the engines in service during the First World War show the coal piled high right up over the two toolboxes.

As is now my usual practice with kits that employ whitemetal, I use Loctite superglue to secure the smaller detail parts as being a lot less troublesome than low melting point solder. As a point of note, it is often useless to try to clean up any moulding lines on such castings with anything other than a scrape of a modelling knife blade; the casting process invariably produces a 'stepped' part. I now tend to the view that trying to correct this on small components only makes this error worse in the smaller scales.

This engine was to have Kadee couplings, which meant adding a slab of approximately 3mm thick brass plate to the base of the tender to ensure that nothing comes adrift later in this locomotive's life.

The front pilot coupler is similarly body mounted, to avoid transmitting buffing forces through the pony truck, and also to avoid any potential fouling of the air hose casting through excessive side swing on curves.

Above right
Front end with boiler handrails affixed and other pipework added, but still awaiting buffers.

Right
The rear of the tender, showing just the three ROD lamp irons and a single brake pipe – relocated from below the buffer to clear the swing of the Kadee couplers. Buffers are the kit items, unfortunately not of quite the correct pattern, but at least now with the central hole shown in prototype photographs.

Below
Tender underside. Note the mounting pad for the Kadee coupler, and the adjusting screw – secured with Loctite – to set the level and prevent the rear truck from wobbling around its pivot.

Right
Screwed spacers are used to hold the tender top at the right height over the frame for assembly so the tender wrapper can be soldered into the correct position.

Right
The complete tender. The large pipe along the right-hand side was soldered onto the supports using clamps made from cut up paper clips bent into 'chain links' with the break in the chain being filed into a 'V' to hold the round section brass rod. The screws in the coal space will be covered with the drop-in coal load.

Finishing touches

Whilst substantially complete, a few jobs still remained to be done before the Pershing could be classed as ready for the paint shop.

I could have just stuck in the backhead with a puddle of Loctite 401, but as I have a fear of things dropping off sometime in the future, however remote and unlikely this might seem, I decided to do the job properly with a tapped plate and a screw through the cab footplate.

Likewise with footsteps on the smokebox and the boiler for the enginemen to access the sandbox filler. The original etched parts had locating 'pegs' of 1mm wire soldered to them, and the pegs were 'thinned' by filing them flat on their undersides to make them less obtrusive.

At this point, it was time to track test the almost completed locomotive. I always do this before painting, as there is invariably a degree of 'tweaking' needed to the mechanism at this stage, and if any modifications are required there is no risk of marring the finish.

Though the chassis will go around 18" radius curves – just – the front overhang and the position of the front coupler draft gear box will tend to tip the pony wheels off the track, so my guess is that 24" radius would be safer for normal running. I could have mounted the coupler on the pony truck, but at the expense of losing detail from the front buffer beam – air hoses and the like – and having to provide springing to keep the wheels on the track in the event of the locomotive having to propel its train.

Painting and lettering

Painting is best not rushed if a durable and decent finish is desired. I like to leave each coat at least a couple of days to dry – preferably assisted by a period of hibernation within a cardboard box placed in a warm airing cupboard, after first letting the majority of the solvent to evaporate off for about three hours.

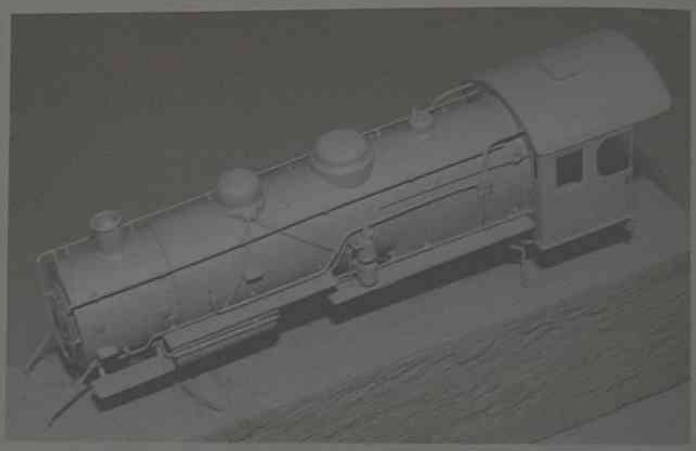
I am now adopting a regime of first bathing major body components in cellulose thinners, or else going over with fine emery, a small suede brush with brass bristles, or a glass fibre pencil. This removes any grease on the metal to be painted, and from then on, such components are only handled with a gloved hand to avoid subsequent contamination from oils on the skin.

So far, I am playing it safe – and being lazy – by using for a primer and black base coat automotive acrylic paints from spray cans. This is misted on almost, from a distance of between four to eight inches away, with a series of fast passes, starting and finishing the spray with the nozzle pointing clear of the model. The idea is to provide coverage with a build-up of several near-dry coats, rather than one heavy application which might obscure some of the more delicate detail.

Small and more intricate subassemblies – wheels, cylinders, valve gear unit – are brush painted with an etching primer. On this model I have switched to Phoenix Precision primer, which goes on very thin and dries nearly transparent. Mix up less of the activating thinner and the etching primer than you think you will need – a little goes a long way!

Above
The complete but as yet unpainted locomotive undergoing track testing.

Below
The loco body in primer.



Left
The backhead with tapped bracket soldered on for secure fitting inside the cab.

Right
The tender body in primer.

Once the etch primer is dry, the first colour coat is applied to these sub-assemblies with a brush. I find that the key here to get an even finish is to work the brush with a mixture of a stippling and downward strokes – any marks that remain visible when dry will look like oil or water streaks.

On the last few locomotives I have built, I have found myself increasingly relying on a jeweller's eyeglass to check for blemishes and missed areas. When these are discovered, they need to be touched in with a small nearly dry brush to mimic the 'air-brush' finish on the rest of the model.

A particular problem with the Pershing was the need to match the main sprayed colour coat – which is a borderline satin/matt 'Rally' black – with the brush painted areas. For what it is worth, I have found that Humbrol 'Hull Black' (ref.85) is close enough, especially when thinned right down and applied almost as a wash.

The ROD colour scheme appears to have been a plain black with white lettering. As there are no commercially-available transfers, to my knowledge at least, I made my own on an inkjet printer. I used a Linux-based PC which enabled me to push the ink density several times higher than that provided by some off-the-shelf manufacturer's printer drivers under Windows. I always make two sets of transfers when I am doing this, just in case something goes wrong with the application of the first set....

The transfers are sealed with acrylic matt spray before being cut from the sheet. This does not affect the inks, and seals the transfer from water during the separation of carrier film and paper backing.

Unlike a 'proper' transfer, they are a bit on the thick side, but will conform to rivets and suchlike given a generous application of a softening agent such as Solvaset. If any bubbles persist, these can be carefully lanced with a sharp pin, and the area flooded again with the setting solution.

I try to leave these home-made transfers to settle face up for at least a day before turning the model over to do the other side. On the Pershing, the process of making these decals conform over the various rivet lines of the tender took nearly a week start to finish, possibly because I was applying direct to a matt instead of a gloss varnished surface.

There is always going to be a degree of 'bleed' under the edges where the transfer has been cut out of the surrounding sheet and the ink-jet printing is exposed to water.

Once the transfers have settled over any underlying detail, the next stage is to overpaint the background colour – in this case black – with a stippled coat of the same shade as that used for the rest of the model. The aim is to 'overpaint' the transfer as close as one dares go to the ink-jet printed lettering. The human eye will then see the crispness of the lettered edges but ignore any subtle change in the colour shading adjacent.

However careful one is with masking tape or brush, even a thin sliver of paint in the wrong place can play havoc with a model's running and electrical pickup. With the Pershing, a couple of the axle slots had to be gently scraped clear of matt black to allow the hornblocks to sit properly in the top of the frame U cutouts. For the same reason, I took extra care to both scrape then finish-polish the driving wheel treads with fine emery cloth.

Above
The loco body painted black, with selected areas (e.g. cab roof, smokebox) highlighted with a matt finish.

Below
The self-made transfers.

Tender coal load

The 'coal' in the tender is actually a 'drop-in' item, complete with its own base. This takes the form of a several layers of 60thou plasticard built up to a rough profile of the finished coal load from prototype photos, and painted matt black.

A 'fence' of masking tape is then stuck around the lowest edge of this assembly – which is the same shape as the base of the tender's coal space – and a 50/50 mix of white glue and water is then spread over the plasticard. Fine crushed coal – almost dust – is then sprinkled into this. A few drops of water with just a pinhead of washing-up liquid to dispel the surface tension, applied with an eye-dropper over the top of the coal, helps the glue to 'wick' upwards and so bind everything together. After about 24 hours or perhaps a little more, the tape can be peeled away to leave a coal load that is almost touching the tender sides, yet can be slipped in without risk of marring the finished engine's finish.

Above
Transfers on the tender after application of decal film softening solution. Note the white 'bleed' where the solution has crept under the cut edge of the transfer film and dissolved the ink.

Above right
The finished article. The ink-jet transfers have been blended into the paintwork on the tender sides.

Right
The coal load is separate and will be added once all painting and assembly is completed. A small piece of double-sided adhesive tape will secure it in the coal space.