VENTURER MODELS – VM32-CL37 – 1/32nd Scale

English Electric Type 3, Class 37

Build Instructions – For Standard Wheelset and Battery/Radio (V 1.2 - Feb 2023)

General

Firstly, thank you for purchasing this kit which is our second release in what will become a range of 1/32nd Scale models of British outline Diesel and Electric locomotives from the 1950's through to present day. Most variants of the Class are catered for, and please do check that the kit reflects your chosen prototype.

Our models are made from a combination of quality materials, usually comprising main body superstructure in detailed cast resin, metal chassis and bogie frames, brass, resin and plastic detailing components and simple etched parts. Our aim is to provide a good representation of the prototype locomotive in a kit form which is capable of being built in a modest timescale, and by hands familiar with basic modelling experience and straightforward modelling techniques.



Inside Your Kit

Your kit box contains all the components required to build the locomotive of your chosen specification. If you should find that any components are not of the required or requested type then please let us know and we will, of course, remedy this wherever practicable. **Attached to these instructions is a checklist of the components provided**, including:-

- 1) Bodyshell comprising two cabs, two noses and single central body section, cab control desk (+detailing), cab floor, seats, rear cab bulkhead, and under-slung tanks.
- 2) Laser cut steel metal chassis.
- 3) 2 x Articulated Bogies Kit comprising steel wheels to standard profile (or fine scale if requested) with silver steel axles, laser cut bogie frames, and all detailing parts in

brass/resin, silver steel pivot post, all axle and pivot bearings and mountings, motor mounts, 4x motors and pinions, spacers and gears.

- 4) Rotating Fan Kit comprising detailed fan, grill cover frame (brass), fan mounting frame, motor mount, fan motor and fixings.
- 5) Etches for window surrounds, cooling fan grill (including spare), side grill air-intake bar, door kick-plates (check your prototype), door handles, head-code doors/plates, roof rivet detailing (for 37/0 split-head code variants check your prototype and period)
- 6) Laser cut windows in clear PETG.
- 7) Brass detailing parts, including pipework, horns (if applicable), couplings, wipers, headboard clips and lamp brackets, steps, and bogie detailing parts.
- 8) Spacers, mounting frame for the under-slung tanks and Fosworks Radio/DCC*.
- 9) Door Handrails Wire (Stainless Steel), and Nose handrail wire (Nickel-Silver) labelled accordingly.
- 10) Brass knurled inserts on 3mm internal threads are routinely used with your model. Several will be pre-fitted into parts provided, but others will need to be inserted into locating holes you drill during the build. These inserts are best squeezed into place (rather than driven/hammered), and a small vice/clamp will assist in this.

* Fosworks Radio/DCC Sound for your model is available through us, or can be purchased directly from Steve Foster at Fosworks. Website: <u>https://fosworks.co.uk/</u>

Recommended Tools and Equipment (Note: Not Provided, except where stated)

Electric hand drill, "Dremel" disc cutting tool, Screwdrivers (various), Snips, Allen Key (2mm)

Two-part Epoxy Resin glue (J B Weld or Araldite is recommended)

Cyanoacrylate ("Superglue") – I use EverBuild Industrial cyano. [Note: Superglue is referenced as "SG" throughout the instructions]

Body-filler – I use Ronseal Wood Filler (the type with filler plus mixing of a small amount of activator) as this has very similar sanding properties to the resin used for your model. Halfords also supply body fillers suitable for use, such as their P.38 car body filler.

Canopy Glue – I use Formula 560 available from various suppliers.

Files and sanding papers/sticks (180, 240, 400, 600, 800, 1000 recommended). I obtain these from Amazon sold under the HoNoson brand name.

Drill bits for 1mm, 1.2mm, 3.2 mm/1/8", 3.5mm and 4mm.

Sharp craft-knife/scalpels

Metal and plastic primer paints. (Available from Railmatch, Phoenix Precision, Tamiya or Halfords)

Finishing paints – proprietary acrylic or enamels. I tend to use Phoenix and Railmatch enamels, but acrylics are equally suitable.

Decals – 1/32nd scale transfers are available to order on request from Railtec Transfers and also from John Peck at Precision Labels :-

https://www.railtec-models.com/

http://www.precisionlabels.com/

Before We Start A word about working with resin

The major body components are cast in a safe, non-toxic, durable resin which can be worked effectively with simple hand and machine tools, regular modellers glues, and a wide variety of paints. However, there are a couple of dos and don'ts......

DO Wash all the resin components in <u>warm soapy water</u> (I use "Shiny Sinks" fluid) and rinse and dry thoroughly before working or painting.



Washing the parts will remove any remaining release agents used in the casting process to ease removal of the part from the mould. It is important to wash remaining traces away (including rinsing well to remove traces on limonene from soap suds – whilst limonene has some health benefits for us, it plays havoc with our painting!) to ensure glues and paints adhere correctly to the material.

DON'T wash using actetone or IPA (Isopropyl alcohol) as these will attack the surface of your resin parts.

DON'T force the resin components as they can break. If there is a need to adjust a resin component because it does not quite align, then heat the part in warm (not boiling) water for 30 seconds or so and the resin will "give" a little. Hold as required whilst the part cools and it should retain it's shape.

REMEMBER: As sanding of the resin parts/body-fillers will create fine dust particles, please dampen sanding papers/blocks/sticks with water, and/or consider using masks (paper "Covid" masks are fine)

to reduce exposures to inhalation.

Any questions? Phone Ian on 07732 057585

Email: <u>sales@venturermodels.co.uk</u> Download instructions as .pdf at <u>www.venturermodels.co.uk</u>

Order of Construction

Recommended

1) WASH - Clean all resin parts. [Page 5]

2) CHASSIS – Preparations, positioning the chassis fixing point and underslung tanks [Page 5]

3) CAB INTERIOR – Preparations, Cab detailing, Control desk, Hand-brake wheel, Seats [Page 9]

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PARTS LISTS [Pages 33-40]



Part 1 - WASH – All resin components

Clean all resin parts with warm soapy water followed by a bath in "Shiny Sinks" fluid to help degrease and remove traces of mould release agent from the casting; rinse well (removing limonene residue) and allow to dry.



Part 2 - CHASSIS – Preparations, positioning the chassis fixing point and underslung tanks

Let's start with something quite straightforward. This applies to all variants. Take the main central body resin cast VM32-CL37- R3 and carefully remove the residual resin reservoir (if still attached) from the end of the body casting. I use a Tenon saw to carefully cut through the resin flash approximately 1mm to 2mm from the end of the casting. The remaining flash can be removed by paring the resin away slowly with a scalpel and using sanding blocks and sticks to clean the casting ready for butt jointing to the cab at a later stage. I tend to use 180, 240, 400 and 600 grade sanding papers, and the HoNoson brand sanding sticks available at Amazon. Take your time and ensure a good square end for mating to the cab. If any moulding marks remain on the body (check the under-valances in particular), then gently sand these away as required. I sometimes leave traces of such marks on models I intend to weather heavily as these can assist in the effects of grime on the turnedunder skirts.



Take the mild steel chassis plate VM32-CL37-C1, four chassis mounting blocks VM32-CL37-3D1 and four fixing screws VM32-CL37-H1. Screw the mounting blocks (2mm Allen key) to the chassis aligning the blocks with the flat edges facing out and with the rounded edges to the chassis plate as shown right. [These flat sides are to be secured to the inside of the main body section VM32-CL37-R3 as shown below. The chassis and screws will effectively hold the plates in the correct position whilst the gluing process is undertaken.]

Take the main centre body section VM32-CL37-R3 and lay it on one side. Insert and centre the chassis plate with the mounting blocks uppermost, ensuring that the slight tapered overhangs at each end of the chassis plate are equal length over the body – this ensures the plate is centred. [Note: The chassis plate is handed, but it does not matter which way round the plate is at this stage for the purposes of fixing the mounting blocks VM32-CL37-3D1 to the body VM32-CL37-R3.]

Ease the mild steel chassis plate VM32-CL37-C1 into the correct locating position which is central to the body, and with the bottom of the plate aligned to the top of the lifting point recesses in the bodyside as shown in the picture. When happy with the position of the chassis plate, proceed with fixing the mounting blocks in position as follows below.



In rotation, unscrew one of the mounting blocks, apply an even coat of epoxy glue to the flat side of the mounting plate, and secure it back in place against the bodyside holding it in position using the fixing screw. Take your time with this as accurate positioning and a good firm bond to the bodyside will ensure easy removal and replacement of the bodyshell to the chassis for the lifetime of your model. Once the mounting blocks are firmly secure, unscrew the chassis VM32-CL37-C1 and place it to one side ready for furnishing with the Fosworks Radio/Sound mounting plate VM32-CL37-F1 (if applicable/required), the underframe spacer VM32-CL37-3d5, and the underslung tanks VM32-CL37-R13 & R14. Apply more epoxy around the top and sides of the mounting blocks (not the bottom) to maximise the bond to the bodyside in these three planes.

We now need to drill out the four locating holes to take the 3mm internal dia. brass inserts in each of the two underslung tanks VM32-CL37-R13 & R14. Take the 3d printed underframe spacer VM32-CL37-3d5 and position the two underslung tanks VM32-CL37-R13 & R14 beneath the underframe spacer noting the marker indents which are indicated in the tops of each tank. These denote to which end they are to be fitted to the spacer, however these are NOT accurately aligned to the holes which need to be drilled. Use the frame spacer VM32-CL37-3d5 as a jig. Sit the spacer on each tank and carefully drill 3mm dia. pilot holes into the resin tanks through the locating holes in the spacer to ensure the correct alignment. Then drill right through the pilot holes to a depth of 10mm using a slightly larger 3.5mm to 3.8mm drill bit.

Take a knurled brass insert and press/squeeze it into each of the holes in the resin tanks using a small vice/clamp. Screw the tanks into place through the countersunk holes using the 3mm x 10mm engineering screws shown. [Note: if correctly aligned and fitted you should find that there is a small gap of 1-2mm between the tanks. Fill this gap with an offcut of "plasticard" or similar, securing both tanks together, and holding the alignment.

At this stage consider fitting the Fosworks ON/OFF switch and charging socket. A 3D printed mount is available from us for this purpose if required – just let us know if required.







The 3d printed underframe spacer VM32-CL37-3d5 may already be attached to the chassis VM32-CL37-C1 but, if not, now's the time to join the parts using four 3mm dia. X 10mm machine screws. Note also that the spacer is handed and will only fit one way around with the countersunk holes facing the metal frame ready to receive the underslung tanks (if not already fitted per the preceding procedure described above).

At this stage the VM / Fosworks Class 37 DCC/Sound / Radio/ Speaker cradle should be fitted, if required – available separately.

You should now have a completed chassis ready for stripping, priming and painting. We recommend using a Red Oxide primer for the steel chassis, followed by a coating of either black, or your chosen main body colour. The spacer and underslung tanks should be gloss black and weathered as required.



Part 3 - CAB INTERIOR – Preparations, Cab detailing, Control desk, Hand-brake wheel, Seats



Part 4 - CABS AND NOSES - Adding the noses, buffers, couplings

If you intend adding lighting for head codes, high intensity light, and red warning lights then it is recommended that you fit these prior to fitting the cab to the main body. Venturer Models will provide lighting looms if required. Call us for prices and availability.	
Remove any remaining resin casting reservoir from the cab casting VM32-CL37-R1 and sand back flush to the back of the cab. Test fit the cab to the main body VM32-CL37-R3. If you should find that the casting is not quite aligning correctly, it should be possible to ease the resin cab into position by placing the cab in hot (not boiling) water for <u>approximately 30</u> <u>seconds</u> (DON'T LEAVE IT TO STAND), then gently holding the cab in the correct position and allowing to cool whilst held in place. Repeat for both cabs as necessary. Now we'll switch to the nose end of the cab.	Example where a hot water adjustment will assist the fit:-
Noses vary depending upon the model variant, but the procedure is basically identical. Clean up any flashes remaining on the castings from the moulding process and test fit the nose to the cab section. When happy, secure the nose to the cab section with epoxy. Once cured, fill any gaps with filler and carefully sand to a smooth finish.	
I prefer to fit certain detailing parts, buffers and the couplings at this stage prior to fixing to the body as I find it easier than when the cabs are attaching to the body, but the choice is yours. Follow your chosen prototype as detailing varies significantly across the lifetime of the Class. [For making up the couplings, see Section 7].	

Take a completed coupling and fit the draw bar through the hole in the buffer beam. If tight, open out the hole carefully by filing, or slightly narrow the brass draw bar by filing, until the bar slides through the hole. With the coupling in position, slide one nylon washer over the shaft, followed by the coupling spring, and then a further nylon washer. Squeeze the spring between the washers, and secure the draw bar using a split pin as shown. [Note: The first washer should fit over the <u>buffer</u> spring wire – see below]

The four buffers are cast in brass and the shafts are longer than required. Trim each of the shafts back such that the total length of the buffer head and shaft is 29mm, and drill a 0.8mm hole through the shaft 3mm from the end of the shaft ready to take the piano-wire spring. Remember that if fitting oval buffers then your hole needs to be drilled parallel to the shape of the buffer head as the wire will hold the buffer's angle/attitude when in place. [Note: the piano sprung wire supplied may be of a slightly different gauge. If so, the 0.8mm drill hole may need to be slightly larger – check the diameter of the wire supplied]

Test fit the buffers into the nose. If the buffer holes are not clear then drill out with 3mm drill bit.

Using pliers, make a 3mm long 90 degree bend in one end of the sprung piano wire. With one buffer in place in the buffer beam, thread the piano wire through the 1mm hole you've drilled the buffer shank, and then through the second buffer. Trim the wire, leaving at least 5mm available. When final fitting, bend a second 90 degree angle in the opposite end of the wire to hold the second buffer in place. Also, ensure the wire sits behind the first nylon coupling draw bar washer as mentioned in .





The sprung wire is held in place using two "U" shaped staples made up from the 1mm nickel- silver rod supplied with your kit, but <u>do not fit</u> <u>these until the couplings are in place</u> . This is to ensure the coupling clearance is allowed for when drilling and fixing the staples in place. Bend up four staple (two for each nose) just wide enough to cover the spring and approximately 5mm long. With the couplings in place, carefully drill two 1mm holes either side of the buffer sprung wire about 3mm to the side of the coupling draw bar hole. With the buffers and the sprung wire in position, secure the sprung wide by gluing the staples in place with SG.	Nickel-silver staples
Pipework and cables from the nose do not vary significantly between the variants. Check your prototype, but the basic arrangement is as shown. The black silicone tubing "loop" between the multiple working jumpers (orange and to the right) is omitted on this picture. A large picture and detailed reference pictures of the "real thing" will be added to the website shortly.	
The resin nose casting has indicator blocks and holes for the multiple working jumpers (orange). These two small resin blocks on the buffer beam are actually standing a little too proud on the beam, and to make a more accurate fit for the brass detailing parts it is better to reduce the height of these by carefully trimming them back by 3mm. This allows the brass jumper detailing to sit a little further back on the beam and gives a more prototypical impression. The holes should be drilled out with 1mm dia. drill to receive the castings.	
There are indicator holes in the buffer beam for the vacuum pipe and train air pipe (red). Again drill out 1mm to receive the pipework costings	
The main air reservoir pipes (yellow) require two 1mm dia. holes to be carefully drilled vertically upwards into the nose to a depth of about 5mm. The holes should be adjacent to the face of the buffer beam, and 3mm inside the edge of the buffer stock. When fitting the pipework casting, ensure sufficient clearance for the movement of the buffer without striking the pipe.	

5) FAN ASSEMBLY – Building and securing the fan assembly to the body section



Secure the completed fan unit into position in the main body using 4 of the self-tapping screws provided. (Wiring not shown).	
Remove the fan grill etch from the etches sheet and clean off any flashes. Note that the etch is not exactly circular. This is to allow for the curvature of the body with the shortest diameter lying front to back along the roof, and the widest diameter being side to side. Using finger and thumb, gently tease the flat etch into the required curve to match the roof curvature, noting that the detailed half-etched outer rim is uppermost. When happy with the fit, secure in place with thin SG	
Clean up the brass fan cowl casting VM32- CL37-B15 and gently tease as necessary to ensure a good fit over the roof fan grill as shown. Secure in place with SG.	
Electrical	Refer to your chosen Radio/Dcc/Battery supplier, or consider the Venturer Models/Fosworks Radio/DCC/Sound available
	with prototypical sound files by LegomanBiffo.

6) BODY ASSEMBLY – Attaching cab sections, body filling and finishing

The cab to body is a simple butt joint and secured with epoxy. The rear cab bulkheads locate against the joint and add further strength when secured in place later.	
Once cured, fill any gaps in the joint using your preferred filler (I use Ronseal wood filler – it's suitable for use with the resin and has similar sanding properties). Once cured, carefully sand the filler away and ensure a good smooth joint.	
Take plenty of time over the careful sanding of the joints to remove all excess filler. Re-fill if necessary, and use primer paint or guide coat to spot any unwanted crests, ridges or indents. Second application of filler and sanding underway.	
Once happy with the body overall, prime with a good quality plastic primer having once again washed thoroughly with Shiny Sinks or similar degreaser.	

7) COUPLINGS – Making up brass couplings





8) FOSWORKS - Radio/DCC/sound cradle mount

If fitting Fosworks Radio and sound equipment, we can provide you with a 3d printed mounting platform specifically designed for use in conjunction with the Venturer Models Class 37. Contact us if required.



The Venturer Models/Fosworks Radio/DCC/Sound system includes fan control, cab lighting and head-code lighting control, and is available separately through Venturer Models. If you'd like the full system kit including ESU Soundcard, lighting and fan looms, etc. for your kit, then please do contact us for further details.

9) REAR BULKHEAD - Cab Rear bulkhead



10) ETCHES – Window surrounds, Fan grills, rivet detail, kick-plates etc.

Photographs of the etches sheets are appended on page 37. The sheet is stainless steel and the parts are designed for super-gluing into place. Not all etches will be required for your particular model. Please check your prototype as items such as head-code plates, and door kick-plates may not have been applied to your particular locomotive in the period you are modelling.

However, the etches which should be used on all models are:-

VM32-CL37-SSE1 – Fan grill (two are supplied, only one is needed)



VM32-CL37-SSE2 – Front Window Surrounds (Note: two types are provided for the two types used over time with these locomotives. Check your prototype).

VM32-CL37-SSE5 – Radiator grill frost plate frame



VM32-CL37-SSE7 – Door window surrounds



VM32-CL37-SSE8 – Fan panel square rivet band



11) DETAILING

Buffer beam	
Roof rivets – 37/0 only	
Drilling roof holes – 37/0 only	
Nose steps	
<u> Underslung Tanks – Valve details</u>	
Horn alignment – large and small	
Ventilation cap on cab roof	
Headcodes	
Window surrounds	

12) BOGIES

The VM Class 37 bogie incorporates an articulated arrangement allowing the outer axles on each bogie to pivot. The motors are housed in mountings driving MOD 0.5 pinions with direct drive onto gears secured to the outer axles only. All axles are sprung and ride in

ball racer bearings.

The steel bogie frame is supplied with the 3d printed stretchers which hold the motor mounts in position, and these are generally already glued in position in your kit. If, however, the stretchers have been supplied separately, or have become detached, then please secure them back in position using a good quality epoxy glue, ensuring they are fitted the right way round and the holes are correctly aligned to take the 3mm pivot screw.

Secure the 3d printed spring retaining caps over the reception holes using epoxy as shown in the adjacent picture. Ensure the noggin underneath the cap is centrally aligned to the hole.







lathe, then using the lathe chuck to hold the axle whilst fixing the wheel onto the axle is also ideal for this purpose.	
Apply a small amount of 603 to approximately 5mm of the end of the axle and insert this into the wheel centre. Stand it upright on a flat surface and slip your locating jig over the axle to hold in position ensuring the axle and wheel hub are flush to the flat surface. Leave overnight to set securely. Repeat the procedure fixing <u>one</u> <u>wheel only</u> to each axle (I.e. for all six axles) at this stage.	
Each axle runs on ball racer bearings supplied with the kit. If the bearings are too tight to slip onto the axles, then use a fine emery cloth to dress the axles such that the bearings will slide smoothly on and off each one.	Bearings 2 per axle
Next job is to fix the MOD 0.5 Spur Gears (Green) to each of the four driving wheels. If the smaller cog has not already been removed from the gear-set in your kit, then these need to be removed using a Dremel cutting tool and filed smooth and flat to the main spur gear side.	Spur Gears Remove small spur gear from the main spur and file flat.
Check the green gear will slide onto the axle. If the hole is too small, then carefully drill out the centre using a 1/8" drill bit (3.2mm) or reamer. Remember: This needs to be done accurately as the pinion/gear mesh depends on it to run true.	

Next take two of the 9mm dia. nylon washers and check they slide down the axle. If the washer hole is too small, then drill the nylon with 1/8" drill (3.2m) such that they will slide onto the axles. Test fit the drive gear arrangement by sliding the components onto the axle in the order shown. I.e. washer – green spur gear – washer – bearing.

When all slide down to the wheel satisfactorily, remove them and we're now ready to glue the first washer and the spur gear in place. To do this use a good quality epoxy ensuring that you do not allow the glue onto the teeth of the gear. Apply first to the base of the axle and wheel using just enough epoxy the secure the washer, and press into place. Next slide the spur gear half-way down the axle and apply epoxy to the face of the gear facing the wheel taking care not to get any epoxy too close to the gear teeth. Apply enough epoxy such that it will overlay the washer and adhere the side of the spur gear to the rear of the wheel. Press into place again ensuring no epoxy gets into the teeth of the gear. Pressing into place may squeeze some of the epoxy through the four holes in the gear. This is fine as we will want to ensure the glue fills these holes adding further strength to the bond to the rear of the wheel. Indeed, if insufficient glue has been applied to fill the holes, then add a little more glue to complete this. Then clean up the inner face of the spur gear removing any excess epoxy. Check the spur gear is correctly spaced slightly away from the rear of the wheel by the spacer, and is in alignment with the rear of the wheel. Gently spinning the axle in your fingers should enable you to identify and adjust and misalignment. Once happy, stand the wheel, axle and gear aside and allow the glue to cure. Repeat



this process for the remaining 3 driven	
We'll now turn our attention to the 3d printed motor mounts. You will have 4 motor mounts in your kit. These may need a little tidy-up to remove any residual plastic support material from the printing process. This can be done simply using a stiff brush and a file. Clear the holes for the axle bearings and test fit the bearings and wheeled axle. Check that the axle spins in the bearings and through the motor mount without friction. If necessary, run a 3.5mm drill or reamer through the axle guide hole. Once running smoothly, remove the axle and bearings and place to one side whilst we fit the motors.	
Remove the MFA labels from your four axle drive motors and snip off the three red suppression capacitors from the rear of each motor as these are not required. File away any residual solder from the motor casing.	Remove the MFA label completely and also the three suppression capacitors - either unsolder or snip off and clean the motor barrel with a file file to remove residual solder.
The motor drive shafts (as supplied) are slightly too long for our requirements and so we need to cut them down by removing 2.5mm from the end of each one using a Dremel and cutting disc. This will leave 4.5mm of the drive shaft protruding from the motor hub to take the pinion (smaller [red]) spur gear. <u>Slightly</u> chamfer the end of the drive shaft ready to receive the pinion gear (but do not fit these at this stage).	

The motors can now be pressed into the motor mounts ensuring that they are fitted in the correct orientation with the output drive end going into the mount first and with the wire connections vertical to the top and bottom as shown. Pare the twinned motor wires apart by pulling them gently into two separate wires and bend the electrical connector tabs with wires attached up and down. Re-align the wires as shown in the picture and secure together again with a small cable tie. Once happy with the alignment, use a blob of rapid epoxy or "thick" superglue and actuator to hold the wires/cable-tie in place.

The red pinion gears as supplied are 6mm in depth. Again, these are too long for our requirements, and we need to remove 2.5mm effectively cutting each one down to 3.5mm in length. Your kit may be supplied with the pinion gears already cut down in our workshops. If not, then these can be reduced in size by carefully cutting with a Dremel cutting disc and cleaning up of the gear teeth using a fine file. If you have any problems with this procedure, then please contact us and we'll supply you with cut down pinions machined on the lathe ready to attach to the motors. With the motors now located in the motor

mounts, the pinion gears may now be squeezed onto the motor drive shafts and tested together with the wheeled axle/bearings to ensure effective motor operation and smooth driven axle/wheel action. The wheel should rotate with only the friction of the gear and motor evident, and no binding. If any tight spots then this is likely due to either plastic impeding the teeth from the cutting of the pinion gear, or residual glue in the teeth of the main spur gear. Clear the teeth with a fine file if necessary, but do not over-cut. Small draws of the file and rechecking until a smooth rotation is achieved.









Use nylon washers (or cut a brass bush if you prefer) to space the second wheel clear of the bearing and rear of the motor/wires. Loctite the second wheel in place ensuring the axle stub is flush to the centre hub of the wheel. This ensures the back-to-back measurements are correct. Stand upright and allow the Loctite to secure the second wheel overnight. A simple jig or accurate engineers vice/clamp can assist in ensuring the wheels remain parallel whilst the Loctite cures overnight. You now have a completed power unit ready for fitting into the bogie. Repeat for the other three powered axles.

The centre axle is sprung and rides on bearings in a pony attaching to the bogie frame through four smooth sided machine screws.

Take one of the remaining axles with single wheel attached and slide two bearings onto the axle (either way around). Now attach the second wheel (Loctite 603) ensuring the axle is perpendicular to the wheel. Straight edges will help to hold the axle straight upright. Once aligned, leave overnight to cure. Repeat for the second centre axle (second bogie).

With the wheels set, take each centre axle and align the bearings with the slots in the pony. Squeeze the axle and bearings down into the pony and press firmly until the bearing sit in the riding position with the axle running through the centre of the hole. Now fit the keeper plate into the recess, and secure with the four self-tapping screws, being careful not to overtighten. Use just enough torque to set the screws and no more as you do not want to tear the holes in the 3d printed pony.









The pony can now be fitted to the bogie using the four smooth sided machine screws and springs. Firstly, place the springs into the holes in the pony. Slide a single nylon washer onto each screw, and position each screw through the holes in the bogie bolster plate, remembering to ensure the bogie pivot and bearing are located in place in the bolster.	
Now locate the bolster plate on the metal bogie frame, with the screws passing down through the holes in the frame. [Note: the picture is just showing checking the alignment without the steel bogie frame present]	
Here, the bolster, pivot, retaining screws and washers are in position, and the pony has been lifted into position beneath the steel bogie. The pony spring freely in the space between the stretchers. If any "lips" from the keeper places catch on the pony, then carefully sand these off until the pony is unrestricted. Repeat for the second bogie.	
We can now fit the power units to the main bogie frame using the smooth shanked screws. Insert the half circle rear of the power unit into the stretcher and slip the screw (with single washer) down through the locating hole in the bolster, the metal chassis plate, the hole in the power unit, and the keeper plate. Secure with a nylon washer and 3mm nyloc nut.	
Repeat for the remaining power unit in the other side.	

Slip the main springs (the heavier gauge springs) into position under the cover cap, and over the bolster in the 3d printed power units. Squeeze the springs to ensure they are located well. Test the bogie for springing by pushing the bogie pivot up and down. You should get a nice even springing across the bogie. [Note: The spring shown in this picture is incorrectly showing the lighter spring used in the pony – ensure you use the heavier gauge spring for this main springing in the power unit]. Repeat for the second bogie. At this stage you may wish to strip the bogie and paint. I tend to use a Red Oxide primer on the steel frame, followed by a base coat of gloss or matt black depending on customer preference for ex-works or future weathering. Next, we will add the brass detailing parts to the resin bogie frames VM32-CL37-R12. Note the frames are handed and we'll start with a pair for one bogie with a left and a right. Laid out is the left (above) and right (below) outer bogie frame with the relevant brass parts shown. Note the brake cylinders on the centre axle also carry the steps which are handed. Firstly, clean up the brass castings to remove any remaining investment material or flashing. The lug lengths on each of the brake cylinder castings is about 5mm, so remove any excess by cutting with a Dremel or similar. The keeper plates should have the sprues along the bottom of the keeper plate removed completely. Test fit the brake cylinders and upper steps, and also the keeper plates below as shown. When happy with the fits, secure with SG.

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13) Painting and Finishing

Metal and plastic primer paints. (Available from Railmatch, Phoenix Precision, Tamiya or Halfords)

Finishing paints – proprietary acrylic or enamels. I tend to use Phoenix and Railmatch enamels, but acrylics are equally suitable.

Decals – 1/32nd scale transfers are available to order on request from Railtec Transfers and also from John Peck at Precision Labels :-

https://www.railtec-models.com/

http://www.precisionlabels.com/



Parts List

STEEL (Mild and Silver-steel)

VM32-CL37 C1 Mild Steel Chassis (1)	VM32 CL37 CL Steel Chassis	VM32-CL37 C2 Mild Steel Bogie Frames (2)	A A A A A A A A A A A A A A A A A A A
VM32-CL37 C3 Mild steel wheelset (12)		VM32-CL37 C4 Silver-steel axles (6)	

RESIN

VM32-CL37-R1 Cabs <u>x2</u>		VM32-CL37-R2 Nose x2	
VM32-CL37-R3 Body Centre Section (1)		VM32-CL37-R4 Cab Control Desk (2)	
VM32-CL37-R5 Cab Floor (2)	Control Desk Scuto - Floor	VM32-CL37-R6 Seats (4)	AR RE
VM32-CL37-R7 "A" End Bulkhead (1)		VM32-CL37-R8 "B" End Bulkhead (1)	
VM32-CL37-R9 Cab controls (2) sets of 3		VM32-CL37-R10 Handbrake wheel (2)	P.P

VM32-CL37-R11 Fan (1)	KON/	VM32- CL37-R12 Bogie frames (Left & Right) (2) Sets of 2	
VM32- CL37-R13 Underslung Tank #1 (1)	VM32-CL37 R13	VM32- CL37-R14 Underslung Tank #2 (1)	VM32-CL37 R14

3D PRINTED COMPONENTS

VM32-CL37-3d1 Fan frame (1)	VM32-CL37-3d2 Fan motor mount (1)	
VM32-CL37-3d3 Body mounting blocks (4)	VM32-CL37-3d4 Cab floor securing blocks (2)	
VM32-CL37-3d5 Underframe spacer (1)	VM32-CL37-3d6 Bogie bolster spacers (2)	0
VM32-CL37-3d7 Motor Mounts (2)	VM32-CL37-3d8 Bogie bolster plates (2)	Res .
VM32-CL37-3d9 Body mounting blocks (4)	VM32-CL37-3d10 Bogie stretchers and main spring retainers (4)	

BRASS

VM32-CL37-B1 Windscreen wipers (1)	R	VM32-CL37-B2 Horn #1(Long) (2) VM32-CL37-B3 Horn #2(Short) (2)	
VM32-CL37-B4 Buffers (4)	~	VM32-CL37-B5 Pipework set #1 (2)	R
VM32-CL37-B6 Lamp brackets (2)	N	VM32- CL37-B7 Headboard mounts (1)	
VM32-CL37-B8 Brake levers (1)	No.	VM32-CL37-B9 Couplings (2)	
VM32-CL37-B10 Pipework set #2 Vacuum Pipes (2)	SQ.	VM32-CL37-B11 Tank drains #1 (1)	No.
VM32-CL37-B12 Tank drains #2 (1)		VM32-CL37-B13 Multiple working jumper (A) (2)	

VM32-CL37-B14 Multiple working jumper (B) (2)		VM32-CL37-B15 Nose Steps (not on all variants – check your prototype) (2)	-
VM32-CL37-B15 Fan grill cowl (and etched grill shown) (1)		VM32-CL37-B16 Bogies: Air cylinders (plain) (8)	
VM32-CL37-B17 Bogies: Air cylinders with left step (2)	Reverse casting of VM32-CL37-B18 (2)	VM32-CL37-B18 Bogies: Air cylinders with right step (2)	
VM32- CL37-B19 Bogies: Axle keeper plates (12)			

GLAZING

VM32- CL37-W1 - Windows - set (1)



ETCHES - Stainless Steel (SSE) (1)



VM32-CL37-SSE1 – Fan grill (two are supplied, only one is needed)

VM32-CL37-SSE2 - Front Window Surrounds (2 types)

VM32-CL37-SSE3 - Centre head code cover plates (not needed for ready-plated noses)

VM32-CL37-SSE4 – Door kick-plates (vary – check your prototype)

VM32-CL37-SSE5 – Radiator grill frost plate frame

VM32-CL37-SSE6 – Rivet bands – 37/0 Roof detail – check your prototype for the band detailing

VM32-CL37-SSE7 – Door window surrounds

VM32-CL37-SSE8 – Fan panel square rivet band

VM32-CL37-SSE9 – Split head code box surrounds

And a separate small etch sheet for:-VM32-CL37-SSEx – Door locks and handles (1) Set of 4



HARDWARE – Screws, Nuts, Washers, Clips, Wire, Split-pins, etc..

VM32-CL37-H1 Stainless Steel M3 Socket Low Head Cap Screws (12)	Used for: Bogies 12	VM32-CL37-H2 M3 Socket Head Button Screws with Flange 10mm (6)[10 if with Radio mount]	Used for: Body/Chassis fixings 4 Cab floor fixings 2 Radio Mount 4
VM32-CL37-H3 Stainless Steel M3 Phillips Csk Machine Screws 10mm (8)	Used for: Underslung Tanks 4 Tanks spacer 4	VM32-CL37-H4 Pozi Pan Self Tapping Screws 9.5mm (20)	Used for: Fan mounting plate 4 Bogie keeper plates 16
VM32-CL37-H5 Pozi Pan Self Tapping Screws 6.5mm (4)	Used for: Pony keeper plate 4	VM32-CL37-H6 Washer M3 in Nylon (44)	Used for: Bogie bolster/pony 24 Power units 20
VM32-CL37-H7 Bogie Pivot Bearing (2)	Used for: RC Bearing ¼"	VM32-CL37-H8 Bogie Pivot (2)	Used for: Silver Steel ¼"
VM32-CL37-H9 Bogie Axle Bearings (12)	Used for: RC Bearing 1/8"	VM32-CL37-H10 0.8mm piano wire (1)	Used for: Buffer springing
VM32-CL37-H11 0.9/1.0mm N/Silver rod (1) VM32-CL37-H13	Used for: Nose Handrails Buffer spring "U" staples Used for:	VM32-CL37-H12 0.9mm/1.0mm N/Silver rod (1) VM32-CL37-H14	Used for: Door Handrails Used for:
Split Pin	Coupling spring retainer	"R" Clip	Bogie pivot retainer

(2)		(2)	
VM32-CL37-H15 Pony Springs (8)	Used for: Springing the freewheeling centre axle pony.	VM32-CL37-H16 Bogie Springs (4)	Used for: Springing the motor mount & powered axle pony.

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