

## BLITZEN



Thank you for buying this locomotive kit from Boot Lane Works, please read all the instructions carefully before assembly.

### Tools & Adhesives

I recommend a few tools to help you assemble your kit –

- Small Bench Vice
- Modelling Knife (*I use a scalpel*)
- Tweezers, Pliers, etc...
- Needle Files, various shapes
- Wet & Dry abrasive paper (*the mixed selection from Halfords is very good*)
- Selection of small twist drills, including 1.5mm & 2mm diameter
- A 90-degree angle (*I use a set block, but a small set square will work well*)
- Personally, can't manage without my small, tapered reamer, look for them on eBay!  
*TAKE CARE WITH THE REAMER - MAKE A SMALL CUT, TRY, AND CUT AGAIN*

I also recommend the following adhesives –

- Super Glue
- Dichloromethane, A liquid solvent for the acrylic  
*We use E.M.A. Model Supplies "Plastic Weld"*

### ***A little about the printing process.***

*The printer extrudes a filament of plastic, layer by layer, to create an object. As it does so, it can leave tiny ridges along the object, and the printing "seams".*

*For best results, clean the ridges off with a file. Before painting and rubbing back with wet 'n' dry.*

### ***THE RESIN PARTS ARE BRITTLE AND MUST BE HANDLED WITH CARE***

*The resin is hardened by an ultraviolet light process but continues to adsorb the light after the process. Please ensure the resin is thoroughly painted to stop the hardening process.*

### ***THE ACRYLIC IS ALSO BRITTLE, CARE SHOULD BE TAKEN DURING CONSTRUCTION***

\*\*\*\*\* **IMPORTANT** \*\*\*\*\*

Please bear in mind that this kit, although intended for garden use, is a reasonably small power unit, designed for hauling a handful of wagons or a carriage.

**We DO NOT guarantee this model if used for “Heavy Haulage”!**

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This model draws inspiration from the many fireless locomotives built in the UK from 1913 into the 1950s. It is built around our tested CLARA chassis but is completely freelance in design.

The principle is simple; the boiling point of water alters with the pressure surrounding the water. At sea-level, the boiling point is 100°C, however the boiling point increases with pressure and drops with lower pressure.

A fireless engine's pressure vessel (the accumulator) is charged with hot water and superheated steam from a stationary supply, usually in an industrial setting where such steam & water would be plentiful.

Once charged the locomotive would operate as normal, as the pressure in the accumulator dropped, the water boils off (remember the principle) and generate more steam.

Once the water level and steam pressure dropped to below a healthy operational level, the engine would return to the charging point.

The application lent itself to industries where a plentiful supply of superheated steam & water was readily available from stationary sources. The lack of a coal fired heat source (and associated gasses noxious) on the locomotive gave it considerable advantages in areas such as munition facilities, building interiors, food storage areas, etc.

Andrew Barclay & Sons led the UK manufacturers, but many other contributed to its development. The famous narrow-gauge examples are the Bowater's Papermills, Bagnall's UNIQUE & VICTOR.



*No2366 (built 1929) Bagnall, VICTOR at Bowater's, this locomotive lent some inspiration to our model, BLITZEN.*

## CHASSIS

### **OK, let's jump straight in!**

This is a long description, but bear with me. If we can get this right, everything else will fall into place and your model will run like a dream...

Locate the two cylinder-blocks, they are handed due to their slight inclination. Attach the front cylinder covers with a dab of glue.

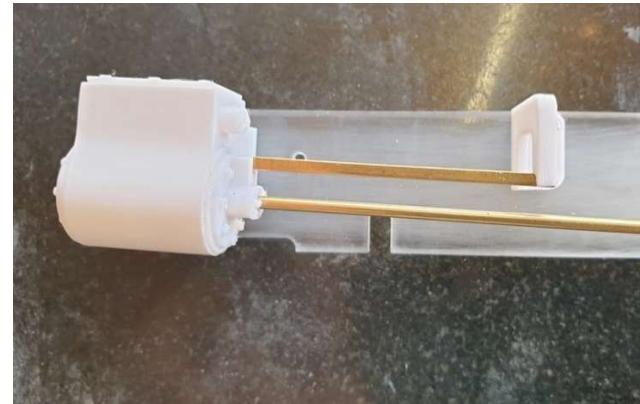
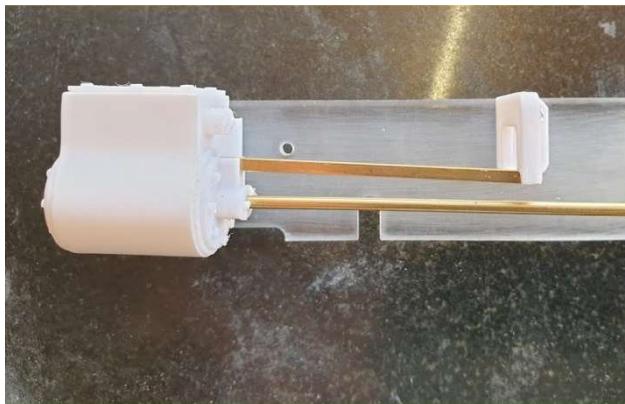
Attach the left-hand cylinder to one acrylic frame using two 8mm M2 screws. I have designed most of the chassis to accept the 8mm M2 screws as self-tapping, some of the holes may require opening slightly to get the screw started. Personally, I like to run an M2 tap through the holes first.

Now locate the left-hand motion bracket. These are also handed; ensure you have the correct one. The flat (build plate) side, facing toward the front of the locomotive. The detail (recessed area) facing the rear.

You will also need the two 2mm brass square sections and the 2mm brass rod.

The brass square section needs to be approximately 50mm in length, you can trim them once you know exactly how they fit.

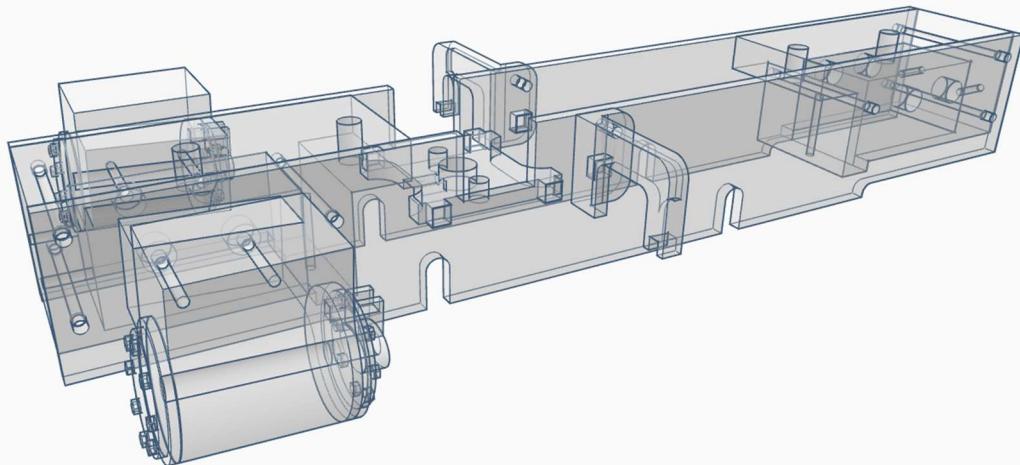
With the motion bracket attached to the frame, fit the slide-bar into the cylinder-block and motion bracket. You need to ensure the cylinder-block is at the correct inclination. Slide the 2mm rod into the cylinder-block and adjust the cylinder-block (loosen the two screws) so that the rod is parallel to the bar.



Locate the two frame stretchers and the motor-plate. The two stretchers are identical.

Attach one of the frame & cylinder-block assemblies, to the front stretcher, and then repeat with the rear. Once you are happy that everything is square, attach the other frame & cylinder-block assembly. Don't forget to sandwich the motor-plate between the frames, the slot on the face is to clear the drive gear on the wheel axle and should face the axle.

**NOTE – THE DRIVE AXLE ON THIS MODEL IS CLOSEST TO THE CYLINDER BLOCK**



## Looking good so far? Let's do the wheels!

There are eight printed inserts for the Binnie wheels, two inserts for each wheel, one with a hole for the crankpin and the other, a counterbalance weight. The inserts push into the wheel from the front and are a good tight fit, but not so tight as to push the wheel out of shape! I found the best way to fit the inserts is to offer them both to the wheel (they have very slight tapers to help you get started). With the two inserts in position, place the wheel and inserts into a vice and squeeze the whole assembly together.

Do this for all four wheels. You may wish to tidy the wheels a little at this stage. Binnie wheels tend to have slight flash marks on the flanges, part of the injection process. I use a file to tidy up the wheels.

Next, add the crankpins. There are six conehead screws in total, 2x 16mm, 2x 12mm & 2x 10mm.

The 16mm screws for the front wheels (for connecting & coupling rods).

The 12mm screws for the rear wheels (coupling rods only).

The 10mm screws for the crossheads.

Do the front wheelset first.

You will need two wheels, two 16mm conehead screws, the  $\frac{1}{8}$  inch axle with the gear and two brass top-hat bushes.

Screw the 16mm into each insert.

Slide a bush onto the axle, the lip of the top hat towards the outside, or wheel.

Next, start pushing a wheel onto the axle. *I use my taper reamer to open the hole in the wheel very slightly, to create an easier start.*

Repeat for the other side, then using your vice, squeeze the two wheels on the axle.

We are looking for a “back-to-back” measurement of 28mm (32mm gauge) and 40mm (45mm gauge) *This is the distance between the back of the two wheels.*

Now do the rear wheelset. Remember, the 12mm conehead screws, and you should have the  $\frac{1}{8}$  inch axle with no gear. Don’t forget the bushes.

**Good.**

**Let's quarter the wheels.**

**This is easy, don't get worked up over it...**

Locomotive driving wheels are quartered. That's to say, the cranks are at  $90^\circ$  to each other. Both wheelsets must be quartered identically to each other. Here's how we are going to do it.



Although the wheels are tight on the axles, they can be twisted.

Try it.

Move the wheels around so they are approximately  $90^\circ$  to each other.

Now place one wheelset in the vice so that the jaws grip the edges of the inserts. The rest of the wheelset pointing upwards.

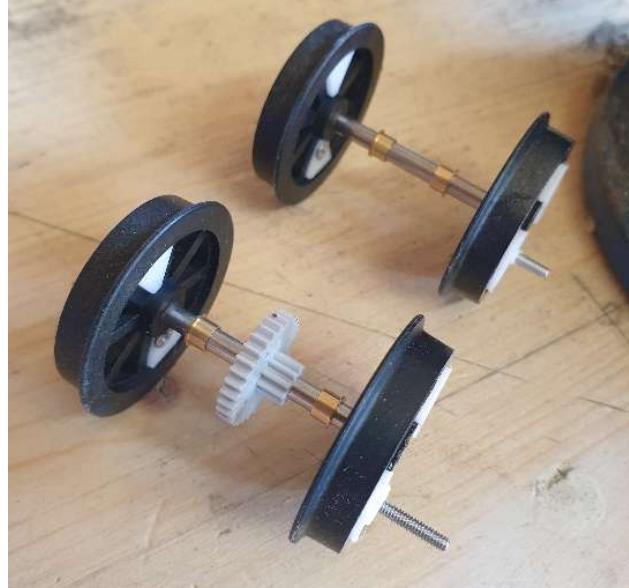
Ensure that whatever you do, repeat for both wheelsets...

I placed my wheelset in the vice, jaws gripping the inserts and the lower crank towards my left, then I twisted the top wheel around so that its crank was at the top of furthest away from me.

With the lower wheel firmly in the vice it is easy to look over the top and see if the top wheel is at  $90^\circ$  to the bottom!

That's it, repeat for both wheelsets. Check your back-to-backs and then check your quartering again. The wheelsets should now drop into your chassis. The lip of the bush should sit outside the frame and is kept place between the wheel & the frame.

Locate the printed retaining plate. It sits in between the frames and screws to the bottom of the stretchers. The plate follows the shape of the frames, and its purpose is to keep the wheelsets in place, pushing up against the bushes.



### We're on the home stretch now! Let's fit the motion.

We have supplied a few extra parts in your kit, I found the crosshead can split, so you have spares and I've included a spare set of coupling rods.

You need two coupling rods (couples the wheelsets), two connecting rods (connects the wheel to the piston rod), & two crossheads. The crossheads are paired, make sure you identify a pair!  
*Technically, these are not crossheads as the loco only has one slide-bar, but...*



Start by screwing the 10mm conehead screws into the connecting rod, there is a countersink printed into the rod. With the screw in place clean the printed area around the screw. This part fits into the crosshead and should be a nice loose fit.

Opening the hole in the crosshead accept the 2mm brass piston rod. The rod will need cutting into two 35mm lengths. Use a file to ensure the ends of the rods are nice and clean. I opened the hole in the crosshead with a 2mm drill bit. Push the rod in as far as you can. But do not obstruct the bore for the connecting rod.

With the piston rod in place, push the

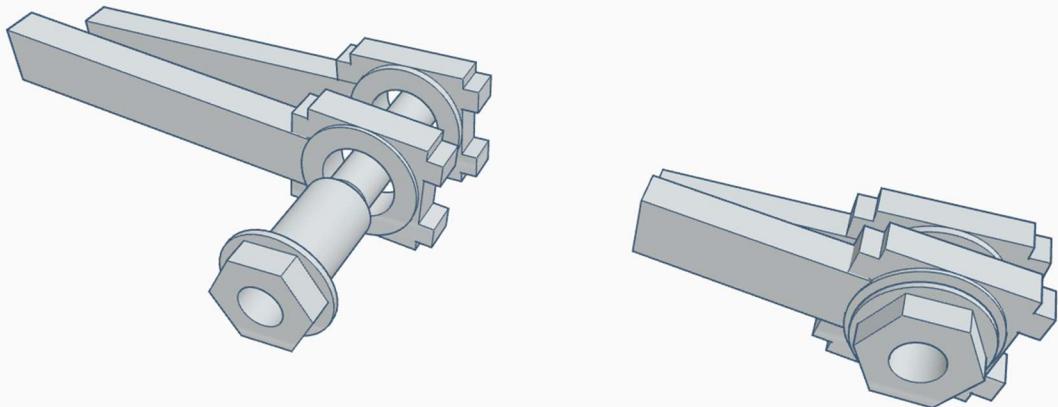
connecting rod into the crosshead and using a washer and nut, tighten the whole assembly. You should find that the rod and crosshead remain nice and loose, but firmly attached to each other? Repeat for the other side.

### Nearly there, one last fiddly bit!

Locate four crankpin sleeves/nuts. This is a new design for Boot Lane, no more messing with tubes!!! You will have some short sleeves/nuts, and some long ones.

These sleeve/nuts screw over the crankpin and are the correct length to capture the coupling rods but still allow them to rotate. The short sleeves/nuts are for the front crankpins, the longer are for the rear crankpins and capture both the coupling rod and the connecting rods.

No more need for tubes, washers and nuts...



The piston rod will need pushing into the cylinder and the assembly rotating until the crosshead lines up with the slide-bar.

With all the rods on, you should now have a free running chassis?  
If not, try and locate where there is a bind.  
More likely than not, it's the quartering?

If your chassis is running freely, attach the motor. There are two screws that are already in the motor. We have ensured the motor plate is already perfectly aligned with the motor and drive gear, no need for complicated alignment, it's already done.

**PLEASE LUBRICATE THE DRIVE GEARS & MOTION  
WE HAVE EVEN INCLUDED SOME OIL FOR YOU.**

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## THE BODY

The body is relatively simple, and if you are prepared to spend a little time cleaning the printed parts and rubbing down the primer, you will achieve some good results.

The body on BLITZEN can be broken down into two parts, the footplate & cab, and the accumulator. There are a number of resin printed detail parts to complete your model.

## THE ACCUMULATOR

This is effectively two large prints, the largest of which is the main body, the smaller is the front piece. The front piece is a good fit into the main part and has flats on it to ensure it stays in the correct orientation. The front piece also has a hole for the recharging valve, a very noticeable part of most fireless locomotives was this valve that was usually mounted at the front of the accumulator. We have supplied a length of 3mm white ABS tube that you can add through this valve if you desire?

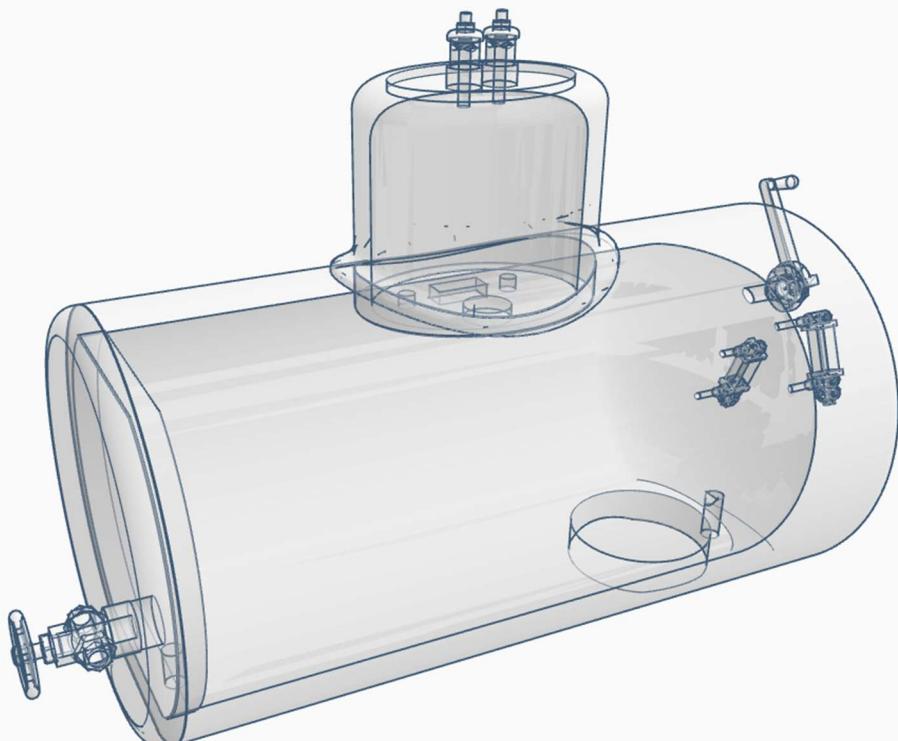
The main part of the accumulator mounts the resin printed dome. An unusual feature of some fireless engines was an elongated dome, this housed not only the accumulators steam dome, but also a "Reducing Valve". These ensured a regulated steam pressure supply to the cylinders.

The practical benefit of the elongated dome for us, is it enables the hiding of both a switch and charging socket on our kit. The switch is supplied; the charging socket is not. As always, we leave the choice of electronics to the individual modeller. The range of different electronics being so varied.

The rear of the accumulator has holes for a regulator (which technically should go through the cab and rear of the dome but would not allow the easy access to the switch) and two, gauge glasses.

You will notice the two glasses are above one another? Remember that the water in the accumulator gives an indication of running time, not whether the firebox crown is covered!!!

The whole accumulator assembly is attached to your chassis, through the footplate by two M3 10mm screws. These are driven up from beneath, through the stretchers, the footplate and into the accumulator.



## THE FOOTPLATE & CAB

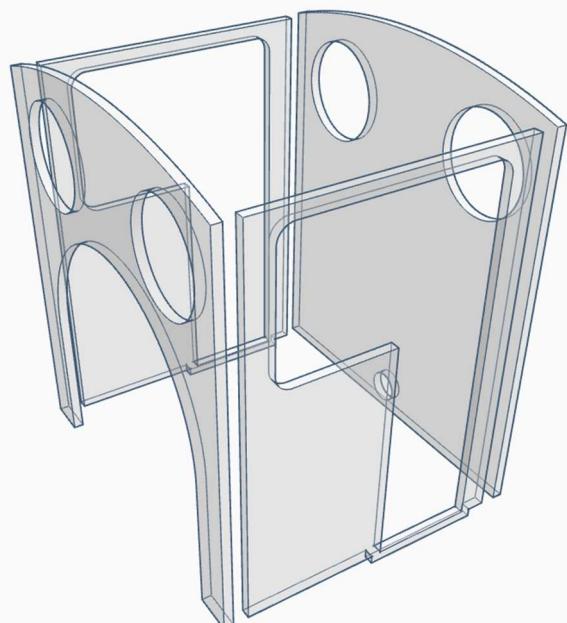
The cab is delicate...

So much so, that we've included a spare side with your kit. It is the cab sides that proved to be delicate, and care MUST be taken during construction.

The cab sides are glued to the inside edges of the cab front & rear pieces. We used a liquid glue.

Ensure it is constructed correctly, the printed roof piece should fit comfortably into the cab once it is together.

The black 0.5mm roof section covers the printed roof piece. The notch is for the resin printed exhaust pipe running up the rear of the cab.



Cab window frames fit into the cab front and rear, and there are 1mm acrylic discs to represent the glass windows.

Handrail knobs fit into the cab sides, and lengths of 1.5mm brass is supplied for the handrails. (cut to 50mm lengths).

The cab fits into the footplate, the two slots in the footplate locate the cab in the correct place.

There are two toolboxes (the running/footplate looked terribly bare), these can be fitted along the footplate if you choose?

The exhaust pipe is fitted to the rear of the cab, there is a smaller elbow exhaust pipe that fits into the cab, a hole in the footplate and the cab rear for the elbow.

Bufferbeams are held in place with two M2 8mm screws, through the buffers, and driven into the stretcher at both the front and rear.

We also included a resin printed handbrake standard and reversing lever as extra cab detail.

An electronic copy of these instructions can be found at -  
[www.bootlane.org.uk](http://www.bootlane.org.uk)

*Andrew & Jacqui*

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