

This was the stage when the loco started to really take on a personality, all the bits and bobs giving the boiler real character.

It is worth pointing out at this point that several sizes of hexagon headed BA set screws, together with matching nuts and washers, were used during the detailing of the boiler. These screws are readily available in the UK but should you have difficulty in obtaining BA screws then the major thread diameters are shown below to aid sourcing equivalents :-

Nominal Size BA	Major Diameter mm	Major Diameter inches	Clearance Drill Size
8BA	2.2	0.086	#42
10BA	1.7	0.067	#51
12BA	1.3	0.051	3/64"
14BA	1.0	0.039	#61

Boiler Front.

The first item to be constructed was the boiler front or smoke box door. This was formed from four circular pieces of 0.080" (2mm) styrene. The first piece, the inner locating spigot, was achieved by drawing round the outside diameter of the boiler directly onto the styrene and then drawing six tangential cutting lines touching the curve.

The hexagon was now cut from the styrene and a centre point punched in and a 1/4" hole drilled through. A 1/4" bolt was passed through the hole and secured with a nut and washer. My electric drill was securely clamped in the jaws of my workmate bench and the free end of the bolt was gripped in the chuck of my drill and held tight.

Once the drill was started I simply held a file against the outer edge of the revolving hexagon and formed a disc. Progressing slowly with many trial fits into the boiler shell I achieved a nice firm push fitting disc.

The disc was now cemented to a larger hexagon and the unit placed onto a section of tube from which the boiler had been cut. The short section of pipe with the spigot and outer hexagon in place was gripped in the bench vice and careful filing reduced the outer hexagon to an exact profile of the boiler.

A third disc, approximately 1/4" less in diameter than the boiler front was now formed and placed centrally onto the outer side of the boiler front, the 1/4" diameter hole being extended through all three sections to enable accurate bonding of the discs to each other.

The centre boss was formed by using a 1/2" diameter washer glued to the rear of a 7/8" diameter disc thus allowing the centre boss to stand clear of the front plate. The washer was then glued to the centre of the boiler front.



Boiler front marked out round Tube and cutting lines added



With a 1/4" bolt through it's centre and gripped in the drill chuck the desired diameter disc is achieved.



Inner disc with outer front waiting to be turned.



Outer disc waiting to be filed to boiler outside diameter.



Filing the boiler front to fit the boiler diameter

The bolt detail was achieved by using 10 BA hexagon headed screws for the outer circle of bolts and 12 BA screws for the inner circle. Nuts and washers on the inner of the boiler front held all the nuts securely in place. The screws being cut to length once secured in place using a disc cutter in a hand drill.

The smoke box door hinges were formed from styrene strip and sewing pins acting as dummy rivets a short length of small diameter rod representing the hinge bar.

The headlamp support frame was the next undertaking. A short length of the original boiler pipe was wrapped with masking tape and the bracket profile drawn on with a permanent fine tipped marker pen. The shape was carefully cut from the pipe section with a cutting disc, dressed with a file and the decorative holes added. A 1" x 1/4" flat base plate was cemented to the top of the support and the unit then cemented to the boiler front using the third disc as a support. This was a nice simple way of achieving a robust support bracket that was well supported.



Lamp bracket marked out on a section of the tube used for the boiler shell.



Bracket fits outside the second disc on the boiler front.



Completed boiler front.

The headlamp is basically a rectangular box with a double bottom, one inner and a larger outer base plate. The side panels have an external raised panel on the outside that has bevelled edges achieved with a small file before gluing to the lamp sides. The side brasses are drawing pin heads glued in place. A 5/8" hole forms the front opening with a piece of clear acrylic sheet forming the lens and held in place with double sided tape. The outer "brass" ring is a fibre washer painted gold! A short length of styrene tubing provides a hold for the light bulb. The inside of the headlamp casing is painted silver to aid illumination.

The lamp cap is formed from 0.080" styrene. The inner piece being a good push fit to enable removal for access to the bulb. The top being shaped from several pieces cemented together then topped with a truncated piece of 1/4" styrene tubing.



Lamp ca

The lamp was eventually fixed to the support plate with four 12BA brass screws, nuts and washers to permit removal should the need arise.

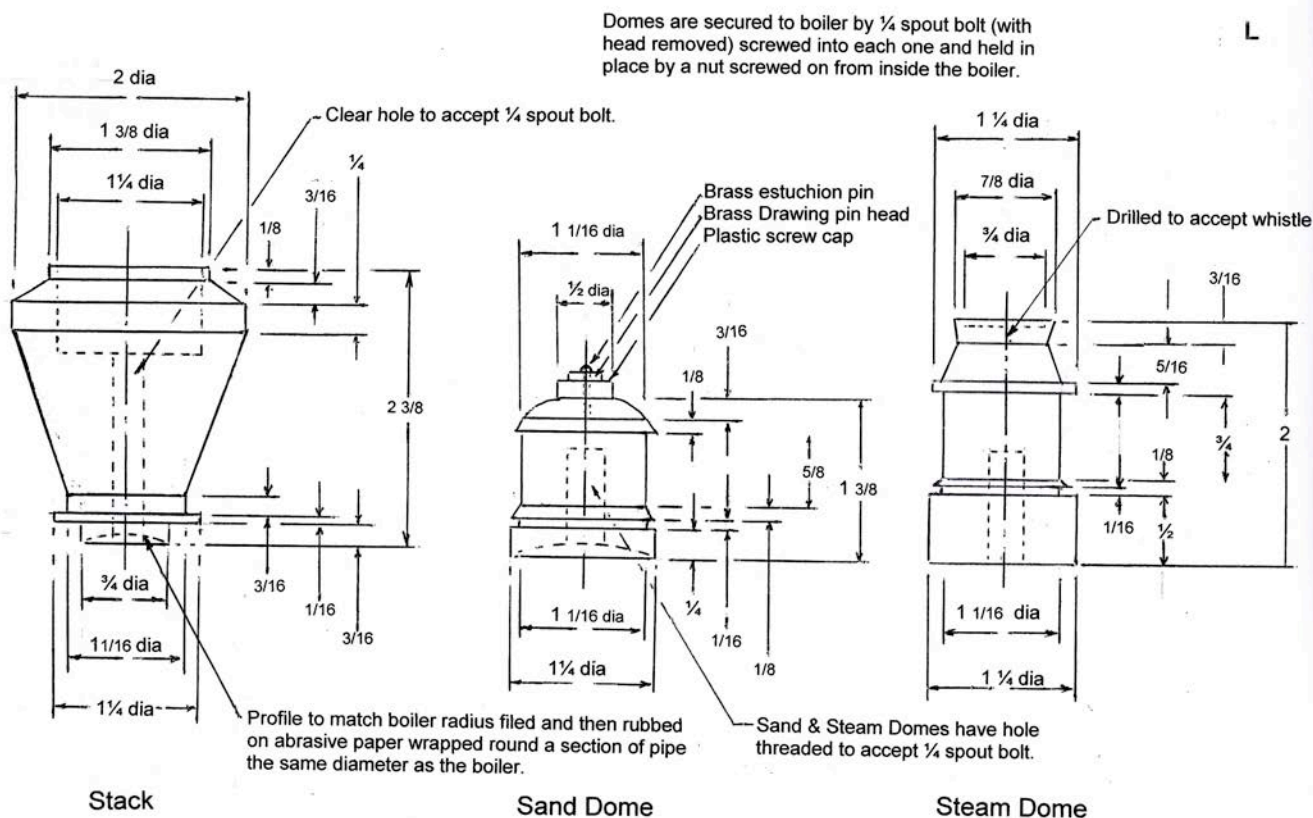
Bell, Smoke Stack & Domes . The easy bit was the bell. I bought a ready made bell from the "bits box" of my local G scale supplier.

The smoke stack and domes were somewhat more complicated to achieve. My son Dave suggested using acrylic rod for both the smoke stack and the domes – great idea. The internet came up with several suppliers and I thus purchased a 9" length of 2½" diameter acrylic black rod for the smoke stack and a 12" length of 1¼" diameter white acrylic rod for the domes. Adequate to make twice the quantity I required just in case I had a disaster.

The rods were cut into suitable pieces then the drilled to a depth of 1" and tapped whilst the black, smoke stack lengths were drilled all the way through.

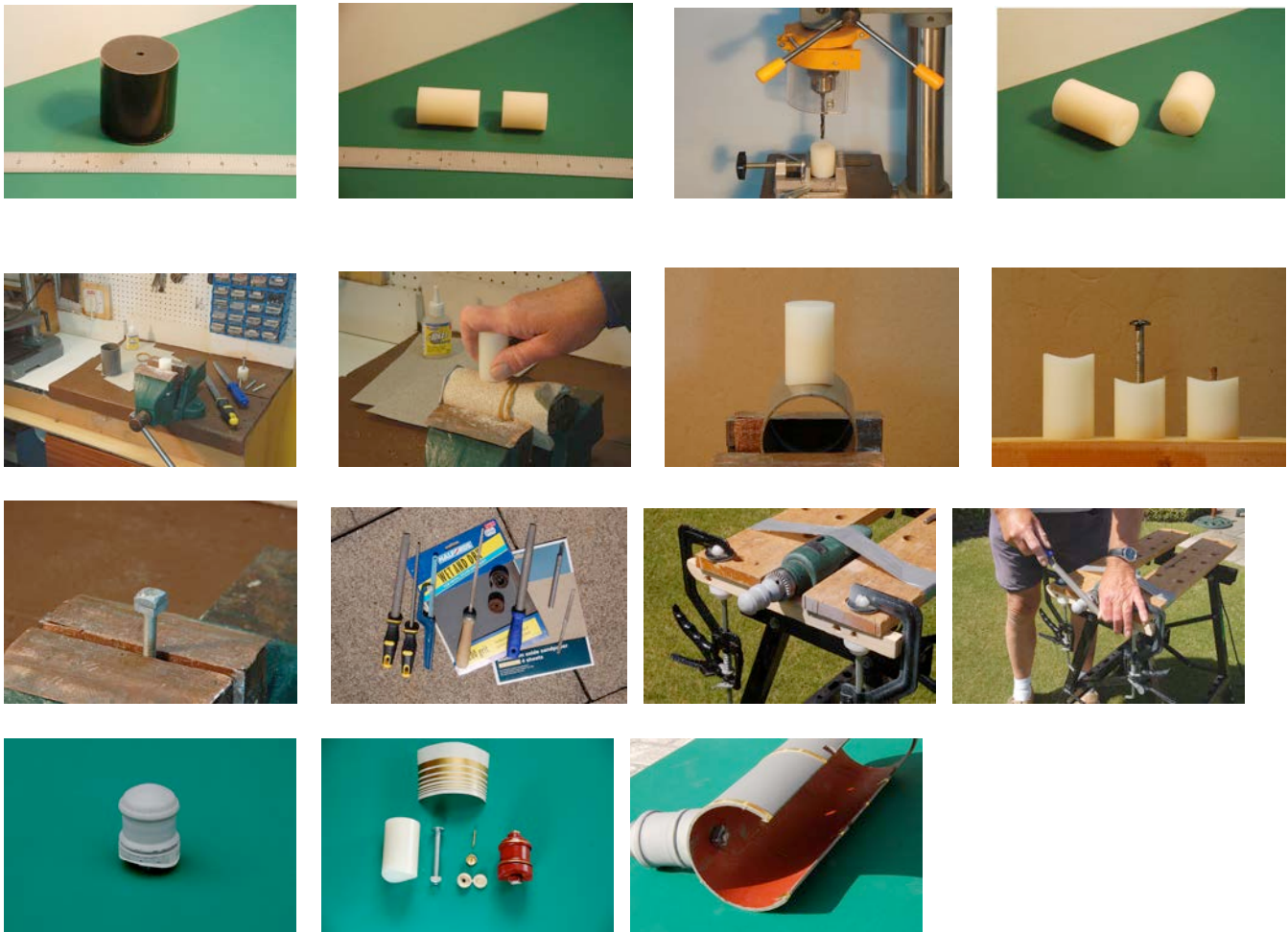
I found it just about impossible to work the larger smoke stack piece and resorted to asking Dave to turn it to shape in his lathe. (This was the only external help I needed during the entire project).

Once the stack had been turned the lower narrow boiler end was filed to a profile to match the boiler shell using a 12" half round file. This was followed by pulling the filed surface over a piece of sandpaper wrapped round a length of the pipe used for the boiler. Once a good fit was achieved the ¼" bolt was secured in place with a spot of CA adhesive to ensure it would not turn once it was in position on the boiler.



Stack, Sand and Steam Dome Details

All dimensions in inches.



The stages in producing the smoke stack and boiler sand and steam

Twelve 0.04" diameter holes were then drilled around the dummy flange at the base of the stack to accept 14 BA brass hexagon headed screws with nuts and washers being offered from below. Once the nuts were tight the screws were cut to length.

The domes were produced in a somewhat less sophisticated manner. The boiler matching curve was achieved in the same way as for the stack and the ¼" bolt was secured and it's head removed

I undertook the next stage in the back garden so as not to scatter dust all over my work room. With protective goggles in place I clamped my electric drill in the mobile work bench, secured the protruding bolt length in the drill chuck and using a variety of files I turned the acrylic rod in to the desired shape finishing off by holding smooth grade emery tape against the revolving dome. This was fun and quite rewarding and surprisingly I didn't need my spare pieces of rod !!

The top of the sand dome was further embellished with a plastic screw cap being glued in place and then a brass drawing pin head and estucheon pin were kept in place with the pin being driven into a 1/16" hole drilled through the screw cap and into the dome. The pins were then removed to be replaced after painting.

The whistle on the top of the steam dome was lurking in my bits and pieces box, though it would be a fairly easy job to fabricate one.

The stack and domes are secured to the boiler by passing the bolt lengths through ¼ " holes drilled through the boiler shell and secured with nuts that were rounded on their upper faces so as to make better contact with the internal curve of the boiler.

Two sets of seventeen holes were drilled around the boiler $\frac{1}{4}$ " and $1\frac{1}{2}$ " back from the boiler front to accept domestic sewing pins simulating rivets. These were cut off on the inside of the boiler and held firm with CA glue.

A $1\frac{1}{4}$ " pad representing the stack base connection to the boiler was formed from thin styrene and glued to the boiler between the two rows of rivets. Twelve rivet holes were drilled and pins inserted. The $\frac{1}{4}$ " diameter hole was then drilled through the pad.

Boiler straps. $\frac{1}{64}$ " x $\frac{1}{8}$ " brass strip was used to form the four boiler bands. Having decided on the location for each band a notch was formed with a needle file on each lower edge of the boiler to accommodate the straps. One end of each strap was bent over and the strap located in one notch. The strap was then bent slowly over the boiler and into the opposite notch keeping a slight pressure on the boiler to ensure a firm seating. Once in place the ends were pressed firmly against the inner side of the boiler.

Once all the bands were in place and checked for alignment, a faint pencil line was drawn against the front edge and the straps removed and labelled with masking tape labels to ensure accurate relocation after painting of the shell. A $\frac{1}{16}$ " hole was drilled in the boiler top, beneath each strap, using the pencil lines as a guide. These holes were to allow a small dab of CA glue to help hold the straps in place on final assembly.

Handrails. The handrails are $\frac{1}{16}$ " brass rod with $\frac{3}{64}$ " x $\frac{1}{2}$ " long brass split (cottar) pins as supports and 12BA brass washers placed beneath the pin heads to give a more prototypical appearance. $\frac{1}{16}$ " holes were drilled into the boiler shell and the split pins, with washers in place, fed through the holes and bent slightly against the inside of the boiler shell. (They would be bent firmly in place upon subsequent insertion after painting). The ends of the handrails were rounded with a file and fed through the pin heads. No glue was required as friction took over!

Both rails, with pins in place, were now removed, labelled left and right, and placed aside



Formation of handrails from brass rod, split (cottar) pins and washers.

Piping. All external boiler piping was formed from $\frac{1}{16}$ " brass rod bent to fit by hand. The four sand pipes are held in place by $\frac{1}{16}$ " diameter holes $\frac{1}{4}$ " deep in the sand dome and $\frac{1}{16}$ " holes in the deck plate. The feed pipe from the air pump is secured into the pump and a $\frac{1}{16}$ " hole at a low level near the front of the boiler. The steam sand feed unit pipe fits into a hole in the sand feed unit and is also secured with a $\frac{3}{64}$ " split pin in front of the cab.

The steam sand feed unit was fabricated from the nozzle of a domestic air freshener and fixed to the boiler with a 12 BA brass hexagonal set screw, nut and washer.



Steam sand feed unit fabricated from air freshener nozzle.

The air feed pump is the item from the Piko loco. A small washer was glued to it's base and a small self tapping screw fed from under the running board to hold the item in place.

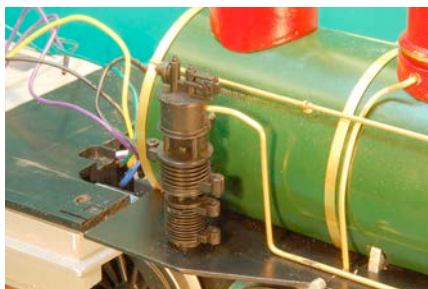
Painting and finishing. All the detail items were removed from the boiler and everything cleaned, given a coat of grey primer for the boiler and stack, red for the domes and lamp. (NOTE I use automotive spray cans for all my spray work).

The red used for the domes and lamp is Peugeot Regency Red, Citreon Meteor Grey for the boiler front and stack and Rover Brooklands Green for the main boiler. All good European auto companies.!!

Once the stack was secured to the boiler the flat upper band was wrapped with gold Pactra Trim Tape. (This tape comes on 72" rolls with strips of 1/32", 3/64", 1/16", 3/32", 1/8", 3/16", 1/4", & 3/8" widths on a single roll). The inner surface of the stack was painted matt black.

The whistle from the Piko Loco was fitted into a 1/16" hole in the steam dome. The final touch was to fit the two makers plates, one to each side of the boiler. The plates, made by a specialist model engineering name plate manufacturer, feature the name of my fictitious railroad (Seath Valley Railroad) as the manufacturer and granddaughter Jocelyn's date of birth as the product number.

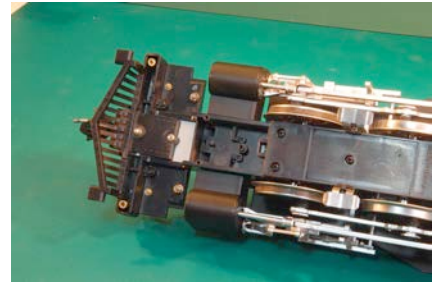
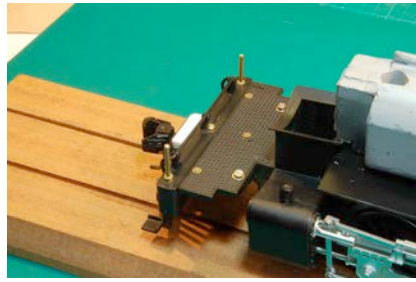
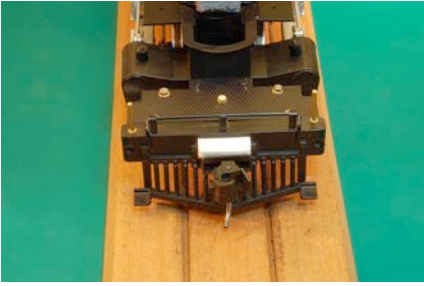
Placing the boiler onto the cover plate the location of the 1/16" holes for the four sand pipes were marked off and the holes drilled. The Boiler was now complete.



Completed boiler assembly showing details added.

The front pilot was next in line for modification to accept a K.D. 830 coupler. It was only necessary to open up a rectangular hole as far down as the top of the cow catcher rivets, fit styrene packing the coupler is held in place with BA set screws. Set screws were also used to secure the front beam / cow catcher to the pilot.

The existing holes in the pilot deck were filled with 14BA Set screws with nut and washer below to give a realistic effect.



Front pilot and coupler details