# Construction

## The boiler and Primary Boiler Fittings

**Narrow Gauge Down Under**

Some folks have asked, why I haven't published more about my locomotive models or prototype history. The truth is that I have! For the last 3 years, I've been a regular contributor to my favorite Australian Narrow Gauge Magazine, called 'Narrow Gauge Down Under'. The magazine covers all things Narrow Gauge, from all parts of the world. My articles have covered the history and model construction of 4-4-0s, C-16s, South Park Mason Bogies and Cooke Moguls, and other odds and ends. The Magazine is available in the US and UK as well as in Australia. For more info, or questions, refer to the Magazine's web site:

http://www.narrowgaugedownunder.com/

My articles are structured not unlike this MasterClass, where much emphasis is placed on the background or prototype specifics as well as building the model. Building a model becomes so much more an adventure when the model can be tied to times, places, people and specifically the actual loco that the model is based.

I firmly believe the finest hours spent in this hobby are found in the 'journey' of a model-making endeavor. It's a journey that begins with a dream and leads through history books, old photographs, written observations and historical accounts with the tracing of specific prototype histories and drawings. This is paralleled with construction calculations, engineering and model making techniques, chasing the 'right' detail parts, painting and material selection...it's a journey that can take you to far flung parts of the world with nothing except a sleeping bag, camera, note book and tape measure...its fun and it makes building a model so much more fun and rewarding. It is my intention though this MasterClass to give you a taste of this holistic approach to building a model. I hope you get goose bumps when you apply the very same rivets to your model that men in times past applied, and you know why the rivets are there in the first place!! This is not rivet counting, but understanding.

**Cover Note - Painting:**

Think hard about how you want your model painted. If painting straight black or grey, then you can fix all the boiler parts in the order described in this text, and spray paint the lot at the end of the chapter. However, if painting with a Russia Iron jacket, you will have to follow these instructions, but fix nothing to the boiler permanently until the end of the chapter, after the boiler pipe is painted separately from the domes, stack, sideboards etc. You will have to consider the painting procedure yourself, but with one caution, don't paint too soon, best fabricate everything in this chapter and paint them as separate assemblies then assemble all the components at the end.

**A note About Russia Iron**

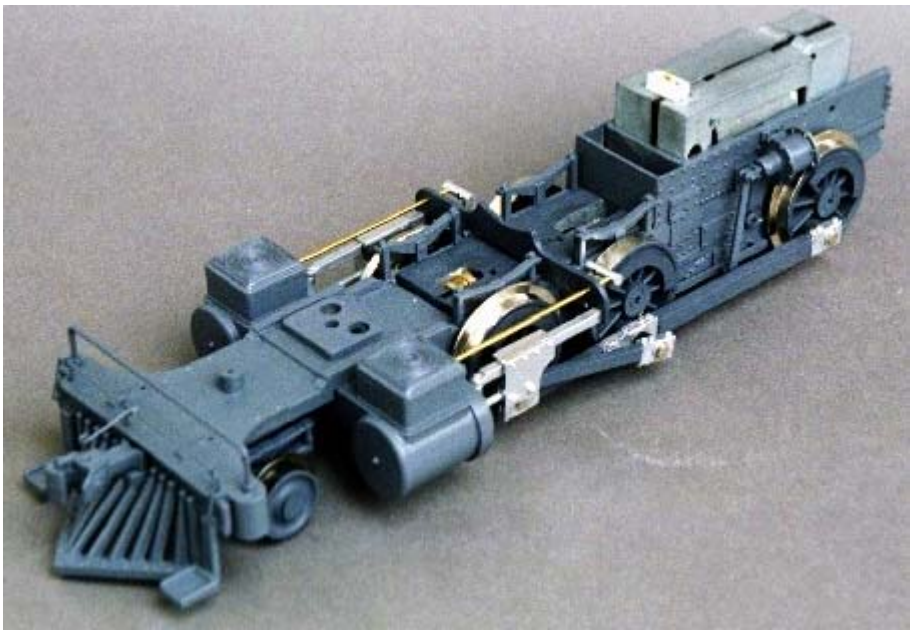
I was going to go into a bit of background about Russia Iron boiler jackets, that long lost metal treatment system, but in order to save my sanity and that of our host, I think it better I just let you loose on a very good on-line description and history of Russia Iron. Please check this link:

http://www.railway-eng.com/dspp/russiron.htm

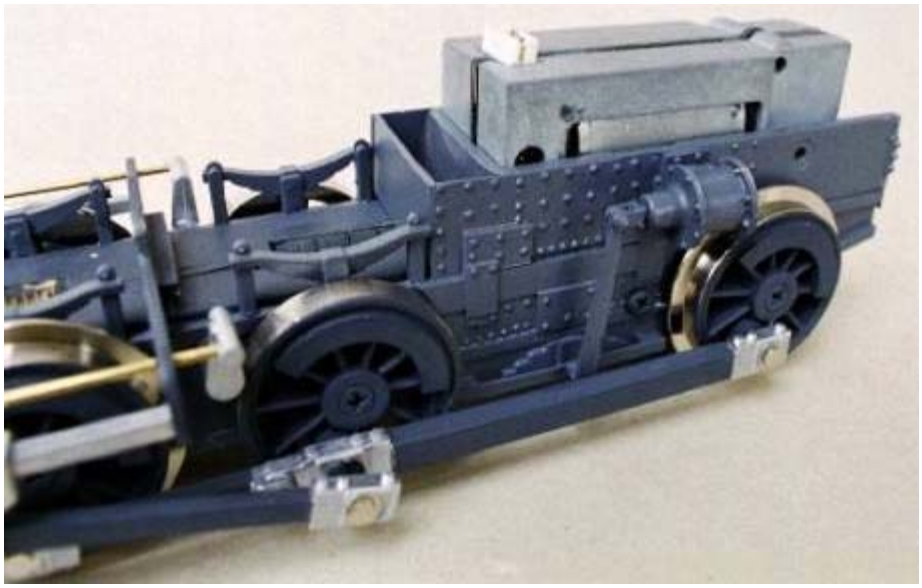
....there are old loco builders...and there are bold loco builders...
...but there are no old, bold.....

Right-ee-oh, lets get onto fitting a boiler to our chassis. Do please pre-read the chapter before starting work, you may wish to apply the details in a different order.

When we last departed at the end of chapter 3, your model should have looked something like this:



*The chassis as seen at the end of chapter 3*



**Cutting the Boiler Pipe**

Take your 43mm diameter PVC pipe.  When I mention the diameter of various pipes, these are outside diameter dimensions.  You have to cut the pipe to the right length, and cut it so the ends are perfectly square to the length.  NO Crooked Cutting OK!!

**Step 1:**

To cut the pipe with a straight cut is not easy, It is not as easy as cutting along a ruler. Cutting around the pipe can often lead to very crooked cutting.

Using some 1/2" wide masking tape, wrap a length clean round the pipe. If you find the tape does not meet its starting position in a straight line, then the tape in on the boiler crooked...peel off the tape and wrap it around the pipe again...and do so again until you get the tape wrapped right round with its edges aligning. What this tape does is provide a true cutting line that will be square to the pipe length.

**Step 2**

Cut along the edge of the tape with either the razor saw or fine bladed hack-saw. Do not just clamp the pipe and cut right through...you'll go crooked, rather cut a little, rotate the pipe, cut a little more and so-on, always following the tape edge on the pipe. When cut through, you should have a neatly cut pipe end, square to the pipe length.  Lightly sand the cut end.

*Cutting along evenly placed masking tape to guide a straight cut.*

With the pipe end cleanly cut, measure out a pipe length of 170mm exactly and place a new length of tape in that position to cut the other end of the boiler. Again carefully cut the pipe by cutting and rotating the pipe, while following the tape edge as a guide.

We now have a 170mm length of pipe which will shortly become our 2-6-0 boiler. This boiler length is for both the 1:20.3 and 1:24 scale versions.

To test the accuracy of your cut ends, place the pipe on a smooth surface or bench and roll the pipe...look at the ends of the pipe as it rolls. If it appears to wobble, your cut BAD!! If the cut end doesn't appear to move or wobble you'z got an A1 first rate made in America cut!!

**Please note, if you're intending to use the Bachmann 2-4-2 cab on this loco**, your cab is a tad longer than the Delton Brass 1:24 scale cab...thus you have to cut your boiler a tad shorter. If using the Bachmann 2-4-2 cab, **your boiler length will be 164mm long instead**...that is 6mm shorter!!

## Setting Your Boiler Datum

In order to fix domes, stacks, side boards and other fittings to the boiler in lines parallel to the boiler itself, and symmetrical to both sides of the boiler, we have to set up a boiler Datum line. Don't get slack here and just glue things on where you think they look OK, you'll be disappointed when you look down the front end of your finished loco and see the stack pointing in one direction, the domes another, the sideboards higher on one side than the other and the cab leaning to one side. The boiler datum sets out all these features accurately.

We have two datums to set, the upper datum and the lower datum. The upper datum is a line along the very top of the boiler and is the line where the domes, bell and stack are fixed. The lower datum is the opposite line along the bottom of the boiler.

**Step 1 - Setting the Datum Line**

Place the 170mm pipe on a nice smooth flat surface. Using tape or blu-tack or some kind of putty, fix the pipe to the bench so it wont roll. Next look close at the point where the pipe end touches the flat surface....mark a pencil line on the pipe end at the exact point where the pipe touches the bench...without moving the pipe, look at the other end of the pipe and mark the point where it touches the bench as well....theoretically both these marks are at the same position at opposite ends of the pipe and a line drawn between them will provide you with a datum line that is exactly parallel with the pipe itself. Draw a pencil line between the marked pipe ends. This is your upper Datum line. If you tried to draw this line by sight, you'll probably have a line that looks parallel with the pipe, but actually veers off to one side. Your domes and stack would all be pointing in different direction!!

**Step 2 - Testing the Upper Datum Line**

Now we test the datum line. Place the pipe on end, at the edge of a table. Get a 3 ft length of cotton threat and tie a weight onto one end...use one of your brass loco parts if you like. Something small and heavy is needed as a 'plum bob'. Hold the end of the cotton onto the top end of the pipe right on the top of the datum line. Use your thumb to hold the cotton in place. Let the cotton hang taught with the plum-bob weight at the bottom hanging down near the floor. Now we let gravity tell us if the datum line we drew was accurate. Watch where the cotton aligns with the drawn datum line. Make sure the plumb bob is not swinging!! If the cotton line aligns with the drawn datum line, your datum is A-O-K. If the drawn line veers off to one side relative to the cotton line, you gotz a problem!! This whole test depends on the cut boiler end being 'square' in the first place or the boiler will not be standing vertical for the test!! If you're not sure of the accuracy of the cut end, try the plum bob test standing the pipe on the other end instead and double check it.

**Step 3 - the Lower Datum Line**

Next we need to measure the diameter of the pipe exactly. A 43mm pipe should have a circumference of 135mm, that's based on the 2-pie-r formula. That's:

**2x3.1415926(pie)x21.5(Radius)**

You will need to confirm your exact diameter, radius and circumference. My pipe might be slightly different to yours.

To make measurements around the pipe you need a reeeeeel thin ruler....the thicker the ruler, the larger the circumference measurement becomes!! To make your own reeel thin ruler, cut a 1/2" wide strip of paper, 200mm long. Place a mark every 5mm along the edge of this length of paper. If the circumference is 135mm, then the half circumference is 67.5mm. Lay the paper ruler out flat and place a mark at the 67.5mm point. Place a bit of tape on the end of the paper ruler and stick it to the upper datum line on the boiler, wrap the paper ruler around the boiler till you reach the 67.5 (half circumference) point and mark the boiler at that point. Next wrap the paper around the boiler in the opposite direction and see if the 67.5 mark comes to the exact same spot. We're talking real accuracy here. If your boiler is slightly wider or narrower, the circumference will be slightly different. Do this same procedure near both ends of the boiler. Thus using the upper datum line, we're marking an accurate lower datum line exactly 180 degrees from the top of the boiler. Draw

another pencil line connecting the two marks and you have the lower datum line. Again check this line is parallel with the pipe by using the plumb bob.

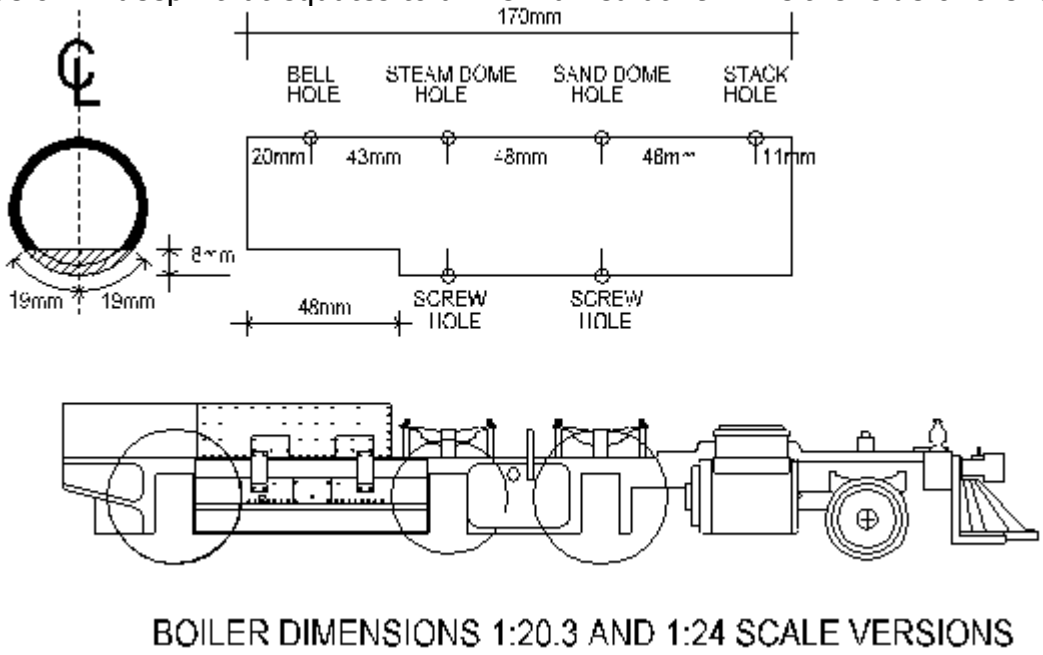
*Note the upper datum line and the paper ruler taped to the datum used to mark out the lower datum under the boiler.*

## Cutting the Motor Block Slot

We now need to cut out the rear of the boiler when the pipe runs over the motor block and connects with the chassis firebox.

**Step 1**

Follow this diagram. Remove a 48mm long section of pipe away from the bottom of the boiler. The section is to be 8mm deep...that equates to a line marked at 19mm either side of the lower datum.




BOILER DIMENSIONS 1:20.3 AND 1:24 SCALE VERSIONS

I know the text in the above diagram isn't clear on screen, but if printed out, it becomes clear. Also if you cut and paste the page into a word document, you can zoom into the page and read the dimensions better. Mark out the area to be cut like this:

**Step 2 - cutting the section out**

Use a razor saw to cut into the boiler at the forward 48mm mark, across the pipe. Then use a sharp knife to cut along the length of the section to be removed. The cut boiler should look like this:

**Drilling the holes for the stack, domes and bell**

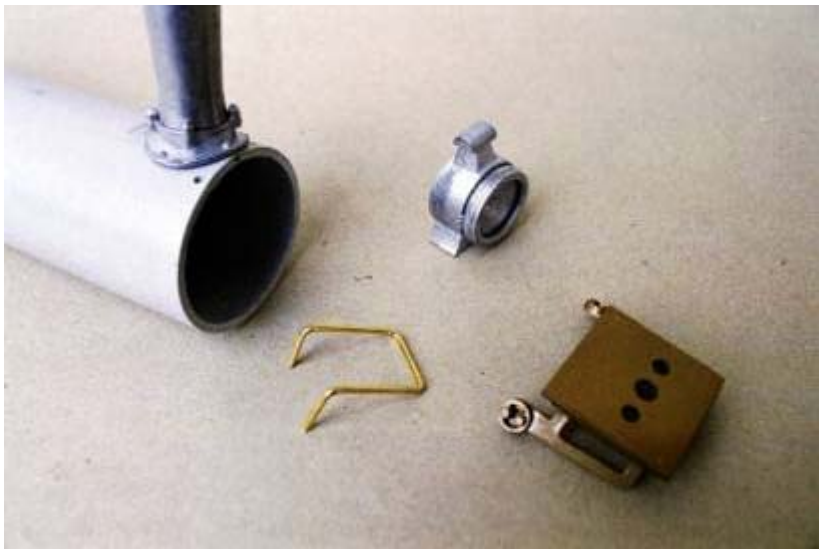
Follow the set out on the diagram above. Drill four holes along the top datum line to locate and bolt in the domes, stack and bell. Depending on your choice of stack, bell and domes, the sizes of the holes to be drilled is up to you. Just drill them big enough for the bolts to pass. When drilling the hole for the stack, the hole might have to be quite large. Its best to drill a small hole first and widen with a large drill after.

**NOTE**: The sand dome has some location flexibility. The sand dome location on my model is set slightly rear of the boiler section center, in order to fit the dynamo between the stack and dome. If building the earlier version, you may want to move the sand dome about 7mm further forward than indicated in my setout drawing. Also review the sand dome location of the prototype Class 40, in chapter 1.

Directly under the sand and steam dome holes, drill two holes on the lower datum line as access ports for the screw driver to fit so you and tighten the dome screws from below when attaching the domes.

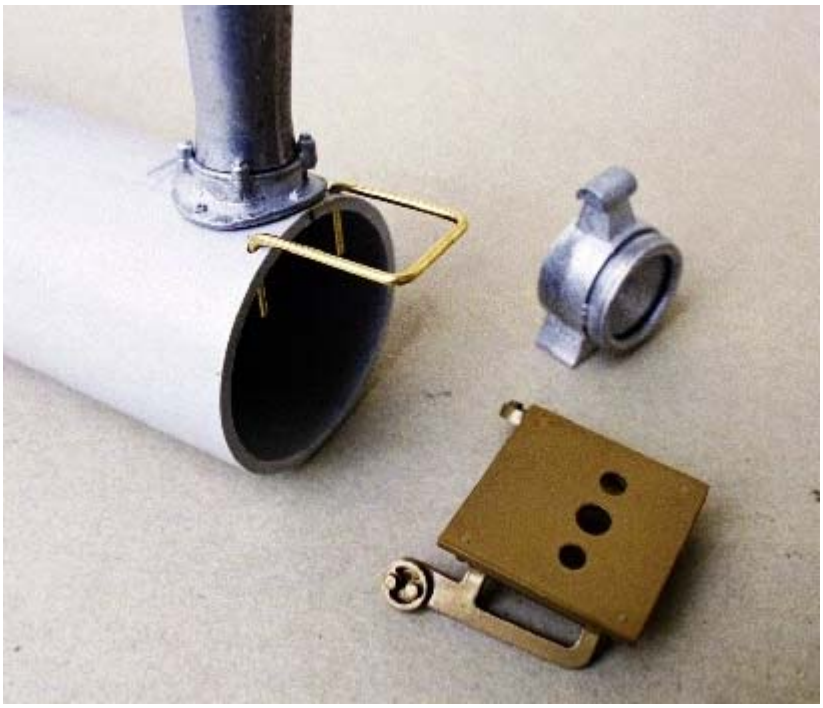
**Fitting the headlight**

Time to fit the cute brass C-16 headlight bracket. There is no easy way to bolt the bracket onto the boiler front and bolt it on square to the upper datum line...so we don't even try. Make a second bracket made of 1.5mm brass rod as a platform for the headlight bracket casting to rest. Bend a brass 'square' shaped bracket from 1.5mm rod, make it 25mm x 20mm...large enough not to get in the way of the three holes in the headlight bracket. Bend the ends of the rods down perpendicular to the brass square you've formed. We then drill two small 1.5mm holes 3mm back from the front cut end of the boiler. Drill the holes equal to either side of the upper datum line.



*The above picture shows our false bracket made from 1.5mm brass rod,*
*and the two holes in the front of the boiler where the bracket will be inserted.*

Next insert the brass rod bracket into the boiler and check the unit is level where the headlight bracket will rest.



*Brass rod bracket in place.*

Then you can either solder or preferably glue the C-16 casting to the rod bracket and fix the headlight as you desire. Note the middle hole in the cast C-16 bracket is for the headlight globe to fit. The other two holes are there to screw fix the headlight itself. If you're using a C-16 style box headlight, the headlight will screw on with all holes aligning. If using a casting or such as I am, drill two holes in the headlight base to correspond with the two holes in the bracket and screw the headlight into place on the bracket, thus:

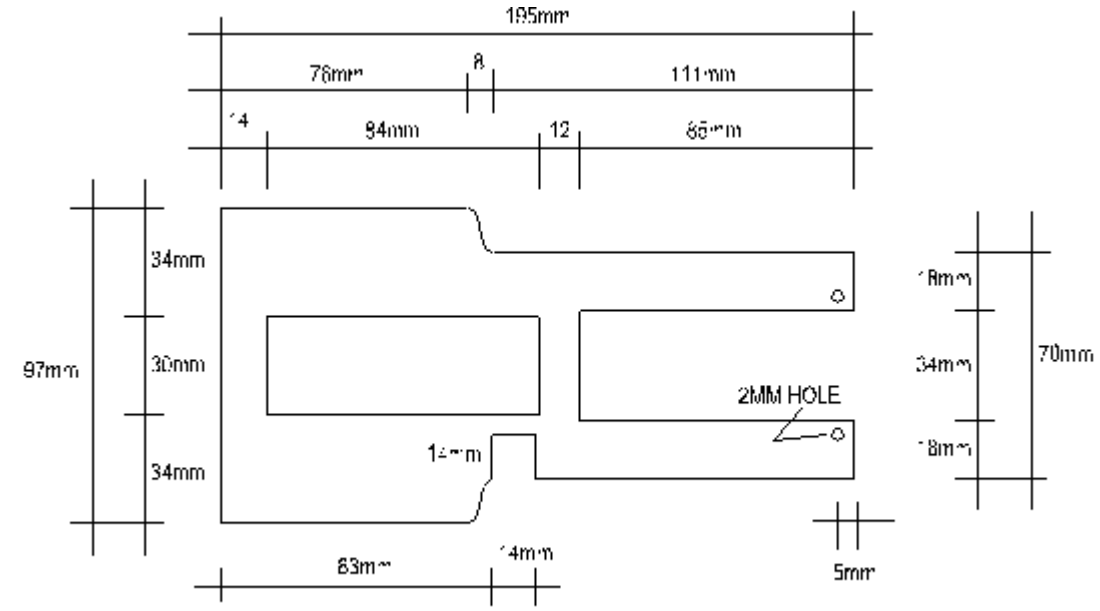
**Making the side boards and cab floor**

This will be a one piece unit cut out of **2mm styrene sheet**. Please follow the templates here and cut your side boards/floor unit as close as possible, note the 1:20.3 version is larger than the 24 scale version.

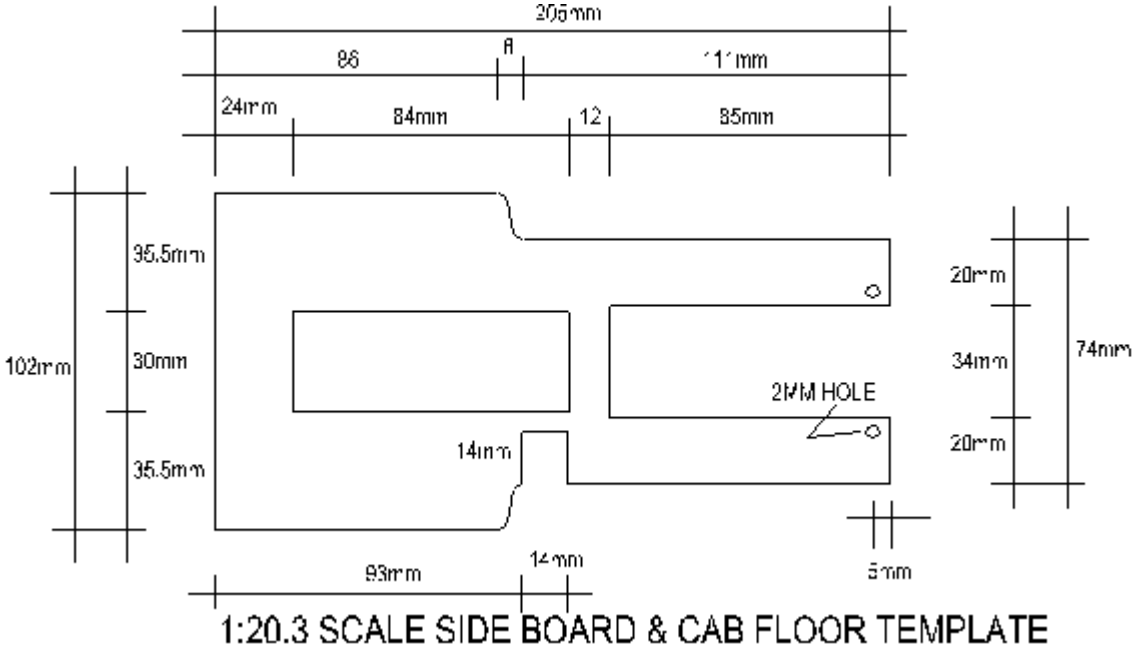
**NOTE:** You may want to widen the sideboard width, to make the loco look wider, lower slung. The widths on these templates are based on typical sizes for a loco of this type.

For those building the 1:24 scale version, and using the Bachmann 2-4-2 cab, the cab floor on the 1:24 scale template is too wide. You will need to slice 3.5mm off each side of the cab floor area only....leave the side board area unchanged.

Here are the templates:




1:24 SCALE SIDE BOARD & CAB FLOOR TEMPLATE

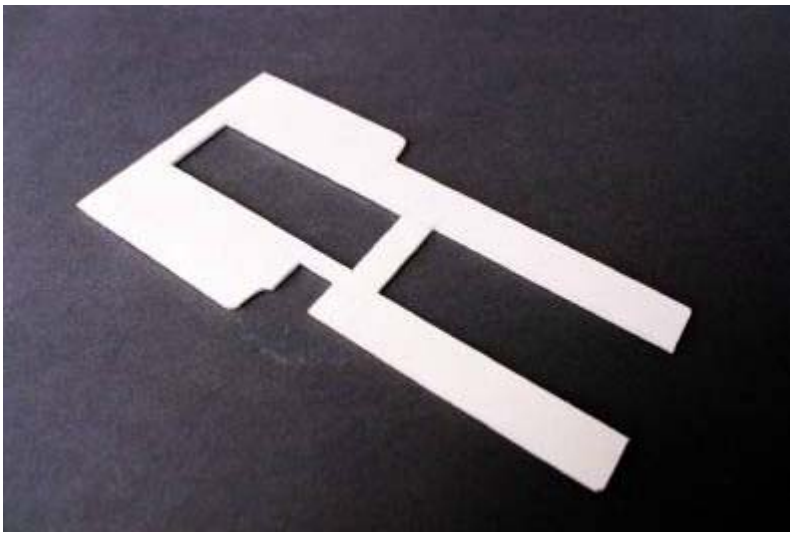



1:20.3 SCALE SIDE BOARD & CAB FLOOR TEMPLATE

Again please print out this page, or save to a word file to zoom in and read the numbers.

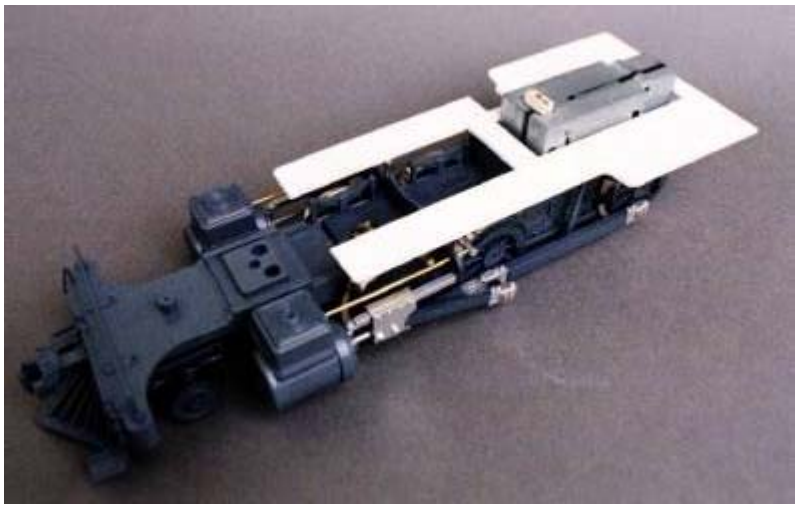
When cutting the 2mm styrene, simply cut in heavy score lines and then snap along the cutting lines by folding the styrene.

Here's what the finished template should look like:

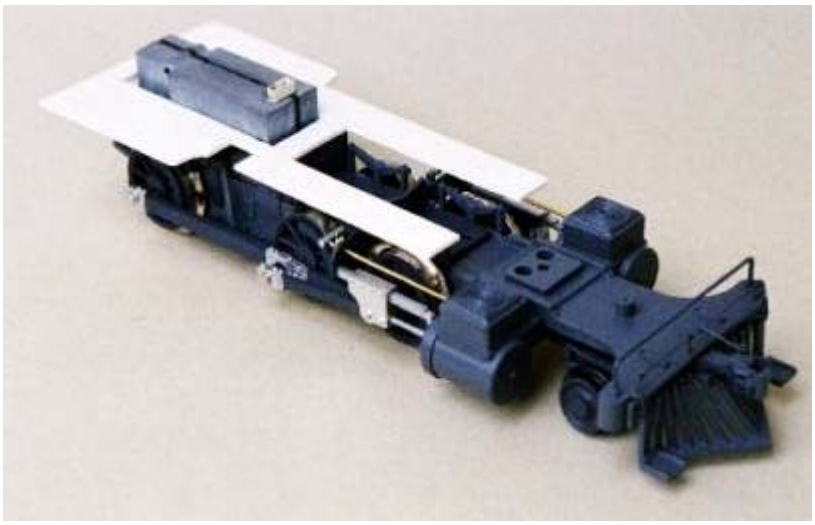


*The completed sideboard/cab floor made from 2mm styrene.*

Drop the floor onto your chassis assembly and test that it fits. There will be no lateral play at all, but you will be able to slide the floor up and back along the length of the chassis by a few millimeters. The actual location you want is one where the rear edge of the cab floor is 2mm -3mm proud of the end of your chassis.  Do not glue this part at all!!

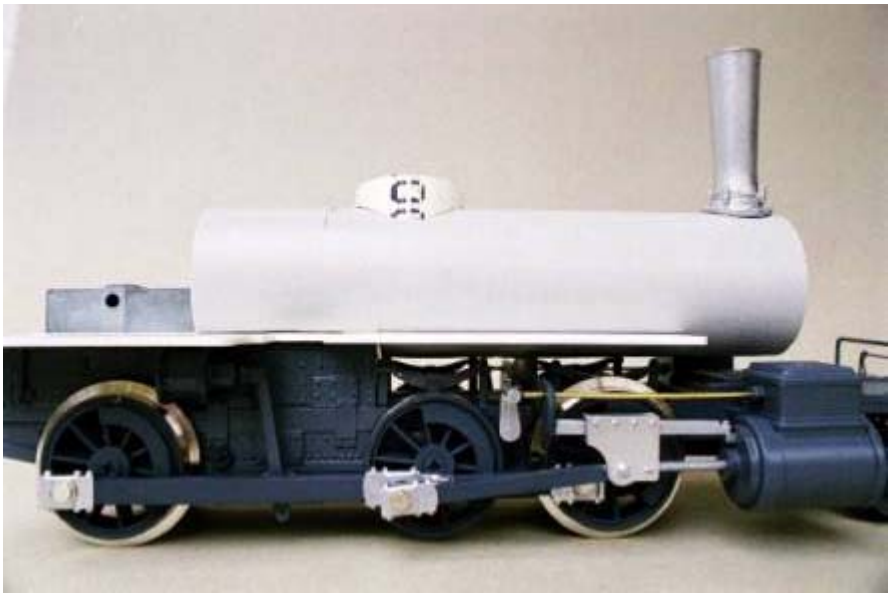


*The floor fitted to the chassis*



Ok I know you're dying to do it.  Take your boiler and place it over the chassis/floor unit thus:

Here's another look....

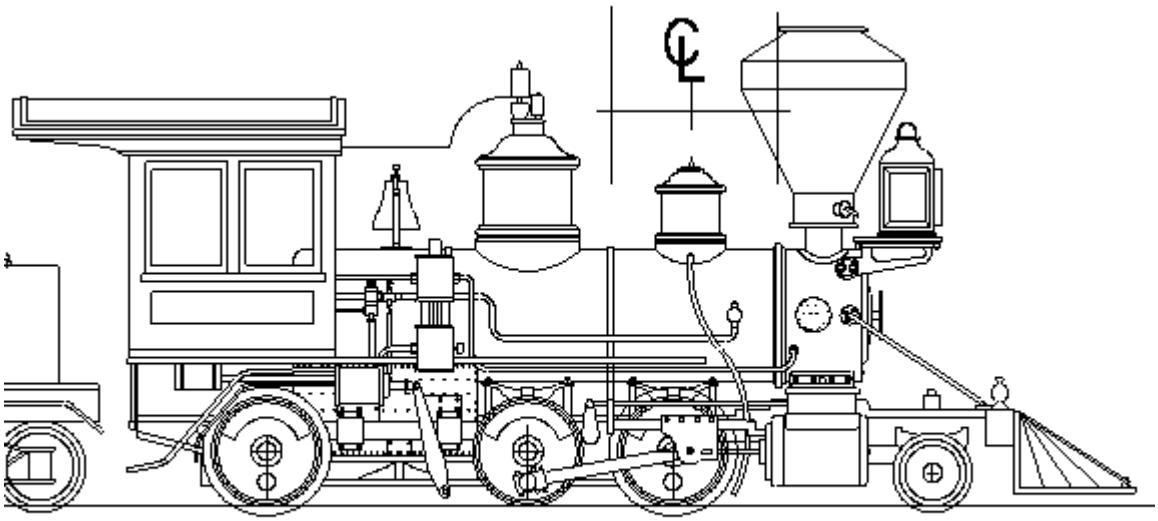


You can just see a slither of light in the cut of the boiler where it touches the front wall of the firebox. Please excuse me. I've shown the base of my steam dome and stack in place. We'll cover the dome making next, however, you can go ahead and insert your stack in place if you wish. If using a brass or white metal stack like mine above, you may need to carefully bend the stack base flange to fit over the curvature of our boiler. Use long nose pliers and bend it to fit. Fix the stack by bolting or using araldite depending on the type of stack used. Make sure its vertical and in line with the upper & lower Datum. No crooked stacks!! If unsure at this time, don't fix the stack until the cab and domes are fitted.

## Making the Domes

For those intending to scratch make their own domes...review 'option 1' then leap forward to 'Option 2'. For those using Accucraft sand dome and Aristo C-16/H-L-W domes, please review 'Option 1'

**NOTE:** For those building the 1:20.3 version of the loco, the domes are identical to the 1:24 scale version. However, you may wish to experiment with the dome heights, to add a bit of 'character'. Try adding about 3-5mm to the dome heights...Don't try this if building the 1:24 scale version!



FREELANCE OLD TIMER, 1:20.3 SCALE

Note the location of the sand dome in a more central position in the boiler section. This location is 7mm further forward than the setout in my prototype model.

### Option 1 - Modifying Commercial domes

Using the Accucraft Sand Dome.

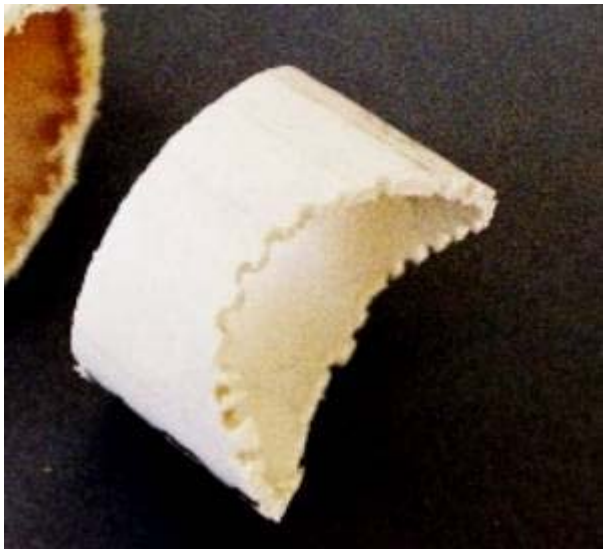
If you're one of the lucky ones to obtain one of the last Accucraft 4-4-0/2-6-0 1:24 scale sand domes, boy you're in luck!! Just go ahead and bolt the thing in place. Find a bolt that fits, check the hardware stores. Just bolt it firmly though the hole you drilled. Bolt from within the boiler tightening the bolt by running a screw driver though the aligning hole in the bottom of the boiler. If you're painting the domes as a whole with the boiler then you can lock-tight the dome in place, never to be removed. If painting a Russia Iron boiler jacket, then you will have to temporarily bolt all the domes in place until the end of this chapter, then take it all apart again and spray the boiler, domes and fittings in their separate colors then re-assemble.
Using the Aristo/Delton C-16 sand dome as the Steam Dome.

This is where we modify the Aristo C-16 sand dome and make it a steam dome. The actual C-16 steam dome is too large for this model. The H-L-W 4-4-0 sand dome is almost identical and suitable for use as well. We need to make 3 things to convert our sand dome to a steam dome:

1. Make a dome base to fit the boiler
2. Make a dome cylindrical centre part
3. Make the steam dome 'cluster' where the safety valves and whistle are mounted.

**Making the dome base.**

**Step 1**
Obtain a length of 33mm diameter PVC pipe, also used as electrical conduit. Use the masking tape technique to cut a clean square end to the pipe. Mark out 4 vertical quadrants about the pipe, Then draw a line around the pipe, going from a point 4mm below the clean pipe end at quadrant 1 to a point 12mm below the end at quadrant 2, to a point 4mm at quadrant 3 and 12mm at quadrant 4....all up you should have drawn the dome base line that would simulate the curved intersection of this small pipe with the curved boiler. Using a 2mm drill bit, drill a line of holes along the dome base line you drew....then cut the dome base section clear of the rest of the 33mm pipe by slicing between the many drilled holes, using a knife.



*This is my dome base with the boiler curvature cut in using many drilled holes.*

**Step 2**
Tape a piece of sand paper to a length of excess 43mm PVC pipe. We will now use the boiler curvature to sand the rough dome base into a clean perfect fit with the boiler. Grind the dome base along the sand paper clad pipe and get sanding!! It'll take quite a bit of sanding and cleaning to get the dome base nice and neat.

*The 43mm PVC pipe clad in sand paper and my dome base being sanded to the right profile by grinding the thing back & forth over the pipe!!*

**Step 3**

You will see the Aristo and H-L-W brass base unit will fit nicely on top of your 33mm PVC dome base.

Next we need to make a dome middle cylindrical section to go between the Aristo/H-L-W brass base and brass top. Use a 29mm diameter PVC pipe for this BUT, you will not find a 29mm PVC pipe!! Nope, but what you will find is a 29mm PVC Electrical conduit joiner. This is a small PVC joiner pipe only about 2" long. Its used to joint two lengths of 24mm PVC Elec. conduit. It's a splicer unit. You'll find these units amongst bend joiners, 'T' intersection parts and other components used to joint conduit. Check the electrical suppliers or hardware stores.

When you have one of these 29mm PVC joiners, use the tape method to cut a clean section of pipe 15mm long. Then insert this section between the lower and upper brass dome parts.

*This picture shows all the steam dome parts lined up. The 33mm PVC dome base, the Aristo brass dome base, the 15mm tall 29mm dia. PVC cylinder and the brass dome top.*

Assembled they look like this...

Now place the dome onto the boiler and take a look!! You can also install the bell in the correct boiler hole at the rear...I hope you've chosen a bell for this model...if not, go back to chapter 1 and look at options.

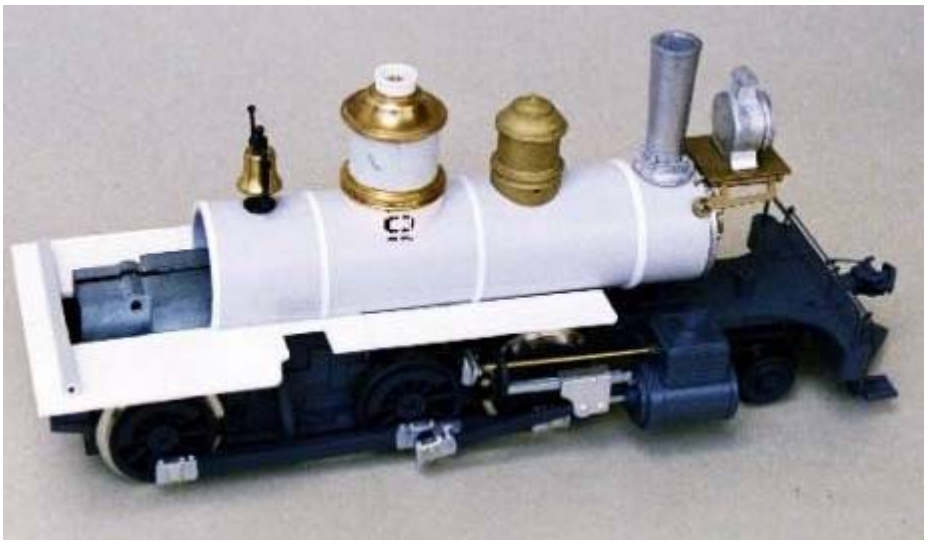
**Step 4 - Making the steam dome Cluster**

Use Evergreen 13mm diameter styrene pipe and slice off a 4mm length. Next use some of that Evergreen 0.020 x 0.030 styrene strip and weld a rim around the top of the 13mm pipe. Weld glue it to the top side of the tube.

Next using pliers, break off the brass ball on the top of the Aristo dome top.

Using the 5min araldite, carefully load some of the glue into the inside of the 13mm pipe section. Don't put glue on the base of the section, or onto the Aristo dome top. Only put the glue within the 13mm cluster pipe. Place the 13mm dia pipe section directly on top of the Aristo dome top and center it up perfectly...and wait!! The glue inside the tube will now run down onto the inside surface of the dome top, holding the steam dome cluster in place. Nice and neat, no globby glue showing at all!!

*Here is the finished steam dome sitting on the boiler, sand dome in front.*



*Here is what the loco looks like...do you see the personality yet?? Yes I've added the boiler bands already. Don't worry, I'll describe this procedure shortly!!*

**Step 5 - Making the safety valves and whistle.**

Take some of the 3mm Plastruct tube. Cut an 8mm length of 1.5mm brass rods and insert a 4mm length of 3mm tube onto the rod, leaving 1mm of the brass rod exposed at the top. That's a safety valve. Now make a 2nd one the same way.

To make the whistle, cut a 20mm length of brass 1.5mm rod. Place over that a 10mm length of 3mm plastruct tubing, leaving a 2mm length of brass rod exposed at the top. Then place over that 3mm tube a 6mm plastruct tube, 8mm long. Thank god all the plastruct tubes fit inside each other!! There it is a whistle.

Now we fill the steam dome cluster unit with araldite glue. Fill to about 1mm from the top of the cluster, this will dry to a hard plastic. When its about 50% dry, about 2 mins after pouring, insert the three brass rods that are the valves and whistle. Hold them in place until the araldite pool dries and holds them solid. Basically fit the two safety valves to the front of the cluster and the whistle behind, forming a perfect triangle in the cluster.

You can get damn fine cast whistles and safety valves from Ozark castings etc, also Bachmann whistles are pretty cool. You can insert them instead of making your own. I often use the Delton Aristo C-16 cylinder oil cups as safety valves, they are the right size and look great.

On my dome I glued two Aristo C-16 oil cups into the safety valve cluster. In post 1900 options, in many cases the whistle was moved to the rear side of the steam dome, and not fitted to the cluster itself. Because my loco is a 1920s version, I mounted the modified Bachmann whistle to rear of the dome side. I used 3mm tubing and an 'L' shaped brass rod drilled into the dome side to fix the whistle into place.

In this picture you can clearly see the two safety valves glued into a pool of araldite within the steam dome cluster. The whistle is mounted behind the dome.

*The whistle mounted to the rear face of the dome.*

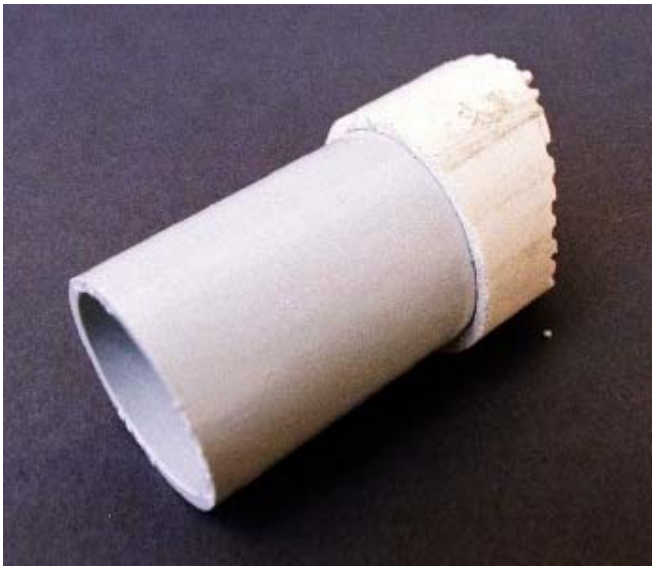
## Option 2 - Scratch Making your Domes

When making your own sand and steam domes, the procedure is essentially the same as demonstrated above (option1), only you repeat the procedure for both domes, using different size pipes. Form the dome bases and the cylindrical dome section as described above. The only addition is to find a fancy dome top to use and add the decorative bands to the domes.

The pipes to use for the steam dome are:

33mm dia base pipe
29mm dia center pipe
The pipes to use for the sand dome are
29mm dia dome base pipe
24mm dia center pipe.

These pipes slide perfectly inside each other like this:



Next you need to find something to use as an ornate dome top for the sand and steam domes. There are two options, both of which I've successfully used before on home made domes.

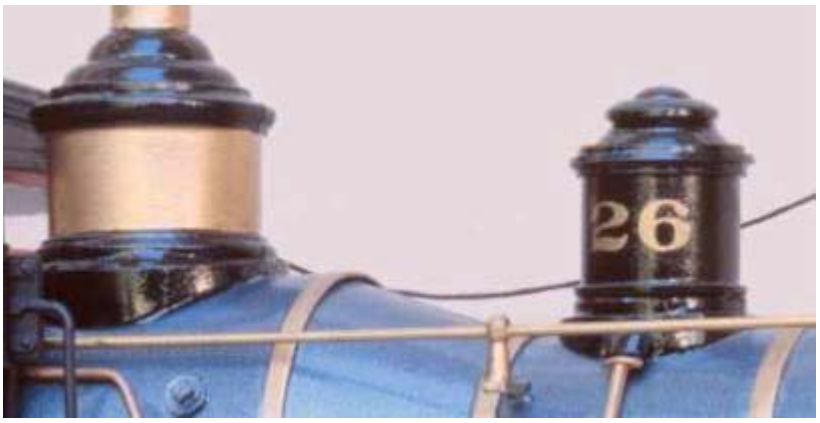
You can use the escutcheons that accompany small drawer knobs - check the hardware store for stylish draw knob bases (escutcheons) These can be plastic or brass and have some nice curves to them. Get two different sized knobs and you'll have a dome top for both the steam and sand domes. A drawer knob and escutcheon might look something like this:

*The brass drawer knob and brass escutcheon which makes a great dome top!!*

Place the escutcheon on top of the pipes like this:

and you can see the makings of a dome already.

The other option for domes tops is to use tailor's buttons, the types used on overcoats are particularly good and some even have a Baldwin style to them!!

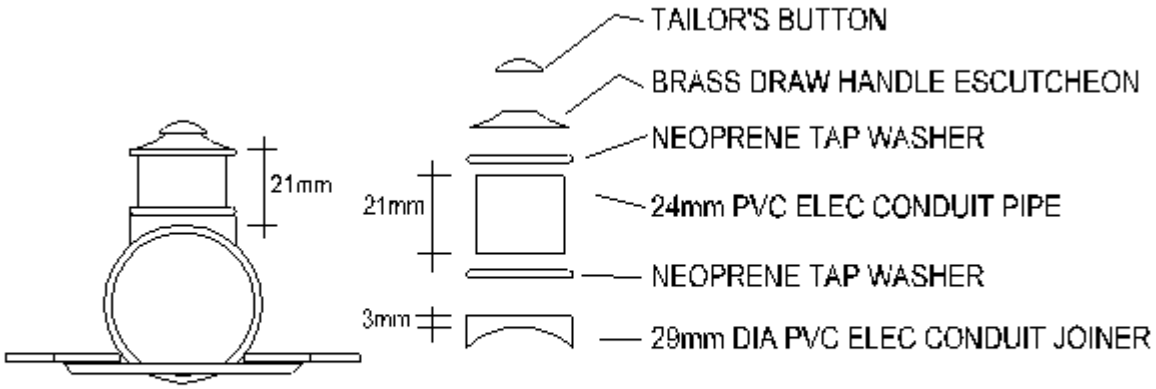



*Domes made from buttons!!*

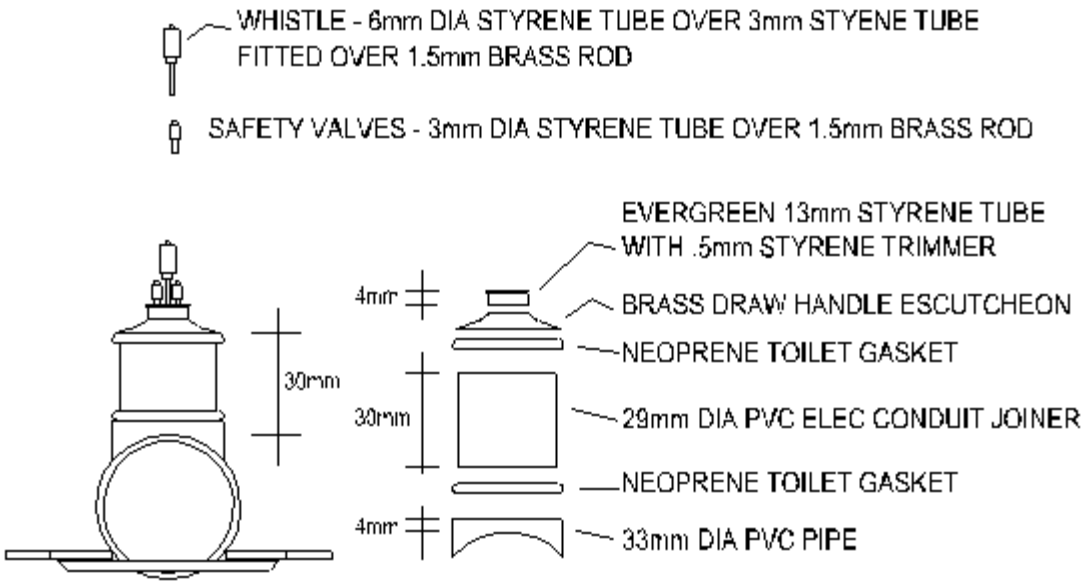
Whether using escutcheons or buttons, the steam dome is finished with a safety valve cluster in the same way we added a cluster to the steam dome in 'Option 1' above.

The sand dome escutcheon or button is best finished with a smaller button on top providing the 'lid' to the sand dome.

To add the fancy rings to the dome sides, I use the black circular neoprene washers, used as tap washers (smaller rings) or toilet cistern washers (larger rings...we call them 'dunny ring!'). These are semi-plastic, rubber rings. Just slide them onto the central cylindrical section of the domes, one at the lower end, and one just below the dome top. To summarize the construction of the sand and steam domes, review the following diagrams:



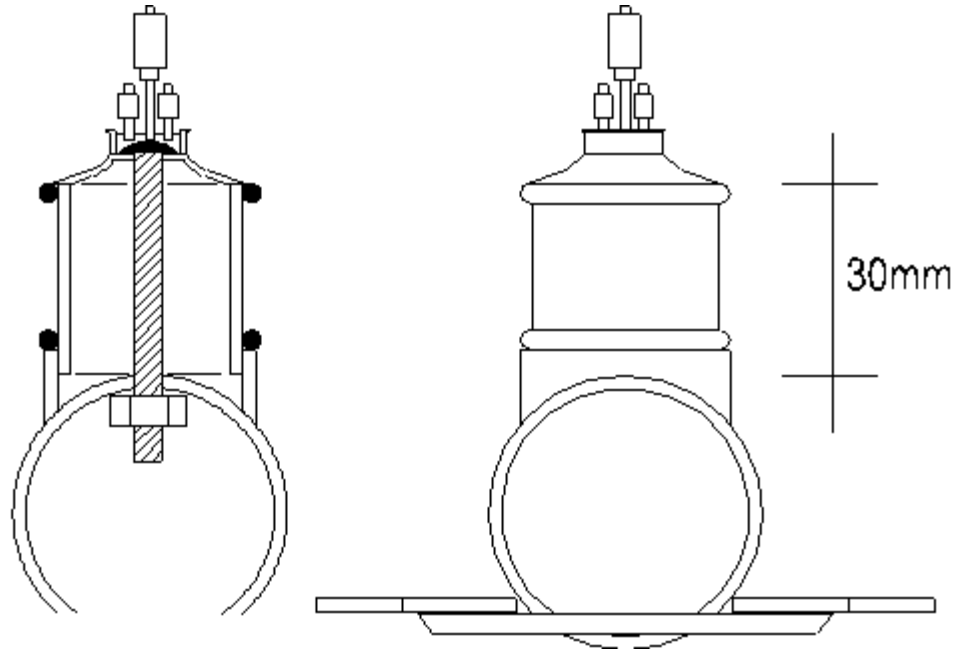

SCRATCH MAKING THE SAND DOME




SCRATCH MAKING THE STEAM DOME

*In both examples, note the use of the neoprene washers applied to the central dome cylinders. Also note the central cylinder, slides within the dome base pipe, and both pipes actually rest on the boiler.*

To fix the domes to the boiler, a method is to run a long bolt down from the dome top into the boiler and attach a nut from within the boiler. When the bolt is in place, you can then apply the steam dome cluster over the bolt head etc and conceal the bolt head. You can still take the domes off the boiler by removing the nut from within the boiler, the domes will come free with the bolts firmly araldited within the domes.




*Bolting the domes to the PVC boiler. Note the long bolt running from the top of the dome into the boiler, tightened with a nut inside the boiler.*

## Boiler Bands at Last

Boiler bands are easy. These are the straps of metal that clamp the sheet metal lagging to the boiler. In the 1870s, the bands were made from brass, or Russia Iron treated sheet metal. By the 1920s, the bands were just plain steel straps, painted with the rest of the boiler. Here are your options:

### 1870s Brass bands

Either apply 2mm wide styrene strips to the boiler and hand paint them gold/brass.

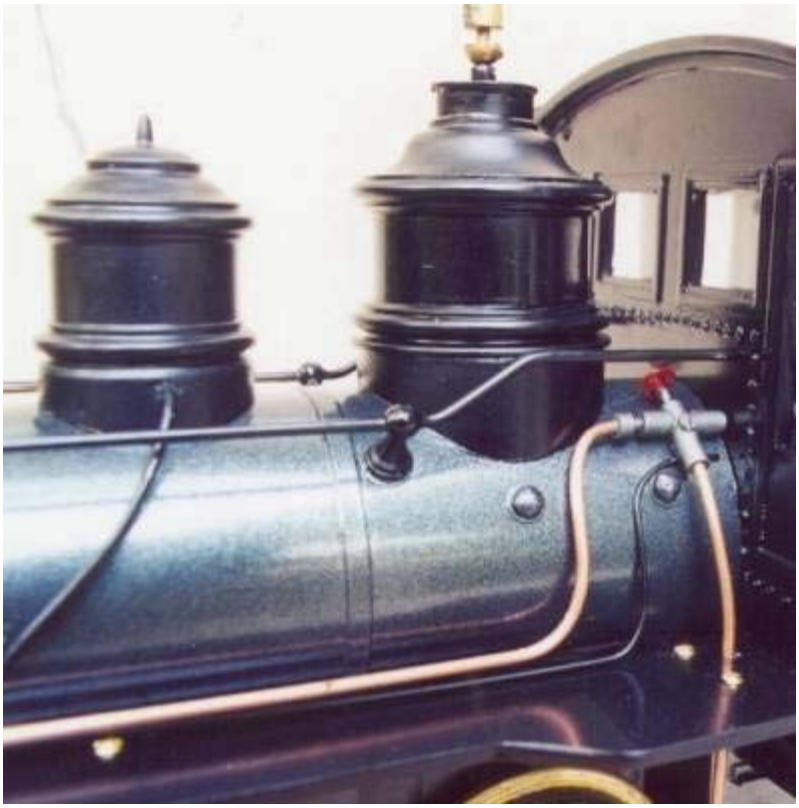
*Painted 2mm styrene boiler bands.*

**OR**

Make real brass bands, 2mm wide. Drill 2mm holes along the lower boiler datum line in the position of the boiler bands and bend the brass strips around the boiler. It's best to put these real brass bands on the boiler after you've fully painted the boiler Russia Iron. Don't even think about masking the bands to spray the rest of the boiler!! Insert the ends of the brass strips into the holes and bend the ends back within the boiler. The bands should be tight around the boiler and should not come free. To be sure the bands will not move, you may wish to apply a drop of araldite to the backs of the bands at the top of the boiler. One drop is all that's needed to keep the bands from moving. Do not use super glue on the real brass bands or they will turn white.

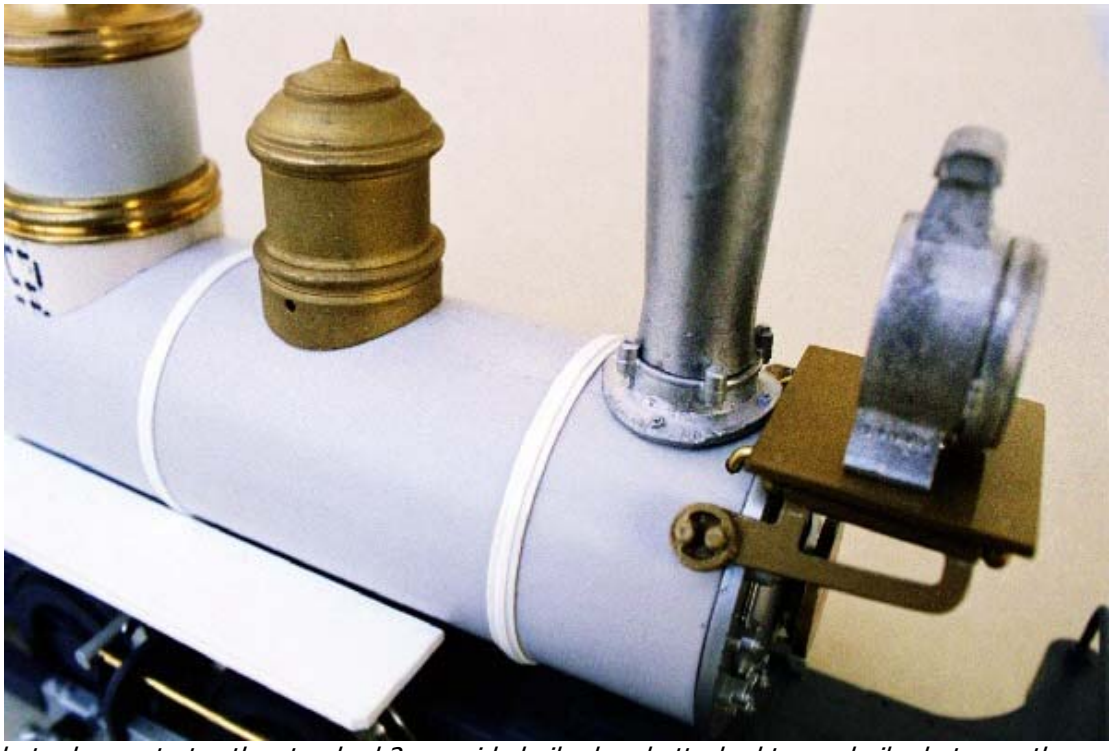
### 1870s Russia Iron bands and 1920s painted steel bands

Using Evergreen 2mm wide strips, glue the bands to the boiler using super glue. This really bonds the styrene to the PVC in a way the solvent glue cannot. Make sure you start the bands at the lower datum line, so no joint in the bands will be seen above the footboards. Make sure you install the bands perpendicular to the boiler, no going crooked OK!!



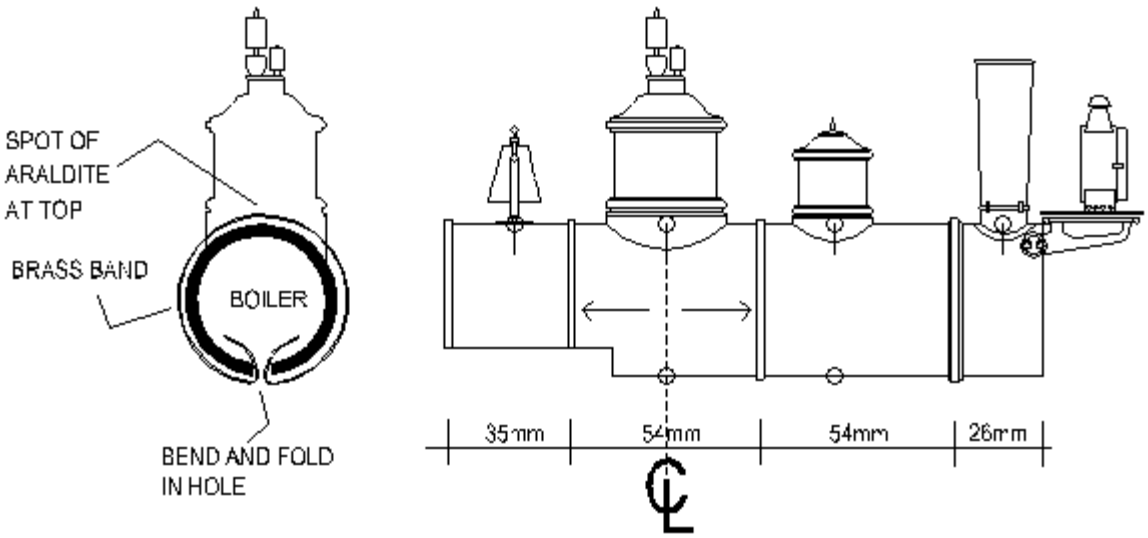
*2mm styrene boiler bands painted Russia Iron with the boiler jacket... very stylish!!*

There is a special boiler band to be added to separate the smoke box and boiler proper. Here we use a 3mm wide band, either styrene or brass strip. If using brass, then the 3mm band alone will be enough. If using 3mm styrene, we built up the band a little, with a second layer of a centrally placed 1mm wide strip, welded to the 3mm band in the center.



*The above photo demonstrates the standard 2mm wide boiler band attached to our boiler between the sand and steam dome and the special 3mm wide band between the smoke box and boiler, with a second 1mm wide band on top.*

The boiler band set-out on the boiler is as follows:




BOILER BAND SETOUT 1:20.3 AND 1:24 SCALE VERSIONS

Note the above diagram also demonstrates how to bend real brass band around the boiler and fold the ends into the bottom of the boiler though 2mm drilled holes. You can see the special 3mm band 26mm back from the front of the boiler.

## Fixing the Sideboards to the Boiler

Its now time to fix the side board unit to the boiler. This has to be a VERY strong connection. While I would not recommend carrying a loco by the sideboards, they should none the less be strong enough to withstand the weight of the loco, if lifting the loco onto the track etc. Remember, think STRONG here.

We provide the strength in the sideboard/boiler connection by fixing the sideboards to 3mm brass or styrene square (SHS) rod. You can use either brass or styrene 3mm SHS, both have worked for me before and neither has ever failed. The secret is to run the tubing right though the boiler.

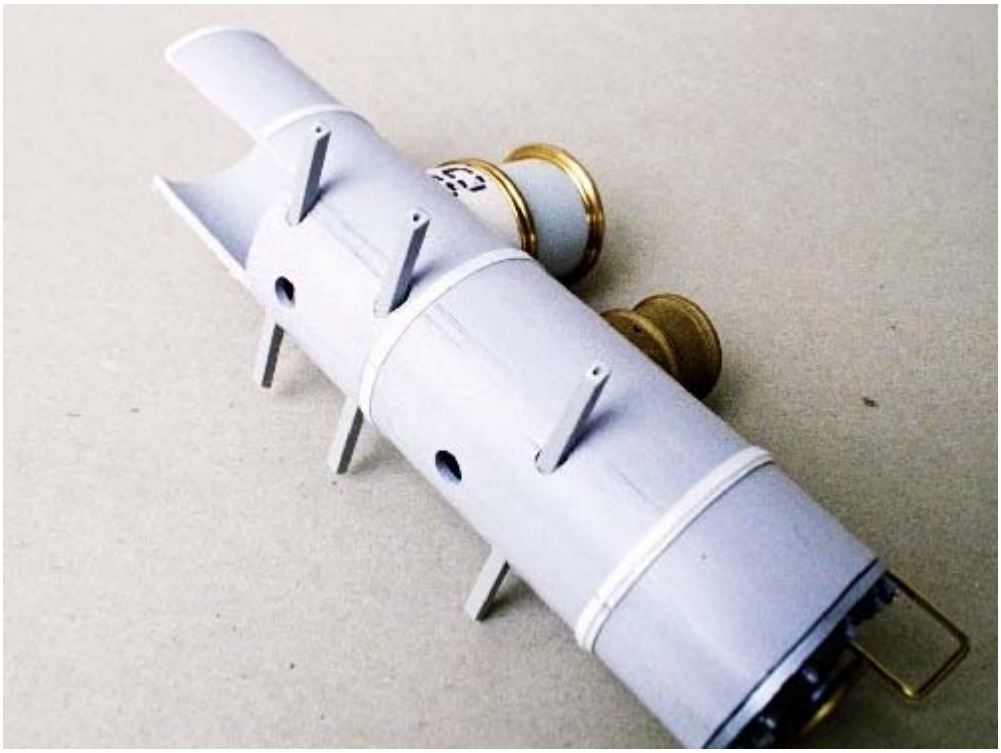
### Step 1 - Alignment

Draw pencil lines along the line of the top of the sideboards. The line will be an extension of the rear cut of the boiler. Remember from earlier in this chapter, the line is 19mm either side of the lower datum line. Place the styrene sideboard unit in place on the boiler, aligning the top of the sideboards with your drawn lines. Now using a small cut of the 3mm SHS bar, markout 3 points along the underside of the sideboards where the SHS bars will penetrate the boiler. Trace around the SHS end at each position. Next remove the sideboard unit and measure the position of each SHS mark on both sides of the boiler to be sure they are all exactly equal relative to the lower datum. We don't want the sideboards to run up hill because you didn't get all the SHS marks equal. We then drill a hole centered over each SHS mark. Make sure you don't drill out of center, causing the sideboards to run uphill or sag. Drill a small 1.5mm hole first right on the center of the SHS mark, then come back with the larger drill and drill out the SHS mark to a size sufficient to insert a full 3mm SHS rod, right though the boiler. Remember to drill into the boiler along an angle similar to the angle of the sideboards relative to the boiler. Oh and make sure your rod positions will not be in line with your dome screws access holes along the lower datum...or these sideboard rods will cover over your access holes...and then you'll never be able to remove the domes!!

**Step 2 - The Support Rods**

Cut 3 lengths of 60mm long 3mm SHS rods. Cut the ends of the rods with a 45 degree cut. Insert the rods into the drilled boiler holes, center the rods equal about the boiler center line and then fix into place by applying araldite to the inside of the boiler, over the rods.

The 3 SHS rods inserted into the boiler should look like this:



*Note the position of my rods does not class with the dome screw access ports or boiler bands.*

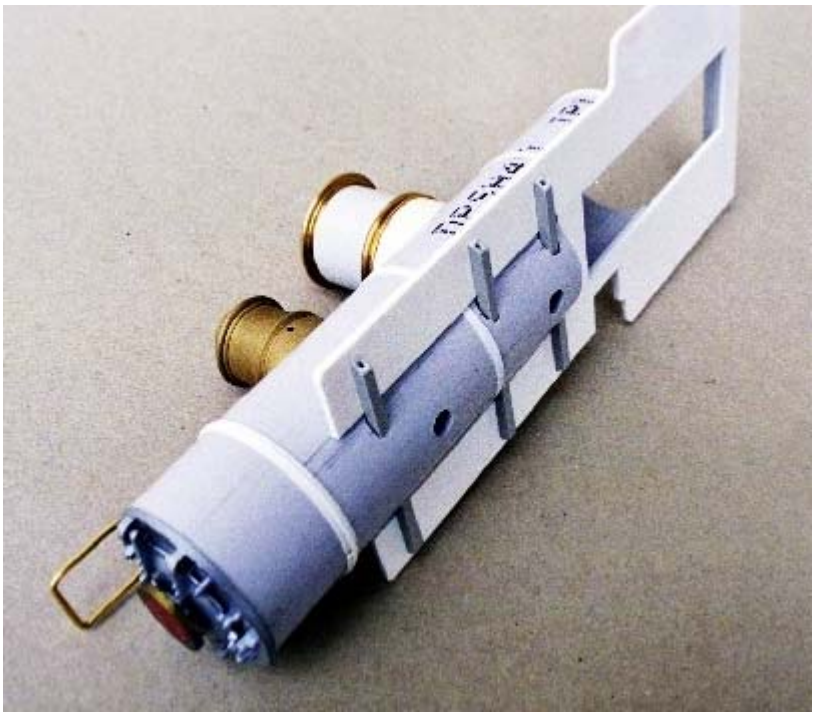
**Step 3 - Install the Sideboards**

Re-install the sideboard unit in place. If using styrene SHS rods, you can weld the sideboards directly to the SHS with a real good bond. If using brass SHS rods, you can use a dob of araldite. We can finally firmly secure the sideboard to the SHS by inserting very small bolts though the sideboard, into the SHS rods. The bolts have to be the very small brass type, sometimes described as 8BA or 10BD. If you're not likely to lift the loco a lot by the sideboards, you may choose not to use the bolts.

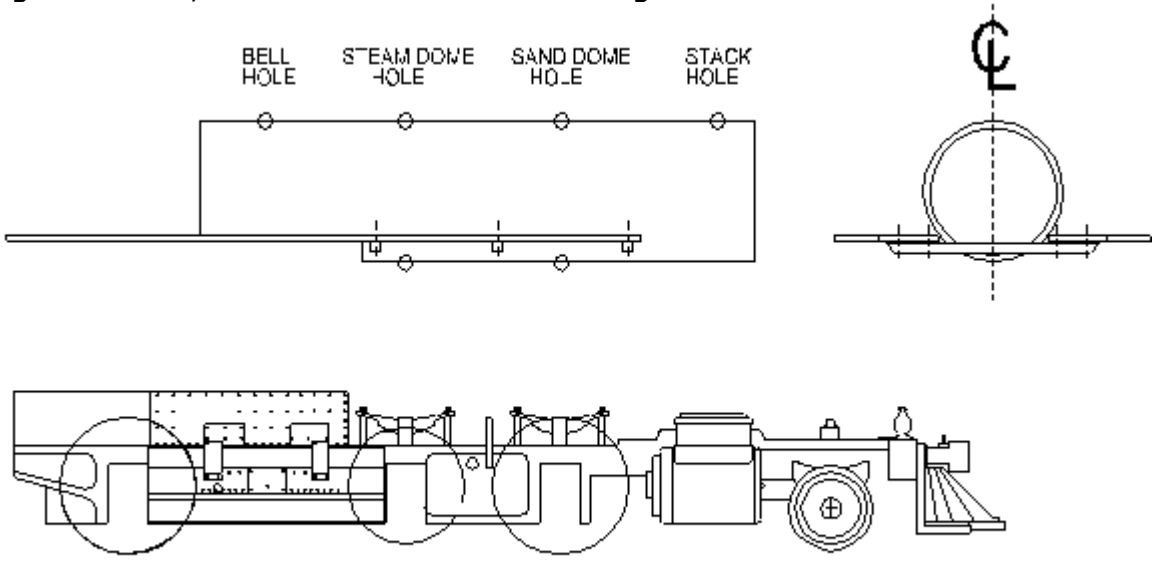
When the bolts are in place, your sideboards would look something like this:

*Note the brass bolt ends in the black sideboard top, these bolt through into the SHS rods for a reeeeely strong fix.*

**IMPORTANT:**
If you're to paint your loco with a Russia Iron jacket, you will need to paint your boiler without any of the boiler fitting attached, including the sideboards. Thus do not glue or bolt the sideboard to the SHS rods until after you have spray painted the boiler at the end of this chapter. Spray paint just the boiler with rods inserted. Remember to place a tab of masking tape on the tops of the SHS rods where the sideboards will be glued on, so you don't have to glue though paint.
The sideboards fitted to the boiler SHS rods will look like this:



The following diagram summarizes the installation of the sideboards, including the SHS rods, running right through the boiler, and the small brass bolts fixing the deck to the SHS rods.




FIXING OF SIDE BOARDS TO BOILER

## Making the Boiler Front

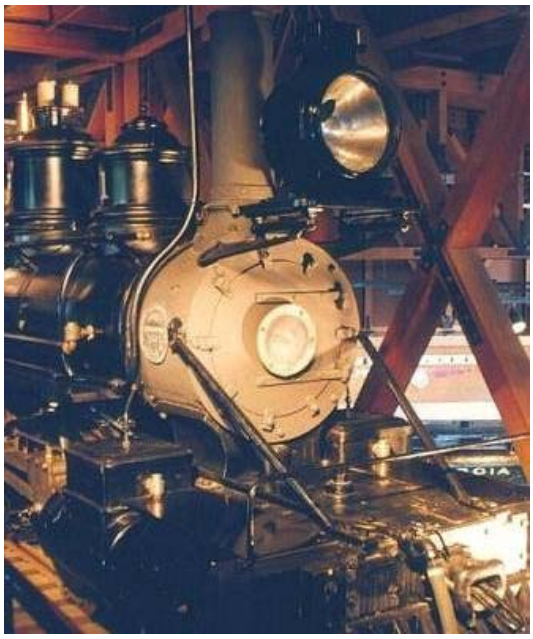
Now if you have one of those cool Bachmann 2-4-2 boiler fronts in your junk box, man you're in luck!! Those boiler fronts come complete with hinged smoke box door, clamps, and even the Baldwin number disk. They also happen to be exactly the right diameter for our boiler! Another Option is to use the boiler front found on the Bachmann Climax. It has the same diameter.

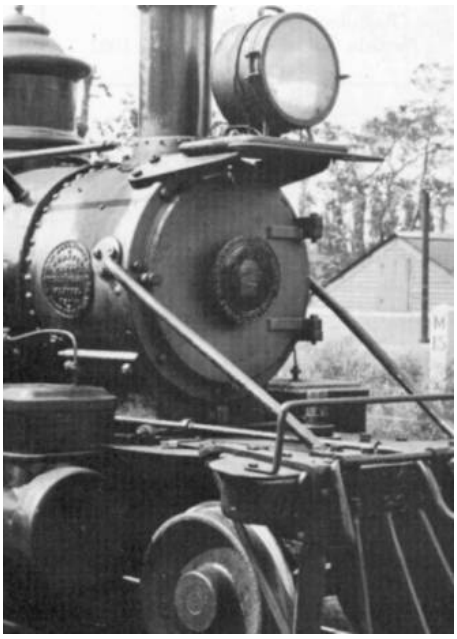
If however you don't have access to one of those Bachmann 2-4-2 boiler fronts, or think they're the wrong style for your particular 2-6-0 version, here's how you might make your own.

Basically we cut a circular plate out of 2mm styrene. Trace around your boiler to get the right size. This 2mm plate is the boiler front base.

Next we make a smoke box door. As indicated on the surviving Baldwin 8-16-D at Sacramento, the smoke box door can be perfectly flat, with bolted clamps around it, holding the door shut.

Also the NCNG #2 'Nevada' had a flat smoke box door for a time as shown here:





In principle these smoke box doors can be made the same way:

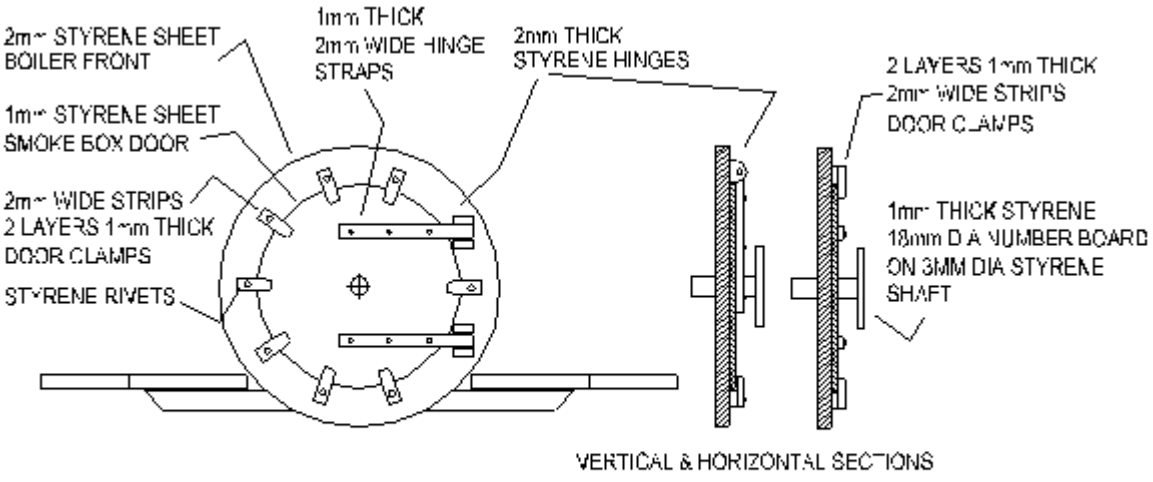
We cut a circular plate of 1mm styrene, the diameter is up to you, but should be sufficiently smaller than the smoke box front/boiler diameter, to provide space for the door clamps. Use an appropriate sized jar lid or something to trace a circle.

Weld the 1mm smoke box door to the boiler front base plate, right in the center. Get it centered now! In the very center of the smoke box door/front, drill out a 3mm hole in preparation for the Baldwin number disk mount.

Next we make both the boiler clamps and boiler front hinges the same way. Use 2mm wide, 1mm thick strips. Two layers are used. The first strip layer builds up the base of the clamp to be level with the smoke box door. The 2nd layer, is the visible clamp that extends over the door. Once again slice some 0.020x0.030 styrene rivets and weld these to the clamps as shown on the following diagram. The hinges are made the same way, in two layers, with the base layer only required under the ends of the hinges the extend beyond the door. Again slice some rivets and attach them to indicate the hinge straps being bolted to the door. Use some 'D' shaped styrene patches to make the actual hinge mounts at the ends of the hinge straps.

Finally make the Baldwin number disk, by cutting an 18mm circle in 1mm styrene. Weld this disk onto a 10mm length of 3mm plastruct tube, weld it at the center point. Insert the disk and tube into the 3mm hole drilled in the center of the door, done man! In Chapter 8 we will make our own builder's plates, and text, so wait till then to decorate your number disk.


*The Baldwin number disk - Inyo*




# A STYRENE BOILER FRONT

*The above demonstrates the principles involved in making the boiler front.*

Typically the Baldwin boiler front doors of the 1870s were shapely, stylish things, and not flat. If you don't want a flat boiler front, you can substitute the 1mm styrene door plate with another more shapely type. The 2mm styrene boiler front base, the clamps and number disk will be unchanged from above. More shapely doors might be found in Tailor's coat buttons, and drawer handle escutcheons. You can also layer up a door out of several plates of 1mm and 0.5mm styrene sheeting, in reducing diameters.

The style you're looking for is something like this:

and

The Bachmann 2-4-2 boiler front can just press into the 2-6-0 boiler pipe and come to a nice snug fit, even without glue. The home made type of boiler front can either be glued into place with araldite or, if you can pack the backside of the base plate with about 4mm of styrene, you can press your home made type onto the boiler end like a cork. It's preferable not to actually glue the front onto the boiler until the completion of the model. In the last chapter, we'll be adding weight in the boiler, by loading it in from the front, so no gluing yet!

Also make sure you allow for the headlight wires to pass though into the smoke box, for connection to the motor block. You can either drill a small 2mm wide hole right at the top of the smoke box front, under the headlight bracket , or try and drill a vertical hole in from the top of the smoke box at the rear of the headlight bracket and feed the wires in there.

## Making the Smoke Box Saddle

The saddle is the forward support for the boiler, right above the cylinders. In reality the saddle and cylinders were made as a complete two part casting. It was the most complex and ingenious casting in the whole loco, and is typical of all US locos through to the end of steam. The whole steam chest, cylinders and saddle were cast in two halves and bolted together along the center line under the smoke box.

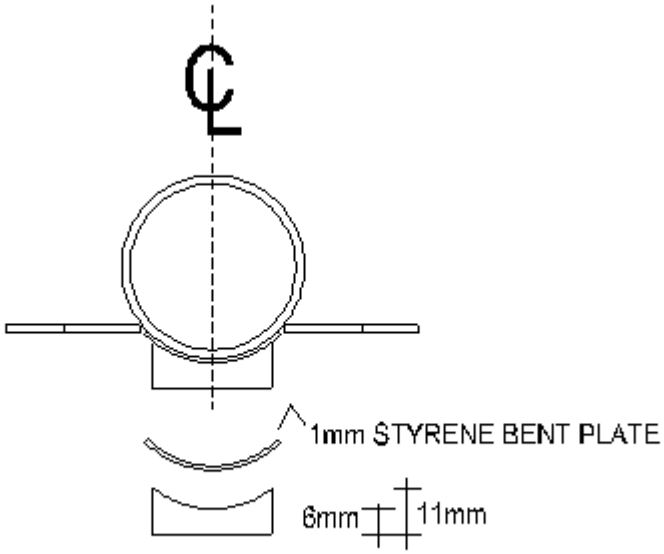
*In this view of the surviving 8-16-D, you can see the black saddle right below the smoke box. Note there is only one bolt left holding the boiler to the saddle!! There are usually 4 holts to each side of the saddle, or 8 bolts in total, however, this loco only had 2 bolts to each side for a total of 4 bolts.*

Our cylinders and steam chests are already in place, so we only have to make the saddle to complete this assembly. The saddle on our model is very simply a small box that aligns perfectly with the saddle mount on the chassis frame. The mount is the square raised part between the cylinders with 3 holes cast in it. The dimensions of the saddle box will be such that the saddle unit just fits around this mounting.  Not even 1mm wider, or our saddle will be too large for the tiny 2-6-0 smoke box.

Here is the saddle mounting block, with the 3 holes in it. The middle hole is the fixing point for bolting the boiler to the chassis.

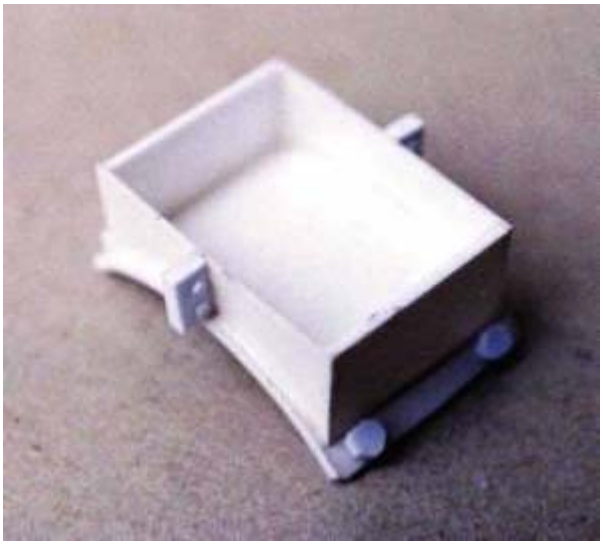
The saddle box has a footprint 20mm long x 25mm wide. The front and rear wall of the saddle with the curve cut in will be fabricated from 0.5mm styrene, the two side walls will be made from 1mm styrene.

The overall profile of the front and rear walls of the saddle are as follows:




MAKING THE SMOKE BOX SADDLE

Note when this saddle box in placed over the mount, firmly pressed onto the frame, the curved saddle top should be 1mm shy of the underside of the boiler. This gap is filled with the actual curved saddle plate. To make the saddle plate, cut a 36mmx22mm rectangle of 1mm styrene. When cut, round off the corners a tad. Now warm the styrene in your hands and slowly work the 1mm thick rectangle into a curved plate, curved to match the boiler curvature. Once the saddle plate is curved correctly and will no longer spring back to flat, go ahead and weld this plate onto the top of the saddle box. Place it centrally.

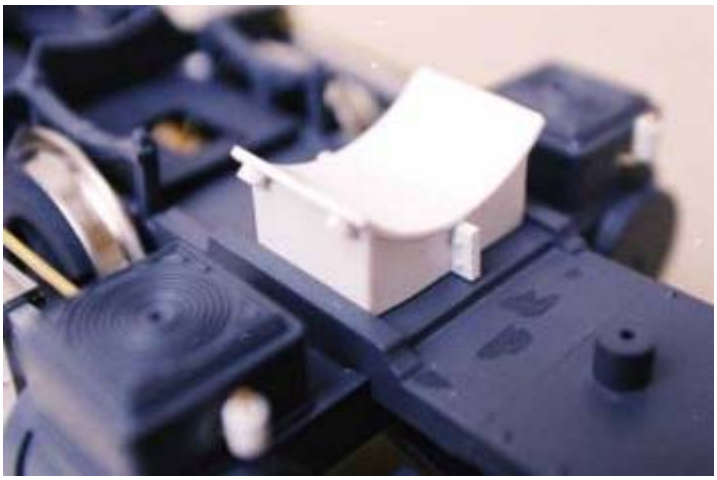


*A view of the saddle box as seen from the bottom.(up-side-down)*

Now insert the saddle unit onto the frame, without glue, put the boiler onto the frame and test the level of the boiler. Make sure the boiler is not running up-hill or angled downward. If the boiler is not level, the saddle is too tall or too short. Adjust as required, either by sanding the saddle unit down a tad to lower, or by adding shims of styrene under the saddle to raise.

Now we add the casting joint lines down the vertical center of the saddle. Cut two 3mm wide, 6mm tall strips of 2mm styrene and vertically weld into place at the front and rear of the saddle box. Next

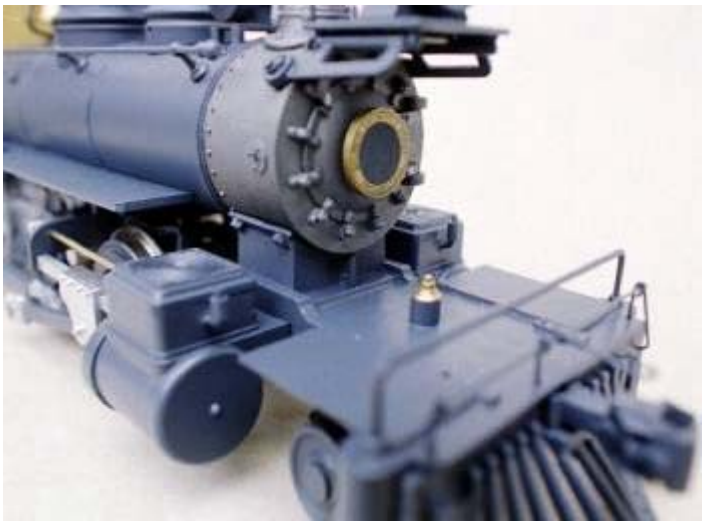
start cutting some rivets again and weld two to each side of the vertical strips. These simulate the bolts holding the two halves of the saddle casting together.



*The saddle in place.*

These saddles usually had a line of 4 bolts to each side. But for some reason our lil' 8-16-D 2-6-0 had only two bolts to each side, or 4 bolts in total fixing the boiler to the saddle. We make the bolt heads by cutting 3mm x 3mm squares of 2mm thick styrene and cutting the corners to turn these squares into Octagons. Now this is your model, and 4 bolts to each side of the saddle look totally cool, so if you want to add 4 bolts to each side, that's your choice.

*This is a typical Baldwin saddle with 4 bolt heads to both sides of the saddle.*



*A view of the finished saddle on our 2-6-0, showing only two bolts to the saddle sides.*

We now strengthen the bearing capacity of the saddle, ready for bolting the boiler to the frame. First cut a 10mmx10mm square of 2mm styrene and another in 1mm styrene. Weld these two patched on top of the center hole of the mounting patch on the frame. Place the saddle unit onto the frame and see that there is a nice firm support under the saddle plate though to the frame bed...we want this firm, so we can screw a long bolt through the frame and into the boiler, clamping our boiler to the frame tightly without crushing the saddle assembly. Finally weld the whole saddle unit onto the frame. Paint as required.

## Boiler Washout Plug and Hand Rails

Boiler Washout plugs are small openings in the boiler for the purpose of filling and emptying the boiler water. The boiler has to be drained for servicing, cleaning etc. The plugs also act as access ports to the boiler interior for inspection. The plugs are literally screwed in. Most plugs are found down around the base of the firebox area. Others are along the upper waterline area of the boiler, used to let air in while the water is drained from the lower plugs. These upper plugs were also used as water filling ports.

*In the above view of Inyo, you can see one of the upper (water line) washout plugs (to the upper right). In this view the plug is removed, and the boiler is open to the air. The inyo is maintained in the Museum with an empty boiler. On special occasions the boiler is filled for a steam-up day, and only then are the plugs inserted and tightened.*

Here is another example of a washout plug of sorts. This plug seen touching the boiler band in front of the steam dome is a plug, however it is probable this was an earlier boiler relief valve or feed water check valve/inlet point. You can see the current check valve location in the same line closer to the smoke box. Many 1870s Baldwin locos had the water inlet lines connect midway down the length

of the boiler. Later these inlet points were moved forward to the lead end of the boiler, for the reason of making sure the cold feed water was pumped into the boiler as far away from the hottest firebox end of the boiler as possible, just a bit of trivia!

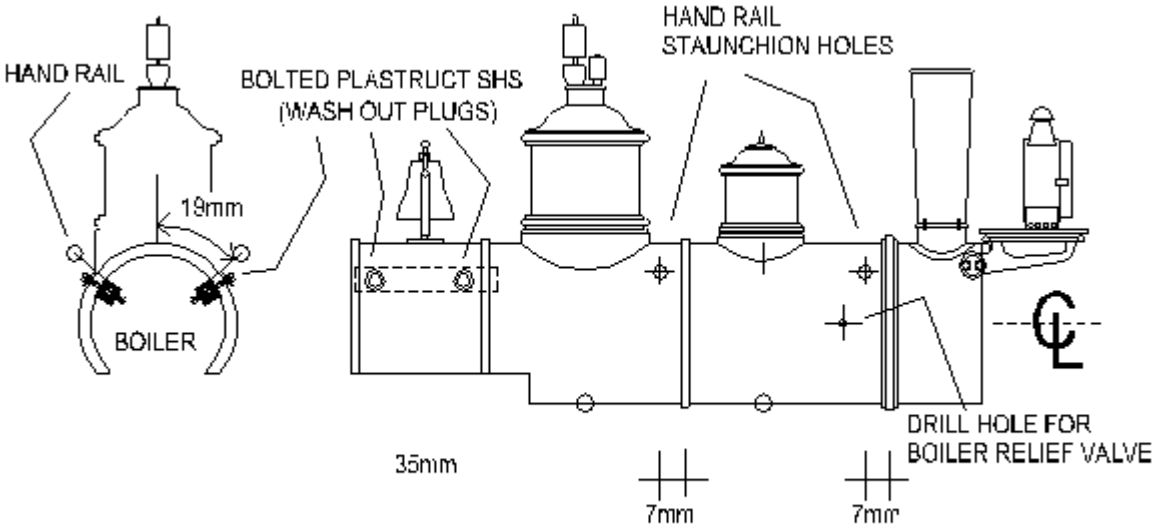
To me the wash out plugs, especially the upper waterline plugs are great because they are a deliberate exposed bolt in what is otherwise a smooth unblemished boiler. We use these plugs to hide some necessary structural members in our model.

The fixing of the boiler to the cab is an essential structural connection. The fixing of the superstructure to the frame is via one bolt in the saddle and two screws at the rear under the cab floor, i.e. the fixing of the superstructure to the frame is only at the extreme ends of the model. Without a firm fixing between the cab and boiler, the loco superstructure will bend like a banana when lifted. The whole superstructure has to be rigid. Gluing the boiler to cab front wall is totally inadequate. We must bolt the boiler to the cab front wall.

To do this we insert two thick hollow rods 40mm long to the waterline area of the rear boiler. Refer diagram below. The rods are plastruct 4.6mm x 4.6 square hollow rods. They come with a 2mm dia. hole down the center, perfect for bolting into - to secure the cab to the boiler end.

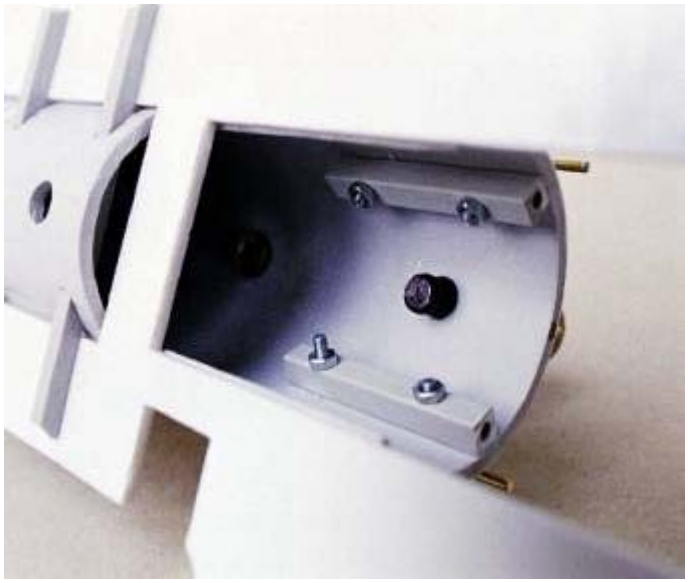
Glue these two 4mm lengths of SHS to the inside of the rear end of the boiler. Next drill two holes though the boiler and SHS rods as shown. Insert two printed circuit board bolts, mini washers and nuts through the holes and tighten. These bolts hold the SHS firmly to the boiler interior and make for A1 fixing points for the cab. The exposed bolt heads are also cunningly disguised as boiler washout plugs on our model. Cool eh? When the bolts are tight, place a dob of araldite over the bolt ends to fill any screw-driver recessed.

Make sure the ends of the 40mm SHS rods are flush with the end of the boiler. In Chapter 5 we'll be adding to two holes in our cab to align with these SHS rods.




HAND RAILS & BOILER WASH-OUT PLUGS

*The boiler washout plugs (bolts) and Plastruct SHSs within the boiler.*



*The bolted SHSs inside the rear of the boiler.*

*The boiler plugs seen fully painted as part of the boiler. Note the screwdriver recess in the bolt heads filled smooth with araldite.*

Finally we put on the hand rail stanchions. We use 4 Aristo C-16 stanchions. Drill holes as shown in the above diagram for their fitment. Make sure you drill the fixing holes in a level line. Glue the stanchions into place with araldite, just a drop, and then insert approx 155mm lengths of 1.5mm dia brass rods into the stanchions. The hand rails are now in place, they do not have to be inserted into the cab front wall.

## Fixing the Superstructure to the Frames

OK guys here it is, the moment you've all been waiting for. Time to bolt the sucker together!

The whole loco is held together by one large bolt and two smaller screws, forming a triangle over the length of the model. Its worth taking a moment here to solder the headlight wires to the block pin plug on the top of the block. Also worth finding a tender plug and socket set for electrical connection of the tender to the loco. Solder a lead for the tender plug into the pin plug at the top of the motor block. Make sure all your relevant parts are pre-painted for the model and assembled. While you can take your model apart as much as you like between now and the end of the MasterClass, from my standpoint, you shouldn't need to. From here on, the model can stay as one assembly.

### Making the Rear Mounting Bracket

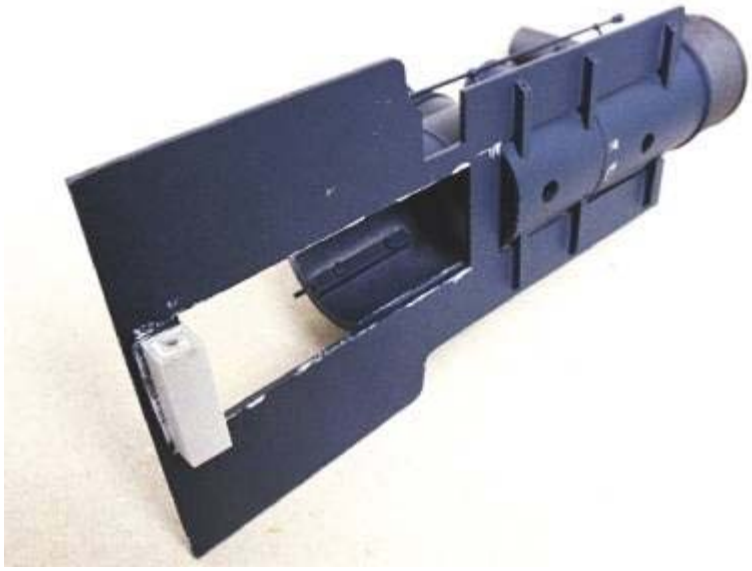
We have to find a way to bolt the rear of the superstructure to the frame. With most of the chassis frame being full of motor block, there isn't much clear space left to bolt anything, that still provides clear and easy access for the insertion and removal of screws. The frame to the rear of the block is nice and clear and we'll use this area to bolt the cab floor down to the chassis.

### Step 1

Take a section of plastruct 9mm X 9mm SHS square tubing. Cut a 26mm long length of this 9x9 SHS. Next take a 26mm length of 4.6x4.6mm plastruct SHS tubing (same as used above in the boiler washout plug step). Clad the 4.6mm SHS over with 1mm styrene to make the SHS into a 6.6mm x 6.6mm SHS. Now insert this packed out 6.6mm SHS into the 9 x 9mm SHS, weld all the styrene together. You should now have a solid SHS rod, 26mm long with a 2mm tube hole running though the center.

### Step 2

With the boiler and sideboards/cab floor in place, weld this 9x9 SHS block under the rear end of the cab floor. Make sure the SHS is mounted within the length of the chassis frame. When dry, drill a vertical hole down though the floor and through the 9x9 block. Firmly bolt the 9x9 block to the cab floor. The 9x9 block is our mounting bracket where the chassis will be bolted to the superstructure.



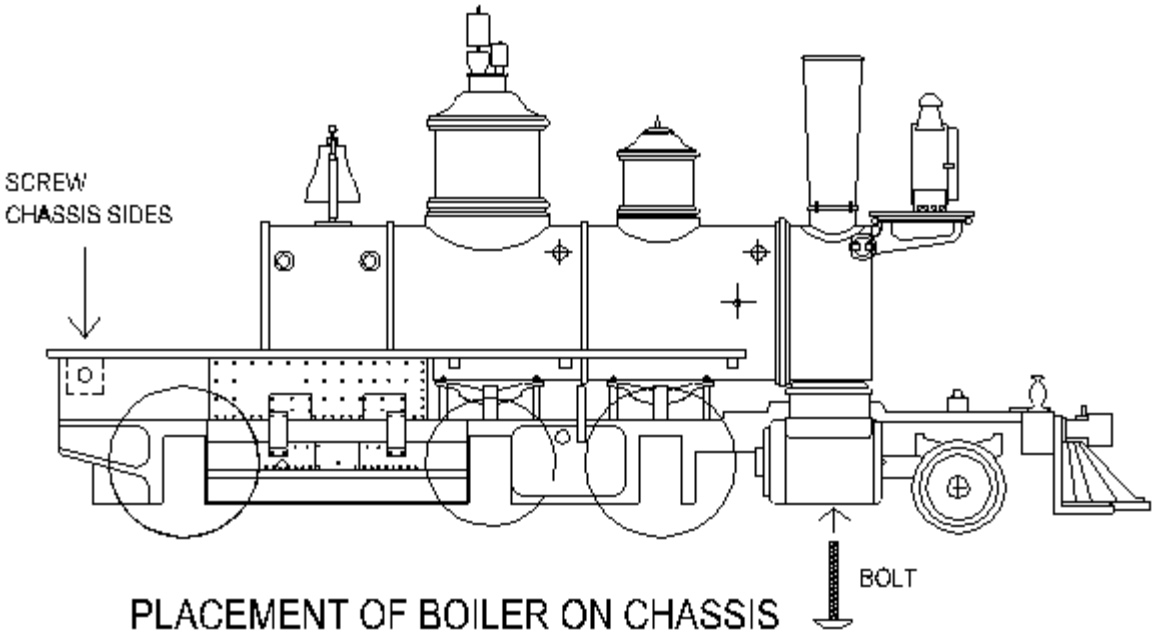
*The 9x9 SHS block mounted to the rear underside of the cab floor*

**Step 3**

Place the boiler assembly back onto the chassis. Drill two holes in the rear sides of the chassis frames to align with the hole running through the centre of the 9x9 block (drill one hole each side of the frame). Then insert some snug fitting screws though the holes and tighten. The rear of the superstructure is now screwed to the frame.

**Bolting the Boiler to the Frame**

Turn the model onto its side. Look at the center hole seen between the cylinders on the underside of the frame. This is our fixing point for the boiler front end. Hold the boiler firmly into the saddle, make sure it's a snug fit. Drill a hole right up into the smoke box using the existing hole between the cylinders as a guide. You can choose a small enough drill size so that the bolt that is inserted though this hole will be able to thread directly into the PVC boiler pipe. Thus no actual nut will be required inside the smoke box for the bolt to fix into. If you do happen to drill the hole too big for the bolt to get a good thread, then take the smoke box front off and thread a nut over the bolt from inside the smoke box and tighten. You will HAVE to ensure your smoke box front is removable in future to access this nut, in order to drop the chassis out for maintenance. If you were able to thread directly into the PVC pipe, then the smoke box front does not have to be removable, but its still a nice idea to have it come off for easy access into the boiler to replace headlight bulbs or add weight etc.




*The above diagram illustrates the rear fixing block (dotted) and the bolt fixing through the saddle to fix the superstructure to the frame.*

Having done this, please do not yet lift the model by the domes or superstructure anywhere, because the sideboards/floor will bend dreadfully under the weight. The superstructure will not be rigid until the cab is installed in the next chapter.

## The Boiler Braces

The front boiler braces have to be the cutest detail of a Narrow Gauge loco. These are the diagonal metal braces that run down from the smoke box sides to the leading edge of the pilot deck. On a narrow gauge, inside frame loco, the braces tend to converge toward the pilot deck, which is also a delight. The braces are in reality made from iron and while cylindrical in section, are flattened at the ends to bolt flat against the loco structures. At the smoke box end the brace forms a circular disk that is bolted to the smoke box with 3 bolts.


*Note the end of the boiler brace - a circular disk bolted to the smoke box with 3 bolts. (this is the circular thing to the left of the Baldwin builder's plate- we'll make the builder's plate at the end of the job, so wait on that one!)*

The braces run down from the smoke box centerline -(or close to) to the pilot deck, where the rods flatten and two bolts fix the braces to the deck. This is once again beautifully demonstrated on our prototype 8-16-D 2-6-0 at Sacramento.

*Note the disk like tops to the braces fixed to the smoke box sides and the flattened lower ends with two bolts at the pilot deck.*

**Some Myths**

Once again model companies, with their chosen detailing of models can really help to misinform.

**Myth 1**

We love seeing our boiler braces on models in gleaming brass - WRONG. The braces were always Iron. They had a major structural role to play and brass braces just wouldn't be strong enough. The whole of the pilot deck is supported by these braces. There is very little chassis framing under the deck for support. Thus when the loco is double heading or pulling trains using the pilot coupling, the braces do an enormous amount of work in keeping the loco's front end from falling apart. These are major structural elements and are made from strong materials. Iron first, then steel. In some cases they could have been painted brass colors. You will have seen a lot of the braces painted white in the photos of real loco in this series. Inyo, Genoa, Sonoma, Empire, Eureka etc all have white painted braces (except for the ends of the braces). These were often painted white for safety. The crew had to climb over and around the braces to get up onto the boiler sides, and the braces were a hazard. Painted black they tend to vanish, so white paint was the answer. You can decide if you're 1870s versions will have white braces.

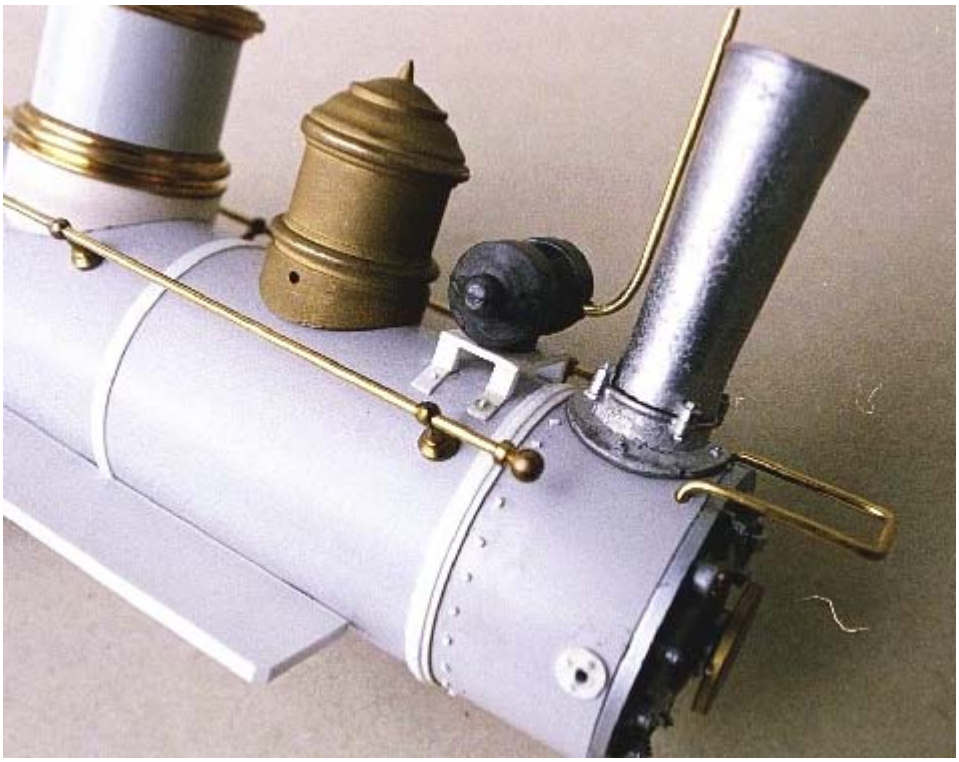
**Myth 2**

The braces on many model locos do not go down a straight line to the pilot deck, instead they're found running to a point about 10mm above the deck, and then head down vertical making a nice dog leg in the brace. The Aristo C-16's braces are like this, along with many other models. While I can't categorically say this is wrong, I can say with certainty, its unlikely braces ever had dog-legs in them. Again from a structural viewpoint, the braces formed a structural triangle over the deck, a

dog-leg in the brace is a certain point for a fracture and failure in the structure. The braces must run in a straight line from boiler to deck, no changes in direction. The braces will then follow the lines of force.

**Step 1 - Making the bolted brace plates**

Fabricate two 6mm dia circular plates from 0.5mm styrene. You can make such small disks by cutting a 6x6 square, then cut the corners to make an octagon then cut those remaining corners, then sand the edges. You'll be left with a nice circular disk!
Using a drop of araldite, weld the 6mm plates onto the smoke box sides, right up near the front edge of the PVC boiler pipe. (refer prototype photos above). Glue them in place along the horizontal centerline of the smoke box.
Next cut some more of our famous rivet (bolt) stick. Slice the rivets/bolts, and weld them to the plates. Make a note of the angle in which the braces will follow to the deck and center the 3 bolts around that angle. Please look at the Inyo photo above again to place the 3 bolts.
Drill a 1.5mm hole in the center of the 6mm disk, drill right though the PVC pipe as well. Do this to both sides of the smoke box.



*The brace end disk fixed to the smoke box side, with a hole for the brace rod and the 3 bolts. The line of rivets near the boiler band are added details handled under the 'detail' section of this chapter, as is the dynamo.*

**Step 2 Making the Braces**

You will notice the C-16 pilot deck we're using in our frame already has the lower flattened ends of the braces molded into the deck, with a hole behind for our wire braces to run. Thus there is nothing left to do for our braces other than make the rods themselves and insert the ends into the smoke box plates and deck holes.

Now I can't give you a template to bend the braces, so you'll have to form these yourself. The length depends on exactly where your boiler ends. Make the braces out of 1.5mm brass rod. You will

have to bend the top end of the rods with about an 80 deg bend. The lower ends of the rods with about 130 deg bend. It might take some trial and error to get the braces the right length and all fitting into the holes properly with no visible bends in the rods, or dog-legs. If you want to do a test rod in-situ, you can use some solder wire, reeeel soft and easy to bend. Insert one end into the smoke box and pull the other end into the deck, then carefully remove the solder brace without bending it. Then just copy the solder brace with a real one in 1.5 mm brass to the same profile.

*The 1.5mm Brass braces in place, ready for painting.*

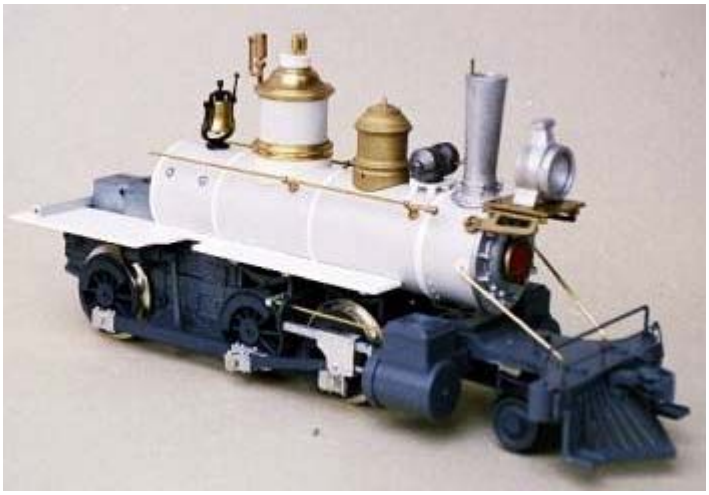
When installed, make sure the braces do not pull the pilot deck up out of level (your braces are too short) or push the deck down causing the pilot to drag on the rail head (your braces are too long!).

This is the hard bit paint it, black, grey what ever your iron colors are for the model. YES paint it, no I know you like the shiny brass. PAINT IT!! You can add a touch of white if you like!

*Painted!!*

Well there it is, a boiler, domes, stack, washout plugs and decking for the cab. You're ready for Chapter 5 now - Cabs!!

Your model as seen under going painting, will look something like this:



*The work of chapter 4, as yet unpainted.*

*The model is now primed ready for final top coats.*

Now some of you will be wanting to know what their loco will look like without having to wait for the cabs chapter. If you are building the 1:24 scale model and have the taller Delton brass cab from J&W trains, I'll give you a head start with the cab right now. Sorry to the rest of you scratch making your cabs, you'll have to wait for chapter 5 to turn your thing into a loco!!

## Commercial Wood Cabs for this Project

I'll take this moment to advertise the fact that we have some commercially made real wood cabs on offer for this project. They are made to both the 1:24 and 1:20.3 scales, and have the actual profiles of the cabs used on this model, based on the CAD drawings done for this MasterClass. If you want to use a real wood cab, and don't want to scratch make your own cab in styrene or wood as will be covered in chapter 5, then you should place your order for a wood cab now so that you'll have it in hand when chapter 5 is unveiled in a couple of weeks. The cabs are made by Vance Bass of FH&PB Railroad Supply Co. and are of the highest quality. You will know of Vance's work and his wood cabs offered as retrofit cabs to the Accucraft 'Ruby'. The walls are made from three layers -- two of 1/32" walnut and one of 1/16" baltic birch plywood for strength. If interested, please contact Vance or visit

his web site. Wood cabs would give particular character to the 1:20.3 models. Contact details are as follows:

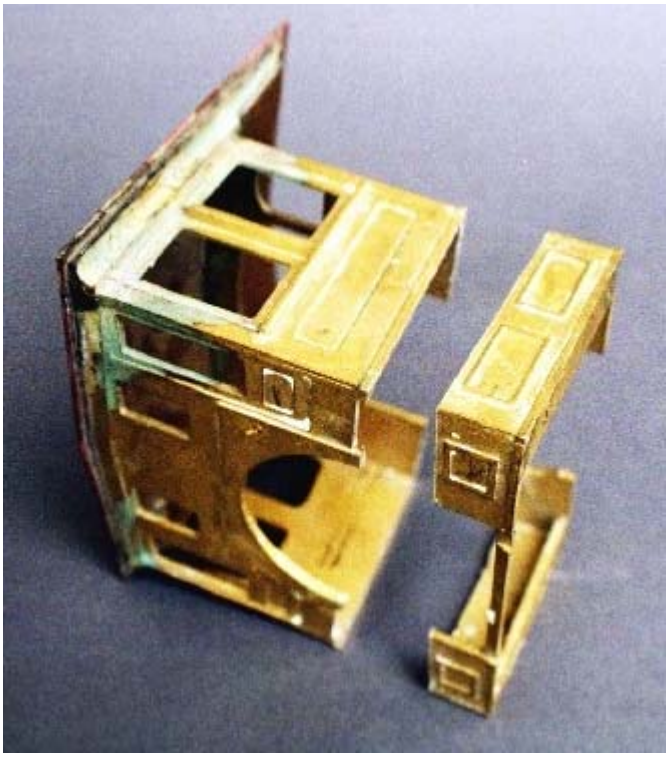
Vance Bass
FH&PB Railroad Supply Co.
6933 Cherry Hills Loop NE
Albuquerque, NM 87111 USA
http://www.nmia.com/~vrbass/fhpb/

## The Delton Brass Cab

Those building the 1:24 scale version and intending to use the Brass Delton cab, just for the purpose of letting you see what your loco looks like, we'll cut our Brass Delton cab to the right height and sit in on the loco cab floor up against the boiler. Do not fix, glue or paint anything else, just wait for chapter 5 for all those details. I am allowing you to cut the cab now, because if I don't you'll go ahead and cut it anyway....!!

OK lets cut the cab.

Look at the cab side walls. About 16mm up from the cab base is a horizontal floor line; a 2mm thick cast line that runs right round the cab. There is cast paneling above and below this floor line. We want keep this floor line with the cab and cut off the paneling below this line.
Using the fine bladed hack saw or jeweler's saw/razor saw, start cutting along the bottom of the floor line detail cast on the cab side walls. Check the photos here as to the line to cut. DO NOT CUT ON THE WRONG SIDE OF THE FLOOR LINE, OR YOU'RE CAB WILL BE TOO SHORT!!



*The Delton 1:24 brass cab, cut off below the floor line detail.*

Once the bottom paneling of the cab is cut off, do some filing, clean-up of the cut edges and then rest the cab in place and await chapter 5 for the rest of the adventure regarding cabs!

Thus:

Some of you will have obtained cabs with a brass roof soldered on, others will have a cab without a roof. Which ever you have, we'll be making a roof out of 2mm styrene in the next chapter, with some added detailing. Even if your cab has a brass roof, the sheet is too thin to look right for a wood framed roof, so we'll be adding a styrene roof on top of the brass one to thicken it up.
See you in the next Chapter...and good luck!

David Fletcher
August 2001