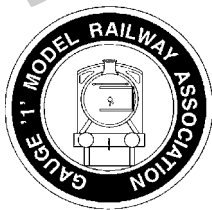


# The DEE Book - Edition 3



*By Dick Moger & Barry Applegate*

**How to construct a twin inside cylinder  
methyated spirit or butane gas fired  
4-4-0 locomotive  
to 10mm = 1ft  
in Gauge "1"**



*Published By The Gauge "1" Model  
Railway Association*





*Dick Moger's original "Dee", the prototype, in front and Frank Norton's "Dee" before painting at the back.  
Photograph by Frank Norton*

## DEDICATION

This publication is dedicated to the late Devera (Dee) Hobson, our founder member's wife.

## FOREWORD

The authors would like to express their gratitude to those who have contributed both material and ideas in developing this publication. They include: John Barton, Tom Barratt, Bob Hines, Gerry Chesmore, Frank Norton, John van Riemsdijk, Tony Riley and Brian Searle.

Martin and Pauline Hulse edited this publication including creating the layout and final presentation.

Photomatic Ltd gave permission for us to use a fine picture of a 'D' Class in Southern days on page 4.

Michael Pritchard of Railway Modeller gave kind permission to use the GA drawings by the late Ian Beattie.

Tony Riley allowed the use of his fine picture of a 'D1' on page 5.

Dick Moger provided the cover picture which shows the original Gauge 1 Dee in full steam on its home track, together with the two pictures on the outside back cover of the full size 'D' as preserved in the NRM in York.

Frank Norton provided the many constructional pictures throughout the text, and the picture above.

Tony Hobson provided the underview montage photograph on page 8.

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Information on G1MRA can be obtained from their web site at [www.gaugeone.org](http://www.gaugeone.org) or by writing to the Membership Secretary at PO Box 5252, Northampton, NN5 6XB, England. Other books published by G1MRA include *The Project* - how to construct a single cylinder Gauge 1 locomotive, and a series on *Modelling in Gauge 1*.

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*Cover picture shows Dick Moger's original DEE in its 6th year of running.*

*Diagram at bottom right of cover is from the 3D companion CD - see page 96*

## CHAPTER 2 - Chassis

### Mainframes

These are standard plate frames in 1/16" bright mild steel made in the usual manner by bolting two plates together and then drilling and filing as required.

Beginners might find it convenient to use double sided tape to hold the two frames together before cutting to size. It is suggested that at least two holes are drilled, countersunk and fitted with countersunk 8BA screws and nuts before serious filing or milling takes place.

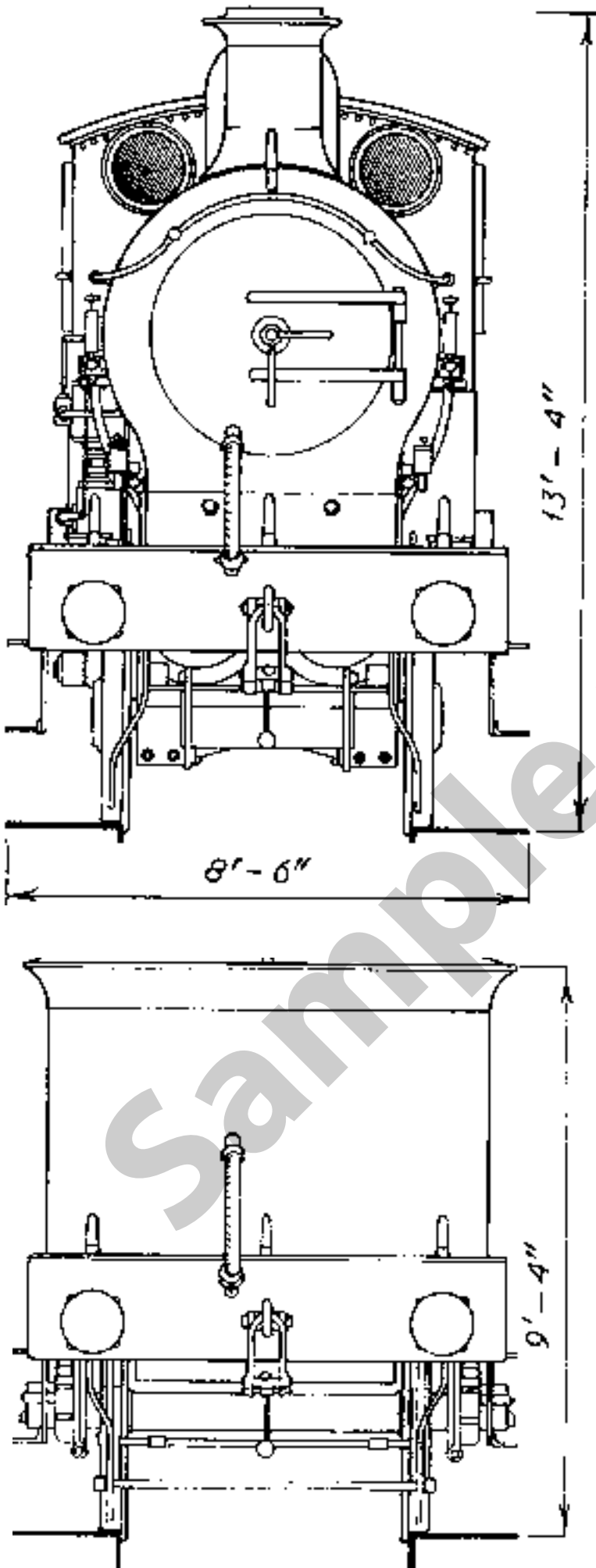
Our original models employed some very nice 6mm ID x 10mm OD x 3mm ball races from Compass House Tools of Rotherfield in Sussex. These were held in a retainer rather like an axle box, which allows for dropping of the wheel-sets.

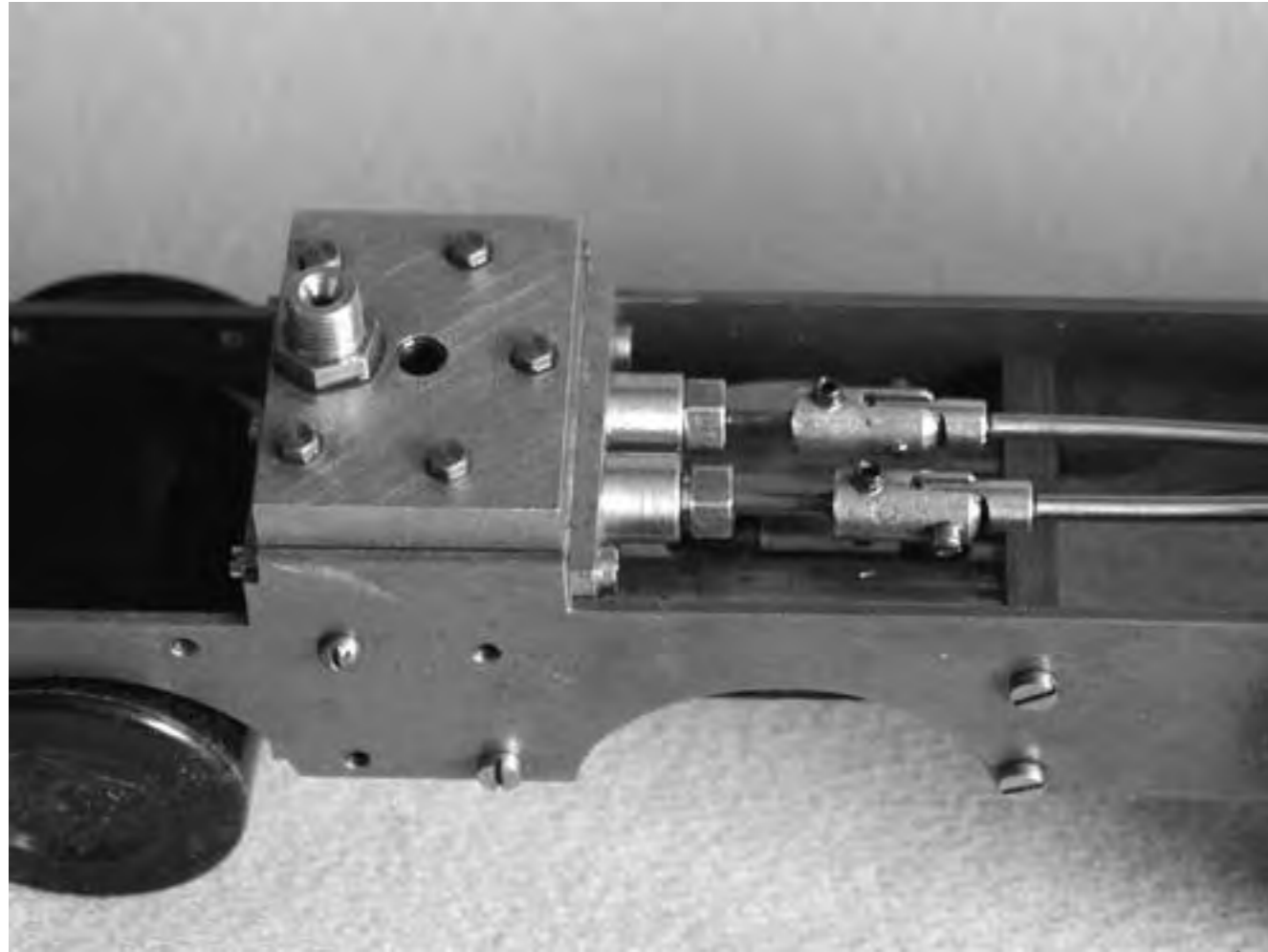
On completion of the crank axle with its demountable components, it was decided that these removable axle boxes were an unnecessary complication and we have reverted to plain bearings as for the "Project". No doubt experienced builders will have their own favourite method for doing this if they so desire.

If ball races *are* used, then the frames will need doubling by the addition of 1/16" plates over the axle areas in order to support the outside of the bearings. This is no big deal and these bearings will give a very smooth ride and outlive the rest of the locomotive.

Note that on our model, the upward projection of the frames by the cylinder block is essential. In order to get a scale front, the smoke-box wrapper comes *outside* the frames, with the prototype's characteristic extension of the mainframes above the footplate being dummies attached to the footplate. This works out very nicely and, for once, gives us a genuine scale appearance at the front end.

Note: As with the "Project", our 10mm per ft scaling of the prototype leads to mixed Metric and Imperial on the basic drawing overleaf.





Photograph by Frank Norton

## Manifold

This small block fits on top of the cylinder block. It provides the cross connections for the exhaust as well as a seating for the blast pipe and the main steam input. It is suggested that a PTFE gasket is used and you are reminded not to forget the holes for steam inlet and exhaust outlet in this gasket!

Ensure that the recess in the base of the manifold allows steam entry to the ports and is clear of the  $5/32'' \times 40\text{tpi}$  studs used to prevent valve rotation.

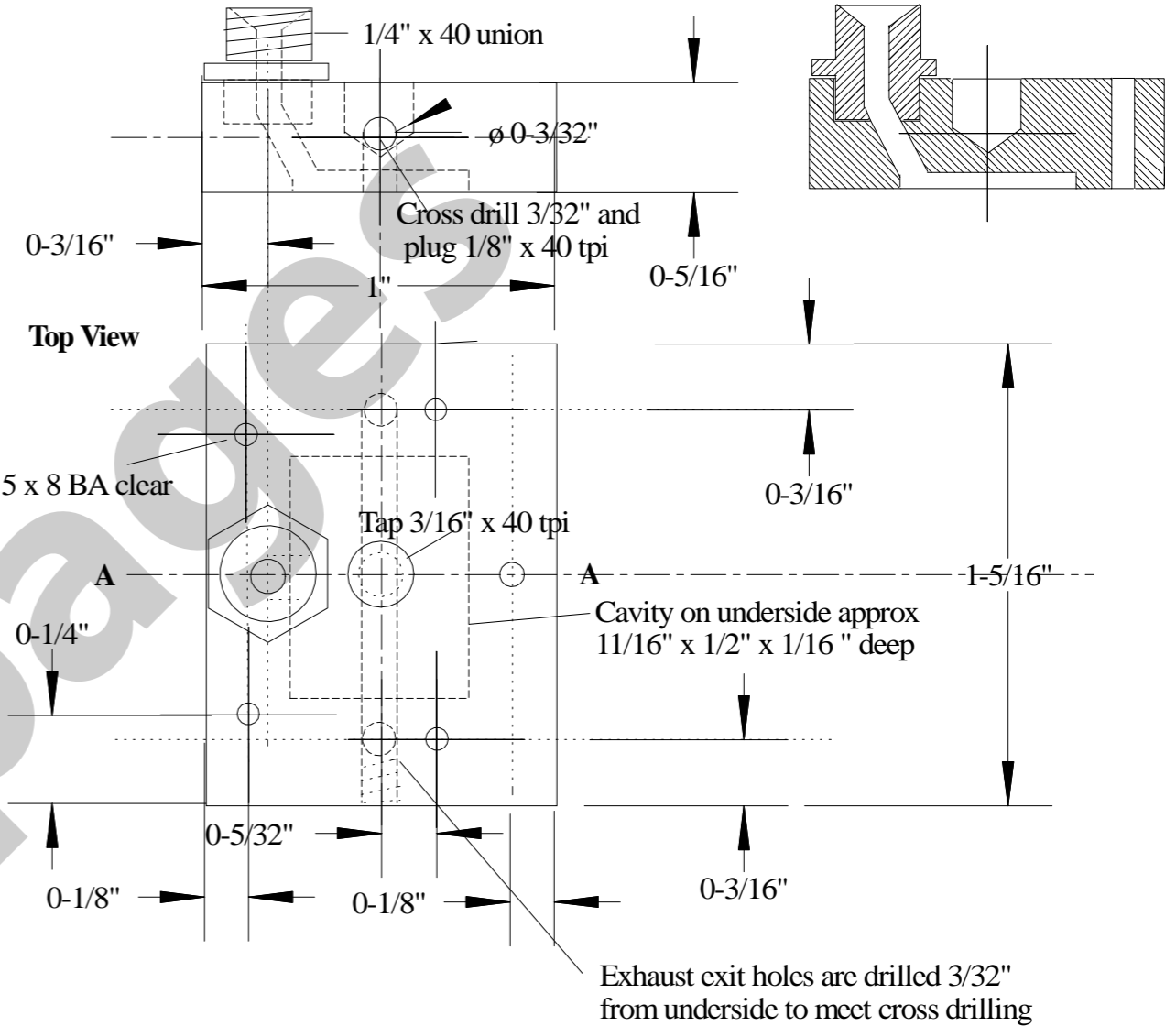
The base of the union for the main steam input will need to be securely held into this manifold block to prevent it unscrewing and twisting the main steam pipe when the boiler is removed. Either a strong Loctite or silver

soldering will achieve this. If silver soldering is used, ensure that the base is rubbed true again to remove any distortion.

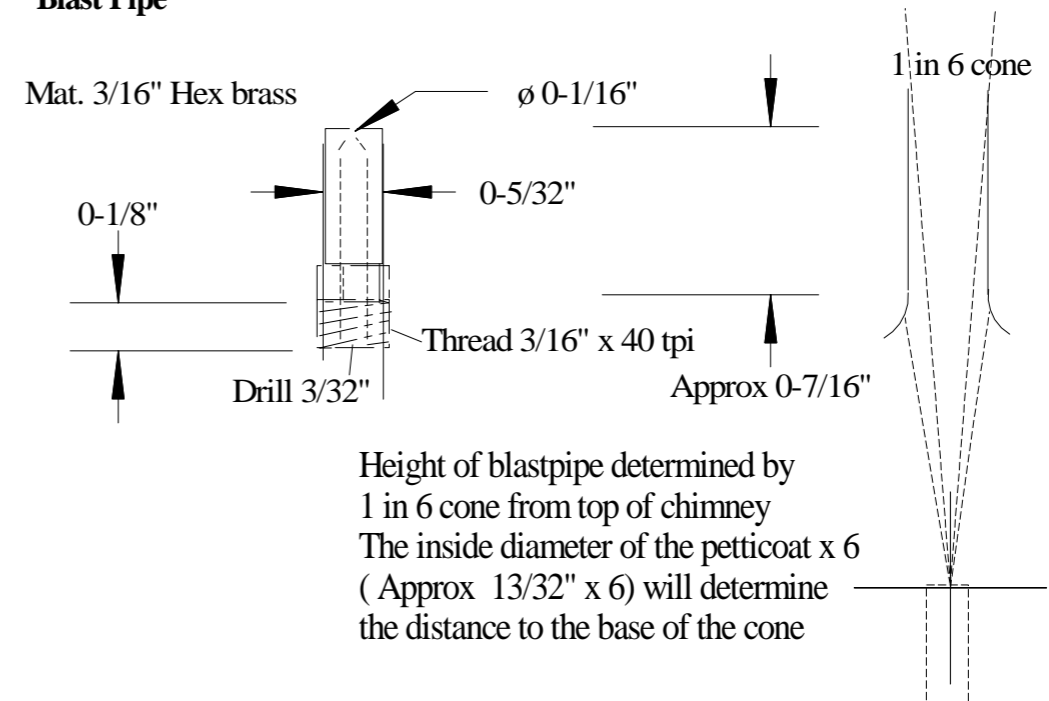
Note that the entry hole for the cross drilling must be plugged without obstructing the vertical exhaust entry hole.  $1/8'' \times 40\text{tpi}$  or 5 BA will do.

Note also that the blast pipe nozzle can be made from a 6 BA cheese head screw with the body of the blast pipe tapped accordingly. This allows for easy adjustment, removal, cleaning and replacement.

## Manifold

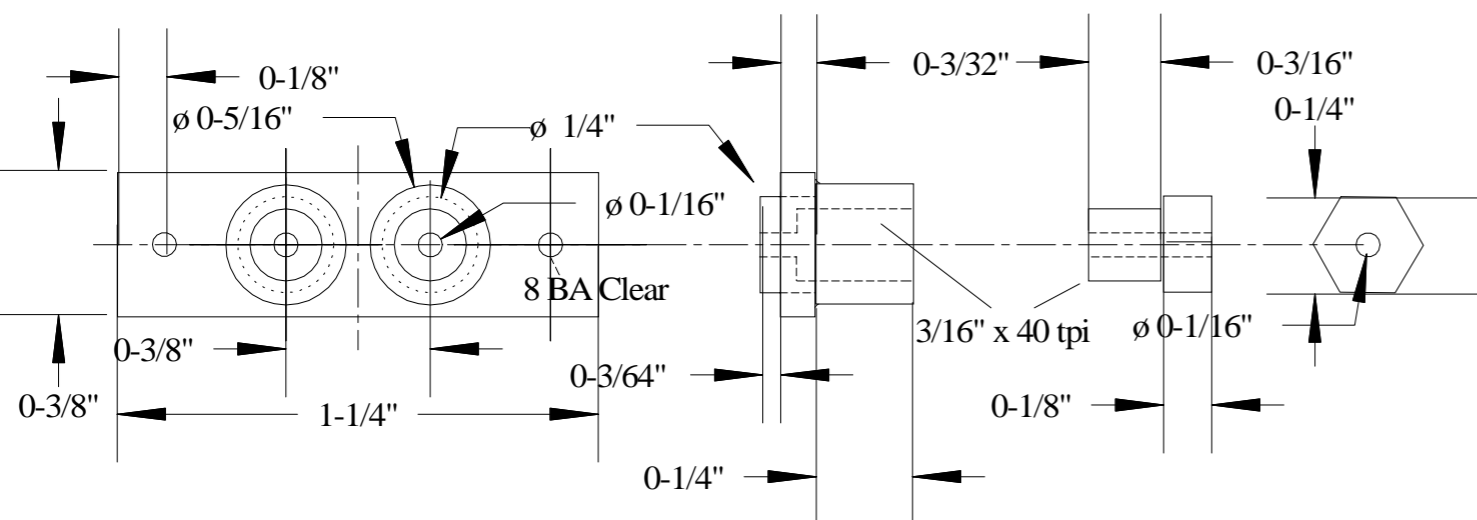


## Blast Pipe



Height of blastpipe determined by 1 in 6 cone from top of chimney  
The inside diameter of the petticoat x 6 (Approx  $13/32'' \times 6$ ) will determine the distance to the base of the cone

## Valve Rear Cover



## 'D' Valves



This is acceptable because these nuts do not set the valve timing, and the rod can be removed or inserted into the guide by unscrewing the knuckle end. In practice, it is easiest to undo the valve knuckle pins, remove the two valve bracket mounting screws and withdraw the guides with their rods and valves as one unit. The timing is unaffected by this manoeuvre.

The end 10 BA nut is adjusted so that the valve is free to move up and down but with no noticeable slop forwards or backwards. This nut must be Loctited in place.

The valve is prevented from rotating by screwing in a 5/32" x 40 tpi stud into the top extension of the exhaust port. Screw the stud down until it just touches the valve and then back it off at least a quarter turn.

## Valve Timing

This process is rather simpler than it would at first appear to be. Although the real port faces are obscured from view, the drillings in the top of the block are extensions of these ports and can be used instead. All that is required is to leave off the front plate and the two 5/32" x 40 tpi grub screws in the exhaust port extensions and to gently rotate the valves so that they are upside down in their chambers.

To check for equal port opening, rotate the motion by hand and observe that the edges of the valve exhaust recess line up with the centre of the exhaust extension hole at both ends of the travel. Use the 7 BA nuts on the top of the eccentric straps to achieve this.

If the edge of the exhaust cavity does not coincide with the centre, then ensure that an equal offset is obtained for the two extreme positions.

The timing of the valve proper is achieved by observing that the valve port is just about to open at the top or back dead centre of the crank axle. Adjusting the slot on the split eccentric by a little judicious filing will correct any gross errors of timing. Individual variation between cylinders and fine-tuning for forward and reverse can be accommodated by this means.

After completing the timing, return the valves to their upright position and reinsert the 5/32" grub screws until they just touch the top of the valve. Back off a quarter of a turn securing with a little weak Loctite.

We owe John Van Riemsdijk the thanks for introducing us to this idea. It is the heart of this design, because it allows a much shorter cylinder block to be used than is normal, thanks to the lack of bolting surfaces for the steam chest. This in turn gives the bogie more freedom.

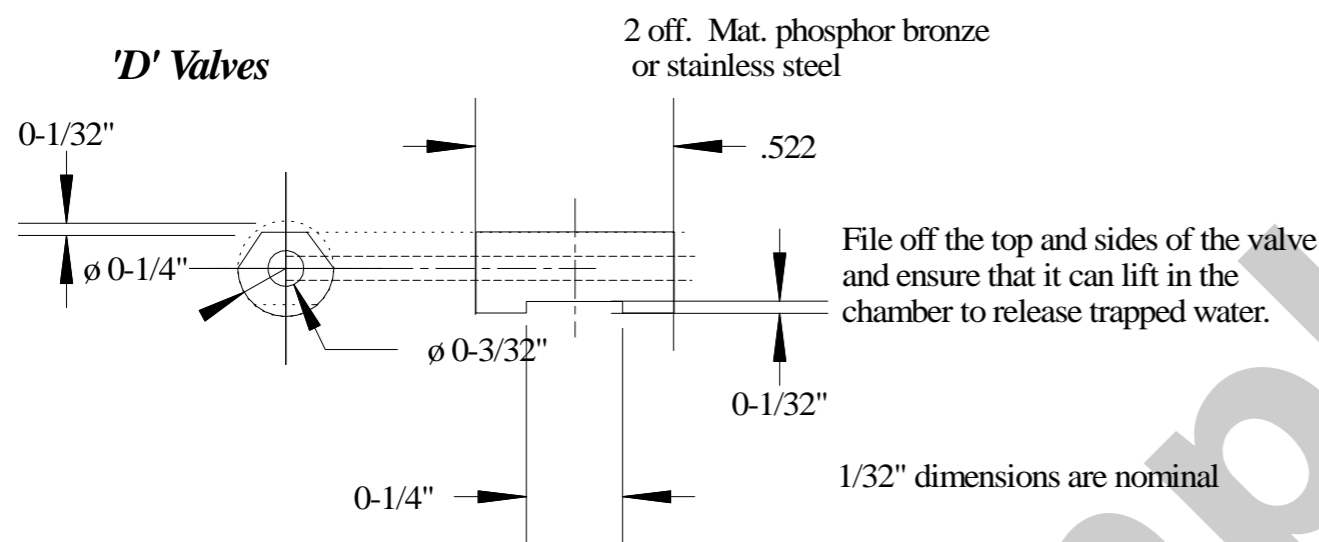
Despite appearances, these are in fact slide valves but are easier to make than the conventional style. The material can be brass, bronze or stainless steel, provided that it is different from the material used for the block itself.

A simple 1/4" piece of drawn round is used. This is drilled 3/32" to allow movement, notched 1/4" for the exhaust cavity and the top flattened. It is also necessary to file off a small area on the top sides to allow the valve to lift in the presence of trapped water. Although this is easily done with a file, use of the vertical slide on the lathe with an end-mill is suggested for the exhaust cavity, since accuracy here will help in the setting up process later. Note that the 1/32" dimensions are not critical.

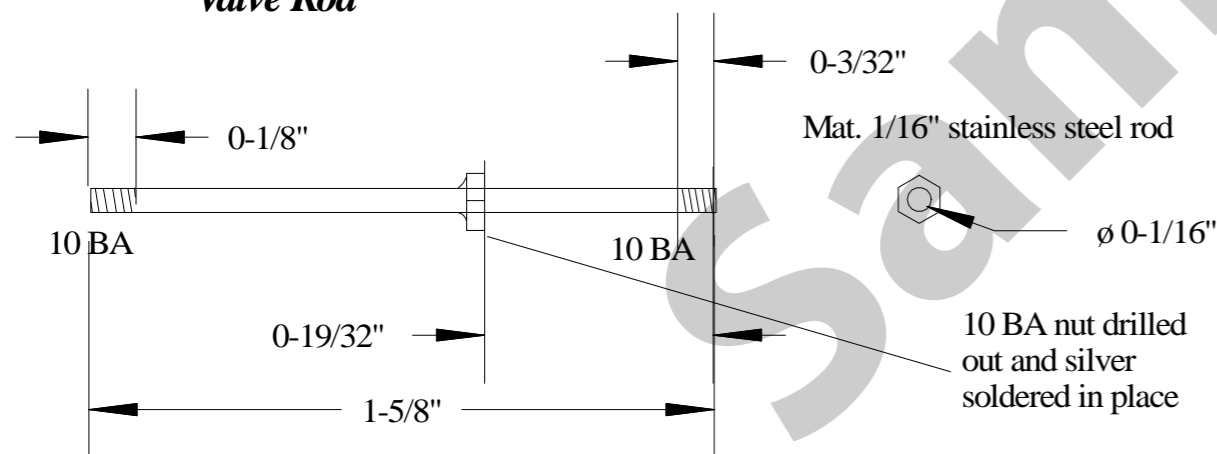
These valves are very easy to make, but require more care with lapping to make them seal. Please read and follow the notes under 'Motion Assembly Notes' carefully.

The valve rod is 1/16" stainless steel threaded 10 BA. On the original "Dee", this rod was threaded all the way up to the other end of the valve so that a 10BA nut could be run up as a stop for the valve. Threading this length of rod is tedious to say the least, so it has been shown on the drawings as a drilled out nut silver soldered in position.

## 'D' Valves



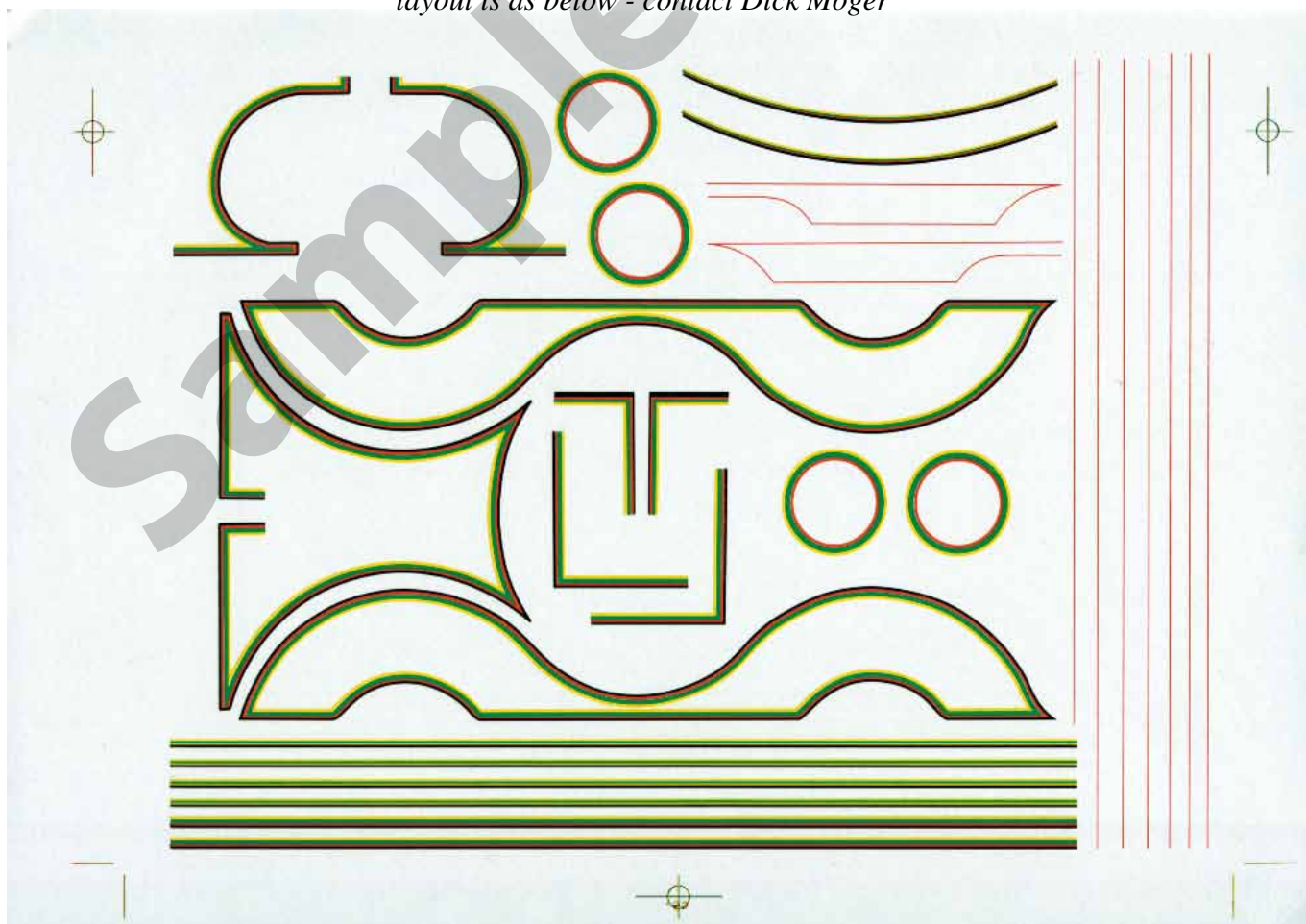
## Valve Rod





*Tom Barratt's unpainted meths fired Dee in action*

*Water slide transfers for the original Dee livery have been prepared  
layout is as below - contact Dick Moger*



Two views of No. 737 at the National Railway Museum, York.

