

RIDE-ON TENDER FINALE ● GEARING FOR BUDGET BATTERY LOCOS

THE MAGAZINE FOR MODEL ENGINEERS

ENGINEERING in Miniature



Challenge accepted

**Driver's-eye view
of taking on
IMLEC**



SAFETY VALVES: HOW TO MAKE THEM IN THE HOME WORKSHOP

PLEASE COME AND SEE
US AT THE MIDLANDS
MODEL ENGINEERING
EXHIBITION,
THURSDAY 12TH -
SUNDAY 15TH
OCTOBER
2023



STUART MODELS

FOUNDED 1898

For the MODEL ENGINEER SETS OF CASTINGS

We offer Sets of Castings suitable for both those starting out in model engineering as well as those looking for a new and challenging project.

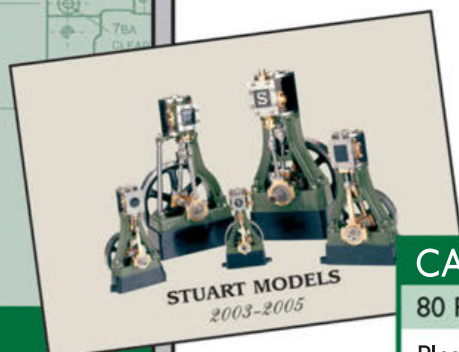


For the ENTHUSIAST PRE-MACHINED KITS

Many of our engines are available as Pre-Machined Kits allowing you to finish the model with a set of spanners and simple hand tools.

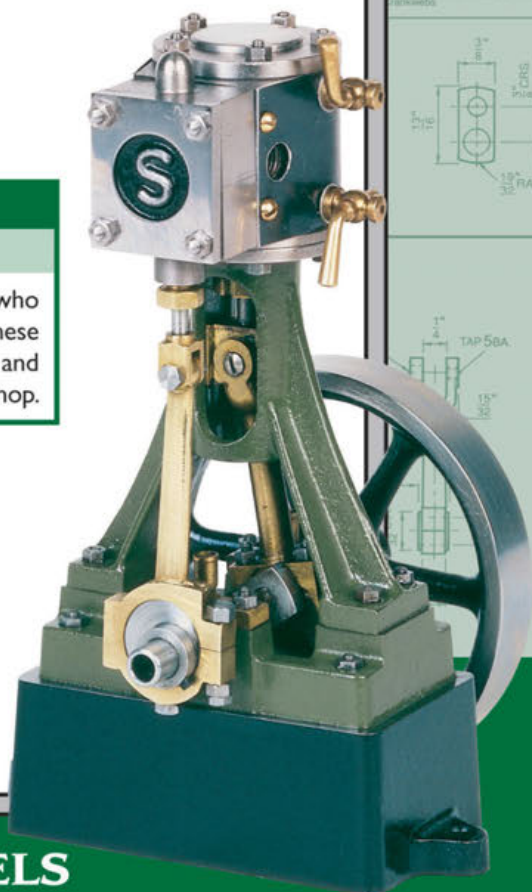
For the COLLECTOR READY TO RUN MODELS

The perfect choice for anyone who has an interest in steam. These models are assembled, painted and thoroughly tested in our workshop.



CATALOGUE - £6.00
80 PAGE FULL COLOUR

Please send £6 for our eighty page comprehensive full colour catalogue which covers our entire range of models and accessories.



STUART MODELS

GROVE WORKS, WEST ROAD, BRIDPORT, DORSET, DT6 5JT

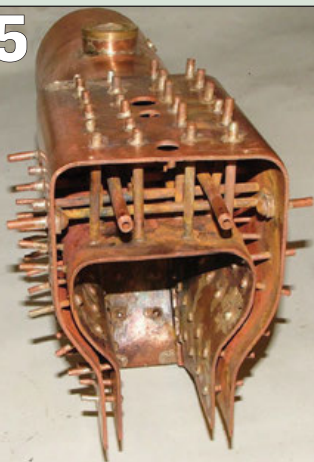
• TEL 01308 456859 • FAX 01308 458295 • www.stuartmodels.com •

CONTENTS

SEPTEMBER 2023 Volume 45 Number 03

THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING
in Miniature

05



05 THE TANK ENGINE THAT NEVER WAS

by Nick Feast

10 DREAMING SPIRES RALLY 2023

by John Arrowsmith

14 MAKING SAFETY VALVES AT HOME

by Rich Wightman

20 HARRY'S GAME – NOT SO SLIPPERY

by Harry Billmore

24 SUB500 – BUDGET LOCO TRANSMISSION

by Rich Wightman & Julian Harrison

28 BENCH TALK – SHEET METAL FOLDING

by Harry Billmore

30 7 1/4-INCH GAUGE RIDE-ON TENDER FINALE

by Peter & Matthew Kenington

36 EVENT REPORT – MY DAY AT IMLEC

by Nick Feast

39 READERS' WORK – A SIMPLE DIVIDING TOOL

by Neil Heppenstall

40 LETTERS

41 CLUB & TRACK NEWS

45 CLUB DIARY

FRONT COVER

Nick Feast found competing in IMLEC – the International Model Locomotive Efficiency Competition at Bristol a big challenge, as he describes in this issue. Bristol SME member *Bernard North* took the picture.

10



24



EDITORIAL

Just where have all the stationary engines gone?

Welcome to the September edition of **EIM** – I always find it slightly odd writing something for the month that marks the end of summer at the end of July when we are just getting into summer – I can tell by the rain (or liquid sunshine as we call it in mid Wales) rattling the windows of my home office...

Deciding what to put in each month's **EIM** is always a bit feast and famine – sometimes you worry about having enough to provide a good selection for readers and at other times, far too rarely, you struggle to get everything you want in! This month is one of the latter, with the result that the latest episode of Nick feast's Schools-class build is taking the briefest of breaks (partly because Nick sent in a highly topical and interesting driver's-eye tale of taking on the IMLEC competition), and a planned piece by Tech Ed Harry, covering the different grades of steels and in response to a specific reader request, will also now appear next month.

Despite what we think is an interesting and thought-provoking range of subject matter in this issue, I do find myself agreeing with the thoughts of reader Neil Heppenstall, who takes me to task on the letters page for content biased towards railway subjects. Neil does summarise that I can only publish what I get in, and there's the rub – I would very much like to publish features on model engineering subject matter that does not require the use of two lines of steel or aluminium, I just don't get enough of it!

Stationary engines are a case in point. I've always been a big fan of such engines – they are generally easy to build and able to be completed in a fairly short time, both of which will appeal to newcomers to the hobby seeking encouragement as they embark on what is often a first build. When complete they can be very therapeutic as they gently tick over propelled by steam or air, or simply sit on mantelpieces and such as excellent display models, their builder able to look at them and say "I made that".

I don't, however, see much stationary engine subject matter in the editorial inbox – less so than when I took up the editorial reins five years ago. Do builders think we don't want to hear about their efforts? If so, I can assure them we do...

Andrew Charman

The October issue of **Engineering in Miniature** publishes on 14th September.

Editor: Andrew Charman Technical Editor: Harry Billmore

Email: andrew.charman@warnersgroup.co.uk Tel: 01938 810592

Editorial address: 12 Maes Gwyn, Llanfair Caereinion, Powys, SY21 0BD

Web: www.engineeringinminiature.co.uk

Facebook: www.facebook.com/engineeringinminiature

Subscriptions: www.world-of-railways.co.uk/Store/Subscriptions/engineering-in-miniature

FOR SUBSCRIPTION QUERIES call 01778 392465 – the editor does not handle subscriptions.

Publisher: Steve Cole
Email: stevec@warnersgroup.co.uk

Design & Production: Andrew Charman

Multimedia sales manager: Sarah Jarman
Tel: 01778 392055
Email: Sarah.jarman@warnersgroup.co.uk

Advertising design: Amie Carter
Email: amiec@warnersgroup.co.uk

Ad production: Allison Mould
Tel: 01778 395002
Email: allison.mould@warnersgroup.co.uk

Marketing manager: Carly Dudge
Tel: 01778 391440
Email: carlyd@warnersgroup.co.uk

Published monthly by Warners Group Publications Plc,
The Maltings, West Street, Bourne,
Lincolnshire PE10 9PH.

Articles: The Editor is pleased to consider contributions for publication in **Engineering in Miniature**. Please contact us to discuss your work.

© **Publishers & Contributors**
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the Publishers. This periodical is sold subject to the following conditions; that it shall not without the written consent

of the publishers be lent, resold, hired out, or otherwise disposed of by way of trade at a price in excess of the special recommended maximum price, and that it shall not be lent, resold, hired out, or otherwise disposed of in mutilated condition, or in any unauthorised cover by way of trade, or affixed to as part of any publication or advertising, literary or pictorial whatsoever.

Whilst every care is taken to avoid mistakes in the content of this magazine the publishers cannot be held liable for any errors however arising. The reader, in pursuing construction and operation of any product, should exercise great care at all times and must accept that safety is their responsibility.

Engineering in Miniature – ISSN 0955 7644

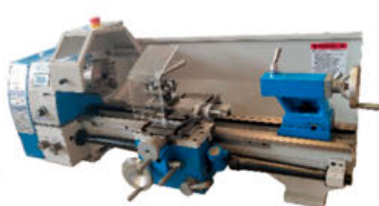


AMA714B Mini lathe
Brushless Motor

SPECIFICATION:

Distance between centers: 350mm
Taper of spindle bore: MT3
Spindle bore: 20mm
Number of spindle speeds: Variable
Range of spindle speeds: 100-2250mm
Weight: 43Kg

Price: £694



AMABL250Fx750

SPECIFICATION:

Distance between centers: 750mm
Taper of spindle bore: MT4
Spindle bore: 26mm
Number of spindle speeds: Variable
Range of spindle speeds: 50~2500rpm
Weight: 140Kg

Price: £1,904

W 2 Axis DRO - Price: £2,280



AMABL290VF Bench Lathe (11x27) - power
cross feed - BRUSHLESS MOTOR

SPECIFICATION:

Distance between centers: 700mm
Taper of spindle bore: MT5
Taper of tailstock quill: MT3
Motor: 1.5kw
Weight: 230Kg

Price: £2,782

W 2 Axis DRO - Price: £3,150



AMAVM25LV

SPECIFICATION:

Model No: AMAVM25LV (MT3) / (R8)
Max. face milling capacity: 63mm
Table size: 700x180mm
T-slot size: 12mm
Weight: 120Kg

Price: £1,431.00

W AXIS POWERFEED - Price: £1,659

W DRO - Price: £1,921

W DRO + PF - Price: £2,210



E3 Mill R8 Metric Brushless Motor

SPECIFICATION:

Max. drilling capacity: 32mm
Max. end milling capacity: 20 mm
Max. face milling capacity: 76mm
Motor: Input- 1.5KW
Packing size: 1050x740x1150mm
Net weight: 240kg

Price: £2,560.00



AMAVM32LV

SPECIFICATION:

Model No: AMAVM32LV (MT3) / (R8)
Max. face milling capacity: 76mm
Table size: 840x210mm
T-slot size: 14mm
Weight: 240Kg

Price: £2,100.00

W DRO - Price: £2,537

W DRO + PF - Price: £2,948

See website for more details of these machines and many other products including a large range of accessories that we stock

Prices Inc VAT & Free Delivery to Most Mainland UK Postcodes

www.amadeal.co.uk

| Call: 0208 558 4615 | Email: info@amadeal.co.uk |



The Tank Engine that never was...

Nick continues the short tale of his 3½-inch gauge 'might-have-been', reproducing what might have happened had the Southern Railway Q1 lost its tender for a tank...

BY NICK FEAST Part Two of Three

Tank locomotives tend to be associated with light duties on branch lines, shunting or empty carriage movements. The Southern Railway had express tank engines but owing to doubts about stability on imperfect track they were rebuilt as tender engines.

The added weight of water in the side tanks makes it difficult to set spring rates and unlike automobile chassis, railway locomotive suspension is only damped by the friction in the component assemblies. Minor track imperfections could set up quite large oscillations which were thought to be a factor in several derailments on the Southern in the 1920s, so the SR took the decision to not only improve the quality of its track but also to rebuild the 'River' class 2-6-4 tanks into tender engines.

Tank titan

If, however, we look further afield some pretty impressive tank locomotives have been produced, although not generally intended for high-speed use.

Photo 10 shows the Bulgarian State Railways (BDZ) class 46 two-cylinder 2-12-4 tank loco constructed in 1931. This 150-ton

giant was built for pulling heavy coal trains over steeply graded lines in the north of the country. Grate area was 52 square feet and it produced a tractive effort of 78,000 lbs, around double the power of a British Railway 9F 2-10-0 tender loco.

I assume two firemen were required to maintain steam and the spacious cab looks to be able to accommodate them and also provide good visibility when running bunker first. One has been preserved and is occasionally used on special trains.

I visited Sofia in spring 2016 but was not able to see this giant known locally as 'Mother Bear'. I knew it was housed in the old loco sheds adjacent to the Central Station but didn't have the necessary permission to visit, although this wouldn't have stopped me in my trainspotting days in the '60s! However access meant crossing a four-track main line, in full view of many non English-speaking railway staff. Having seen the inside of a Bulgarian police station in 1969 after being arrested on suspicion of being a 'subversive' (I had long hair!), I didn't fancy taking the chance so instead enjoyed the accessible parts of the comprehensive public transport system of the capital city.



PHOTO 10:

A tank engine to wonder at, Bulgarian Railways class 46. It has the tractive effort of two 9Fs. Photo: Flickr, courtesy of Historical Railway Images.

Photos by the author unless credited

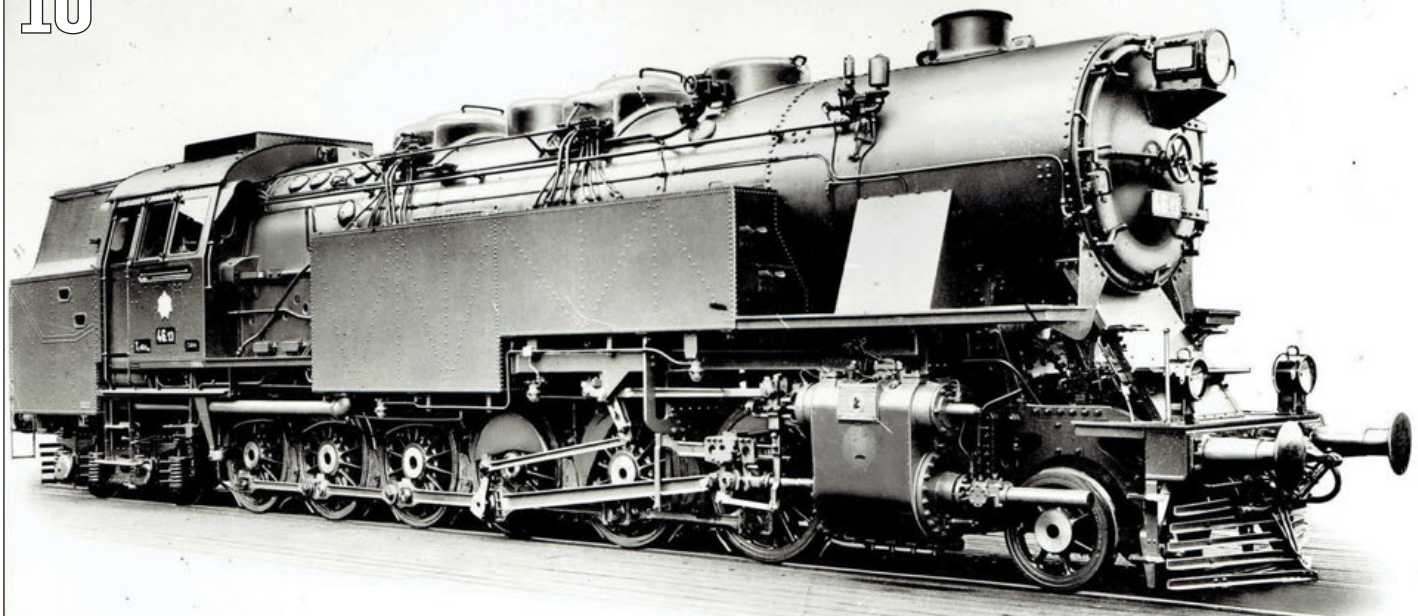
The long hair and the authoritarian regime have both long gone and an enjoyable few days were spent enjoying the city's varied transport facilities. It has an extensive tram system of almost 100 route miles of both standard and metre gauge, with vehicles from all eras. The latest air-conditioned super trams can be seen alongside a vintage 1935 Siemens design. There is also a metro system and large trolleybus network.

There are some videos of this impressive restored locomotive on the web; it has a warning hooter of considerable volume that would do justice to a sea-going tug!

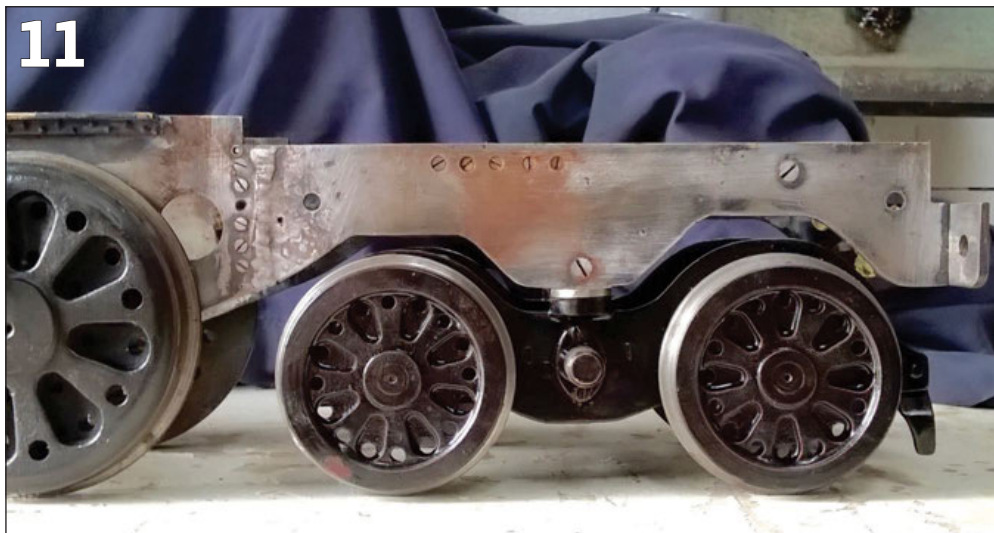
Rarely modelled

The European rail network in general employed many main-line tank

10



11



12



PHOTO 11: Frame extensions welded on; Bulleid tender wheels carry the load via pads on bogie frames.

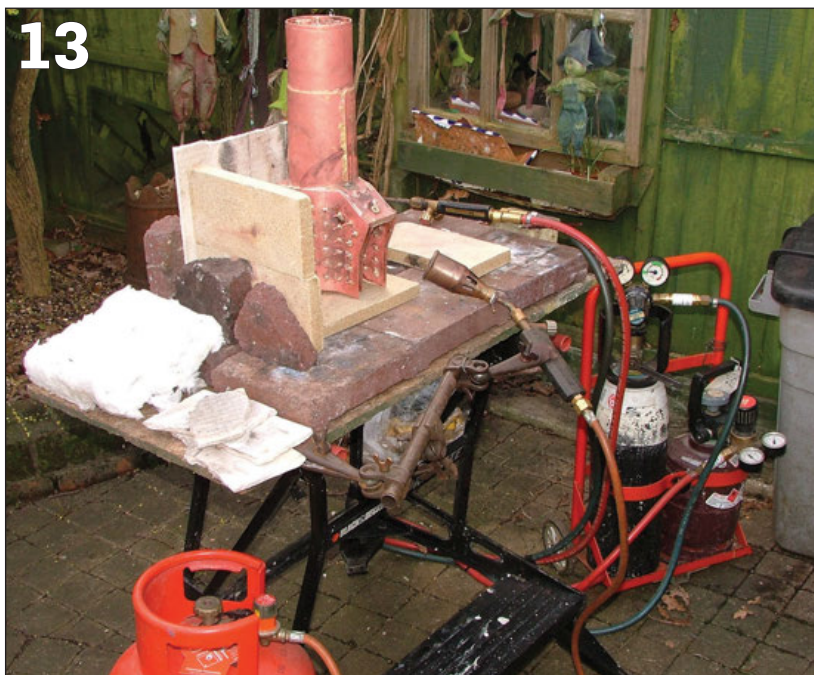
PHOTO 12: Shorter firebox and taper barrel gives a more conventional look to this boiler compared to the original Bulleid design.

PHOTO 13: Garden boiler construction allows heat to disperse safely. A windless day is preferred otherwise more screening is needed.

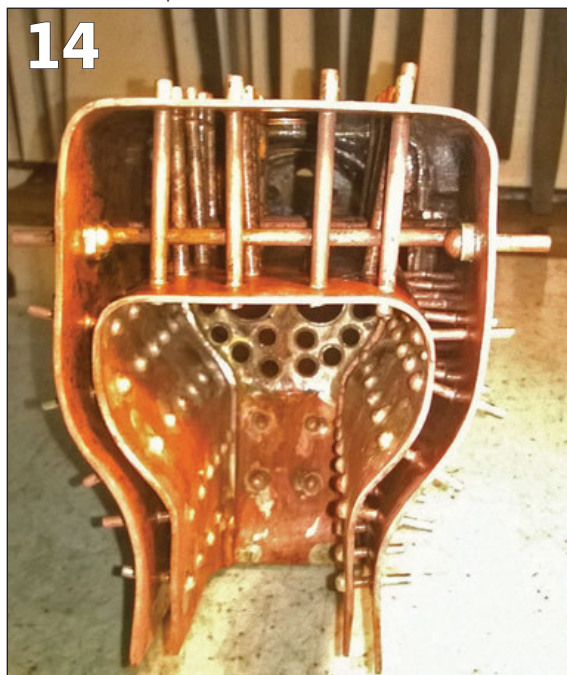
PHOTO 14: Rod stays have to be positioned exactly to avoid clashing.

PHOTO 15: Result of not getting it right, rear cross stay needed slight repositioning. Longitudinal hollow stays for blower and oil supply to cylinder.

13



14



engines but these are rarely seen in model form. In fact it is unusual to see any non-British domestic design modelled, which I think is a shame. I am aware that there are few published designs available but European-outline models do have certain advantages. Even in standard gauge the European loading gauge is generous enough to make a main-line 3½-inch gauge loco a serious passenger hauler for a club track.

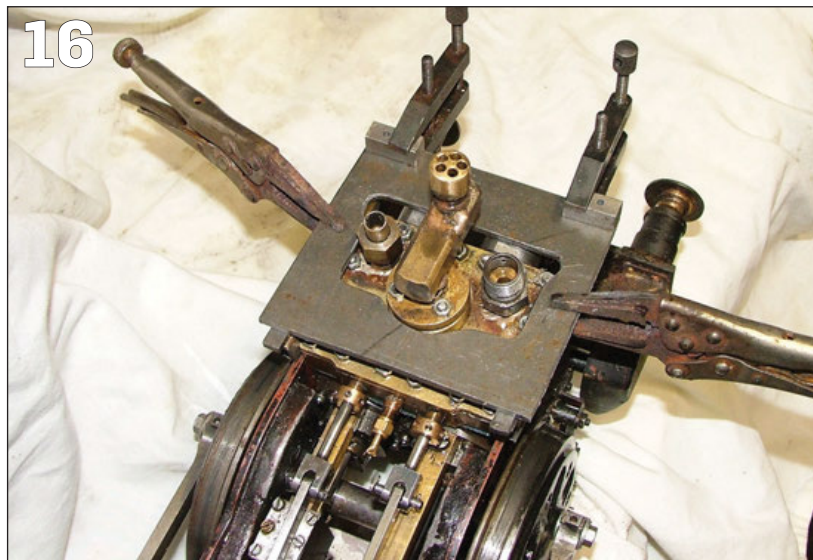
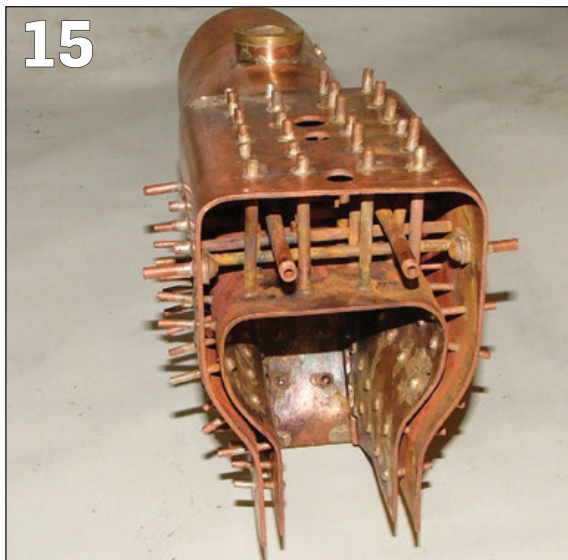
Back to my 'imaginary' Q1 tank loco, **Photo 11** shows the rear frame extensions welded to the standard Q1 frame; an extra frame stretcher has been fitted where the row of screw heads is visible. The extensions are 3mm mild steel; the rear buffer beam mirrors the front item.

Having built two locos to my original design, I decided to make a few changes on this version. Experimentation to try and get a better performing engine is all part of the fun of miniature loco building! The prototype Q1 has a huge firebox, making up half the length of the entire boiler. This was so that during wartime when it was introduced it could burn inferior coal; the best coal I believe was reserved for the Navy.

Fuel on the line?

It could make steam on slack (coal dust with small bits), ovoids (compressed coal dust and cement), and even garden rubbish. I have it on good authority from a Bluebell Railway driver that while C1, the only remaining Q1, was operating as part of the Sussex preserved line's fleet it did a day's shunting burning old telephone directories!

I decided, however, to try more conventional boiler proportions which would fit the tank engine better as a



smaller grate and ashpan could be used. The firebox was shortened and a taper section inserted at the back end of the boiler tube.

Photo 12 shows the boiler during construction, this followed the same lines as the 'Schools' boiler described in these pages recently (*EIM*, May, June 2023). The main differences are the Belpaire firebox instead of the round-top type on the Schools, and the tapered boiler tube that is correct for the Q1 prototype. My original Q1 design used a parallel boiler tube for simpler construction, it works perfectly well.

In **Photo 13** I have set the boiler making equipment up in the garden, the oxy-acetylene and propane bottle (red) can be seen, with the propane torch clamped in the adjustable 'third hand'. The insulating bricks sit on top of old storage radiator bricks, all supported by the trusty Workmate. Note that the cover strip on the taper section of the boiler is on the outside so that the joints are fully visible.

Photo 14 shows the part-built

PHOTO 16:

Checking the smokebox floor for clearance, it is useful to be able to lift the smokebox off easily for repairs.

PHOTO 17:

Laser-cut steel profiles for smokebox ends brazed up – well over scale but added weight.

PHOTO 18:

A smaller firebox needs a smaller ashpan and grate, so the section behind the trailing axle has been trimmed back.

boiler from the back end – I have gone for rod crown stays as on the Schools, $\frac{3}{16}$ -inch phosphor bronze in this case. When modifying a design that has girder stays you have to be careful that the vertical stays don't interfere with the cross stays, you can see here that I had to reposition the last cross stay at the back with a couple of small brackets so as not to clash with the back row of vertical stays! With the generous safety factors employed in the design of small copper boilers there was no problem with strength, the boiler's hydraulic tests were passed without issues.

Photo 15 is a similar view taken slightly later in the build – I have now added the two longitudinal stays which double up as the blower steam feed pipe and the lubricator oil feed from the sight feed to the cylinders via the smokebox.

I have included the next few photos to show how the unusual smokebox of the Q1 is built up. **Photo 16** shows the base cut out of substantial steel sheet – this one is

2.5mm but you can use thicker if you want, as long as you have the equipment available to do the assembling. I like to use brazing but welding is a possibility.

Access required

It is a good idea to have the cut-out in the base big enough to be able to drop the boiler and smokebox assembly straight down on to the cylinders without removing the cranked blastpipe assembly. On an inside-cylinder loco you need to be able to remove the boiler fairly easily.

The voids around the smokebox plumbing are easily sealed to the floor of the smokebox with high-temperature silicon sealant, there is no need to bother with firebox cement these days.

In **Photo 17** I have added the laser-cut profiles for the front and rear of the smokebox. These are 6mm thick, I have been pretty generous with the spelter but all these joints have to be airtight and smokeboxes are prone to corrosion. Some people like to use brass, I prefer steel wherever possible, ►





PHOTO 19: Ashpan and grate remain fixed to the boiler, disposal of the fire is achieved by removing the pin that drops the grate and hopper doors together.

PHOTO 20: Plumbing boiler pipework is a slow job. Space is tight in 3½-inch gauge cabs. Backhead clad and insulated; the lagging on the steam pipes is whipping cord from the chandlery.

PHOTO 21: First mock up of the platework; the bunker was fine but cab sides and tanks were refined later.



it's what they use on the full-size and pump sticks to it much better. And of course it's much cheaper!

Photo 18 shows the ashpan and grate, I am again using the 'Rosebud' type. Apart from providing consistent steaming I have found this type lasts longer than the conventional firebar grate and is less likely to get blinded with small pieces of coal or clinker.

The usual ashpan for this loco as a tender engine would have a section behind the trailing axle as well as the front part shown here with the hopper doors in the open position. Viewing from underneath (**Photo 19**) shows how a single pin holds the doors closed and holds up the grate via a supporting leg.

In **Photo 20** I am in the process of piping up the boiler. There will be no axle pump on this loco so the steam manifold above the regulator flange has valves for the steam supply to both left and right injectors. The middle valve is the steam supply to the loco steam brake. I have angled the two outside valves down by around 10 degrees to make a little more space for the hand wheels.

The valve on the left side of the cab is the blower; the feed pipe is taken through the boiler via a hollow stay. The valve on the lower right is the steam supply to the displacement lubricator. Steam will be condensed in a coil of copper pipe inside the dummy coal bunker. The lubricator oil reservoir is beneath the firehole door – I am using a pole reverser instead of the usual handwheel and screw of the tender design.

Trial by card

The boiler cladding and smokebox are the same items as on the tender engine, once this had all been assembled I made various cardboard mock-ups to get the shape of the side tanks and bunker correct. **Photo 21** shows pretty much the final design, with elements of other Southern tanks and the BR standard 4 tank included.

In **Photo 22** the bunker has been

23



turned into metal, note the steps and handrails added for the fireman's access and the inset step on the bunker cutaway. I have added beading to the top edge of the coal space and around the cab lookout.

Photo 23 shows the finished loco, I have modified the side tanks to have sloping tops at the front to improve visibility forwards via the V-fronted cab, much like the modification to the original Bulleid Pacifics. The cab roof can be raised to 45 degrees on parallelogram hinges and there is a large sliding hatch as well to give a view of the water level and pressure gauges on the move. Steps and handrails allow access to tank fillers.

Defying convention

Bulleid enthusiasts will probably have worked out the numbering logic by now, for those not so afflicted the explanation is as follows. The Southern Railway's CME liked to be different so did not follow the more usual Whyte denomination of driven and non-driven wheels, preferring the continental European method of counting axles rather than wheels. He added his own twist of course, using letters rather than numbers for the driven axles.

Therefore a six-coupled engine used 'C' as the denominator, and at the end of the prefix, not in the middle. Thus a pacific would be 21C followed by the running number. So logically an 0-6-4 loco would have been a 02C to my mind. As this design would undoubtedly have been a great success there had already been 33 built by the time that 02C 34 hit the rails!

The last item on the agenda was the water supply tank. Tanks on the loco were dummies, available for extra ballast to aid traction if required.

Photo 24 shows the finished item constructed from 3mm copper sheet, measuring 14 inches long by 5 inches

wide and 6 inches deep giving a total volume of almost 7 litres.

I included a fine gauze strainer in the filler neck, removable for cleaning, and a pair of quarter-turn ball valves for the injector supplies. 6mm outside diameter plastic pipes and push-in connectors are convenient for the loco connection, and a copper pipe is used for the hand pump connection.

The club boiler inspectors duly carried out all the required testing and the loco was all ready for the track. Then along came Covid...

In part 3 I describe a change of heart, as 02C 34 becomes C10... **EIM**

■ Part 1 of this series appeared in last month's August 2023 issue of **EIM**. To download a digital edition or order a printed copy of the issue go to www.world-of-railways.co.uk/store/back-issues/engineering-in-miniature or call 01778 392484.

Due to lack of space Nick's series on building a 3½-inch gauge Schools class 4-4-0 is taking a short break this month and will return next month with the description of constructing the loco's valve gear.

24



PHOTO 22: A mixture of W class and BR4 tank, the bunker looks the part.

PHOTO 23: The Q1T ready to leave the works. Note cutout in side tank to access rear sandbox (or insert the key!) and retaining bars for fire irons on top of tank sides.

PHOTO 24: The water tank sits on the driving trolley, hence the carpet stuck to the base to protect the seat cover. Side tanks proved too small to accommodate the hand pump.

BELOW: Nick likes his Q1s... He tells how the tank loco ended up looking like this other one that he owns next month but to read about his IMLEC exploits pictured here by *John Allen* of the Bristol SME, turn to page 36.



The 2023 Dreaming Spires Rally

Anything but summery weather fails to dampen the enjoyment of the traditional gathering in the City of Oxford, as John reports.

BY JOHN ARROWSMITH

The annual rally at the City of Oxford Model Engineering Society was held over the weekend of the 14th to 16th July at the Society's immaculate track site in the city's Cutteslow Park, but what a contrast to last year's event when lovely warm sunshine had greeted both visitors and members.

This year there were some very soggy spires indeed as the rain dampened the proceedings, but in the

way of British model engineers the wet gear was donned, the engines steamed and the drivers just got on with doing what they do, despite the best efforts of the weather to spoil things.

To be fair though the early part of the morning was dry but the rain soon arrived to affect the atmosphere of the rally. Visitors had come to the event from many parts of the UK, from northern England, South Wales, the Midlands and fairly locally and they

just got on with operating their railway and traction engines – it was good to see a number of the latter in steam adding to the atmosphere especially when the traditional Fairground organs started playing.

Unusual visitors

Whilst it was dry I was able to get round and see what locomotives and stock were being prepared and there was an excellent variety of models on display with a couple of prototypes I had not seen before. Standing on one of the steaming bay sidings was a very interesting selection – David Goyder had brought his Midland 4-4-0 Class 60 (Photo 1) which is quite a rare model – although very similar in profile to the standard Midland 4-4-0 this one has a smaller boiler and only 60 full-size versions were built.

Next in line was an excellent example of a Southern Merchant Navy class 4-6-2 Pacific in 3½-inch gauge 'Union Castle' (Photo 2). The current owner Alex Webb, a member of the Reading Society, explained to me that the loco was built in 1974 using only an outline drawing for OO-gauge engines and that the builder John Selman had made all the castings and fittings along with the boiler.

The same builder had also built the next engine in line, again a rare prototype in the shape of a Southern Z Class 0-8-0 tank engine (Photo 3). Only eight of these were made in full size and I have never seen a model of one before. John had also made all the

PHOTO 1: An excellent model of a Class 60 Midland Railway 4-4-0 owned by David Goyder.

PHOTO 2: Alex Webb brought his 3½-inch gauge Merchant Navy Pacific loco.

PHOTO 3: The 5-inch gauge 0-8-0 Z Class tank locomotive also owned by Alex Webb.

PHOTO 4: Just a whiff of steam as the 5-inch gauge Southern Q Class 0-6-0 owned by Darren Davies approaches the station.

Photos by the author





castings and fittings for this loco.

Continuing with the Southern theme, Darren Davies from the Basingstoke Society had brought along another rare model of a Maunsell 0-6-0 Q-class tender engine (Photo 4). Neil Davies told me that recently made adjustments to both the injectors and the steam operated reversing gear seemed to be working more efficiently after some stationary tests. On the track and in steam it seemed to be performing very well.

Park and ride

The traction engines were located outside of the club's site in the park and a grand sight they made too. I noted that the 4 1/2-inch scale Marshall traction engine was another rare model (Photo 5). Driven by Simon Gates it is owned by Richard Bradley and they had come up from Mark in Somerset to attend. The engine was built by Ron Torr who copied the full-size example to ensure all the details were correct.

A powerful-looking and well-made 4-inch scale Burrell Showman's Engine (Photo 6) owned by Kevin Cousins from Leighton Buzzard was built from a Live Steam Models kit, and ran around the park to the Double Fairground Organ display (Photo 7)

PHOTO 5: An excellent road steam line-up included this 4 1/2-inch scale Foster driven by Simon Gates.

PHOTO 6: Kevin Cousins from Leighton Buzzard with his 4-inch scale Burrell Showman's loco.

PHOTO 7: This pair of fairground organs provided rally participants with a musical background.

PHOTO 8: Another 4-inch Burrell owned by COSME member Stephen Honey.

PHOTO 9: From Rugby, Philip Hancock's 4-inch Foster was in "working clothes".



near the front entrance to the COSME track site.

Next to Kevin was another fine 4-inch scale Burrell Showman's engine with Steve Honey in the driving seat (Photo 8). This was accompanied by a single 65-note organ which works on the usual blower system but is connected through a MIDI music system to provide the music.

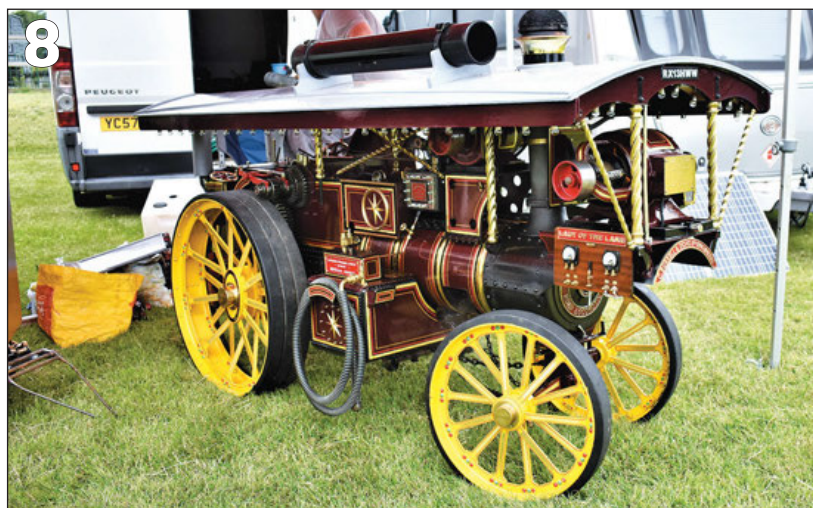
The fourth engine attending the rally was the 4-inch scale Foster built and owned by Philip Hancock from the Rugby SME (Photo 9), described by Philip as in its "working clothes".

One of the first locos in steam and

running was Dave Holland with his Sweet William 0-4-2 'Lady May' who had a good run before the rain started – this did not deter him from continuing (Photo 10).

Another early starter was Mick Moody from the Bridgend club who had his 7 1/4-inch gauge Hunslet looking immaculate and in steam and taking the track in its stride including the line out in the park (Photo 11).

A number of locomotives were now in steam on the raised track and performing very well. The B1 owned by Steve Newall, a member from the Basingstoke club, was going very well





(Photo 12) – Steve told me he has owned the loco since 2010 and has rebuilt it to as close to scale as he could. Fortunately he had access to the full-size engine which provided many of the details and dimensions needed to complete this rebuild.

David Goyder was also getting good track time with his Midland Class 60 which had plenty of steam with the damp atmosphere providing some attractive moments (Photo 13).

A really striking engine was the 7¼-inch gauge Darjeeling B Class owned and driven by Gordon Roberts (Photo 14). The bright blue livery really stood out.

Another fine-looking Southern engine was that owned and built by Glyn Winsall from the Rugby Society.

His 5-inch gauge Southern U-class Mogul performed faultlessly during Glyn's time on the track (Photo 15). The engine was based on the Ashford design by Martin Evans but updated by Glyn to be as close to the original as possible.

A non-steam locomotive running was the 5-inch gauge Hymek being driven by Mick Lowe also from Basingstoke who was enjoying his track time (Photo 16).

A regular attendee at these rallies is James Duncan with his two young sons who even at their young age are competent drivers. In the rain we all experienced, these little guys were quite happy to be with dad driving a superb example of the Liverpool & Manchester Railway's 'Lion' for

PHOTO 10:

Dave Holland takes time out for a chat on his Sweet William.

PHOTO 11:

Mike Moody from Bridgend on his 7¼-inch Hunslet quarry tank 'Sundew'.

PHOTO 12:

The B1 4-6-0 owned by Steve Newall was going well in the rain.

PHOTO 13:

Lots of steam as David Goyder steams his Midland Railway 4-4-0 through the station.

PHOTO 14:

Gordon Roberts brings his 7¼-inch gauge Darjeeling B Class back into the main track from the park.

some considerable time (Photo 17).

The South Oxfordshire Area Group of the 16mm Association had set up a small twin-track display of their models and work in a large gazebo in the picnic area of the raised track. This welcome relief from the weather provided some interesting images and operations (Photo 18)

Dainty dribbler

There was another small display of models in the main clubhouse which provided some good discussion points (Photo 19). One in particular was an example of an original Birmingham Dribbler provided by Richard Brown (Photo 20). These apparently began life in 1860/70 but there was no way of knowing if this model was from that era – Richard told me that he was given it in the 1950s.

The name of these engines derives from the two small holes in the back of the frames which dribble water when in steam and operating on a level surface. The front wheels were on a slight angle so that the little engine always goes round in a circle.

Back outside again and the Fairground organs were now with a couple of traction engines providing a musical background to operations on the track. An impressive sight on the track was the 5-inch gauge model of an LNER 2-8-2 P 2 locomotive owned by Martin Parham which just took the track in its stride (Photo 21).

Also braving the incessant rain were David and Francis Mayall who had their 5-inch gauge Conway working well. David had also brought his excellent example of a BR standard Class 2 Mogul which was located on the steaming bay sidings.

What appeared to be an unusual combination was Steve Newall's B1 and the Southern Q class of Darren Davies coming into the station as a double header, but the B1 was actually pushing the Q back to the steaming bays for a blow-up...





PHOTO 15: Glyn Winsall drifts through the station on his Southern U-class 2-6-0.

PHOTO 16: Mick Lowe from the Basingstoke club with his 5-inch gauge Hymek.

PHOTO 17: James Duncan and one of his sons driving his 'Lion'.

PHOTO 18: There was plenty of atmosphere on the 16mm scale Association layout.

PHOTO 19: Part of the display in the clubhouse of members' models.

PHOTO 20: A very old Birmingham Dribbler displayed by Richard Brown.

PHOTO 21: Supreme motive power in Martin Parham's 5-inch 2-8-2 LNER P2.



Of course no rally of this type would function without all the hard work put in by the host club and on behalf of everyone who attended the weekend they deserved very big thanks for all their efforts in ensuring the event took place.

As always a constant supply of tea and coffee plus some real ale was constantly available and once again the ladies of the club provided an excellent selection of cakes for visitors to enjoy. The rain did not spoil things really but at the end of the day there were some very soggy spires. Thank you all for a great day out. **EM**

■ More photos on the Club News pages.

Making your own safety valves

Rich bites the bullet and decides not to go the commercial route when requiring safety valves for a 5-inch gauge Sweet Pea.

BY RICH WIGHTMAN

A recent short series of mine that was published in the December 2022 to March 2023 issues of this journal described the building of my first steam loco 'Conway', a 3½-inch gauge 0-4-0 tank engine to a design by Martin Evans. She's a great loco that has given me many hours of pleasure. Virtually every part of her I made myself either from the solid or by fabrication.

When it came to the safety valve, Conway has just the one, however I didn't fancy making one. The plans do give details of the safety valve but at the time I had gained no experience of making them and figured such a critical part might be outside of my current skills, so I opted to buy one.

The model engineering exhibition at Harrogate was a few weeks away and one was added to my shopping list. Having toured all the traders' stands I bought the cheapest on offer.

In use, however, a problem arose. Conway would reach her working pressure of 80 psi at which point the safety valve would open and gush steam and boiling water out. The pressure would then drop down to 50

or 60 psi before the valve closed. I learnt that a tap with the back of the shovel would also close the valve but this was not an ideal situation to be in for a first-time steam loco owner!

Talking to other members at our club the advice given was to buy a valve from Polly Model Engineering (www.pollymodelengineering.co.uk – usual disclaimer). An order was placed and on arrival the valve was fitted to the loco. The next time down at the club Conway was fired up and the pressure rose to 80 psi, at which point there was a gentle fizz and the odd pop from the valve and the pressure remained steady at 80 psi. It was an amazing difference that transformed the operation of the locomotive, so much so that for my current build 'Chub', which has two safety valves, I also ordered them from Polly Model Engineering.

Chub is nearing completion but waiting in the wings is a part-built 5-inch gauge Sweet Pea, an Ebay find, that I am slowly collecting materials for. I have the plans and the book written by the designer, Jack Buckler, that I have read many times.



"I figured such a critical part might be outside my current skills..."

Finding myself at a bit of a loose end one evening I picked up the book and looked at the safety valves, of which two are required. On a forum dedicated to the Sweet Pea loco mention was made that the safety valves as specified on the plans are a little under-size together with the suggestion that they should be upped from a ¼-inch ball to a ⅝-inch ball. At the time of writing Polly Model Engineering had announced that they had retired so purchasing appeared to no longer be an option. I have since heard that they are now trading again (under new management - Ed).

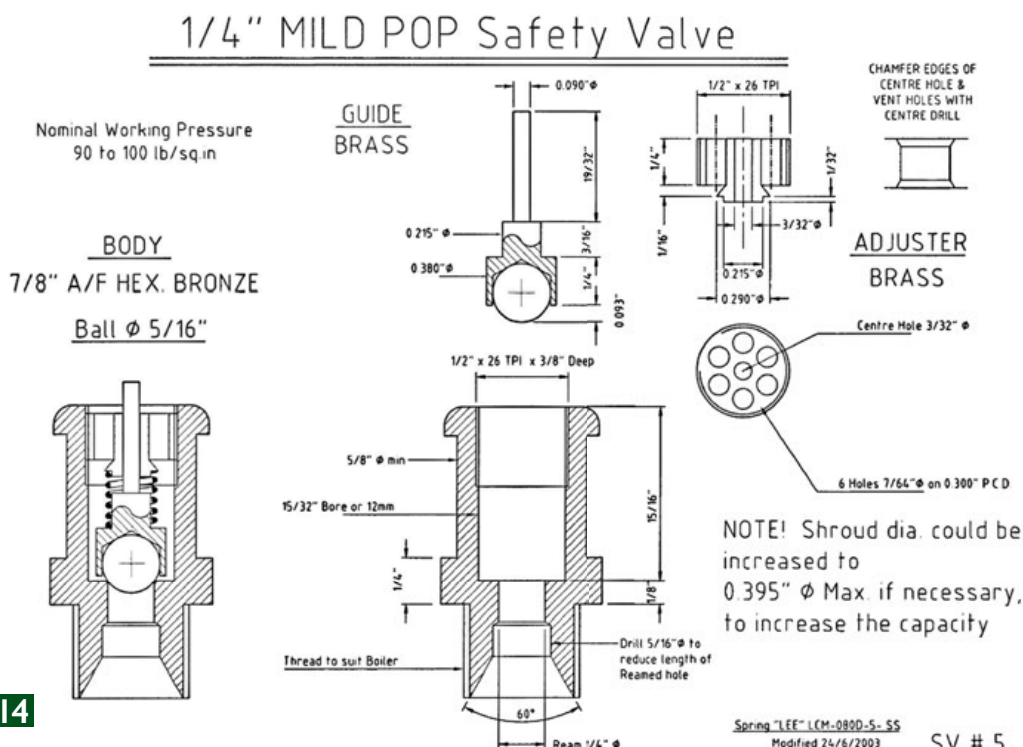
Online encouragement

Thinking that my skills have improved over the years I decided to have a go at making the safety valves. Before I started I did a bit of research on the internet and a couple of online forums also proved invaluable.

I came across a reference for the Gordon Smith design of safety valves which were according to those that use them the bee's knees. Gordon went into great detail of improving the design of safety valves for model steam locos in the February to April 2001 issues of *EIM* where you will find all the technical details of his trials.

FIGURE 1

Gordon Smith safety-valve design (approx full-size)



Further research informed me that the plans for these valves were available at the princely sum of £1.00 from would you believe Polly Model Engineering – Gordon gave the exclusive rights to Polly to make and distribute drawings and parts for his designs. As far as I can see there are about 30 plans available ranging from a 1/8-inch ball for Gauge 1 locos up to a 5/8-inch ball for 10 1/4-inch gauge locos. Polly also supplies the balls and the correct springs.

I chose plan number SV#5 (**Figure 1**) which is suitable for large 5-inch gauge locos, uses a 5/16-inch ball and is the type I made and shall describe here. Not all the safety valves in this series are of the same design but they all perform a similar function.

The plans specify 7/8-inch across-flats hex bronze for the body, which is not an easy material to source. I had a short length of 20mm diameter bronze bar in stock that was just long enough to get the two safety valve bodies out of so I used that.

In the lathe the end was faced and then centre drilled followed by a 15/64-inch drill (**Photo 2**). 15/64-inch is just under 1/4-inch which will be reamed from the opposite end later. Next I counterbored with a 5/16-inch end mill (**Photo 3**) to a depth of 5/16-inch followed by a centre drill (**Photo 4**) to create the flared mouth at 60 degrees. I was making two safety valves so the part was then reversed in the chuck to have the opposite end machined exactly the same.

On the plans it says thread to suit boiler which in my case is going to be 5/8-inch x 26 tpi. So each end of the bar was turned down to 5/8-inch – there is ample material thickness to take it down to a 1/2-inch thread if desired. Using a tailstock die holder each end was then threaded to 5/8-inch x 26 tpi (**Photo 5**).

From round to hex

Because I was using round bar the next job was to machine the hexagon. To do this I held the bar in a collet in my hexagon block. Using a 1/4-inch end mill 1.5mm was taken off each of the six sides to produce a 17mm across-flats spanner size in a position to leave a flange for the sealing washer (**Photo 6**).

Once again the bar was reversed and the opposite end machined the same, before the bar was cut in half on the bandsaw (**Photo 7**).

Each valve body was held in the chuck, turned and faced to a finished length. The body then needed to be bored out, to a depth of 15/16-inch. The top 5/8-inch was to be tapped 1/2-inch x 26 tpi – now the plans specify that the body should be bored to 15/32-inch or 12mm but all the tapping charts I have



PHOTO 1:

Job done – a finished set of safety valves to the Gordon Smith design.

FIGURE 1:

Drawing of the Gordon Smith safety valve design (drawing courtesy Polly Model Engineering)

PHOTO 2:

First step – bar centre drilled and drilled 15/64-inch.

PHOTO 3: Bar then counter-bored with an end mill.

PHOTO 4:

Flared mouth created with a centre drill.

PHOTO 5:

Each end turned and threaded to suit boiler.

PHOTO 6:

Hex shape machined on...

PHOTO 7:

...before bar cut in half using a bandsaw.

PHOTO 8:

Silver steel turned down to make D-cutter.

PHOTO 9:

Exactly half machined away to 0.226-inch.

Photos by the author

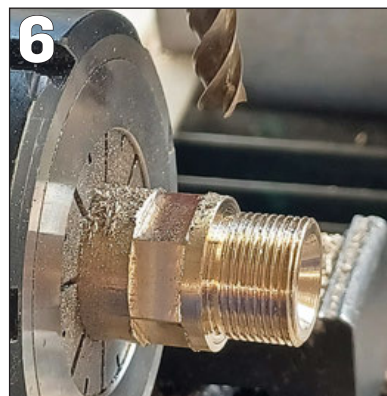
specify a tapping size hole of 29/64-inch or 11.5mm?

I also noticed that I couldn't simply drill the hole as it needs to be flat-bottomed – a cutter of some sort would be needed. A quick bit of research told me I would need a D cutter, so I started with a bit of 1/2-inch silver steel mounted in a collet. This was turned down to exactly 0.4537-

inch (29/64-inch) for 1-inch in length then polished with some very fine Wet and Dry (**Photo 8**).

The piece was transferred to the milling machine and exactly half was machined away to leave 0.226-inch (**Photo 9**). I stamped the body of the cutter for future reference (**Photo 10**).

Now it needed to be hardened so it was over to the hearth. The torch was



WHAT IS AVAXHOME?

AVAXHOME-

the biggest Internet portal,
providing you various content:
brand new books, trending movies,
fresh magazines, hot games,
recent software, latest music releases.

Unlimited satisfaction one low price

Cheap constant access to piping hot media

Protect your downloadings from Big brother

Safer, than torrent-trackers

18 years of seamless operation and our users' satisfaction

All languages

Brand new content

One site



AVXLIVE ICU

AvaxHome - Your End Place

We have everything for all of your needs. Just open <https://avxlive.icu>



applied gently at first to get some heat into the cutter starting at the body end away from the tip. The heat was increased until the body started to turn red then the torch was worked along until the cutting end was also a nice colour of boiled carrots (**Photo 11**). It's important to make sure the heat is all the way through the tool.

At this point it was dunked into a

bucket of cold water with a swirling action (**Photo 12**). A quick test with a file confirmed that it was now glass-hard (**Photo 13**).

Some tools that I have made this way I haven't bothered to temper but I decided to in this case. First I polished the tool with some fine Wet and Dry (**Photo 14**). Polishing also helps to see the colour change when tempering.

PHOTO 10:

Cutter marked for future use.

PHOTO 11:

Cutter heated to boiled-carrot colour to harden.

PHOTO 12:

Next step, cutter quenched in water with a swirling action

PHOTO 13:

Testing the cutter hardness with a file.

PHOTO 14:

Tool polished with Wet and Dry paper

PHOTO 15:

Grinding the tool for use.

PHOTO 16:

Mandrel made to screw valve bodies into.

PHOTO 17:

End drilled in $\frac{29}{64}$ -inch...

PHOTO 18:

...followed by the D-bit.

PHOTO 19:

Cheap calipers fitted to Rich's tail stock.

Back in the hearth the tool was gently heated to a light straw colour then dunked in the cold water bucket again. When tempering it's important not to get the tool too hot – if it starts to turn blue you have gone too far.

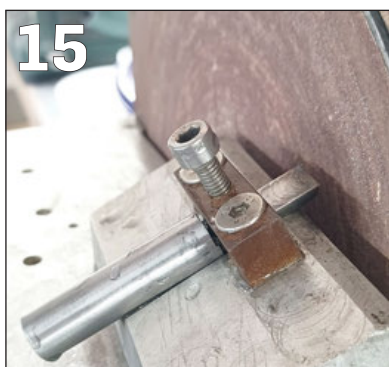
All that was now needed was a bit of relief grinding on the tip. You could do this before the hardening process if you wish. I have a little jig set at 30 degrees I made years ago for sharpening the tool bits for my tangential cutter, so I used that on the disc sander (**Photo 15**). I don't think the angle is too critical on a tool that will get only occasional use on bronze.

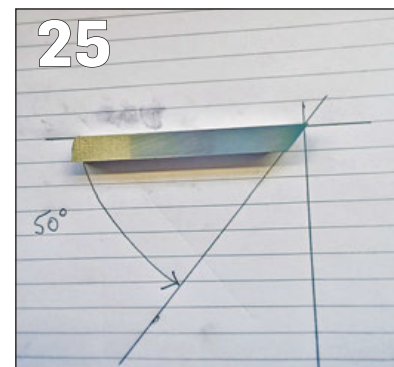
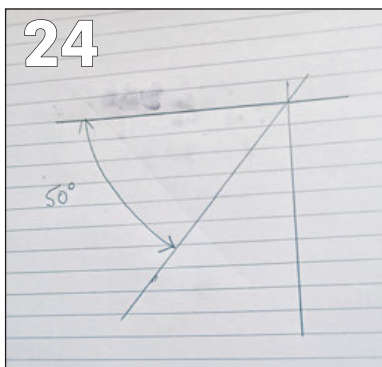
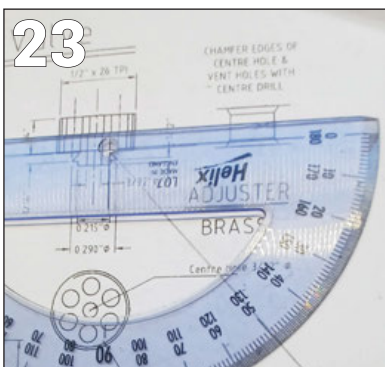
To hold the bodies in the lathe a stub of brass was drilled and tapped $\frac{5}{8}$ -inch x 26tpi (**Photo 16**). The body was then screwed into this and the through hole finished with a $\frac{1}{4}$ -inch reamer. Next I drilled out with a $\frac{29}{64}$ -inch drill – care must be taken not to go too deep, I went in about $\frac{5}{16}$ -inch from the tip of the drill (**Photo 17**).

Budget caliper

Now the D bit could be used to finish the hole to a flat bottom at a depth of $\frac{15}{16}$ -inch (**Photo 18**). I have a butchered cheapo digital caliper fitted to my tailstock so I can fairly accurately drill to a depth (**Photo 19**) – nice steady light cuts are the way to go. **Photo 20** shows the bottom of the machined hole.

The body can now be tapped $\frac{1}{2}$ -inch x 26tpi to a depth of $\frac{5}{8}$ -inch **Photo 21**. Note that I have a mark on the tap at $\frac{5}{8}$ -inch as a guide. The final step involves a bit of profiling with a parting tool to finish the bodies (**Photo 22**).





Next on the agenda was a pair of adjusters. Looking at the drawing I could see that another tool would be needed to machine the profile. No angle was given on the plans so I drew a line along the profile and measured it with a protractor, it was near enough 50 degrees (Photo 23). A tool was ground up using a 50-degree angle drawn on a bit of paper as a guide (Photo 24-25).

I chucked a piece of 1/2-inch round brass and faced it, then using the new ground tool for all the turning operations. The first of these was to turn some brass to 1/2-inch, centre drill and then drill 3/32-inch (Photo 26), followed by turning a boss at 0.290-inch diameter x 3/32-inch deep (Photo 27).

Now the 50-degree ground tool could be used to plunge in and create the tapered profile. The boss was now reduced to 0.215-inch diameter to a depth of 1/32-inch (Photo 28). Sorry about the slightly out-of-focus photo

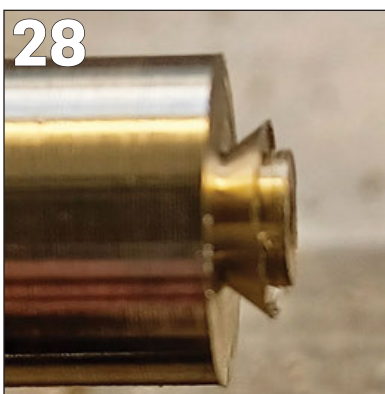


PHOTO 20:
Bottom of the machined hole.

PHOTO 21:
Tapping the hole.

PHOTO 22:
Next step is to profile the body.

PHOTO 23:
Gauging the angle for making profile tool.

PHOTO 24:
Tool needs to be 50 degrees...

PHOTO 25:
...and is duly ground to correct angle.

PHOTO 26:
Adjuster turned, faced and then drilled 3/32-inch.

PHOTO 27:
Boss then turned around hole.

PHOTO 28:
Final profile machined in.

PHOTO 29:
Threading the adjuster with die in tailstock.

PHOTO 30:
Mandrel drilled and tapped.

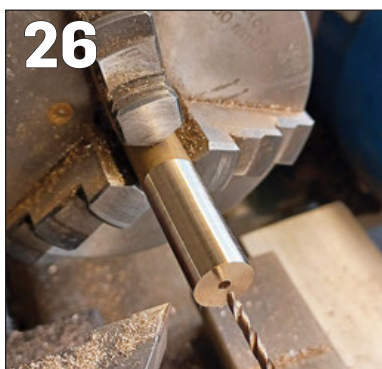
here but you can see the desired shape has been achieved.

Using a die holder in the tailstock a 1/2-inch x 26 tpi thread was run down the bar far enough to make two adjusters (Photo 29). The profiled shape can also be seen in this photo. I parted-off at 0.34375, 1 1/2-inch and repeated the above operations to make the second adjuster.

The six steam holes now needed to be drilled. This can't be done from the

same end as the profiled section as it is slightly over the holes. A mandrel is needed and mine was made from the 1/2-inch round brass bar, centre drilled and tapped M2.5 (Photo 30).

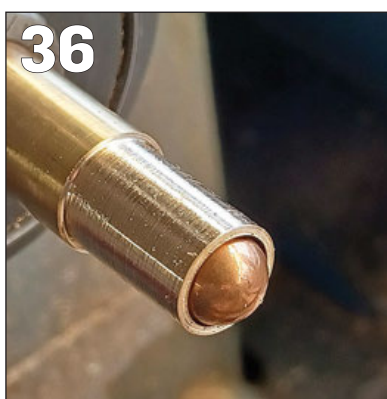
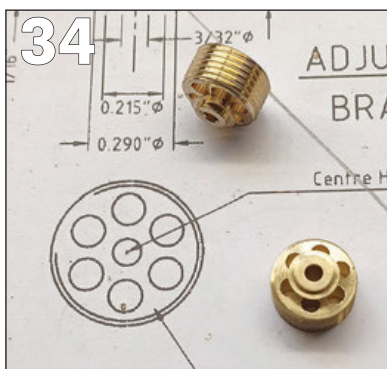
Held vertically in the milling machine vice the mandrel was centred under the quill (Photo 31). The adjuster was bolted on using a M2.5 socket-head cap screw (Photo 32). I used the bolt-hole circle feature on my DRO (digital readout) to drill the six





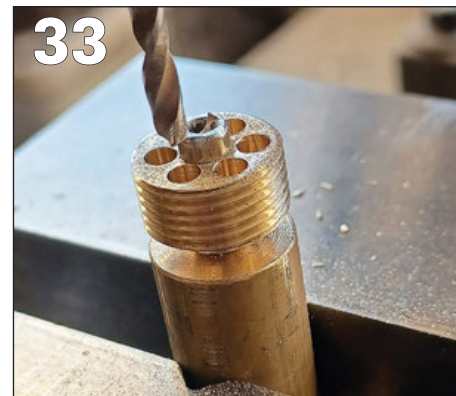
$\frac{7}{64}$ -inch holes on a 0.300-inch PCD (pitch-circle diameter) as in **Photo 33**. Care must be taken not to drill too far and catch the edge of the profiled part – I used the depth stop on my mill to make sure I didn't! The two adjusters can be seen in **Photo 34**.

The final parts to be made were the brass guides. I faced and turned down a bit of $\frac{7}{16}$ -inch round brass to 0.380-inch for a length of $\frac{1}{4}$ -inch then centre-drilled it (**Photo 35**). The plans state that this dimension can be raised to 0.395-inch to increase the capacity so I chose to turn to 0.390-inch.



I centre-drilled and then drilled $\frac{5}{16}$ -inch to a depth of 0.219-inch. This is where the ball will sit (**Photo 36**). This measurement must be from the tip of the drill – I used the DRO on my tailstock for this.

Actually measuring how much the ball sticks out is very difficult so I made a setting tool from $\frac{7}{16}$ -inch round brass bar. I faced the bar then with a $\frac{5}{16}$ -inch end mill drilled in to a depth of 0.093, checking using the depth measurement of a set of digital calipers (**Photo 37**). If you go too far you can skim a little off the end



until the correct depth is achieved.

The plans say that the ball should protrude from the shroud by 0.093-inch so taking very light cuts and checking with the depth gauge it can be achieved. **Photo 38** is a shot of me checking the depth which is not quite there – **Photo 39** shows the correct depth has been achieved.

The first part of the shroud is $\frac{1}{4}$ -inch in length. Part off a sufficient length, around $1\frac{1}{2}$ -inch, then holding the shroud part in a collet – it will go into a $\frac{3}{8}$ -inch collet – centre drill then with tail-stock support turn down to 0.215-inch (**Photo 40**). Next turn the shaft to down to 0.090-inch with a sharp tool (**Photo 41**). Due to the slender nature very light cuts should be taken.

Waste not want not

The total length of the shroud is $1\frac{5}{16}$ -inch. I found this to be a bit scary and a waste of brass so for the second guide I machined just the shroud part as described above.

I reversed the piece and held it in a $\frac{3}{8}$ -inch collet, centre-drilling then drilling $\frac{3}{32}$ -inch to a depth of 0.195-inch (**Photo 42**). I cut a piece of $\frac{3}{32}$ -inch stainless-steel round rod to length and pushed it into the shroud (**Photo 43**), then silver soldering into the shroud (**Photo 44**). Held in the collet it was a quick job with Wet and Dry paper to reduce the diameter to 0.090-inch (**Photo 45**). The completed guide can be seen in **Photo 46**.

The stainless steel spring is manufactured by LEE Springs, part No. LCM-080D-5-SS. I obtained mine directly from LEE but Polly does supply them.

The parts of the safety valve can



PHOTO 31: Mandrel centred under the quill.

PHOTO 32: Adjuster is mounted with a 2.5mm screw.

PHOTO 33: Drilling the six holes needed.

PHOTO 34: The completed pair of adjusters.

PHOTO 35: The guide turned, faced and then centre-drilled.

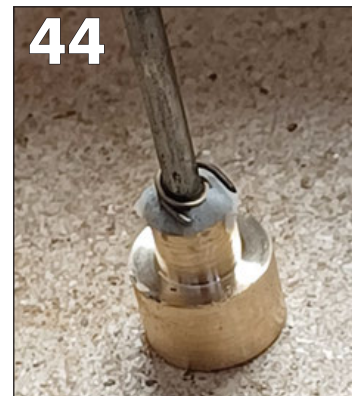
PHOTO 36: Test fit of a ball.

PHOTO 37: Making the ball depth setting tool.

PHOTO 38: Checking the depth – it's not quite there yet.

PHOTO 39: That's better – the correct depth achieved.

PHOTO 40: Turning the first part of the guide down to 0.215-inch.



be seen in **Photo 47**. At the time I didn't have any $\frac{5}{16}$ -inch stainless-steel balls but I did have some nitrile ones which I used for testing. I made up an adapter for the pump and gave it a few pumps. The pressure rose to the required 80 psi then started to relieve (**Photo 48**). If I pumped really fast I could get it up to nearly 90 psi but it rapidly fell back to 80 psi – a successful and pleasing test.

A few days later the stainless-steel balls arrived in the post. I used one of them to tap onto the seats then replaced it with new balls. Both valves were retested and worked perfectly. Chatting to the guys on a forum I visit they said they now use silicon nitride balls (**Photo 49**) so I ordered some from our Far-Eastern friends and fitted them. They are beautiful and look like black pearls. They also behaved perfectly when tested.

Finally a little adjusting tool was made up from a bit of brass and a pair of stainless-steel pins (**Photo 50-51**).

Locked down

On a forum that has proved to be a gold mine of information and assistance it was pointed out to me that in the current boiler regulations a locking device is required on the adjuster. Section 11.9 says; 'Safety valves which are found to alter their set position during operation allowing the uncontrolled release of the boiler contents shall be fitted with some form of locking device to prevent this happening.' I wasn't sure whether or not this rule applied in this case but decided to err on the side of caution.

Both bodies have been cross-drilled and tapped M2.5 and a 2.5mm x 4mm stainless-steel grub screw fitted to provide a means of locking



PHOTO 41:

Turning down the shaft.

PHOTO 42:

Second version required less machining.

PHOTO 43:

Stainless-steel rod pushed in...

PHOTO 44:

...and soldered into the guide.

PHOTO 45:

Cleaning up the guide shaft.

PHOTO 46:

Job done, a completed guide.

PHOTO 47:

The parts of the safety valve.

PHOTO 48:

Test of valve proved a success.

PHOTO 49:

Silicon nitride balls are now the popular choice apparently – they look like black pearls.

PHOTO 50:

The safety valve adjusting tool.

PHOTO 51:

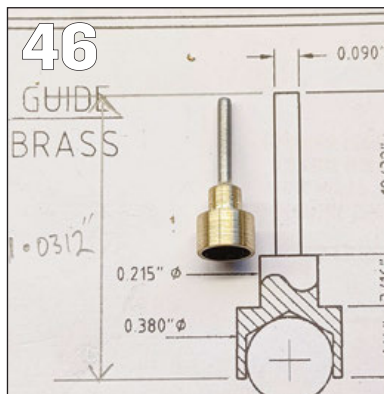
The tool in use.

PHOTO 52:

Final step, drilling and tapping for locking grub screws visible in photo 1.

the adjuster. It's unlikely I think that the adjuster could move as it is held by the pressure of the spring but hey ho rules are rules (**Photo 52** and **01**).

All I need to do now is complete the build of my Sweet Pea loco, build a boiler, have it tested, then fit my new safety valves, then... Happy days. **EIM**



Tackling a not so slippery situation...

Harry's never dull battle with the foibles of the machinery on the 12¼-inch gauge Fairbourne Railway certainly sees some variety this month...

BY HARRY BILLMORE



PHOTO 1: A gap where there should be a brass shim, also note the amount of sand that gets everywhere...

PHOTO 2: The back end of 'Sherpa' lifted far enough to get the axleboxes off the rear axle.

PHOTO 3: Checking the axle journal, it all looks good.

PHOTO 4: Checking the crank pins – they all show signs of scoring right under the grease nipple hole.

PHOTO 5: The matching score in the bearing material.

Photos by the author

I mentioned in last month's report from the Fairbourne Miniature Railway that our 6-inch scale Darjeeling Himalayan B Class 'Sherpa' had shed one of its side control shims. So having put the loco's tender back onto its wheels after changing all its bearings, I stripped the brake gear off the loco along with the underkeeps and rods and lifted the rear of the engine enough to get the axleboxes off.

This revealed some interesting wear on the crank pins – directly below the grease ways there is a groove worn into the pin, this is both visible and can be felt by running a nail across the pin. On the axlebox however, there is no such grooving, the journal looks pretty good and feels smooth to the touch.

This is concerning since the loco received new axles, cranks and crank pins less than 18 months ago. I believe the scoring is due to the grease nipples not being cleaned off before the next load of grease is put in and therefore pumping sand directly into the bearings. You can see the effects on the bearings in Photo 5.

The replacement of the shim was relatively simple until I snapped off one of the brass screws in the axlebox – caused by me taking too long to put the screw in and it getting stuck in the Loctite and then snapping off as I applied more force. This necessitated a careful bit of milling and the hole carefully cleaning out with a tap so I could put another one in. At the second attempt it worked fine and the

shim was reattached.

Unfortunately just as I was cleaning everything up to re-fit the axleboxes, the driver of our Welsh Highland Railway 2-6-4T 'Russell' came in to say the loco's regulator wasn't working. Sure enough, the regulator lever moved freely but the valve wasn't opening. Thankfully this happened while the loco was stationary at the water column so it was a relatively easy thing to put the diesel out on the train service while I quickly prepped and lit up our Lynton & Barnstaple Railway Manning Wardle 2-6-2T 'Yeo'.

Service improvement

With Yeo taking over the service from the diesel and Russell cooling off I could get back to Sherpa and in short order I had it back on its wheels with all the rods back on. I could then set about one of the modifications I have been wanting to do ever since I first drove the loco, that being moving the injector water valves from in the tender footwell to inside the cab.

There are several reasons for doing this, but the chief one is that the valve handles had recently been snapped off repeatedly by crews and I had got very tired of replacing them.

A new set of valves, some pipework and a couple of lengths of 10mm rod provided the necessary parts. I bent the rod at one end to form the handle and the other end I threaded M10. I bent the valve handles that came with the valve completely



back on themselves, this presenting a face directly above the valve spindle for the operating handles to attach to.

I welded on an M10 nut to each of these, then having passed the handle through its supports, screwed it into the nut and locked it into place with a lock nut. The modification has proved very successful and there is now no danger of a valve handle being trodden on and broken off!

Once Russell had cooled down, I took the loco's dome top off to see what had happened to the regulator. Thankfully it was a very easy fix – the pin going through the lifting link to the operating arm of the valve had come loose and the split pin had disappeared. Once again this was due to the lack of a clevis and a load being applied to the split pin that it had never been designed to take. This winter I will weld the pin to the operating arm so there can be no side load applied to the split pin, but for now I replaced the split pin with a new stainless one (which are considerably more difficult to split) and put the engine back together.

Fit to start

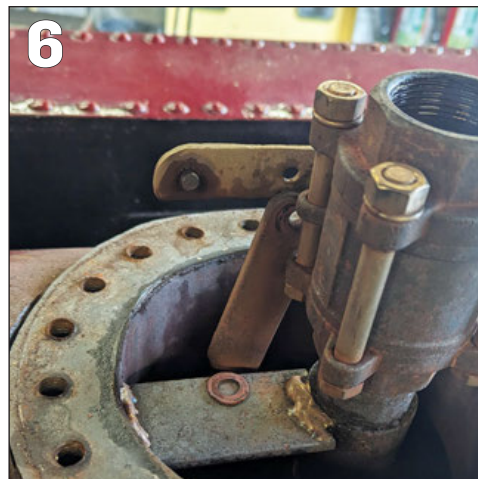
With three fully functioning steam locos again I could turn my hand to the our Simplex i/c loco, which needed an electric starter fitting to allow anyone to be able to start it, not just the fittest members of our crews. The way I decided to do this was to put a belt around the flywheel and use an electric motor to turn the flywheel and thus bring it up to speed to start.

This meant that I needed to slightly re-run the fuel pipework, so a bit of annealing ensued with the residue of diesel burning off inside the pipe. This was all washed out with diesel before final fitting to ensure no particles were left in the fuel line.

I bought the electric motor from a company that sells kits for electric motorbikes, it is a 5hp 24-volt permanent-magnet motor, this should also allow me to use it as a generator to re-charge the batteries, but that's a little way off yet.

I made up a motor mount with slotted mounting holes to allow for belt tensioning. But unfortunately the first belt I bought was far too stretchy and even when I had it tight onto the flywheel, I could then pull it by hand over the starter motor's pulley and it would simply slip on the flywheel.

The solution to this was pinching the compressor drive belt from our out-of-service diesel 'Tony' and combining it with a short length of spare belt of the same type I found at the back of one of the shelves in the workshop – this type is a woven reinforced belt with a brass pin to hold the links together and is both far



stronger and less flexible than the quick, easy and cheap belt I had been trying to use.

A quick test with a pair of batteries and some cables touched to the terminals proved the idea sound, however before I could proceed with making the battery box and wiring it up properly a radio message came through saying that Sherpa's crosshead had become detached from the piston rod on one side.

I quickly gathered up the tools I thought I might need along with some spare taper pins and headed out to where the train had come to a stop. I then had a large audience of a full eight-carriage train watching me make the temporary repair to the loco to enable it to finish its trip. Thankfully one of the passengers had found one of the taper pins that had fallen out so one of them I could simply re-fit, with the other coming from my stash of spares.

Once the loco got back to Fairbourne, I then took both taper pins back out again, reamed both holes out with a taper reamer and fitted two new pins to ensure a good

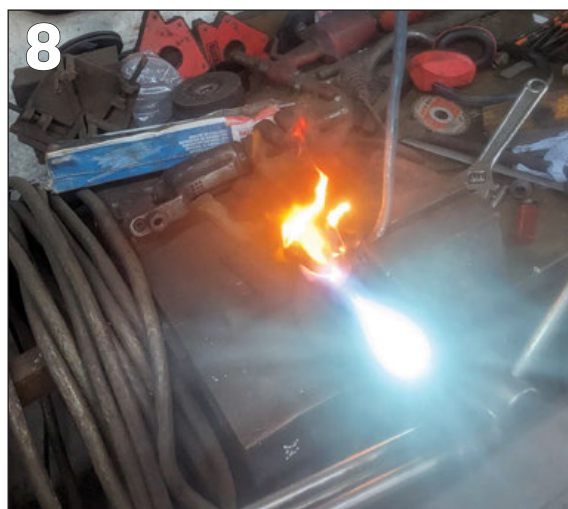


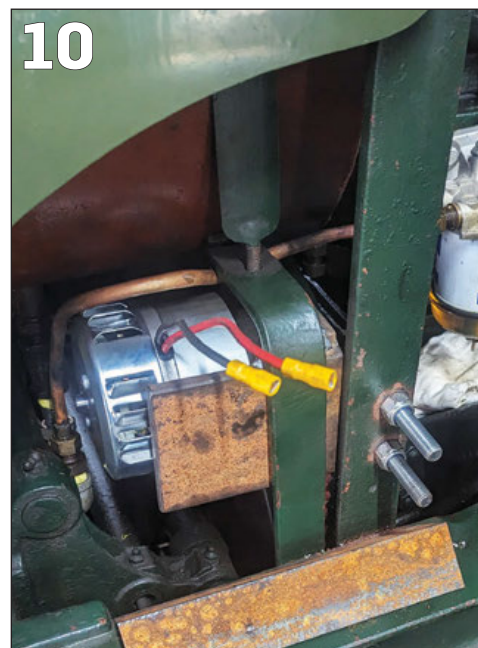
PHOTO 6: Regulator linkage of 'Russell' after falling apart.

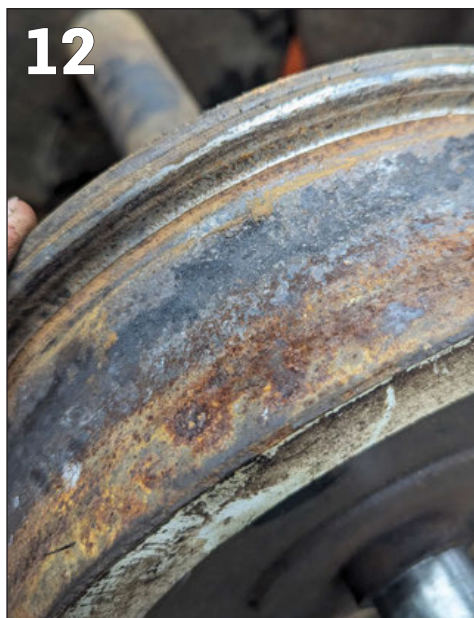
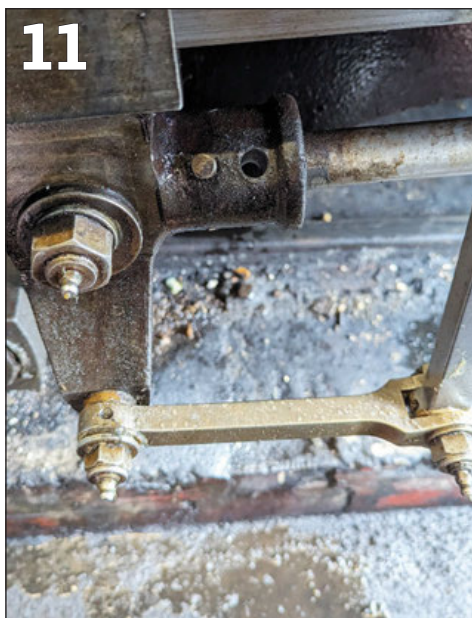
PHOTO 7: Sherpa's injector water valve handles moved into the cab for ease of use and to stop the ones in the footwell being trodden on.

PHOTO 8: Annealing the copper fuel line for the Simplex.

PHOTO 9: First belt attempt, this one was far too stretchy

PHOTO 10: Starter motor in position with its bracket.





fit, sending the loco back into traffic with its next train leaving five minutes down, which I don't think is too bad!

The following day I had a couple of extra new volunteers joining me in the workshop, so I set them to work stripping the two spare carriage bogies to remove the wheel sets for turning. With them all cleaned up I could then inspect the wheels properly, at which point I discovered the roots of the flanges had been built up with stainless weld.

These are wheels machined from a disc of EN8 steel and with the thickness of the wheels, the pre-treatment for these should have been to heat them up to at least 100 degrees celsius, then use dry 7018 electrodes (a low-hydrogen rod) to prevent cracking. Given that the weld is in stainless and there is no written procedures for how this was done it is going to be an interesting job to machine and I am going to have to be very careful if I find any cracks or hard spots.

I also had a delivery of the first set of machined cylinder blocks and valve chests for the steam pumps I have designed to make the air required for the air brakes that will be fitted to the loco. This is a twin-cylinder double-acting pump with the steam valves from one cylinder being operated by the piston of the other, therefore producing a pump that should never have a dead spot and should always self-start. I will be writing a complete build series on these pumps at some point in the future.

Frustrating find

One morning when I arrived at the station I discovered the first bit of vandalism that has happened for a very long time. Someone had taken our coal wagon and crashed it repeatedly into the buffer stop of the headshunt, hard enough to break the weld on one rail and break the rail itself on the other side.

What followed was a lot of grinding to find decent metal underneath the layers of rust before an equally large amount of welding to replace the buffer stop.

I could then return to working on the Simplex – I made up a battery box out of steel angle iron welded together to form the frame, skinned in aluminium sheet. I only used these materials because we currently have an excess of the aluminium sheet and it needs using up somewhere! I have described how I used the box-pan folder and a few other techniques to make the box elsewhere in this issue.

With the batteries in I could finish off the wiring – a solenoid to actually do the high current switching and a push button to fire the solenoid is about as simple as you can get.

With all of this together and tested I made up the lid, slapped a coat of paint over it all and moved onto the sanding gear. When I regauged the



PHOTO 11:

Taper pins holding Sherpa's crosshead to piston rod having evaporated.

PHOTO 12:

EN8 wheel with stainless weld build-up on root of flange, hopefully this won't cause an issue when machining.

PHOTO 13:

First parts of the steam pump to Harry's design.

PHOTO 14:

Vandalised buffer stop with snapped rail on left (and in inset) and a broken weld on right.

PHOTO 15:

Battery box frame for Simplex being painted up.

PHOTO 16:

Battery box with the electronics fully installed.

PHOTO 17:

Starter motor all running well with the new belt.

PHOTO 18:

One of the historic 15-inch gauge carriages going off for restoration.

PHOTO 19:

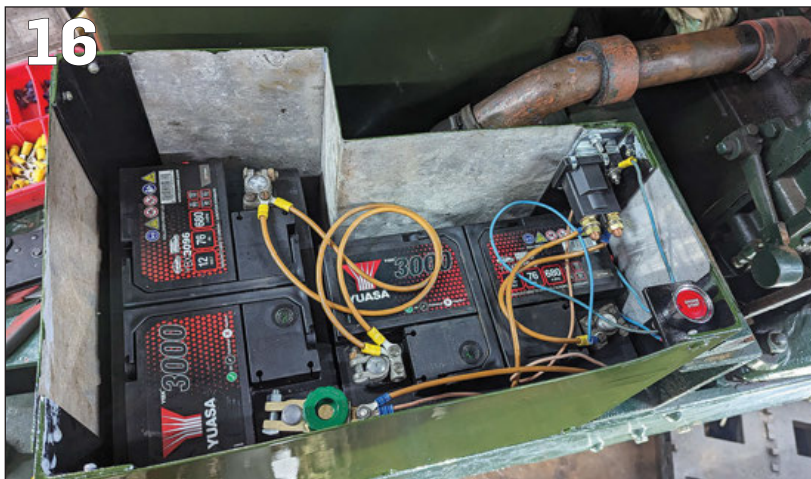
Simple but effective sanding gear on Simplex.

PHOTO 20:

New sander upstands made from extra long bulkhead hydraulic fittings.

PHOTO 21:

New bulkhead fitting visible sticking out of the bottom of the sand bucket.



loco from 2ft to 15-inch I hadn't moved the sanding pipes, partly because on one side they were completely missing, and partly because as a reasonably self-sanding railway we don't normally need to use any extra sand.

Given the slip

A few weeks prior to this latest work, however, I had been using the Simplex to shunt eight carriages out of the carriage shed in a fine drizzle, the worst railhead conditions and the loco simply slipped to a stand on the steepest part of the tight curve.

To rectify the sanding issue I needed to remove the stubs of the old sanding pipes and replace them, then readjust the ones that were still there. One of the pipes adjusted very well, the other simply snapped off as soon as I tried to turn it, so it, along with the other stubs that were left needed gas-cutting off. This is a particularly unpleasant task as I had to basically sit directly under the molten stream of metal falling from the cut, due to the shape of the pit.

I replaced the old set of sanding pipes with ½-inch bsp bulkhead fittings modified with a cross hole just above the bottom of the sand pot – this allows sand to trickle down into the sand pipe when the covering tube is lifted by a foot pedal in the cab. Underneath the bulkhead fitting there



will be a length of pipe and a female-female union to make changing rotten components easier.

Finally, one of the line's 15-inch gauge carriages has been sent away for restoration by the Denver Light Railway and Steve, one of our volunteers who worked on the line in its change-over period from 15 to 12¼-inch gauge in the 1980s. So this was pulled out of the back of the carriage shed, swapped back onto its 15-inch bogies and put onto the very nifty tilting trailer of friend of the railway Andy Walton.

Once again combined with operational duties, loads of shunting and a few bits I have probably forgotten while writing this up it has been yet another busy month at the Fairbourne Miniature Railway! **EIM**



Sub500 – a pair of 5-inch gauge electric locos

Julian takes the lead in the budget battery-loco build this month, describing the transmission of the club project that started as something for the grandchildren.

BY RICH WIGHTMAN & JULIAN HARRISON Part Four of a short series

Turning to the transmission of our sub-£500 budget battery locomotives, firstly we will need some maths. Some speeds were suggested earlier in the build so we need to explain them. The speed of the motor, the size of the wheels and the required speed of the loco will require maths to work out the reduction gearing we will need in the transmission unit.

Most 5-inch gauge locomotives normally run at between six and eight miles per hour. Some clubs may have a maximum speed on their track and if your club does I suggest you use this as your design speed – I opted for a speed of seven miles per hour. We can always hold the speed down on speed-limited tracks with a method shown later.

If your club has a speed limit I suggest you plan to go just above it as the loco will slow slightly on any upward slopes or under load.

We need a couple of other measurements. The wheels we are using are 3½ inches in diameter (1¾-inch radius). We need the circumference (the distance around the outside) to tell us how far one revolution will take us.

The circumference of a circle is worked out by the formula $2 \pi r$. Pi is taken as 3.142 so the circumference of our wheels is two times 3.142 times 1.75. This gives 10.99 inches which I rounded to 11 inches, 0.91 of a foot.

Now as we know there are 5280 feet in a mile so if we multiply by 0.9 that gives us 5802 revolutions of the wheel per mile. If we multiply this by our design speed, which for us was seven miles per hour, we need 40,614 revolutions per hour which when divided by 60 gives 677 revolutions of the wheels per minute (rpm).

The type of motors we are using vary slightly between 4000 and 4500 rpm. I have assumed the middle figure of 4200 as this is nearer to the rated speed of my motor. Don't always trust the label if the motor has one – mine said 4700 rpm which it does not achieve.

More volts smaller cables

A quick note here about the motors you choose. Ensure that you use 24-volt motors as this reduces the size of cable you will need to wire up the loco. Due to the amperages 12-volt motors need considerably larger, more expensive cables. This will be explained further when I cover the electrics later in the series.

We need to reduce 4200 revolutions of the motor down to 677 revs of the wheels. This is where our transmission or gearbox comes in. It reduces the speed but gives us plenty of torque – especially useful when moving off or accelerating.

All the reduction and drive is done through two 8mm-pitch chains and four sprockets. Sprocket number

PHOTO 57:

Steel cut to length for the transmission box.

PHOTO 58:

Three parts of the transmission bolted together for drilling.

PHOTO 59:

Pen marks ready for setting drive chain radius.

PHOTO 60:

Use the chain and sprockets to mark the radius.

PHOTO 61:

Marked out ready for drilling.

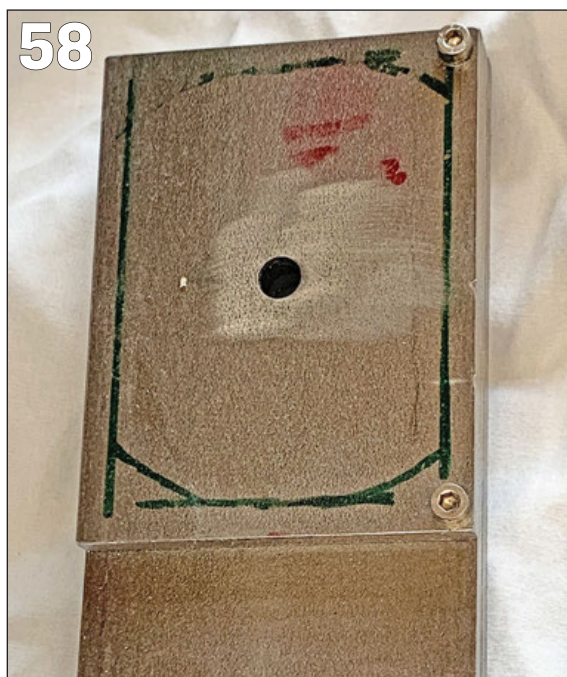
Photos by the authors



one attached to the motor has eight teeth. This is the smallest that will keep the chain attached to half the teeth to avoid chain slip and wear.

To work out the size of sprocket number two we multiply the motor rpm by the number of teeth, therefore, 4200 times eight gives 33,600 and we then divide this by the revs we want on the first reduction. If we go for roughly a quarter reduction we can use 1000rpm which gives us 33.6 teeth.

A 36-tooth sprocket tooth was used as this appears to be more commonly available so the actual rpm we achieve is 934 revs. This now needs reducing to our design speed of 677rpm and the chain drive needs to change direction.



The first chain runs more or less parallel to the top plate. The second chain needs to be at 90 degrees to the plate to drive the centre axle directly below the transmission unit.

A sprocket is attached to the 36-tooth sprocket on the same spindle. This sprocket needs to be slightly smaller than the one on the centre axle. We do not need to be as small as the 8-tooth motor sprocket as this would leave the sprocket on the axle too small to fit. The smallest that would comfortably fit the axle is a 15-tooth so for sprocket three attached on the spindle with sprocket two a 12-tooth was chosen.

The maths on this pair is the same as the previous pair. This gives us 934rpm times 12 divided by 16. The result is 700rpm at the wheels which actually gives us 7.22 mph. If the axle sprocket is dropped to 15 teeth it gives 747rpm which is 7.72 mph. If you wish to permanently restrict the loco to 6mph these are the two sprockets you change to achieve this.

Various combinations give different speeds – swap the 12-tooth spindle sprocket three for a 10-tooth and you get 6.44mph for 15-tooth and 6.03mph for 16-tooth axle sprockets. Bear in mind that under larger loads you will struggle to achieve these speeds – this is why we opted for seven miles per hour.

I will from now on refer to the four sprockets by their numbers. Number one on the motor spindle, two and three on the drive spindle and four on the centre axle. This should help if you have changed any away from the tooth counts we used.

Transmission build

With the maths completed we can build our transmission. For continuity I used some of the 3-inch by 1/4-inch flat steel used for the frames. We had to buy a standard length which is three metres. This should be enough needed for the entire locomotive.

The first job is to cut three pieces. Two are about nine inches long and the third is shorter at four inches. Mine can be seen in **Photo 57**. They need to be temporarily fixed together to ensure alignment of the bearings (**Photo 58**).

Drill 4mm holes in the top corners of the smaller plate. This plate will eventually become the motor plate. Use this plate as a template to drill the other plates and bolt together with M4 nuts and bolts. Mark the motor plate with the position of the motor spindle centre. Drill the centre hole to 8mm for now – we will machine later to the sizes needed.

We now need to work out where the shaft will go for the 36-tooth

number two sprocket using this hole as the reference. There are two choices for this. There are calculators on the internet that will give you the distance between the centres once you have completed the tooth counts for both sprockets, in this case 8 and 36-tooth, and the length of the chain you want to use.

Another way is to manually mark the centres. Fix your 8-tooth number one sprocket to the 8mm hole using an M8 bolt. Cut and join the chain to the length that suits your plates. As can be seen in **Photo 59** a marker pen is used to colour in the area where the centre of the 36-tooth number two sprocket should be.

Sharpen an M8 bolt to a point to act as a scribe. Assemble the two sprockets and the chain and put the sharpened bolt through the centre of the 36-tooth sprocket (**Photo 60**).

Pull the chain tight and move the 36-tooth sprocket from side to side using the scribe bolt to draw a curved line on the area covered by the marker pen. **Photo 61** shows the curved line produced by the scribe going from top to bottom. The other line was drawn on centrally ready for drilling. Drill on this mark through both plates. Remove the motor plate and set aside for boring later.

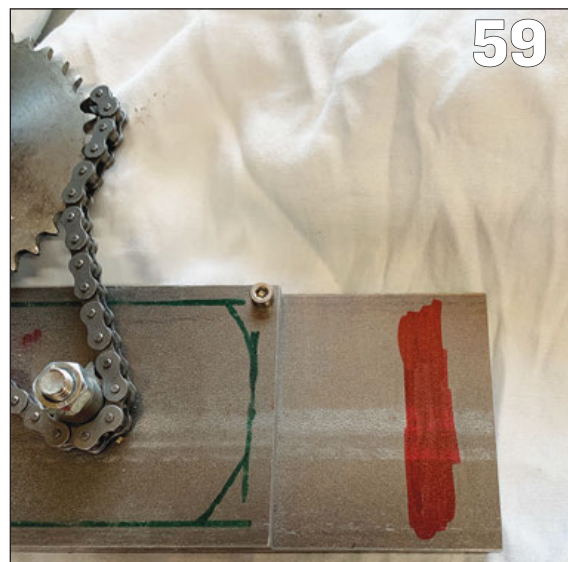
Bearing on the matter

On the other two plates we need to open the holes out to accept our chosen bearings. The choice of bearing size is entirely yours but will be based either on what you already have in your workshop or what you can buy cheaply from your local bearing suppliers. We bought ours on a special offer from Arceurotrade (www.arceurotrade.co.uk, usual disclaimer) but any bearing supplier will do.

The bearings will need to be sealed units so they don't get dirt inside them and I recommend buying metric bearings, not imperial – this is to make the front drive spindle easy to source. On an 8mm bearing an M8 stainless bolt can be used or an M10 used on a 10mm bearing. This saves some machining.

Whenever I now refer to the front of the transmission it is always the opposite end to the motor as the motor is mounted towards the rear of the transmission. The four bearing holes can either be bored on a lathe or drilled. If using a lathe you will need either a four-jaw chuck or a face-plate to hold the plates in position for boring. The holes need to be bored accurately so the plates match each other.

Also if you bore the holes leave a narrow ridge on the outer edge to retain the bearings. It only needs to



62



holes so can be small – one millimetre will suffice.

The alternative way to form these holes is to drill them. Bolt the two plates back together and drill the holes out to as close as you can get to the outer size of your bearings. In my case the 8mm bearings have an outer diameter of 22mm. I had drills big enough to get me to 16mm.

To open out further and to give the retaining ridge I used a step drill – I bought a cheap set of three from Aldi for about a fiver. The larger one goes in 2mm steps up to 26mm so was perfect. The steps are each about 5mm deep and I used a marker pen to colour in the 24mm step to warn me when I had drilled to 22mm.

The plates were unbolted and one at a time I opened out the holes to 22mm. Use either a pillar drill or a mill for this task in order to keep the hole square to the faces and remember to drill from the inside face towards the outer face.

Once the 22mm step had fully entered the hole the marked ring was still showing above the face of the plate. With the step being about 5mm

deep this left a retaining ridge formed by the 20mm step. The taper feeding the 22mm step onto the 24mm step will give a decent finish to the edge but don't push it in too far.

The bearings can be pushed into the holes now. They should not be hard to push in unless you have bored the holes to a tight fit. Don't worry if they are not quite tight enough to hold the bearings securely in place. Use a centre punch to 'damage' the edge of the holes – just punch four or five spots equally around the edge of the hole with the bearing in position and this will hold the bearings in place. More spots can be put in if any bearing is still not secure but there is no need to overdo it. This is only to stop the outer case of the bearing rotating in its hole.

Stuck in place

The alternative to punching is to use Loctite retainer or similar. After running for a while we found some of the bearings came loose so still had to be glued. It is probably worth gluing them all but wait until the transmission is finally assembled

“After running for a while we found some of the bearings came loose so still had to be glued...”

PHOTO 62:

The motor plate ready for boring.

PHOTO 63:

Motor plate bored to size.

PHOTO 64:

Use the motor to check the size.

PHOTO 65:

Use the motor to mark the fixing holes for drilling.

PHOTO 66:

All plates drilled and ready for the bearings.

PHOTO 67:

Mill out the baseplate for the drive chain.

PHOTO 68:

The milling operations completed.

and glue them then. This will fix them in their correct positions for the spindles.

The motor plate now needs machining to take the motor before we can continue with the assembly of the transmission. The motors we used have a front face with four holes for mounting and a machined circular locating ridge around the spindle 2 to 3mm deep.

Mount the previously drilled motor plate in the four-jaw chuck of a lathe with the 8mm hole centred as accurately as you can as shown in **Photo 62**. It needs to be reasonably accurate to keep the motor in line with its spindle but does not need to be accurate to three decimal places.

Bore out the hole right through to near to the diameter of the ridge on the motor (**Photo 63**). Once you are close to it machine carefully until the motor will just locate in the hole. Do not remove the plate but just keep moving the boring bar back enough to test with the motor until it fits.

Now remove the plate and use the motor as a template to mark the four mounting holes (**Photo 64**). The holes on ours were 5mm so I used an old 5mm drill as a punch to accurately mark through.

Mark only one hole first. Remove the motor and drill on the mark to 4.2mm and tap to M5. Bolt the motor on using this hole and then mark the other three holes.

Remove the motor and drill and tap these last three holes (**Photo 65**). Test your accuracy with four M5 cap-head bolts. If they don't quite fit open out the motor hole with either a file or drill them bigger until they fit. Once tested remove the motor and set aside for later fitting. These three plates can be seen in **Photo 66**.

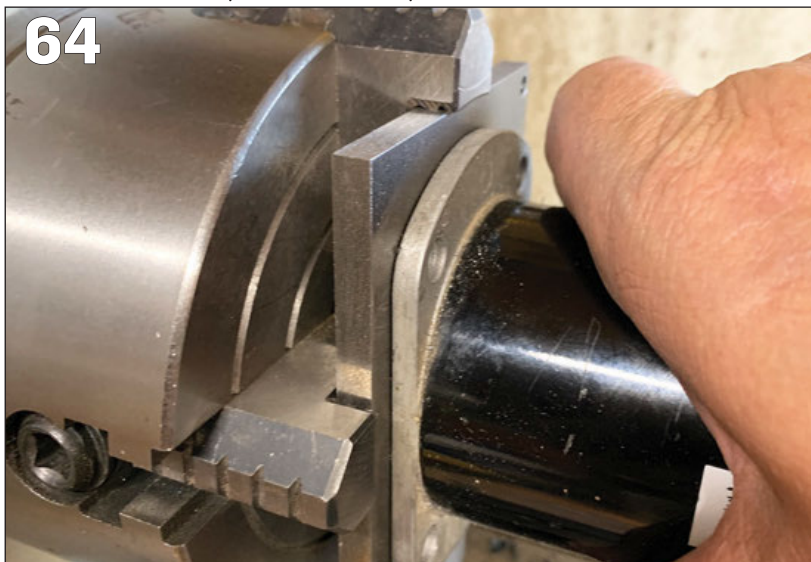
Baseplate build

We now need a baseplate for the transmission which is another piece

63



64



of the 3-inch by $\frac{1}{4}$ -inch plate. Cut a piece slightly longer than the two bearing plates. I made the first transmission with a baseplate measuring the same size as the bearing plates but struggled to fit the mounting and chain adjustment bolts. So for the second one I cut the plate 40mm longer which gave me an overhang of 20mm each end, making things a lot easier.

Using long bolts or M4 threaded rod and plenty of nuts fix the three plates together in their correct position and spacings. The motor face of the motor plate will need to be flush with one edge of the baseplate. The middle bearing plate is next with a half-inch gap from the motor plate. The outer bearing plate is then one and three quarter inches from the middle plate flush with the opposite edge of the base.

Success on a plate

The three plates should now form an assembly three inches thick to match the width of the baseplate – adjust them as necessary.

Mark three lines along the baseplate matching the centres of these three plates, starting 20mm from one end. Use the assembly as a guide – sit it in its correct position and mark the base at the end of each plate. Drill 3.3mm holes in the baseplate along these centre lines.

You will only need eight holes – one at each end of all three plates about 6-10mm in from the end marks. The last two go on the bearing plate lines level with the end hole of the motor plate.

Turn the assembly onto the side with the outer bearing plate downwards. Hold the baseplate on in its correct position and use the drill to spot through the holes for the motor plate. It is worth first doing a hole each end. Drill and tap the holes in the edge of this plate M4 and open

these two holes in the baseplate to 4mm. Use a couple of M4 bolts to secure the baseplate.

You can now spot all the other holes with the 3.3mm drill, then remove the baseplate and open the holes all to 4mm. Drill and tap all the holes in the bottom edges of the plates to M4 and fit the baseplate to test.

Using a marker pen put a line on the baseplate along the inside face of the bearing plates and mark a line where the centre of the front bearings sit. Remove the baseplate so it can be machined. Mark a line about 50mm either side of the front bearing centre making a box with the previously marked lines.

We now have a box marked approximately $1\frac{3}{4}$ inches by 4 inches centred between the front bearings. Cut out this hole either by drilling, cutting and filing or more easily using a mill – as you can see from **Photo 67** I used my mill with the finished result in **Photo 68**. This will be the hole where the drive chain will pass to the centre axle. It does not matter if the hole is slightly oversized – the problems come when it is too small as the chains can catch.

Near to the ends of the baseplate drill four sets of holes. Before drilling lay the baseplate on the top stretcher plates of the frames with the centre line for the front bearing above the centre axle. Mark the baseplate along the front edge of the front stretcher and the rear edge of the rear one. These can be seen as the dotted lines on the plans. **EIM**

■ Julian will complete the building of the transmission in next month's issue. Parts one to three of this series appeared in the June to August 2023 editions of **EIM**. To download digital back issues or order printed copies go to www.world-of-railways.co.uk/store/back-issues/engineering-in-miniature or call 01778 392484.



Round the bend...

Harry is obliged to go back to basics, describing a traditional metal-forming technique that will find many uses in all sizes and scales of model engineering.

BY HARRY BILLMORE



The recent job that I undertook to make up a new battery box for the Simplex locomotive at the Fairbourne Miniature Railway (fully described in this month's edition of 'Harry's Game') required me to fold up several bits of sheet metal, both aluminium and steel and I thought that a couple of the techniques I employed would be of use to novice sheet metal workers.

For most of the bending work I used a box-pan folder – these are incredibly useful pieces of equipment which have adjustable fingers that you can move out of the way to ensure that the folds are in precisely the right place. Unfortunately however, for all but one of the bends on the battery box lid, my folder was just too small so I went back to a technique I was taught years ago.

On the line

Having marked out where the fold on the sheet needed to be, I positioned

the fold line right on the edge of my bench and clamped a large piece of bar over the top – with some careful setting-up you can get the fold line right under the corner of the bar.

With everything clamped down tight I then started to gently hammer the fold upwards, starting at the corner and gradually working towards the other end. This generally assists in making sure there will be minimal rippling or odd gaps as you work along.

Tight and tidy

Once the lip has been hammered against the bar you can then go back and tidy up any odd little sections that you have missed. Especially if you want to tighten up the bend, tapping along the bottom of the bend line will do that nicely. I had to do this using the bar as a dolly to ease the bend I had earlier put in using the box-pan folder.

In the old spirit of pictures being worth a thousand words, the images on this spread should clearly demonstrate the technique, which is the same whether the component is intended for a 15-inch gauge loco like in this case or for your 3½-inch gauge tank engine. **EIM**

■ *Bench Talk* highlights useful techniques, tips and dodges that readers might benefit from in their workshops – if you have something suitable, why not send it in for your fellow readers to enjoy? Send to editor@engineeringinminiature.co.uk or 12 Maes Gwyn, Llanfair Caereinion, Powys, SY21 0BD.



"This generally assists in making sure there will be minimal rippling or odd gaps as you work along..."

PHOTO 1: The battery box sides were bent up easily using the box-pan folder.

PHOTO 2: Too long for the box-pan folder, the long edge of the box is clamped down to the edge of the bench.

PHOTO 3: Gently starting to form the bend from the end, methodically working along the sheet.

PHOTO 4: Gently starting to form the bend from the end and again working along the sheet.

PHOTO 5: It's not always perfect – you may end up with small gaps like this one.

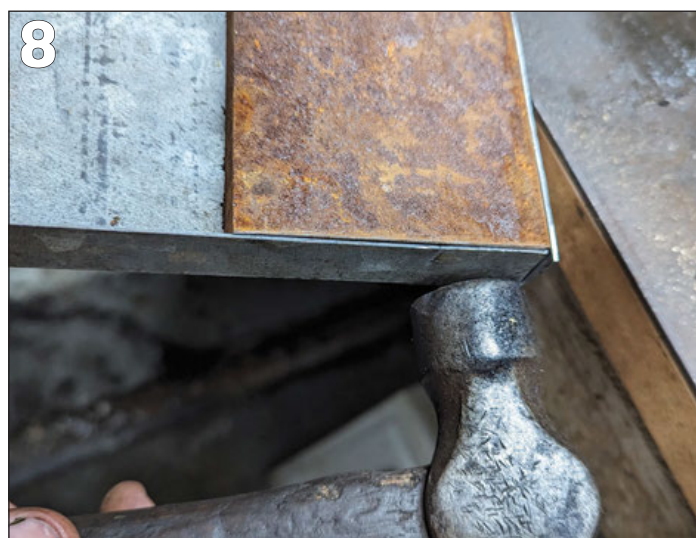
PHOTO 6: Gently tap the material into place, working along the gap as you go.

PHOTO 7: This bend had been over-folded on the box pan folder.

PHOTO 8: To ease the bend, the large piece of steel was used as a dolly and gentle taps on the base of the radius brought out the bend.

PHOTO 9: The resulting join complete.

Photos by the author



Building a ride-on tender from scratch

Peter and Matthew conclude the build of their 'beginners' project 7¼-inch gauge ride-on tender, and enjoy awards success as a result...

BY PETER AND MATTHEW KENINGTON Part Eleven of 11

Closing in on the conclusion of our 7¼-inch gauge ride-on tender build project, the next job was the matter of adjusting the brakes. Whilst the brakes are largely self-adjusting, a little setting-up will likely be required to ensure that equal braking force is applied to the wheels on both the front and rear axles.

The simplest way of doing this is to apply the brakes (once assembled, of course) and then attempt to turn each axle by hand. If the brakes are applied firmly, it should be impossible to turn either axle. If one of the axles can be rotated, then some adjustment is needed. This is provided by slightly elongating the hole in one or other of the brake cross-bars as shown (and described) in **Photo 184**. If the design has been made closely to the drawings, only a very small elongation (at most) should be needed.

Water Pipework

There are a couple of routing options for the pipework, as shown in **Figure 67**. The limitations of this 2D diagram are evident when considering the 'alternative' approach (the red-dashed line); it appears that the pipework will interfere with the wheel flanges. This is not the case in practice and the pipework will locate above the flanges and well clear of them.

The first step is to soft-solder a short length of pipe to each pneumatic connector (**Photo 185**). The pneumatic connector we used was RS (formerly

RadioSpares) type 187-8765. The pipe can be precisely cut to length later, immediately prior to installation. The resulting structure is installed into a ¼-inch BSP threaded hole in the buffer-beam (**Photo 186**).

The tap can now be added and the length of the pipe section can be judged and cut. In effect, the tap and control need to be temporarily installed in the top plate of the chassis, with the pipe and pneumatic connector unscrewed from the chassis the required amount for this to fit correctly. The amount by which the connector needs to be unscrewed can be measured and this amount removed from its attached pipe section. The result (minus the column and handle) is shown in **Photo 187**.

The underside pipework is made from two sections – at least that's how we did it. It would be possible to make this from a single section, but it would need installation prior to fitting the wheels/axles/axleboxes/hornblocks and all of the bend measurements would need to be precise.

We chose the simpler option of making the pipework for each side in two pieces and joining these with a length of plastic pipe (the same specification of pipe used for the drain point, discussed earlier in the series). We used a long overlap for this join, to ensure that no air could get in and disturb the operation of the injectors, but without a need to fit jubilee clips.

The first section of pipe connects

FIGURE 67
Pipework options

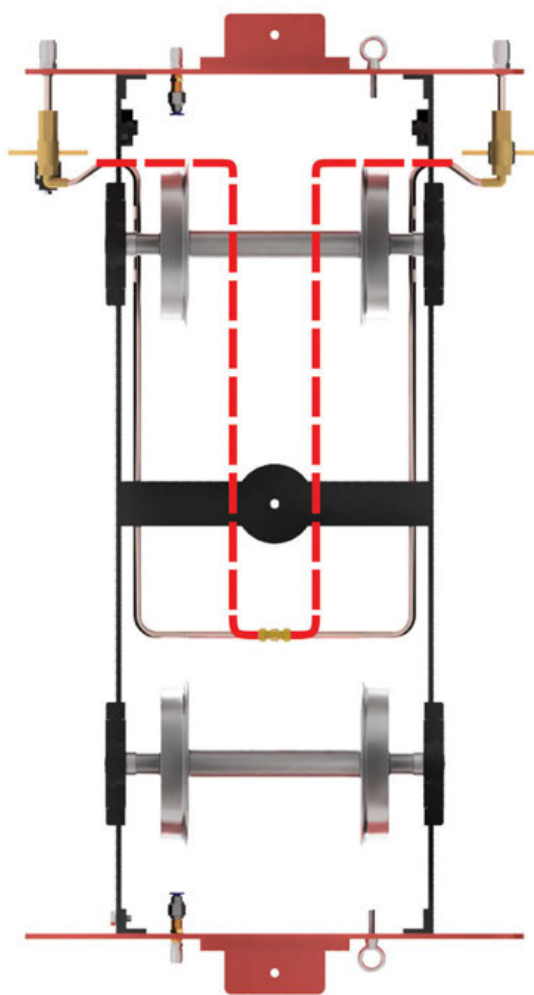




PHOTO 184: ‘Adjusting’ the brakes by elongating the hole in one of the brake cross-bars – which needs elongating will depend upon which brakes are on most tightly, the end with the tighter brakes is the end in which to elongate the hole.

FIGURE 67: Overview of the two pipework layout options (viewed from underneath, with baseplate omitted). Chosen option shown in red dashes, although note that the pipes were routed above the axles and the frame-stretcher (not as implied by the dashes).

PHOTO 185: Soft-soldering a short length of 8mm diameter copper pipe onto one of the pneumatic connectors.

PHOTO 186: Pipe and connector installed in the chassis.

PHOTO 187: Tap test-assembled (from a plumbing perspective) to ensure all pipe lengths were correct. Note that for final installation, all parts of the tap mechanism, bar the handle, need to be installed at this stage.

PHOTO 188: Matthew cuts one of the lengths of pipe just above (as the photo/chassis is oriented) the tank connection.

PHOTO 189: Marking up the pipe with the bend locations, for the awkwardly-shaped length of pipe running from the (or a) tap and through the side of the frames. The pipe used throughout was standard 8mm domestic plumbing pipe (intended for ‘microbore’ central-heating systems).

PHOTO 190: Pipe-bending, using a standard microbore plumbers’ pipe bending tool.

PHOTO 191: The finished pipe-section. The markings indicate the start of the bend, in each case aligning with the zero on the pipe bender shown in the previous photo.



to a T-piece located underneath the tank drain point and has a single bend taking the pipe parallel to the frames and close to the location of the tap (but inside the frames) – **Photo 188**.

The second section of pipe goes from the tap, through the hole in the frames and on to (close to) the first length of pipe (just described). The shape of this pipe can be seen in **Photo 189** and its construction in **Photo 190**, with the finished piece shown in **Photo 191**. Finally, the complete pipe-run for one side of the tender can be seen in **Photo 192**. PTFE tape should be employed to achieve a water (and air)-tight seal for the various compression fittings used (**Photo 193**).

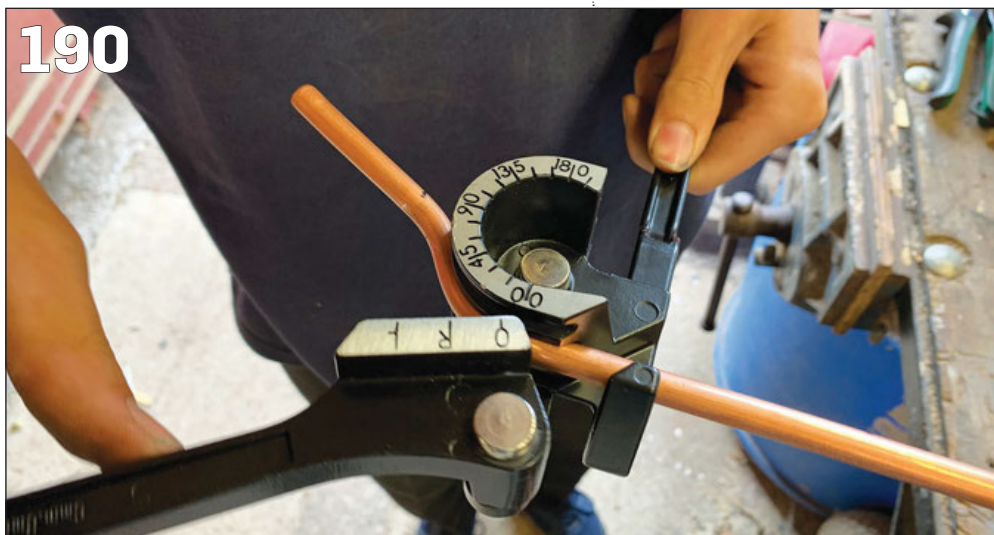
With everything assembled, a

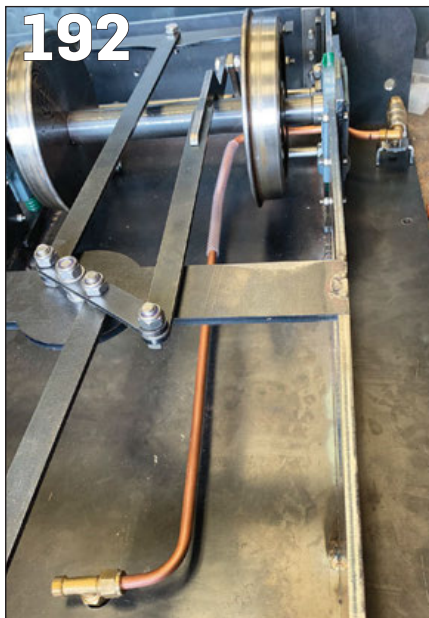


final check on alignment can be made, prior to painting the tap connection components (**Photo 194**).

Vacuum Pass-through

The vacuum pass-through connector assembly consists of a 1/8-inch BSP quick-connect pneumatic coupling, a brass 1/4-inch to 1/4-inch BSP male-male coupling and a 1/8-inch BSP straight male connector for 6mm flexible pipe. The male-male coupling needs to be threaded to 1/8-inch BSP, internally, for its entire length. Fortunately, this connector is likely to have the correct diameter of hole to take a 1/8-inch BSP thread directly (ours did), so it is simply a matter of running a tap through this part and





then installing it in the buffer beam.

Into this thread, the 1/8-inch BSP quick-connect can be installed (not forgetting some PTFE tape on the threads). Finally, the 1/8-inch BSP straight connector (for 6mm pipe) is installed inside the buffer beam, on the other end of the male-male connector (with a little more PTFE tape) – **Photo 195**.

The same process is repeated for the other connector assembly, in the opposite buffer beam. The two can then be connected using 6mm flexible pneumatic pipe, and routed as shown in **Figure 68** and **Photo 196**, and attached to the rigid copper water-piping using cable-ties.

7¼-inch Workmate

A handy tip when assembling the tender is to use a Workmate-style bench set to a 7¼-inch gauge spacing (**Photo 197**). This will make assembly (or checking) of the underside easier, once the tender tank has been added (**Photo 198**).

For painting the tender body (**Photo 199-200**), we again used the same type of spray paint (Rustoleum Hard Hat) as we had for the frames and buffer beams. With plenty of light coats, we achieved a decent finish, although we would be the first to admit that we still have some way to go to describing ourselves as competent paint technicians.

For the outlining, we used gold signwriter's paint and made a stencil from self-adhesive stencilling film (**Photo 201-205**). We used our vinyl cutter to make the stencil and this had to be done in four parts, due to its size limitations. This worked out quite well in the end, but was not perfect. We might try a variant on this theme next time we need to do something similar, on such a large scale (this process is fine for smaller-scale items).

FIGURE 68
Vacuum
pass-through

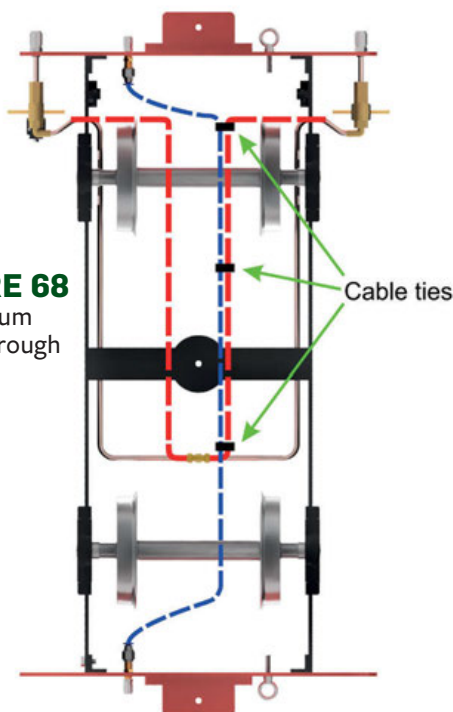


PHOTO 192: The main pipe run for one side of the water-feed system. The length of plastic pipe is used to join the two lengths of copper pipe and simplifies the pipe-bending process, as it allows this to be undertaken on two separate pieces of pipe. Note that the plastic pipe used is the same as that used for the drain on the rear-section of the tender body (**Photo 139**, **EIM** June 2023).

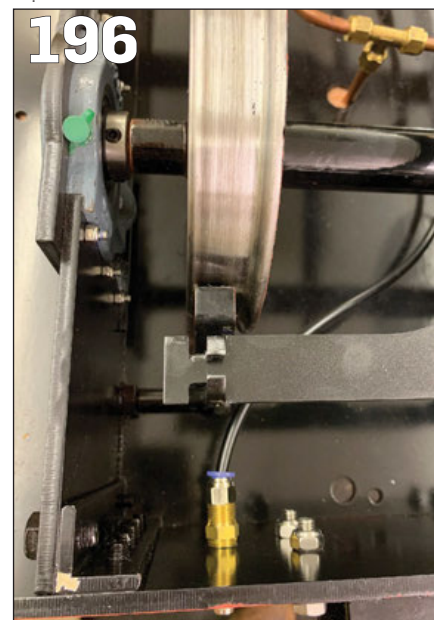
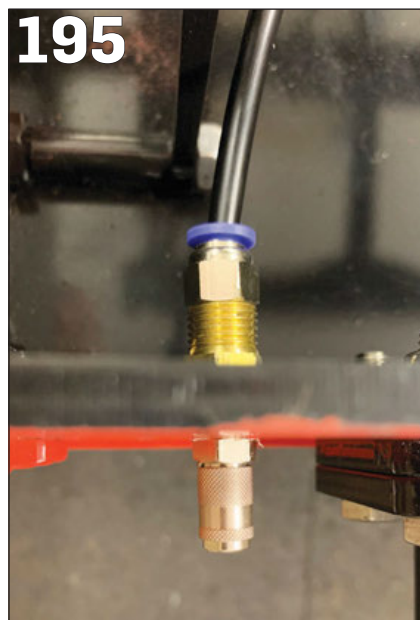
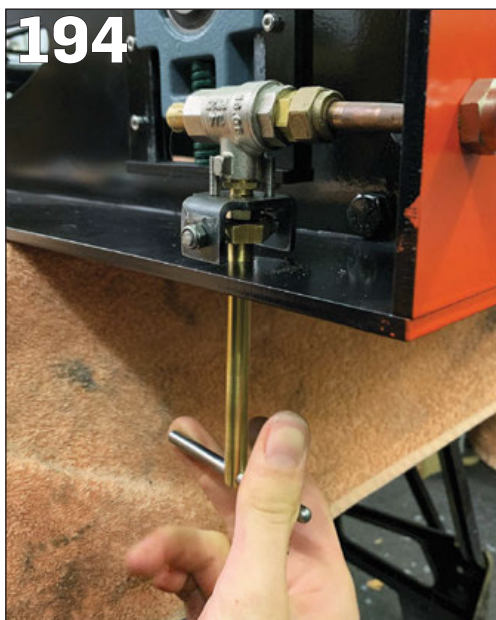
PHOTO 193: Adding PTFE tape to both ends of the elbow connector allows it to tighten to a waterproof-seal in the correct orientation.

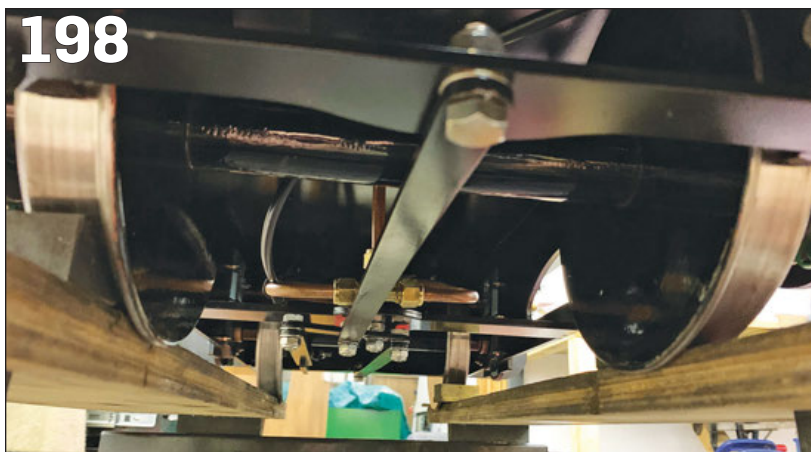
PHOTO 194: Testing tap handle for alignment before painting its connection mechanism.

FIGURE 68: Vacuum pass-through (blue dashed line – again the pipework should run above the frame-stretcher and axles). Note that it easily misses the axles when installed as shown.

PHOTO 195: Vacuum connections, inside and outside of the frames.

PHOTO 196: Routing of the vacuum-pipe.





Rear-section sealing

The rear part of the tender body is made up of two parts which are welded together – the top panel (including the filler pipe) and the side panels (see Photo 111 earlier in the series). It is, of course, possible to seam-weld the two together and provide a seal that way. We weren't sufficiently confident of our welding skills (particularly the 'neatness' aspect), so we opted for a series of tack-welds to firmly attach these two components together. This left the problem of sealing this section.

Why does it need sealing? As discussed earlier in the series, it is highly likely that water will be spilled onto this part of the body when filling the tank and it would be best if this water doesn't find its way into the void containing the tank itself.

A drain-hole and pipe are provided to allow accumulated water to drain safely onto the track, to avoid the rear section becoming an impromptu swimming pool for local

PHOTO 197: Using a Black+Decker Workmate as a raised-level workbench – adjusting the gap to 7¼-inch gauge

PHOTO 198: Tender base installed on Workmate 'track' – this solution has the advantage of allowing underside working with relative ease, though it's probably not advised for a ¼-ton narrow-gauge loco... Note use of wheel-chocks (most obvious on rear-left and front-right wheels in photo). Straps can be added, if desired, for additional safety.

PHOTO 199: Rear of tank after a coat of paint.

PHOTO 200: Prior to outlining – not too bad, but Peter and Matthew say they still have a lot to learn in this area...

PHOTO 201: Outlining with signwriter's paint and a stencil.

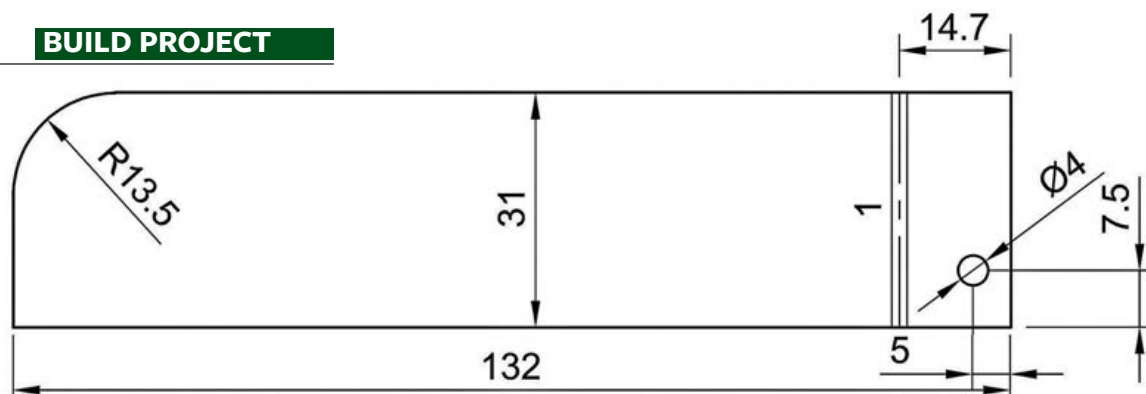
PHOTO 202: On the rear panel, only two stencils were needed, with the horizontal join visible in this picture – careful alignment is needed!

PHOTO 203: Carefully removing the stencil, whilst praying that none of the underlying paint comes with it!

PHOTO 204: The final result – not too bad.

PHOTO 205: And the rear looks decent, too.





Bend Table			
ID	Direction	Angle	Radius
1	Up	90	.9

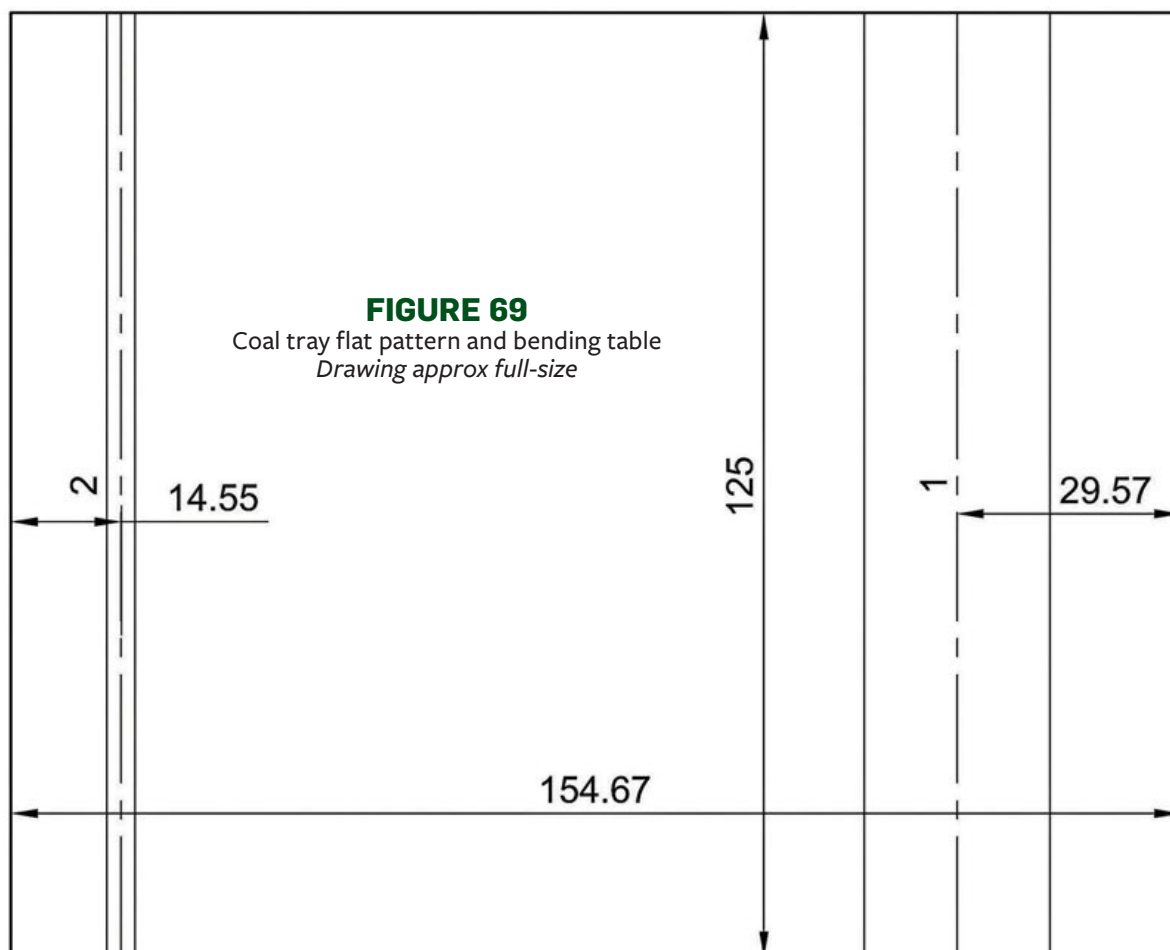


FIGURE 69

Coal tray flat pattern and bending table
Drawing approx full-size

Bend Table			
ID	Direction	Angle	Radius
1	Down	107.4	12.7
2	Up	17.43	11.8

206



invertebrates. For this arrangement to do its job, the rest of the rear section needs to be sealed. We did this with car body filler, which we then sanded down prior to painting (at the same time as the rest of the body). The result can be seen in **Photo 206**.

Finishing Touches

We added a couple of 'accessories' to the finished tender (a euphemism for 'things we perhaps should have thought of at the start and included in the design...'). The first was a coal tray, to stop the coal chute from gradually ejecting all of its coal onto the tender footplate (due to the shaking of the tender when in use on a track). The other was a custom-fit rubber mat for the footplate.

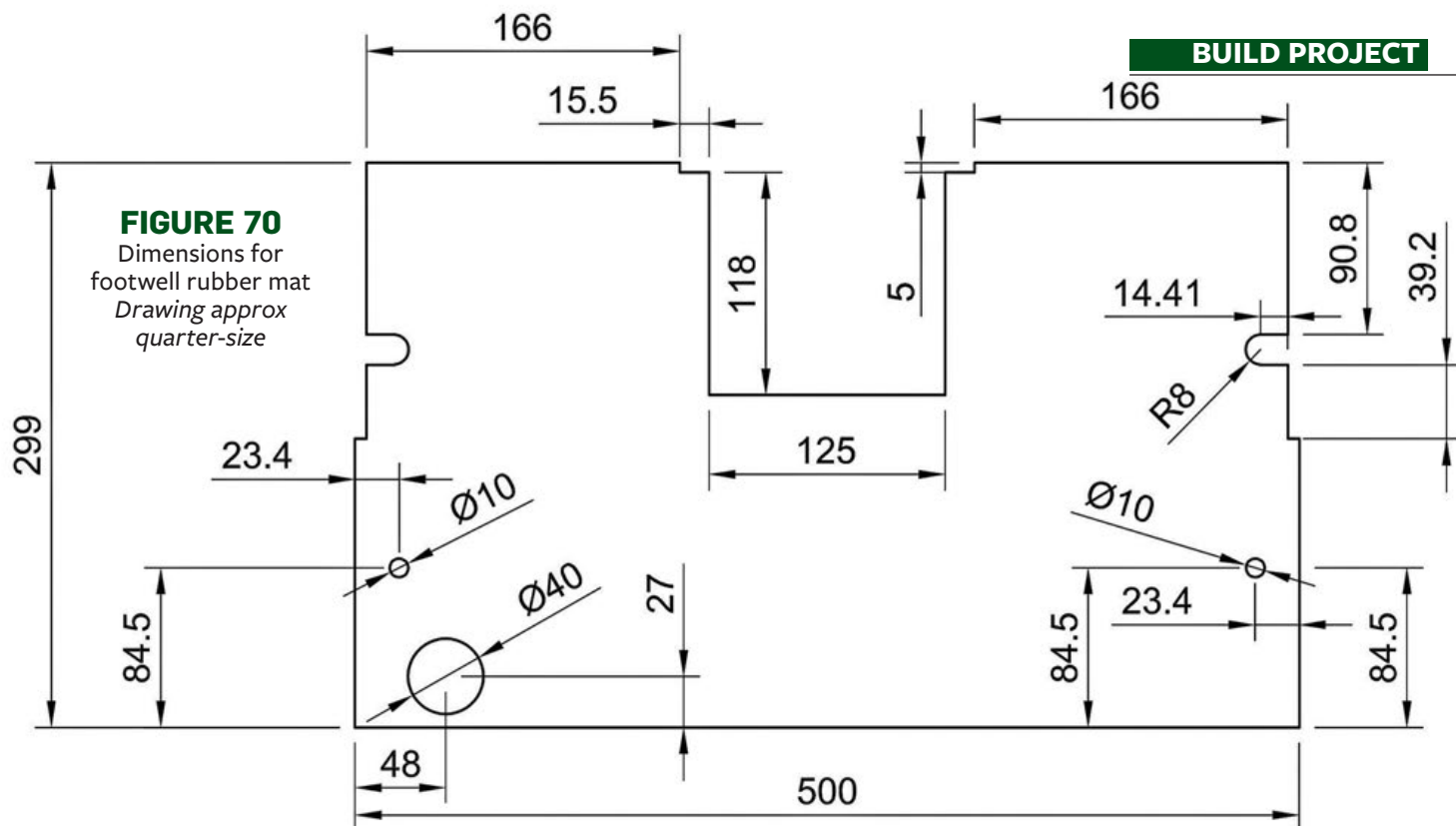
The coal tray was made from 1mm thick stainless steel – since this part will suffer heavy wear in use, from the frequent abrasion of the coal shovel, we didn't think that any paint applied

would last very long and so opted to go for a solution which should remain rust-free in the absence of paint.

The dimensions of the tray are provided in **Figure 69**, together with its bending details. We made a quick mock-up out of cardboard, to judge its appearance and fit (**Photo 207**), before committing to the final design and setting about constructing it (**Photo 208**) and installing it (**Photo 209**).

The floor mat was cut from a piece of 3mm thick chequer-plate rubber garage floor matting. We CNC-cut this using a 'drag knife', which we designed and made for the purpose – hopefully we will get around to publishing details of it in due course.

For those not familiar with the concept of a drag knife, it is (crudely) a 'Stanley knife' or a craft-knife which is held in the chuck of a milling machine, or X-Y router, and which is capable of 'castoring' by means of a ball-bearing arrangement located



between the shaft held in the mill and the blade performing the cutting.

The required dimensions for the mat are provided in **Figure 70** and the resulting mat can be seen installed in the final photo (**Photo 211**).

Award winner

This build project has been quite a journey, but hopefully if you build a tender based on our description your version will work out as well as ours did. We still have a lot to learn (on painting and outlining in particular), but we're pleased with the outcome.

The project did have one final (and unexpected) bonus – it won Matthew the Federation of Model Engineering Societies' (FMES) Federation Trophy and Polly Model Engineering Ltd. Prize, for an unprecedented second time, in March 2022 (**Photo 210**). Those of you who made it to the FMES AGM at Avoncroft will have seen the tender displayed there. For the rest, **Photo 211** will have to do instead.

If you do make one, please share your efforts by sending a picture to our esteemed editor – it would be nice to learn that Idris' tender has gained a few brothers and sisters. **EIM**

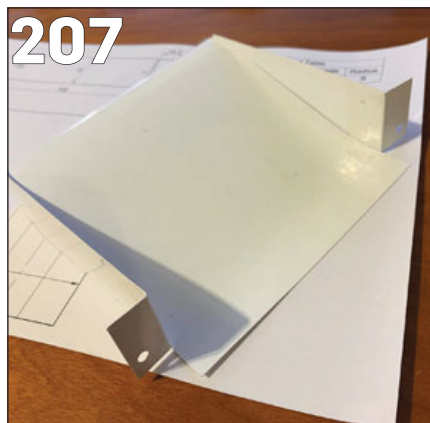


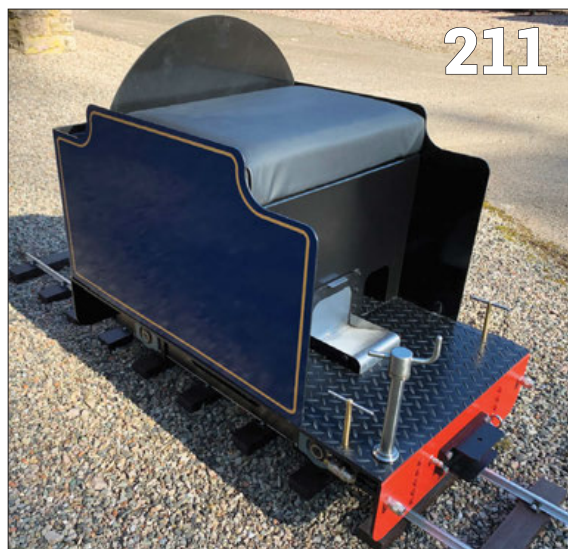
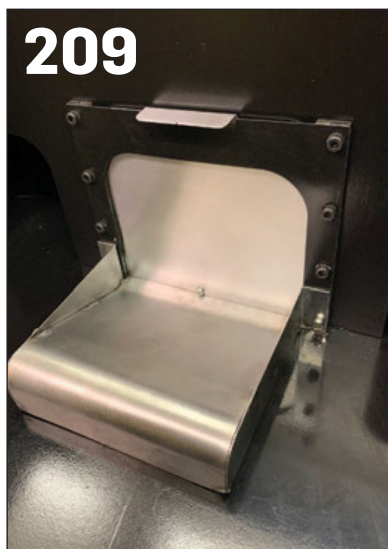
PHOTO 206: Rear section after a few light coats of the tricky-to-apply paint we used. The drain-hole can clearly be seen at the bottom of the picture.

PHOTO 207: Cardboard mock-up to test sizing and utility in-situ

PHOTO 208: The completed coal tray, and **PHOTO 209:** installed on the tender.

PHOTO 210: The outcome of the project – not only a lovely tender but a trophy as well!

PHOTO 211: Well worth the effort – the completed tender.



My Day at IMLEC

Nick bravely puts his skills of track driving to the test by competing in the annual efficiency competition for miniature steam locomotives.

BY NICK FEAST

Bristol is known for many things engineering and otherwise. Buses, cars, aircraft and compressors have taken the city's name over the years, and fine examples of Brunel's accomplishments are still prominent.

The Bristol SMEE was founded in 1909 and hosted the 2023 IMLEC (International Model Locomotive Efficiency Competition), a contest for 3½-inch and 5-inch gauge miniature locomotives. In short, it is about who can haul the biggest load and use the least coal during a half-hour (hopefully) non-stop run. This is a personal account of my experience in the competition, full details of the event will no doubt appear elsewhere.

I have read the reports of IMLEC in the model engineering magazines over the years and also helped with the two competitions that my home club of Bournemouth has organised. Last year I entered for the first time at the Guildford event, driving my 3½-inch gauge Southern Railway Q1 0-6-0 tender engine – it was not a great success. I was not the only driver struggling to find adhesion but once on the move I was able to complete 30 minutes of running with a reduced load of driver and observer, the passengers having disembarked very early in the run!

Injector issue

This year I hoped to do better so I made a few test runs in May at our track, to get rid of any gremlins that may have crept into the shed and hidden themselves in the loco over the winter. Several laps with a light load revealed nothing much amiss though the injector seemed reluctant to pick up and was a bit 'dribbly'. The newly made Ewins-style oil pump seemed to be providing enough oil, so there was not too much to attend to, I thought.

Back in the workshop I popped the loco on the bench. It's light enough to lift without the heavy tackle that a 5-inch gauge loco might need, the dry weight is around 60 pounds. Pushing the loco up and down a few times to make everything was going round as it should be resulted in an unwanted clonk being quite obvious.

Upending the loco onto its buffers to look underneath revealed the two crossheads for the inside cylinders, one connected to its piston rod and the



PHOTO 1: The approach to the station with the IMLEC banner attached to the footbridge. The summit of the track circuit is just beyond.

PHOTO 2: The pleasant setting of the steaming bay. Peter Wardropper attends to his LBSC 'Betty'.

other not! Oddly this had not been apparent while driving on the track!

The pin securing the disconnected piston rod had at some stage come loose and fallen out. All attempts to fix the problem in situ failed, so a boiler-off strip-down was required. Fortunately it's about only 30 minutes work to take the loco's boiler off and I am able to leave the smokebox and boiler together as a unit.

There was some damage to the bronze crosshead so this was bored out and an insert screwed in, then threaded to accept a new 7/32-inch diameter piston rod, Loctited and pinned just to make sure it stayed put. A couple of evening's work and the loco was back together and ready for a

test steaming on the rolling road.

The injector problem was traced to the overflow ball getting stuck in the open position due to the recess above it in the injector body being very close to the outside diameter of the ball. A small blob of silver solder cured this unusual fault in an otherwise reliable injector from a well-known supplier. A ten-minute run on the rolling road seemed to go well – there was no time for a track test so the loco went back under the bench ready for the event.

From my home in the New Forest there are a variety of routes to the Ashton Court track, none of them very convenient. I have the added drawback of an electric vehicle, so a trip on the fastest route via the



motorway network would involve recharging in both directions. Unfortunately there are no electric vehicle recharging facilities at the Ashton Court site whereas I could get a charge from the camping connectors at Guildford last year, enough to get me home non stop.

A direct route could be achieved with just one recharge for the return journey, so it was that bright and early on Friday 6th July I set off in a northwesterly direction following the shortest practical route to Bristol. This happens to follow a lot of the route of the long extinct Somerset and Dorset railway, so I passed through Wincanton, Evercreech Junction and Shepton Mallet. I travelled over the route of the old trackbed several times in fact.

A road closure due to utilities works right adjacent to the Ashton Court Estate added to the challenge of navigating South West Bristol's road system but the track was reached in plenty of time for my 11.30am run. More than enough time in fact as my run was now rescheduled for 1.30pm...

I visited the track last year at a 'Bulleids only' gathering so had an idea what to expect. The direction of travel was the reverse this time, clockwise, so I made time for a walk around the track to refresh my knowledge of the gradients (**Photo 1**).

Rust is good

The 3½-inch rails at most dual gauge tracks get less use than the 5-inch, so the rails I would be on were nicely rusty suggesting ample grip. The loco and associated kit was unloaded in the steaming bays (**Photo 2**), acquaintances renewed and the procedures for the day discussed. I had remembered to bring the entire kit list, so now it was time to set up the loco and confirm that I would actually be able to couple up to the train.

There had been some discussion prior to the event about coupling height and dimensions; my loco is fitted with a flat-steel strip drawbar with a ¼-inch diameter hole in the end. This works fine at my home track as the passenger trolleys have a slot in the drag beam and a ¼-inch pin which drops through. It seems many locos have a jaw into which a drawbar is fitted, so I needed an additional component in order to couple up. The host club kindly made an adaptor, which could be bolted to my drawbar to make the connection.

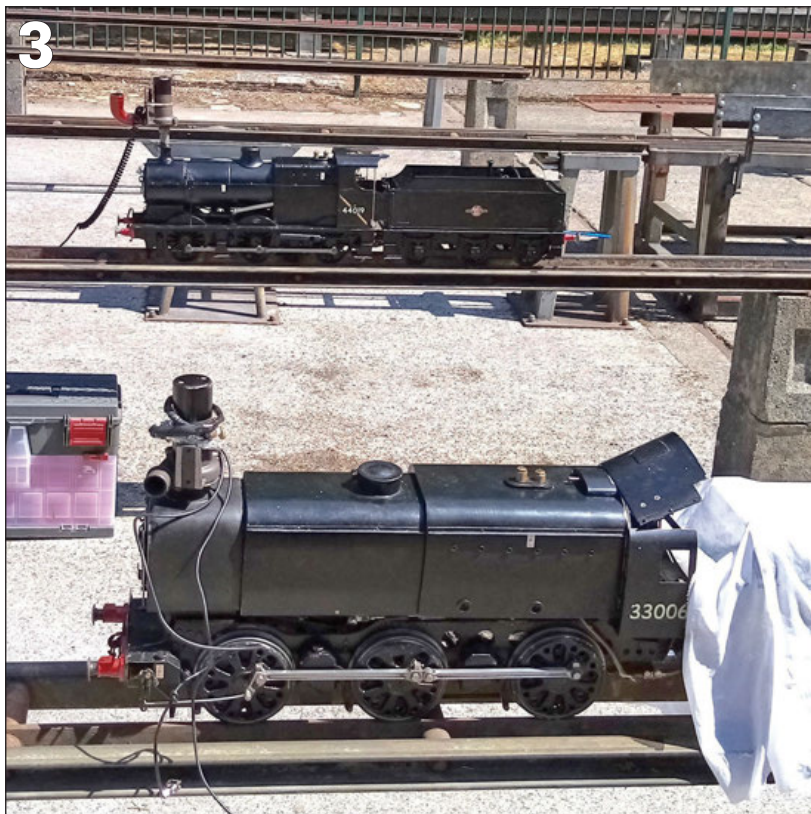
The entrant for the first scheduled run of the day failed to show up so it was down to Roger Hopkins and his Derby 4F to be the pathfinder. This was useful as the Don Young design of the LMS 0-6-0 was the basis for my Q1 in terms of the mechanical layout.

PHOTO 3:

Nick's Q1 ready for steaming while Roger Hopkins' Derby 4F is about to be lit up. Different in appearance these engines are mechanically almost identical. The Q1's tender is covered with a damp sheet to keep the injector water cool. Both have the same choice of steam raising device, the ex-MOD cabin fan motor!

PHOTO 4: Well underway mid run on the climb to the station, all is going to plan so far... This is a screenshot of a video posted on line by 3RP video. Photo courtesy of Luke Bridges, 3RP video

All uncredited photos by the author



The only real differences on the Q1 are slightly bigger diameter cylinders and straight slides on the Joy valve gear instead of curved (**Photo 3**).

Roger opted to take four passengers on the carriage plus driver and observer on the dynamometer car. I thought this was ambitious and he would soon be dropping passengers, but no, he sailed off down the gradient from the start and made his non-stop half-hour run look easy! His stats were impressive, 11 laps completed at an average speed 6.7 mph (a scale 107 mph!) and 0.815lb of coal burned to give an efficiency of 0.7 per cent. This is actually a good figure for a 3½-inch gauge engine and was not beaten all weekend, so very well done to Roger.

I was then introduced to Bruno

Taylor, my observer for the run, and allocated my bags of coal, which appeared to be anthracite beans. There was some debate over whether Welsh steam coal was being offered but this was definitely anthracite. Welsh steam coal is not generally available as small pieces as it is rather too friable and tends to disintegrate before it reaches the shovel!

By now the weather had turned pretty warm so I had covered the tender with a dampened white cloth. Injectors don't like warm water and a black-painted tender in the midday sun will get hot. I need 10-15 minutes to get up steam so while the previous run was under way I lit the fire and waited for the various dribbles and hisses to start.



5



The fire is started with charcoal soaked in paraffin, with the coal being added before going onto the track. I like to have a bit of coal in the bottom of the fire first, so that the whole lot doesn't drop through the grate as the charcoal burns through. This caused a bit of debate with the officials, but it's how you light up a full-size engine, and once the coal has been issued to a competitor it's up to you how and when you burn it.

Once Roger's run had finished I soon had enough pressure to get going so I moved off the steaming bay onto the traverser. Another traverser gets you onto the track and coupling up went as planned. Having seen Roger's run I also opted for four passengers – I had already given out three tickets for my run and the club officials were able to press-gang a fourth!

At this point I should give the club due credit for the organisation – almost 40 persons were credited in the

PHOTO 5: Two passengers have been dropped off as Nick tries to get pressure back, but his run was over. Photo: Rob Speare

PHOTO 6: The contents of the ashpan and grate post-run, a few pieces of clinker but it wasn't full.

PHOTO 7: Inside the smokebox after the run. Lack of oil around the blast nozzles shows the oiling rate may have been a bit light.

programme in many and various roles and there were many others involved I am sure. The site requires a certain number of people to undertake gate duties, which may not be necessary at other tracks, but you do need a certain level of manpower to run an event like this properly.

The start from the traverser to the beginning of the run in the station is made with just the driver and observer and empty carriage(s) – the passengers are picked up at the station which is some 300 feet away up a 1 in 150 gradient and the summit of the track.

This is always a nervous time, and there was a short delay of perhaps a minute or so but it seemed like ages. "Waiting for the tablet," said the observer. Tablet? Is this for single-line working? No, it was the computer tablet, which had been taken to the station to download the previous competitor's run!

It arrived back and was plugged back in to the dynamometer, then I was given the all-clear to move under steam for the first time up to the station. A bit of regulator, then a bit more, nothing happening so full regulator. Still no movement – I don't have draincocks on my Q1 so the cylinders full of water are not clearing. Twirl the reverser back to reverse gear

and a few revolutions clear enough water up the chimney to get the wheels turning.

Pressure is now enough to lift the safety valves and with a bit of slip we are away up the gradient. The stop line is reached and four passengers loaded up. I top up the tender from the plastic bottle offered by the marshal, add a quick splash from the injector to get the water halfway up the glass and we are away.

It's 1 in 200 down from the station and speed soon builds up. Check the fire and the draught from the chimney is pulling the flames forward and on with a couple of shovels of coal. Check the tender axle-pump by opening the bypass fully, there is plenty of water from the tell-tale pipe just inside the tender filler cap which I leave open. I shut the bypass again, I will need the full capacity of this little pump on this run.

Hitting the grade

By now I am doing 8 mph according to the dyno-car indicator and the reverser is pulled back to shorten the cut-off. As I reach the end of the straight the track is already rising at 1 in 250, then a brief section of 1 in 360, then a more noticeable 1 in 120 on the curve approaching the tunnel. The engine starts to slow and the regulator is opened fully, as we get nearer to the tunnel the reverser needs to return to nearly full gear.

A few sparks from the chimney are visible inside the tunnel; we are now down below 6 mph (Photo 4). I ease back the regulator as we go over the summit and shorten the cut-off as we rattle past the steaming bays on the level and over the traverser. Another shovel of coal goes on and I leave the engine to climb up to the station, but a furious slip indicates the track is getting polished in this area so I immediately shut the regulator and slowly reopen to maintain momentum through the station.

There is no need for water on this lap, but I remember to get a fill-up

6



7



next lap. Every now and then the boiler needs a top-up from the injector, which works as it should thankfully. Use of the hand pump is prohibited and constitutes a failure and retirement.

As the laps increase I am beginning to enjoy myself – six people on two carriages is a reasonable load for a 3½-inch gauge loco and 'Charlie' is performing well. Then on lap six steam pressure starts to fall and the starts to look a bit dull. A small amount of coal is added, on with the blower to try and liven things up, but to no avail, a stop on the gradient approaching the station proves impossible to recover from (Photo 5).

A blow-up to regain pressure and reversing to the bottom of the gradient allows me to drop the passengers and make a successful attempt at getting back to the station which could be the end of my run if I choose. However I risk one more lap but the steam runs out just 20 yards from the finish and that means retirement.

Post mortem

I completed eight laps and burnt 1.19 pounds of coal; efficiency was in the order of 0.4 per cent. Back in the steaming bays I made a post-run analysis. The lack of oil on my glasses and the top of the loco combined with the high level remaining in the tank pointed to not enough lubrication. What is sufficient oil for a stop-start session of passenger hauling on wet steam may not be enough for a loco working hard for 30 minutes non-stop, experiencing a degree of superheat!

We can't rule out mismanagement of the fire of course. Dropping the fire at the end of the run shed no more light on the reasons for failure – there were a few bits of small clinker but nothing that should have caused much of a problem on the Q1's long grate (Photo 6). Inspection of the contents of the smokebox showed enough char to cover the floor of the box but not enough to block any tubes (Photo 7).

To rub salt into the wound, Peter Wardropper's subsequent run with his beautifully presented 3½-inch gauge Southern proposed 2-6-2 with the same load of passengers was faultless and showed how it should be done.

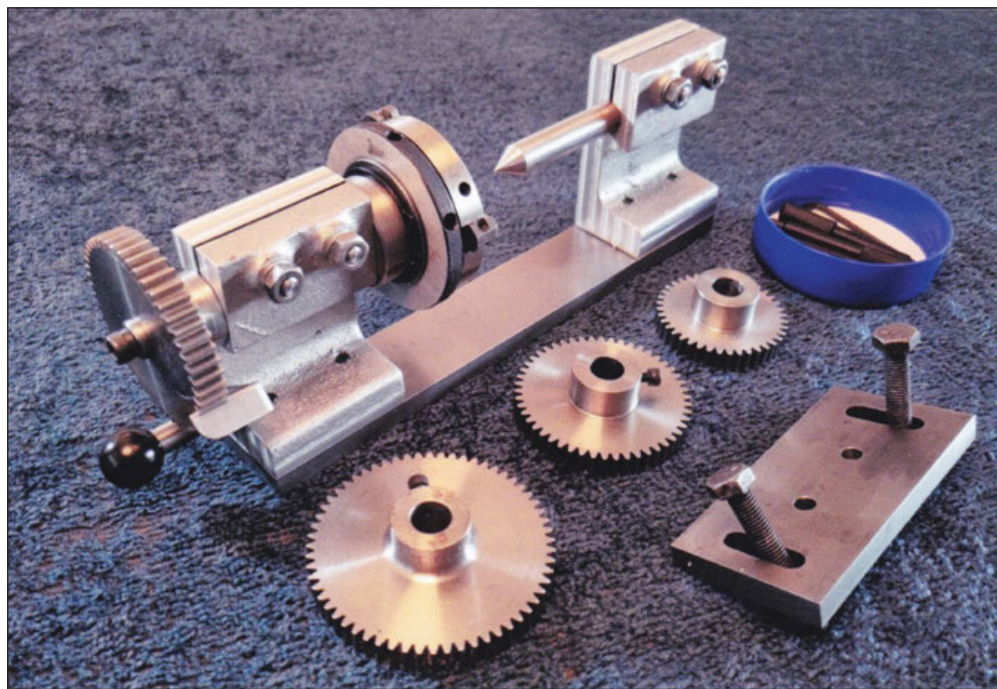
Despite the poor result on paper, I thoroughly enjoyed the event; it was most unfortunate that a technical problem on Saturday caused the organisers to cancel the results of the whole event.

The less said about the journey home the better. Let's just say that the Clifton Suspension Bridge looks mighty impressive from underneath, and rush-hour Friday traffic in the Avon Gorge allows you ample time to admire it! (Been there! Ed). **EM**

A simple dividing attachment

Neil shows off his latest creation as part of an appeal to see what readers are producing in their workshops, and we concur...

BY NEIL HEPPENSTALL



The attachment shown above is based on the design by the late Rudy Kouhoup. He describes the construction of this device and many other items in detail in his book *The Shop Wisdom of Rudy Kouhoup* – I obtained my copy from Camden Miniature Steam Services (<https://camdenmin.co.uk>).

I made a wooden pattern for the two standards, getting them cast in aluminium at a local foundry – sadly the foundry is no longer there, I was told that the council objected to its smoke emissions.

I made the pattern 1/16-inch thicker all round than Rudy's as this greatly increases the stiffness. However as Rudy stated in his account, "the best work is done with tailstock centre support".

I lacked the confidence needed to cut the screw threads of the spindle nose and chuck backplate. Instead I have secured the backplate to the spindle with Loctite in a permanent way.

The gears are secured to the spindle end by M4 socket-head cap screws and the detent finger is held in place by a 2BA screwed knob. The gears chosen for the attachment have 40, 48, 50 and 60 teeth – of these the 48T one is least essential, adding only

ABOVE: Neil's completed and highly useful attachment for dividing on mill or lathe. Photo: Simon Roebuck

16, 24 and 48 divisions to the total.

The headstock and tailstock spindles are clamped in place by the ¼-inch BSW screwed studs and nuts. These tighten the saw cuts in the tops of the standards.

Multiple uses

The attachment is mostly used on the vertical milling machine, held down to the table with finger clamps. However with the spare, short baseplate (at the front of the photograph), the headstock can be mounted on the lathe's cross-slide. This is for the axial drilling of items such as flange plates. The baseplates were drilled using the same jig as that used to drill the bases of the standards.

The whole item has been a pleasure to make and I recommend this and the other designs of Rudy Kouhoup for construction and use in the home workshop. **EM**

■ With this short but useful piece Neil illustrates a point he makes in his letter over the page concerning more of the wide variety of model engineering making it into our pages. So why not take up his challenge? If you have produced something of use in your home workshop, send us some details, and of course a photo, to the address on page 3.

"Sadly the foundry is no longer there, I was told that the council objected to its smoke emissions..."

Model engineering is about much more than railways...

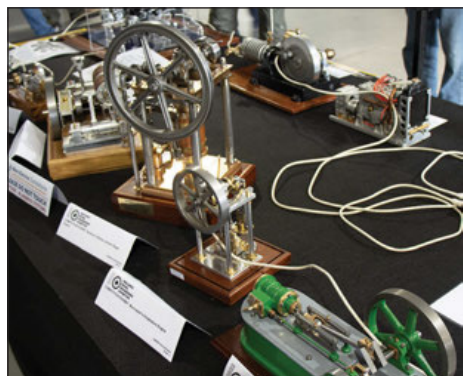
I was a bit disappointed that recent issues of **IEIM** have featured mainly railway matters. There is so much else of interest in engineering but I suppose you have to publish the articles that people send in.

Why not have a Readers' Work page? This would encourage model engineers to send in a photo of the work that they are currently engaged on with a paragraph to explain the significance. This would be better than the present arrangement where photos of mainly finished work are shown. **Neil G Heppenstall**

The Editor replies: I fully agree with Neil! Model engineering is about a great deal more than railway locomotives, but it does seem these days that these are taking precedence.

As Neil correctly summarises, I can only publish what I receive and sadly articles on such things as road locos, stationary engines and workshop tools are now more rarely received than even just a few years ago. I'm assured that modellers are still working on such subjects and we see plenty at the likes of the Midlands show (below). Perhaps their builders feel they are not of interest to the general readers – I can assure them they are!

Neil has backed up his comments by sending in a short piece, which unless you have the irritating habit that I do of reading your magazines backwards, you will have seen on the previous page. We want more! The address is on page 3...



Engines on show

I would like your readers to know that the engines which I have researched and created over the past 52 years are to be permanently displayed at Dartmouth.

Dartmouth is the birthplace of Thomas Newcomen, who in 1712 assembled the world's first commercial steam engine in south Staffordshire. Readers can see my engines by visiting www.davidhulse.co.uk and the exhibition is to start in October 2023. There will be eight engines which chronicle the evolution of the atmospheric engine from 1700 until 1800. **David Hulse**

The Editor replies: Anyone who has seen David's remarkable models will know that this will be an excellent exhibition.



Save our coal...

The supply of coal for our miniature engines is becoming ever more constrained. Indeed, many clubs are in the process of abandoning coal altogether, as it is no longer available in their area. Even where coal is available, the sources are restricted to either Columbia or China (Russian coal having now exited the market for geopolitical reasons!).

We have actually tried some Columbian 'steam' coal and it is not too bad – it burns to a clean ash with little or no clinker (at least in our 7¼-inch gauge 4-inch scale, 'Tom Rolt'), but produces a rather pungent brown smoke, which would probably have my local pulmonologist in tears.

I do, however, have a problem with buying coal which has travelled thousands of miles to get to me and has been mined in conditions which are somewhat closer to 'Victorian' than would be tolerated in the West, when there is an even better source around 30 miles from my front door. I am, of course, referring to Ffos-y-fran, the last operational coal mine in Wales.

For those of you unfamiliar with this mine, it is an open-cast site located close to Merthyr Tydfil in south Wales and it produces the finest Welsh steam coal still (just about) available (although it is not quite as good as its deep-mined counterpart, unfortunately – this had an even higher calorific value).

Ffos-y-fran is, as most of you will know, scheduled for imminent closure. Indeed, it has already been 'closed' once, from what I understand, and has been allowed to re-open pending an appeal. The heart of the matter seems to be environmental (although the local residents are not happy about the traffic and the dust, as has been recently reported by the BBC), with the Welsh Assembly Government deeming the mining of coal to no longer fit with its environmental ambitions (I am paraphrasing a bit here).

This is, from what I have learnt, the basis of the appeal against closure: the vast majority (around three-quarters) of the coal mined at Ffos-y-fran travels 25 miles down

the road to the Tata steel works at Port Talbot. If Ffos-y-fran ceases to exist, then coal will need to be imported from Columbia or (more likely) China, or the steelworks will be forced to close.

This coal is of a poorer quality, producing greater emissions and will have to travel well over 5,000 miles in (very polluting) ships to get to south Wales. This seems both madness and unjustifiable, from an environmental perspective – I think the current phrase used is 'virtue signalling', to describe this policy.

So, is there anything the preservation movement and the model engineering community can do about this? It seems that we may be able to help in a small way. The representatives involved in the appeal process for the Ffos-y-fran coal mine are now seeking letters of support from the heritage sector. Letters can be sent to: steamcoal@hsgplc.co.uk.

It is also suggested that you send a copy to your local MP and any other political figure relevant to your region, or club if writing on behalf of a society or such like.

Further details and some fact-sheets to help inform your letter can be found at: bit.ly/3OAFaGS – the guidelines on the site state that:

"Letters from individuals are actively encouraged and it is preferable if these are written on a personal basis rather than a template letter."

I would encourage as many of you as feel able to write in support of Ffos-y-fran in the hope that the photo accompanying this article is not the last that any of us sees of this 'black gold'! **Peter Kenington**

The Editor replies: Peter eloquently sums up what I've been saying for ages – we all know that the future for coal is not long-term in today's climate-conscious environment, but while we still need it for steel production and such, banning home producers from supplying it and instead forcing it to be imported, creating far more emissions in the process, is little short of madness...

Celebrations, awards and finds

Certainly a mixed bag on offer from the club and track scene this month...

COMPILED BY ANDREW CHARMAN

We start this month's packed selection of club and track updates with a photo sent in by regular correspondent John Arrowsmith, which at first glance seems just to be simply a nice bright picture of a double-headed train. John tells us, however, that the shot is somewhat unusual because it represents the first time the **Hereford SME** has tried running a double-header during public opening. The club's Romulus was combined with a member's Peckett and all went very well while creating lots of interest among visitors – so perhaps we can look forward to more such workings, double the value!

Last month we included some pictures from awards presentations made recently by NAME, the **Northern Association of Model Engineers**, and we are pleased to include a couple more this month, especially because they feature young people which as your editor never tires of reminding us are the essential element to our vocation's future growth, in fact survival...

These pictures were taken on Sunday 2nd July at the Top Field Railway of the **Whitwell & Reepham ME** during presentations to two club members in the NAME Junior Engineers awards.

Dedicated youngsters

Archie Munnings gained his award in the 8-10 year-old group for his dedication to the Top Field Railway – NAME's Bob Hayter told **EIM** that Archie helps out with any jobs that are going on, including track work. He shows a good ability to be around locomotives and miniature railways.

Similarly Charlotte Munnings, who took her award in the 4 to 17 year-old age group is also dedicated to helping both at this railway and other heritage lines. "Charlotte is happy to muck in when there is work to be done and is able to undertake most if not all jobs around the track and the locomotives," Bob told us.

Northern Association chairman Denis Mulford presented the awards and I'm sure he will agree with us that such accolades are a very positive part of the hobby and let's hope we see many more. It's clear that some clubs are very good at attracting younger members to their activities – for example when laying out the report from the Stockholes Farm Miniature Railway's LNER 100th celebration,



PHOTO 1: Double-heading at Hereford, a new thing according to John Arrowsmith.

BELOW: Archie and Charlotte Munnings receive deserved NAME awards from chairman Denis Mulford. Photos: Sue Mulford

which is over the page, your editor was struck by just how many of the members pictured driving the locomotives were young people. Mind you when you read Ivan Smith's report from the event you can perhaps understand why!

Just occasionally a letter arrives at **EIM** Towers that is particularly interesting, especially when it involves the rediscovery of model engineering history thought long lost. The **2½" Gauge Association** has been in touch with just such a letter, alerting us to a large number of Bonds' castings the

Association has recently acquired that may be of interest to modellers in several scales and gauges.

Bond's O' Euston Road was a well-known supplier of model engineering models, castings and all sorts of components from 1887 until it closed down its model engineering department in 1973. The firm still exists but is no longer supplies the model engineering market.

When Bond's closed the **2½"** Gauge Association bought up a large quantity of bronze castings, notably horn/spring 'castings'. These were hot ▶





stamped, the tooling was lost and the Association now supplies these as lost-wax castings to its members.

In the last few weeks a large quantity of castings, weighing in total around 2 tonnes, have become available and the Association has purchased them from a scrap dealer. "They did not want them to be melted down but used to make something," the Association's Robert Postlethwaite told **EIM**.

These castings are in a range of scales from Gauge 1 up to 5-inch and include many wheels, frame stretchers

THIS PAGE:

There could be loads of potential in this job-lot of historic Bond's O' Euston Road castings, saved from the scrappy by the 2½" Gauge Association.

and such like. "The Association only wants the parts which are to our 2½-inch scale so the rest are for sale, at very reasonable prices," Robert said.

"The cast iron looks very rusty but the rust is only on the surface and brushes off. The cast iron machines very easily. They had been stored inside a damp building for about 50 years and some had got very wet."

Brushing up well

Robert added that the castings can be cleaned by soaking in a citric acid solution for about a day and the loose rust then brushed off. "They then come out like new, but then need to be oiled to prevent rust coming back.

"There are also several boxes of mixed bronze castings of all gauges – this needs to be sorted by visitors as to what they need. We have also got lots of wheel patterns in Gauge 1, 2½-inch and 3½-inch gauge."

Robert added that the various components, which are located in Bristol, represent the last chance to obtain genuine Bond's castings from 50 years ago. Anyone interested can contact him for more details, sizes and pictures at membership@n25ga.org – fascinating stuff and a chance to make good use of material while adding a little extra historical aspect to one's locomotive build.

We are well into the peak event season now of course, and we are continuing to receive notices of forthcoming gatherings – if you want your club's event plugged in both these pages and the diary then all you need do is get in touch at editor@engineeringinminiature.co.uk

Latest to do just that is Philip Pritchard of the **City of Newport ME** in south Wales, Philip telling us that the club will be hosting the 'Steam Corner' at the Usk Agricultural Show on 9th September. This show at Gwernesney near Usk, established

Continued on page 44



Marking LNE style at Stoc

2023 marks the 100th anniversary of the creation of the London North Eastern Railway, the LNER, (*writes Ivan Smith*) and being located close to Doncaster, the major production centre for the LNER, a number of our members at the Stockholes Farm Miniature Railway have a keen interest in the LNER. So when it was suggested that we hold a rally to celebrate this anniversary it was enthusiastically welcomed.

We decided early in the planning to have a liberal interpretation, to include locos from the constituent companies and British Railways locos associated with the East Coast Main Line and Eastern Region. We chose the 11th June for the event, also my wife and I's 54th wedding anniversary and so a double celebration.

Three visiting locos included an LNER B1 4-6-0 built around 2002 by Great Northern Steam of Darlington and now owned by Alan Gildersleve. He also brought a rake of four LNER teak carriages, adding to the atmosphere, and a second loco, a Great Northern Class C2 small-boilered Atlantic. Acquired some time ago as a part-built chassis, it has recently been completed with Alan doing the platingwork and Paul Pavier the rest. Test-steamed only, it was on static display for the event.

The final visitor was a Great Central Class 12A 2-4-0 built by Geoff Billington in around 1991 and rebuilt about 3½ years ago by present owner Stephen Dowding. Stephen kindly allowed a couple of our Society members to drive it, including myself, and despite its diminutive size it was a pleasure to drive.

The home-based steam locos on static display were LNER V2 2-6-2 'The Snapper', an LNER L1 2-6-4 tank engine and two further Atlantics. We had planned to unveil another steam loco, 4-6-2 'City of Doncaster', but unfortunately due to the extensive work we put in preparing the site for the rally this loco was not completed in time – watch this space...

Driving for all

At events like this we like to run some non-steam so that our members who are not proficient in driving steam locos can get involved and have a drive. These included a pair of Class 31 A1A-A1A diesels, a Class 04 diesel shunter and a Y6 tram engine. These four are all battery electric and three of them have interesting histories.

One of the Class 31s was started by

R 100 in kholes Farm

14-year old member Adam Oldridge, in 1999 – by the time he went off to university he had completed both bogies, with one fully motorised and a basic chassis. The loco was then taken over by Harry Billmore (I wonder what happened to Harry, is he still involved in railways?) who motorised the second bogie, completed most of the bodywork and added a controller. When Harry left I purchased it and completed it as a Society project.

The Y6 was built by Richard Priestley approximately 21 years ago and I don't think it is a coincidence that his eldest son Alex is also 21!

The Class 04 is our earliest home-built loco. In 2002 an eight-year old boy, Joshua Hague, together with his mother and grandmother moved into the property adjoining the railway. Of course it was not long before Joshua expressed a wish to get involved with us and build something, with his mother's consent of course.

I remember clearly the first evening he came round to make a start on the loco. I gave him a length of 20mm diameter steel bar and a hacksaw and it took him all evening, two hours, to saw two pieces off to form the axles. However, he persevered over the next few years and ended up with a working model of D2334.

Design on the go

I am quite sure that an eight-year old would not have relished spending time producing plans – we simply had a line drawing with basic dimensions, a couple of photos and the 7¼" Gauge Society wheel standards. The loco was simply designed as we went along, but taking full advantage of any material that happened to be 'lying about'.

This procedure would probably make some of the purists cringe, but it has worked with our junior members at Stockholes. Although Joshua is no longer directly involved with model engineering we keep in touch and he has set up his own business. For the work he did on the class 04 and for our Society, in May 2008 he received the Southern Federation junior award.

The LNER rally was run primarily



PHOTO 1:

Alan Gildersleve with his LNER B1 8304 'Gazelle', with small and large-boilered Atlantics in the background. The inset shows the cake produced by Barbara Smith.

PHOTO 2:

Nine-year old Annabelle shunts with the Class 04 as a rather more worried looking Lewis supervises!

PHOTO 3:

GCR 2-4-0 Class 12A being driven by Keary McBrown with owner Stephen Dowding behind.

PHOTO 4:

Ivan and Barbara Smith show the proper way to celebrate one's wedding anniversary!

Photos via the author

as a scale event with limited passenger carrying but this allowed for a lot of our scale stock to be operated. The weather was fine (in fact too hot in the early part of the afternoon), but with plenty of complementary comments at the end of the day the event was considered very successful.

We were able to put on a display of LNER artefacts, jigsaws, books, DVDs, paintings and such and Barbara made a celebratory cake especially for the occasion suitably decorated (and consumed).

Prior to the cutting of the cake by Annabelle, one of our young members, thanks were extended firstly to all the

politicians who in 1921 passed the Railway Act which became law on 1st January, 1923, secondly to members at Stockholes who over the last couple of months spent a lot of time and effort transforming the site after nearly three years with very little maintenance activity, thirdly the visitors, some of whom had travelled considerable distances to be present and finally Jordan Andrew, one of our younger members for actually organising the event.

The final photo sums up the event, Barbara and myself thinking what an excellent way to celebrate our wedding anniversary... **EIM**





some 179 years, attracted around 20,000 visitors last year and is described as a celebration of all aspects of country life.

The Steam Corner Marquee was originally hosted by John Haining of model engineering fame and is now hosted by the club in his memory. Promised according to Philip are “big tractors, little tractors, stationary engines, hot-air engines, Meccano models, an astronomy Planetarium and very much more.”

Philip adds that hobbyists should make the journey to see the many makes of stationary engines on display or even ride on the portable railway; “There is a bonus this year, we have been lucky to locate several full-sized

steam lorries and traction engines, and it is hoped that they will all be there to see.” Sounds great, and on the show weekend John Arrowsmith should be heading a little further south from Hereford to bring us a report.

With lots competing for the space on these pages this month there’s not much room for our usual journey through the latest club journals, we’ll make up for it next month.

For a second successive month we were much taken with the cover image on the latest edition of *The News Sheet*, from the **North London SME**. The club’s well-occupied steaming bays are shown with three impressive standard-gauge tender locos on display – and right between them and

“For like-minded individuals to share their knowledge of all subjects, even bordering on engineering at times...”

A further trio of pictures by John Arrowsmith from the damp but enjoyable Dreaming Spires Rally in Oxford, that got squeezed out of the main report that starts on page 10.

ABOVE: What appears to be an unusual combination of an LNER B1 and a Southern Q Class pass the station, with we understand the B1 giving the Q a little assistance...

ABOVE LEFT: David Mayall’s excellent 2-6-0 BR Standard Class 2 on the steaming bays.

LEFT: Rain, what rain? Nigel Surman seems quite content on his Hunslet as he takes the inner platform road at the station.

towering over them, a narrow-gauge De Winton vertical-boiler loco, with safety valve blowing off furiously for good measure! The North London club rather helpfully makes its newsletters available on its website for fellow enthusiasts to enjoy (currently there are some 247 of them), so to see the picture we are so enthused by simply go to www.nlsme.co.uk.

Sadly there is less than positive news from OLCO, the **Old Locomotive Committee**, the group dedicated to all things involved with the Liverpool & Manchester Railway’s locomotive ‘Lion’ – a new edition of the group’s newsletter *Lionheart* reports that with the recent sudden and untimely passing of chairman John Brandrick, the “moving force” behind OLCO, and a desire by some long-serving committee members to step down, unless new blood can be attracted the future of the group is in serious doubt. This would be a great shame, OLCO doing some excellent work and their stand at exhibitions always highly attractive. If you’d like to get involved you can find out more at <http://lionlocomotive.org.uk>

Seventy and going strong

Finally this month, reading the editorial from **Gravesend MM&E** chairman Richard Lightle in the latest edition of the club’s newsletter *From the Smokestack* struck a chord with your editor, especially in view of thoughts posed earlier in this column. The Gravesend club is celebrating 70 years of existence this year, Richard musing that the founder members back in 1953 would never have envisaged that the club would still be going strong so many years later and bringing pleasure to its members and visitors alike.

“It is testament to the dedication of our membership over the years that the club still exists and provides a platform for like-minded individuals to share their knowledge of all subjects, even bordering on engineering at times!” Richard writes.

“With the lack of any sort of engineering apprenticeships recruiting younger members has become more and more difficult but thanks to the friendly nature of our time-served engineers and our on-site workshop facilities we are able to provide guidance and instruction to those that have come across problems with any of their projects.”

Amen to that – despite all of the challenges of surviving in today’s ever-pressured world, a club that makes the effort to be both welcoming and helpful will flourish...

Thanks for your newsletters as ever, keep them coming, along with pictures from your events. **EIM**



DIARY

EVERY SUNDAY

Bournemouth DSME public running, Littledown Pk, Bournemouth, 11am-3pm (also Wednesdays)

Bristol SMEE Public running day (NOT 15th), Ashton Court Railway, BS8 3PX noon-5pm

Canterbury & Dist ME public running, Bretts Quarries, Fordwich near Canterbury, 2-4pm

Gravesend MM&E public running, Cascades Leisure Centre, Thong Ln, Gravesend, Kent DA12 4LG, 1-4pm

North Wilts ME public running, Coate Water Country Park, Swindon SN3 6AA, 11am-5pm

Rochdale SMEE public running, Springfield Park, Bolton Rd (A58), Rochdale, pm.

Teeside SGR public running, Preston Hall museum, Stockton-On-Tees, 1-4pm

Wakefield SMEE public running, Thornes Pk, WF2 8UD. 1-4.30pm

Welling & District ME public running, Hall Pice Pk, Bourne Rd, Bexley, Kent DA5 1PQ, 12.30-4pm (Until 8th Oct)

EVERY TUESDAY

Romney Marsh ME Track Meet, Rolfe Lane, New Romney, Kent, from noon

SEPTEMBER

- 2** Bromsgrove SME Open Day, gauges 2½, 3½, 5, G1 and 16mm all welcome. www.bromsgrovesme.co.uk, contact Doug Collins 01527 874666.

- 2** Tiverton ME Saturday running at Rackenford track. Contact Chris Catley 01884 798370 (www.tivertonmodelengineering.org.uk)

- 2** Canterbury & Dist ME Open Day,
3 Bretts Quarries, Fordwich near Canterbury, details from secretary ginapearson@btopenworld.com

- 3** Rugby ME members running, Onley Lane, Rugby, CV22 5QD

- 3** Ryedale SME running, Pottergate, Gilling East, YO62 4JJ, 12.30-4.30pm

- 6** Bradford ME meeting, 'King Cotton' by Roger Backhouse, Saltaire Methodist Church, 7.30-10pm

- 6** Bristol SMEE meeting, Midsummer Norton Station & the S&DJR, Begbrook Social Club, BS16 1HY, 7.30pm

- 6** Guildford ME Small Model Steam Engine Group open meeting, Stoke Park Railway, London Rd, Guildford, Surrey GU1 1TU, 2-5pm

- 6** Hereford SME Public Running, Broomy Hill Railway, Hereford HR4 0LJ, noon-4.30pm

- 9** City of Newport ME 'Steam Corner' at Usk Agricultural Show, details at www.uskshow.co.uk

- 9** Polly Owners Group rally at Rugby ME, Onley Lane, Rugby, CV22 5QD

- 9** Bromsgrove SME public running,
10 Avoncroft Museum of Historic Buildings, Stoke Heath, Bromsgrove, B60 4JR 11am-3pm

- 10** Bristol SMEE Public running, Ashton Court Railway, BS8 3PX noon-5pm

- 10** Hereford SME Public Running, Broomy Hill Railway, Hereford HR4 0LJ, noon-4.30pm

- 10** 2½" Gauge Association Rally at Rugby ME, Onley Lane, Rugby, CV22 5QD, from 10am

- 10** Worthing SME public running, Field Place, Durrington, Worthing 2-5pm

- 15** Rochdale SMEE auction night, Castleton Community Centre, Manchester Road, Rochdale, 7pm

- 16** FMES Rally 2023, Frimley Lodge Miniature Railway, Hampshire, open to affiliated clubs, public running on Sunday. Details www.fmes.org.uk

- 16** Rob Roy Engine Rally 2023 at Bromsgrove SME, Avoncroft Museum of Historic Buildings, Bromsgrove B60 4JR, 11am-4pm (see page 39)

- 17** Bristol SMEE Public running day, Ashton Court Railway, BS8 3PX noon-5pm

- 17** Cardiff ME public running, Heath Park, King George V Drive East, Cardiff CF14 4AW, 1-5pm

- 17** Guildford ME public running, Stoke Park Railway, London Rd, Guildford, Surrey GU1 1TU, 2-5pm

- 17** Rugby ME running, Onley Lane, Rugby, CV22 5QD, 11am-1pm, 2-4pm

- 17** Ryedale SME public running, Pottergate, Gilling East, YO62 4JJ, 12.30-4.30pm

- 17** Tiverton ME Sunday running at Rackenford track. (See 2 Sept)

- 17** Worthing SME public running, Field Place, Durrington, Worthing 2-5pm

- 20** Bristol SMEE meeting, Auction, Begbrook Social Club, BS16 1HY, 7.30pm

- 23** Bromsgrove SME public running,
24 Avoncroft Museum of Historic Buildings, Stoke Heath, Bromsgrove, B60 4JR 11am-3pm

- 23** Lincoln ME 90th Anniversary Open
24 Weekend, North Scarle playing field, LN6 9ER

- 24** Hereford SME Public Running, Broomy Hill Railway, Hereford HR4 0LJ, noon-4.30pm

- 24** Worthing SME public running, Field Place, Durrington, Worthing 2-5pm

OCTOBER

- 1** Guildford ME Small Model Steam Engine Group open meeting, Stoke Park, London Rd, Guildford, Surrey GU1 1TU, 2-5pm

- 1** Rugby ME members running, Onley Lane, Rugby, CV22 5QD

- 1** Ryedale SME public running, Pottergate, Gilling East, YO62 4JJ, 12.30-4.30pm

- 4** Bradford ME meeting, Bits & Pieces Evening, Saltaire Methodist Church, 7.30-10pm

- 4** 4 Bristol SMEE meeting, On the Table evening, Begbrook Social Club, BS16 1HY, 7.30pm

- 6** Rochdale SMEE Models Competition night, Castleton Community Centre, Manchester Road, Rochdale, 7pm

- 7** Tiverton ME Saturday running at Rackenford track. (See 2 Sept)

- 8** Bradford ME public running, Northcliffe track, Shipley, BD18 3DD, members from 11.30am, public 1.30pm

- 8** Hereford SME Public Running, Broomy Hill Railway, Hereford HR4 0LJ, noon-4.30pm

- 8** Worthing SME public running, Field Place, Durrington, Worthing 2-5pm

- 12** Midlands Model Engineering
15 Exhibition, sponsored by Engineering in Miniature, Warwickshire Event Centre, The Fosse, nr Leamington Spa CV31 1FE. Details, ticket booking at www.midlandsmodelengineering.co.uk

- 14** Bromsgrove SME public running,
15 Avoncroft Museum of Historic Buildings, Stoke Heath, Bromsgrove, B60 4JR 11am-3pm

- 15** Cardiff ME public running, Heath Park, King George V Drive East, Cardiff CF14 4AW, 1-5pm

- 15** Guildford ME public running, Stoke Park Railway, London Rd, Guildford, Surrey GU1 1TU, 2-5pm

- 15** Rugby ME public running, Onley Lane, Rugby, CV22 5QD, 11am-1pm, 2-4pm

- 18** Bristol SMEE meeting, Steam Launches & Engines, Begbrook Social Club, BS16 1HY, 7.30pm

- 15** Rochdale SMEE AGM, Castleton Community Centre, Manchester Road, Rochdale, 7pm

- 22** Tiverton ME Sunday running at Rackenford track. (See 2 Sept)

- 28** Hereford SME Halloween Running, bonfire & fireworks, Broomy Hill Railway, Hereford HR4 0LJ, 2-6pm

- 28** North Wilts ME Halloween public running, Coate Water Country Park, Swindon SN3 6AA, 3.30-8.30pm

- 28** Bromsgrove SME public running,
29 Avoncroft Museum of Historic Buildings, Stoke Heath, Bromsgrove, B60 4JR 11am-3pm

PLEASE NOTE all outside events and public running are subject to weather – please check with Society concerned before travelling to an event.

Details for inclusion in this diary must be received at the editorial office (see page 3) at least EIGHT weeks prior to publication. Please ensure that full information is given, including the full address of every event being held. Whilst every possible care is taken in compiling this diary, we cannot accept responsibility for any errors or omissions in these listings.

WORLD OF RAILWAYS
PLUS

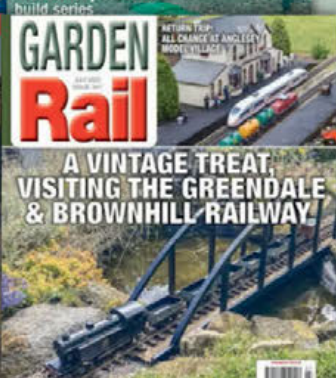
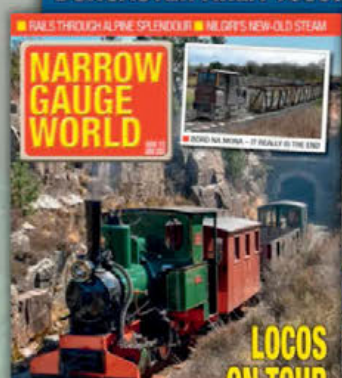
**Only
£5.99
a month**

**The digital membership worth
£3,500**

- ✓ 800+ digital magazines! **Worth £3,200**
- ✓ 52 new issues every year! **Worth £285**
- ✓ 71 Exclusive videos
- ✓ FREE show ticket each year! **Worth £15**
- ✓ 12 months of RMweb Gold membership
- ✓ 20 annual competitions
- ✓ And lots more added every month!

**You get each new issues
of these magazines:**

**PLUS a free show
ticket of your choice**



**Don't miss out! Visit our website and join today:
www.world-of-railways.co.uk/membership**

T&C'S: £5.99 monthly direct debit. One free Warners show ticket a year.

Tracy Tools Ltd

Model Engineering Supplies

We ship anywhere in the world

www.tracytools.com

PRODUCTS

- Taps and Dies
- Centre Drills
- Clearance Bargains
- Diestocks
- Drill sets (HSS) boxed
- Drills
- Drills set (loose) HS
- Endmills
- Lathe Tooling
- Reamers
- Slot Drills
- Specials
- Tailstock Die Holder
- Tap Wrenches
- Thread Chasers

Acme Taps



Taper Shank Drills HSS



Reamer



Taps & Dies



UNIT 1, PARKFIELD UNITS, BARTON HILL WAY, TORQUAY, TQ2 8JG



Tracy Tools Ltd

Tap & Die Specialist, Engineer Tool Supplies

Tel: 01803 328 603

Fax: 01803 328 157

Email: info@tracytools.com

www.tracytools.com

A.M.E. 01952 879607

Abbotts Model Engineering
Makers of fine 5" & 7 1/4" Gauge
Locomotives & Rolling Stock

See Website for up to date info.
Please re-fresh your website browser.



Scan the "QR" code
with your phone camera
and tap the link.

Will take you direct to our
website for all our
up to date products.



Unit D7, Haybrook Ind Est, Halesfield 9, Telford, TF7 4QW

Shop open Mon to Fri 9.00am to 4.00pm
Locomotives, Coaches & Trucks
all on display

www.ametrains.co.uk

MAXITRAK.COM

The best of model rail and road

OVER 40 YEARS
EXPERIENCE

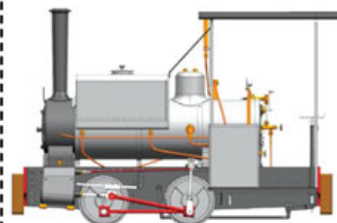


3/4" Sentinel
DG6 Lorry

From £1,515
Ready to Run



3/4" Allchin
£1,295



NEW 5" Gauge Wren
Contact us to register
interest!

Expected Autumn/Winter 2023

5" Planet - In stock now!

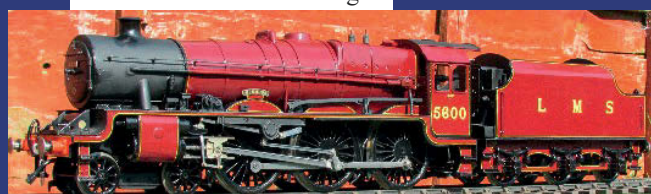


10/11 Larkstore Park, Lodge Road, Staplehurst, Kent,
TN12 0QY Tel : 01580 893030 Email : info@maxitrak.com

UK MANUFACTURES OF LIVE STEAM
LOCOMOTIVE KITS IN GAUGE 1 & 3
Coal, spirit, or static



LMS JUBILEE kit for Gauge 1



Check out our website for more locomotive kits

www.barrettsteammodels.co.uk

Tel no. 01922 685889

The Old Exchange, 47a Coronation Rd, Pelsall, Walsall, WS4 1BG



MIDLANDS MODEL ENGINEERING EXHIBITION

THE SHOW FOR MODEL ENGINEERS



**THURSDAY 12th
to SUNDAY 15th
OCTOBER 2023**

Thursday - Saturday 10.00am - 4.30pm
Sunday 10.00am - 4.00pm

**WARWICKSHIRE
EVENT CENTRE**

**ONE OF THE PREMIER
MODELLING EVENTS IN THE UK**

- MEET THE CLUBS & SOCIETIES
- LEARN FROM THE EXPERTS
- BUY FROM LEADING SUPPLIERS
- SEE THE MODELS



SPONSORED BY
THE MAGAZINE FOR MODEL ENGINEERS
**ENGINEERING
in Miniature**

Why not enter your work and be part of the exhibition?
There are 16 competition and 16 display classes.

See our website for more information. Closing date for entries Monday 18th September.

Tickets can be purchased in advance via our website or purchased on the day of your visit from the ticket office.

TICKET PRICES

£12.50 Adult
£11.50 Senior Citizen (65+ yrs)
£5.00 Child (5-14)

Meridienne Exhibitions cannot process any telephone bookings. If you have event specific enquiries, please call 01926 614101.

Visit our website for the latest information prior to your visit.

f Meridienne Exhibitions LTD



COLLECTION OF
HISTORIC MODELS
WORKSHOP
DEMONSTRATIONS
SERIES OF TALKS

BOOK TICKETS NOW ONLINE AT

www.midlandsmodelengineering.co.uk



NOGGIN END METALS

(+44) 07375 958713

Www.nogginend.com

We supply a wide range of metals and engineering plastics in small quantities for model engineering. Including Brass, Aluminum, Cast Iron, Bronze, Copper, Steel, Stainless Steel, Nickel Silver, Gilding Metal, Nylon, PTFE, Peek and Fluorosint.



EIM Boiler Metal Pack £146.95

BROWSE OUR NEW WEBSITE

www.itemsmailorderascrews.com

**SEE OUR STOCK AND
GET A QUOTE**

BA SCREWS IN BRASS,
STEEL AND STAINLESS.
SOCKET SCREWS IN STEEL
AND STAINLESS.
DRILLS, TAPS AND DIES,
SPLIT PINS, TAPER PINS,
REAMERS ETC.



**FOR A FREE PRICE LIST
PHONE 01427 848880 OR EMAIL
lostignition8@gmail.com**

ITEMS MAIL ORDER, MAYFIELD, MARSH LANE,
SAUNDBY, RETFORD, NOTTS, DN22 9ES

LEADING SPECIALIST SUPPLIER AND PUBLISHER OF TECHNICAL AND MODELLING BOOKS FOR THE MODEL ENGINEER AND MODELLER WORLDWIDE FOR OVER 60 YEARS



Come & see us on stands 3-5 at the Midlands Model Engineering Exhibition from 12th to 15th October at the Warwickshire Event Centre

W: www.teepublishing.co.uk

T: 01926 614101



TRACK WORK
3½" | 5" | 7¼" Gauge

Using PNP Railways components
will simplify track laying
Leaving you more time to enjoy
your hobby

Request a Quote Today



Tel: 01453 83 33 88 | www.pnp-railways.co.uk



POLLY MODEL ENGINEERING



Practical Scale

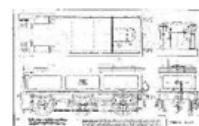
So much more than drawings and castings



Let us help you realise the model of your dreams



Precision platwork – CNC cut / drilled / scored; windows, fittings, to suit a wide range of 5" and 7 ¼" gauge GWR locos and tenders.



Drawings, castings,
lost wax castings,
laser cut parts,
materials, fittings
accessories and
much more...

Buy with confidence from an established
British Manufacturer & Supplier to the
model engineering hobby.



Polly Model Engineering
Unit 203 Via Gellia Mills,
Bonsall, Derbyshire,
DE4 2AJ, United Kingdom

www.pollymodelengineering.co.uk

Tel: +44 115 9736700

Find us on

email: sales@pollymodelengineering.co.uk

HORLEY MINIATURE LOCOMOTIVES

7¼" Drawings and castings
 Dock tank
 BR STD Class 2 2-6-0
 BR STD Class 2 2-6-2T
 BR STD Class 4 2-6-4T
 BR STD Class 5 4-6-0
 BR STD Class 7 4-6-2
 BR STD Class 9 2-10-0
 L.M.S. Coronation Class 8 4-6-2 (Duchess)

5" Castings only
 Ashford. Stratford. Waverley.

7¼" Castings only
 Dart, Roedeer. Green Queen

HORLEY MINIATURE LOCOMOTIVES LLP
 Phone: 01293 535959 E-mail: hml95@btinternet.com
www.horleyminiaturelocomotives.com

 **TEE**
 Publishing Ltd

STOCKISTS OF A WIDE RANGE OF BOOKS FOR MODELLERS AND MODEL ENGINEERS

W: www.teepublishing.co.uk
T: 01926 614101 E: info@teepublishing.co.uk

MJ ENGINEERING Drawings and Castings for Model Traction Engines Locomotives and Model Engineering Supplies

2" scale Burrell Gold Medal 7 1/4" Bagnall NG Loco **2" scale Burrell 10 Ton Roller** **Pre-owned**
 We always have a stock of models and workshop equipment to sell. Check our web site regularly.

Colour Catalogue – send £3.50
 Includes all our range of Traction Engines and Locomotives, Steam Fittings, Nuts, Bolts, Rivets, Materials.

Machining and Gear Cutting Services
2, 3 & 4" Scale Traction Engine Lamps

Rubber Tyres

2&3" Scale Fowler A7 Traction Engine **3" Scale Wallis & Stevens 8HP**

Schoolfield Corner, Church Lane, Dogmersfield, Hampshire, RG27 8SY - Visitors by appointment only
 Tel: 01252 890777 email: sales@mjeng.co.uk web: www.mjeng.co.uk

Tiggy Engineering & Aviation

Laser cutting

Do you need very fine marking or cutting, Boiler name Plate ?

Variety of Material thickness
 Brass, Steel, Copper
 and may other materials
 with minimum font heights
 less than 0.2mm !

Call Mike to discuss :
 Tel: 07738 271770

Meccano Spares

Reproduction & Original Meccano Parts.
www.meccanospares.com
 Tel: 01299 660 097

TO ADVERTISE HERE
CALL SARAH ON
01778 392055

AP MODEL ENGINEERING

INCORPORATING MODEL ENGINEERING PRODUCTS, BEXHILL
 T: 07811 768382
 E: apmodelengineering@gmail.com

AP Model Engineering supplies the largest range of battery electric diesel outline ready-to-run locomotives, locomotive kits, riding cars, rolling stock and accessories in 5" scale, 7¼" scale and 3½" scale. Quality products at affordable prices!
www.apmodelengineering.co.uk

webuyanypworkshop.com

Home workshops cleared, good prices paid, especially for those with either Myford 7 or 10 lathes.

Send your photos to
andrew@webuyanypworkshop.com
 Or call me on 07918 145419

I am also interested in buying Polly steam locomotives, especially those that need some 'TLC'

www.world-of-railways.co.uk

ADVERTISERS' INDEX	
ABBOTS MODEL ENGINEERING	47
AMADEAL	4
AP MODEL ENGINEERING	50
BARRETT STEAM MODELS	47
HOME & WORKSHOP MACHINERY	52
HORLEY MINIATURE LOCOMOTIVES...	50
ITEMS MAIL ORDER	50
MAXITRAK	47
MECCANO SPARES	50
MERIDIENNE EXHIBITIONS	48
MJ ENGINEERING	50
NOGGIN ENDS METAL	48
PAUL NORMAN PLASTICS	49
POLLY MODEL ENGINEERING	49
STATION ROAD STEAM	51
STEAMWAYS ENGINEERING	48
STUART MODELS	2
TEE PUBLISHING	49
TEE PUBLISHING	50
TIGGY ENGINEERING	50
TRACY TOOLS	47
WE BUY ANY WORKSHOP	50

STATION ROAD STEAM

ENGINEERS · LINCOLN · LOCOMOTIVE BUILDERS · BOILERMAKERS

Full-size and miniature engines of all types bought, sold and part-exchanged

We keep a large, constantly-changing stock of second-hand engines in all scales and gauges.
We are always interested in buying engines - from part-built through to exhibition-winning models.



5 INCH GAUGE "CLAUD HAMILTON" 4-6-0

A particularly well-made 5 inch gauge "Claud Hamilton" 4-4-0 in LNER livery - new and unsteamed it has been on display for many years in the owner's house. It's come to us as part of a large collection of 4 inch scale traction engines and 3 1/2 and 5 inch gauge locomotives as the owner downsizes in retirement. Fit and finish of machined parts is to a high standard, the plate-work is neatly formed and well fitted. Paintwork was well-applied in the first place and remains in excellent condition.

Stock Code 11144

£8,500

3 1/2 INCH GAUGE "TICH" 0-4-0T

A 3 1/2 inch gauge "Tich" in large-boiler, slip-eccentric form. The chassis runs well on air in both directions. The silver soldered boiler has had a twice working pressure hydraulic test with no evidence of leaks or distortion - we would warranty as sound. Fit and finish of motion and platework is good throughout, though something's gone awry when it came to the dome; in good cosmetic order, the paintwork a plain but attractive dark green.

Stock Code 10946

£1,650



STUART "MAJOR" BEAM ENGINE

A Stuart "Major" beam engine, a particularly finely made engine, mounted on an engine room platform with detailed stairs and handrailing. The engine has been on display in the late owner's house until recent times, a man legendary in the 7 1/4 inch gauge world and builder not only of many fine locomotives - several of which we've sold over the years - but also what was almost certainly the most ambitious, not to mention picturesque, privately owned and operated railway in the country on which to run them. The engine is in excellent condition, complete with an acrylic display cover - not pictured and not up to the standard of the rest of the engine, which would merit a proper wood-framed glass cover to protect it.

Stock Code 11344

£3,450



5 INCH GAUGE LMS 4F 0-6-0

A 5 inch gauge LMS 4F 0-6-0, an older model, well-built in the first place but now coming up to needing a bottom end overhaul with a good deal of wear in motionwork, valve gear and axleboxes. The chassis runs well on air in both directions, with some clatter from the motionwork and axleboxes. An engine that can be run as-is, next winter would be a good time to pull it down for overhaul - it would make a decent example of this popular class of locomotive. The boiler has had hydraulic and steam tests in recent days with new certification issued.

Stock Code 11267

£5,950

We are always interested in acquiring engines. If you know of a steam engine for sale, in any condition and any part of the world, please let us know. We buy outright, and pay by cheque or bank transfer within 7 days of collection.

All engines listed are on our premises and available for inspection by appointment.

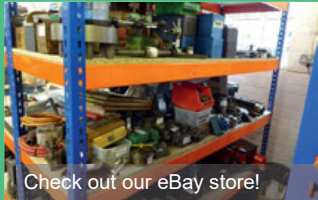
For full details, high resolution photographs and video see our website
Unit 16-17 Moorlands Trading Estate, Metherringham, Lincolnshire LN4 3HX

Email: info@stationroadsteam.com

www.stationroadsteam.com

Tel: 01526 328772

HOME AND WORKSHOP MACHINERY

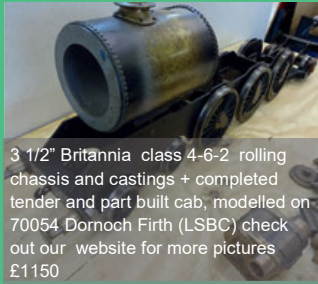


Check out our eBay store!

144 Maidstone Road, Fooks Cray, Sidcup, Kent, DA14 5HS
Tel: 020 8300 9070 - evenings 01959 532199
website: www.homeandworkshop.co.uk
email: sales@homeandworkshop.co.uk
visit our eBay store! Over 7000 items available; link on website;
homeandworkshopmachinery



Colchester Master 2500 long bed
40" centres original from new £6750



3 1/2" Britannia class 4-6-2 rolling
chassis and castings + completed
tender and part built cab, modelled on
70054 Dornoch Firth (LSBC) check out
our website for more pictures
£1150



Colchester Bantam 2000 lathe (long bed)
metric leadscrew, Dickson post £4950



Stanier precision vice 55mm
jaw New / New Zealand £195



Jet JWL 1442, 14" swing wood lathe x
42" centres, 240 volts £1000



Startrite 24 V 10 + welder
bandsaw, nice £1750



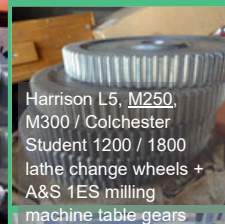
Wadkin wood lathe 6" centre height x
32" centres + 14" rear face plate on
the rear end + 6 3/4" 3-jaw chuck
£1150



X-Y 12" x 6" table £525



Myford Super 7 lathe
power cross feed, Griptru chuck,
Almost showroom condition
except for a couple of chips on the
paint £5450



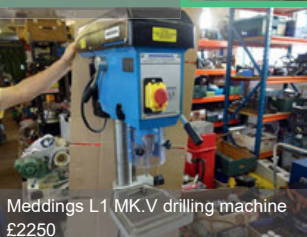
Harrison L5, M250,
M300 / Colchester
Student 1200 / 1800
lathe change wheels +
A&S 1ES milling
machine table gears



Just arrived!
Colchester Bantam 1600 lathe £1500



Elliot table 12" x 4 1/4" high £500



Meddings L1 MK.V drilling machine
£2250



Myford Super 7 B lathe £3450



Creuson Morrisflex 240V
8" polisher buffers £825
each



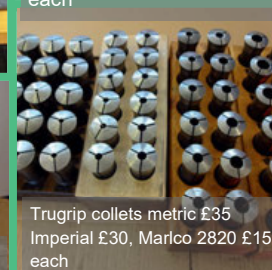
Harrison Graduate wood lathe £1450



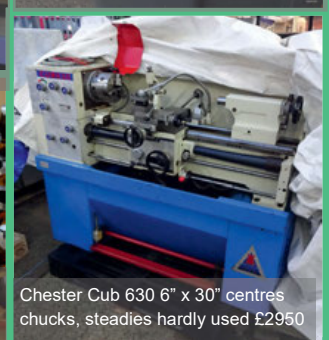
Clarke 917 vacuum former £495



Myford 3/4HP 240V resilient mount
motor configured to match a
Dewhurst reversing switch already
wired + instructions £226



Trugrip collets metric £35
Imperial £30, Marico 2820 £15
each



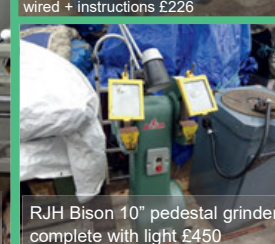
Chester Cub 630 6" x 30" centres
chucks, steadies hardly used £2950



DP / MOD gear cutters
JUST £20 each
please enquire;
Hundreds in stock!



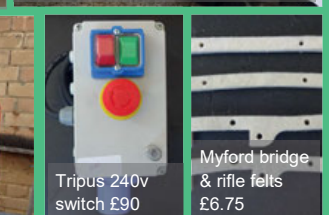
Boxford ME10A lathe + Tesla
Inverter, very nice example £3950



RJH Bison 10" pedestal grinder
complete with light £450

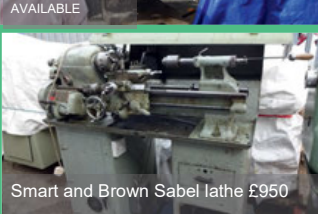


HME Hearth just arrived from
education 3PH / mains gas £500

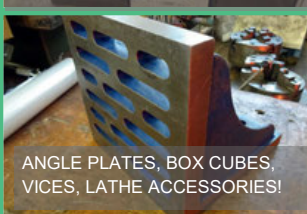


Tripus 240v
switch £90

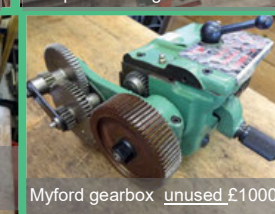
Myford bridge
& rifle felts
£6.75



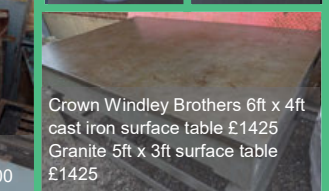
Smart and Brown Sabel lathe £950



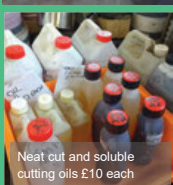
ANGLE PLATES, BOX CUBES,
VICES, LATHE ACCESSORIES!



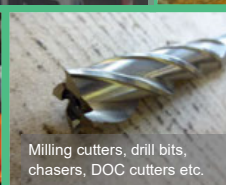
Myford gearbox unused £1000



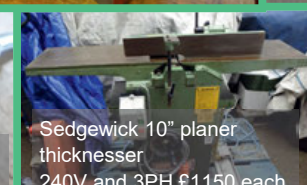
Crown Windley Brothers 6ft x 4ft
cast iron surface table £1425
Granite 5ft x 3ft surface table
£1425



Neat out and soluble
cutting oils £10 each



Milling cutters, drill bits,
chasers, DOC cutters etc.



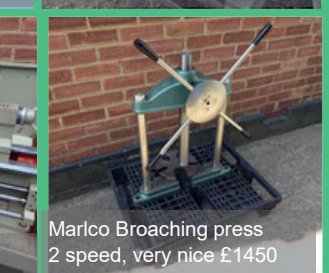
Sedgewick 10" planer
thicknesser
240V and 3PH £1150 each



RJH 6" bandfacer / finisher
1.5HP, 3PH quality £425



Harrison M300 lathe £3950



Marico Broaching press
2 speed, very nice £1450

Please phone 0208 300 9070 to check availability.
Distance no problem – Pallets leaving daily! – prices exclusive of VAT
Just a small selection of our current stock photographed!

Worldwide
Shipping

POWERED BY
barclaycard

