



THE MAGAZINE FOR MODEL ENGINEERS

ENGINEERING in Miniature

OCTOBER 2018 £3.99
1.0
9 770955 764180

A Boiler for the Steam Plant

Martin Gearing's
project for
novice builders

QUALITY
MODELS AT
BRISTOL ME
SHOW



Tips for cutting-edge milling

MACHINING MODS FOR
A LARGE-SCALE LORRY

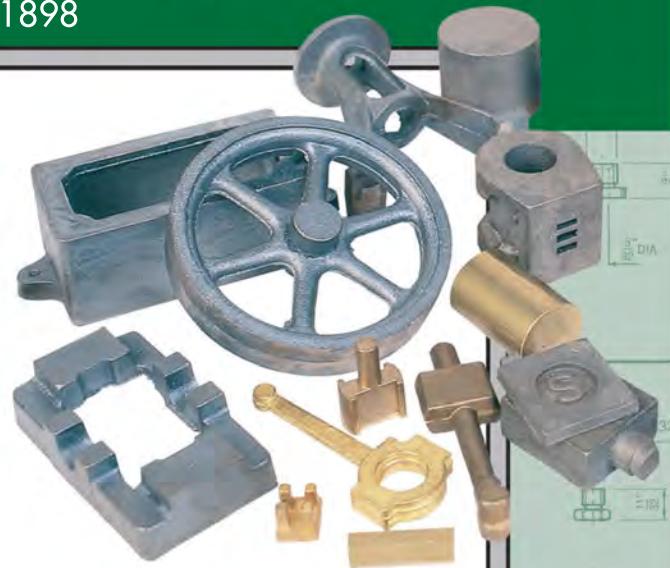


STUART MODELS

FOUNDED 1898

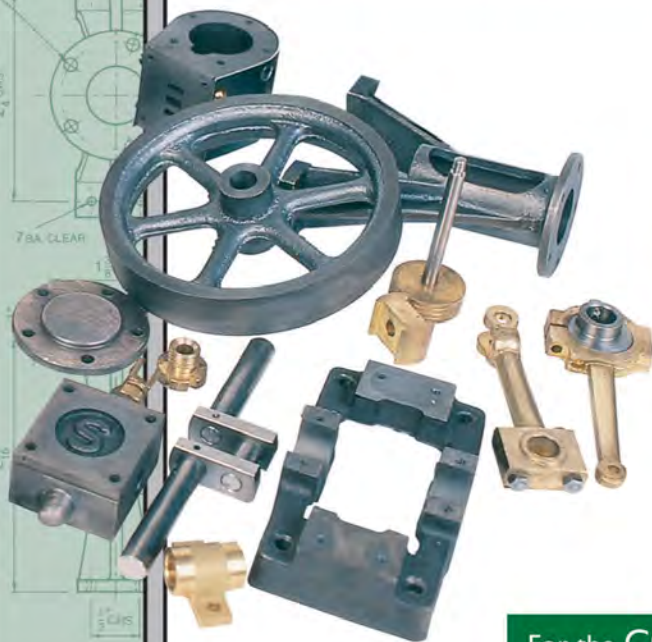
For the MODEL ENGINEER SETS OF CASTINGS

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.



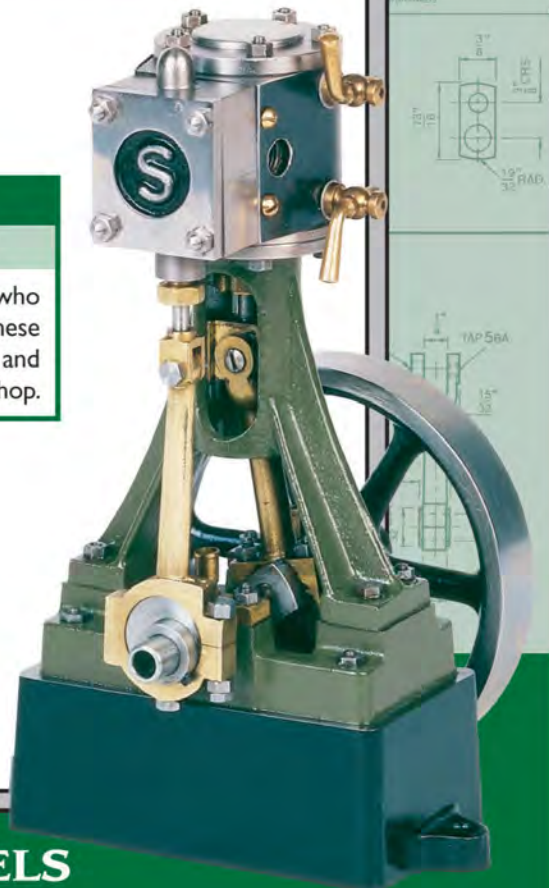
For the ENTHUSIAST PRE-MACHINED KITS

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

OCTOBER 2018 Volume 40 Number 04

THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING
in Miniature



08 A LARGE-SCALE FOWLER LORRY

by Martin Johnson

12 TIPS FOR MODEL ENGINEERS

by John Smith

13 START HERE

Introducing cylinders

14 A BOILER FOR THE EIM STEAM PLANT

by Martin Gearing

20 HOW MANY WORKSHOPS?

by David Coney

22 BRISTOL MODEL ENGINEERING SHOW

by John Arrowsmith

25 MIDLANDS MODEL ENGINEERING EXHIBITION

Pull-out show guide

29 5-INCH CLAUGHTON FINISHING & RUNNING

by Mike Wheelwright

33 WALSCHAERTS VALVE GEAR - BUT IT'S EASY

by Bernard Farguette

37 IMPROVING A HACKSAW

by Jacques Maurel

40 CLUB NEWS

42 DIARY OF EVENTS

FRONT COVER

In this issue we begin a new beginner-orientated series, Martin Gearing building a boiler to power the EIM steam plant.
Photo: Martin Gearing



EDITORIAL

Dougal set to produce a litter?

Welcome to the October issue of **EIM** and I can promise you another packed edition – so packed in fact that a couple of promised features have had to be held over for just a month. A planned new short series on simple steam locomotive building in the smaller scales (16mm or G) will appear next month, while young Andrew Strongitharm's build of the 5-inch gauge Dougal takes a pause for just one issue – rest assured that Andrew will be continuing the description of the chassis in next month's issue.

This series seems to have struck a chord with readers, especially some of our younger ones. Days before I wrote these words Andrew brought the loco along to our Welshpool & Llanfair Light Railway Gala at the end of August, where he was able to photograph it (below) with its full-size inspiration – sadly currently out of service in need of expensive boiler work.

Encouragingly two young members of the Hereford club also visited the Gala to see both Dougals as part of plans to build their own, and we've heard of others also planning builds. Wouldn't it be great if in a few years we could gather a clutch of little Dougals with the restored full-size one?

Your Editor would love to be among those builders. I have a set of completed frames, the boiler materials and several castings in my garage workshop – I just need to be able to access the workshop by removing the various furniture and the like dumped in the garage by offspring moving from one home to another – I feel a skip hire coming on...

Andrew Charman – Editor

The November issue of **Engineering in Miniature** publishes on 18th October.



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

Publisher: Steve Cole
Email: stevec@warnersgroup.co.uk
Design & Production: Andrew Charman
Advertising manager: Bev Machin
Tel: 01778 392055
Email: bevm@warnersgroup.co.uk
Sales executive: Allison Mould
Tel: 01778 395002
Email: allison.mould@warnersgroup.co.uk
Advertising design: Amie Carter
Email: amiec@warnersgroup.co.uk
Ad production: Pat Price
Tel: 01778 391115
Email: patp@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



Ex-display
items now
for sale. Check
our End of
Line

Garden Railways

Visit Our Aylesford Show Room!
Open Monday-Friday 10am-4:30pm & 1st
Saturday of the month 11am-4pm

Request
your FREE
Catalogue
today!

Collect Loyalty Points Online
01622 793 700

www.dream-steam.com



Locomotives | Rolling Stock | Track | Accessories | Upgrades | Fixing kits & Washers | Chuffers | G Scale Figures | Curve Setters

BRAND OF THE MONTH: ROUNDHOUSE As stockists of Roundhouse Locomotives, we have a varied range for instant dispatch but you are able to order any Roundhouse loco from us online, which allows you to collect loyalty points!

In Stock Now*

Millie	Black, 32mm	£650
Millie	Victorian Maroon, 32mm	£650
Sammie	32mm & 45mm	£650
Bertie	Blue 32mm & 45mm	£650
Bertie	Yellow, 32mm	£650
Bertie	Maroon, 32mm	£650
Bertie	Deep Brunswick Green, 32mm	£650

On Order

Clarence	Due Sept 2018
Little John	Due Sept 2018
Bulldog	Due Oct 2018
Lady Anne	Due Nov 2018
Katie	Due Jan 2019
Russell	Due Jan 2019
Lilla	Due Feb 2019
Billy	Due March 2019

Large stocks of the Roundhouse white metal parts including loco lamps, metal jacks, buckets and much more available to purchase!

Home builder parts including basic pressure gauge, basic radio control kits, buffer sets, buffer overlay plus more also available!



Many Home
Builder
parts and kits
available to
order online!*

*In stock as of 07/08/18, please note these loco's may no longer be available, check stocks online or call. Please note basic range takes 4 weeks from initial order and other locomotives are in batches. Batch dates will be in product description. Locomotives in stock will state instant dispatch available.

PECO

32mm (SM32) Track

Flexi Track - 12 Pack	SL600x12	£110.00
Flexi Track - 4 Pack	SL600x4	£38.00
Flexi Track - Single	SL600x1	£10.00
Setrack Curve - 6 Pack	ST605x6	£44.00
Setrack Curve - Single	ST605x1	£6.90
Setrack 38 Radius Curve - Single	ST607	£8.50
Setrack 38 Radius Curve - Six Pack	ST607x6	£48.00
Right Hand Point	SLE695	£45.00
Left Hand Point	SLE696	£45.00
Y Point	SLE697	£45.00
Small Radius Right Hand Turnout	SLE691	£45.00
Small Radius Left Hand Turnout	SLE692	£45.00
Wagon Turntable and Crossing	SL627	£20.00
Rail Joiners - 24 Pack	SL810	£3.50

45mm (G45) Track

Flexi Track - Six Pack	SL900x6	£79.00
Flexi Track - Single	SL900x1	£15.00
Setrack Curve - Six Pack	ST905x6	£40.00
Setrack Curve - Single	ST905x1	£8.00
Setrack Straight - Six Pack	ST902x6	£40.00
Setrack Straight - Single	ST902x1	£8.00
Right Hand Point	SL995	£54.00
Left Hand Point	SL996	£54.00
Point Motor Mounting Plate	PL8	£3.60
Metal Rail Joiners - 18 Pack	SL910	£5.00
Insulating Rail Joiners - 12 Pack	SL911	£3.10
Dual Rail Joiners - 6 Pack	SL912	£5.00

SLATERS

Festiniog Railway Ashbury First Class 4-Wheel Carriage Kit	16C01	£73.50
Festiniog Railway Third Class Ashbury 4-Wheel Carriage Kit	16C02	£73.50

Dinorwic Slate Wagon Kit	16W01	£20.00
Festiniog Railway 2 Ton Braked Slate Wagon Kit	16W03	£26.60
Festiniog Railway 2 Ton Unbraked Slate Wagon Kit	16W04	£25.40
War Department Light Railways K Class Skip Wagon Kit	16W06	£20.00
Dinorwic Quarry Slab Wagon Kit	16W08	£25.50
Dinorwic Quarry "rubbish" Wagon Kit	16W09	£25.50

Slater's Mek-Pak	0502	£5.00
Slater's Mek-Pak Brush	0505	£3.70

BACHMANN

Percy and the Troublesome Trucks Set	90069	£390.00
Thomas with Annie & Clarabel Set	90068	£390.00
Thomas' Christmas Delivery	90087	£410.00
Toby the Tram	91405	£250.00
Thomas the Tank Engine	91401	£225.00
James the Red Engine	91403	£230.00
Annie Coach	97001	£80.00
Clarabel Coach	97002	£80.00
Emily's Coach	97003	£80.00
Emily's Brake Coach	97004	£80.00
Troublesome Truck 1	98001	£59.50
Troublesome Truck 2	98001	£59.50
Ice Cream Wagon	98015	£56.00
Tidmouth Milk Tank	98005	£39.00
S.C. Ruffey	98010	£70.00
Explosives Box Van	98017	£56.00
Open Wagon Blue	98012	£56.00
Open Wagon Red	98013	£56.00
Sodor Fruit & Vegetable Co. Box Van	98016	£56.00
Sodor Fuel Tank	98004	£56.00
V Dump Car (Oxide Red)	92504	£46.00
G' Flat Wagon with Logs	98470	£79.00
"LS" Skeleton Log Car	98490	£79.00
"LS" Speeder Orange	96253	£90.00
"LS" Speeder PRR	96251	£90.00
"LS" Speeder Santa Fe	96252	£90.00

Set-a-Curve

Available in 32mm and 45mm
with a wide range of Radii

£15



DSW

Upgrade Cylinders	DSUPCYL	£72.00
Ceramic Gas Burner Set	DSUPGBS	£90.00
Three Wick Meths Burner	DSUP3WMB	£45.00
Dead Leg Lubricator	DSUPDL	£29.00
Steam Regulator Kit	DSUPSRK	£35.00
Small Brass Chimney Cowl	DSENSMCWL	£4.00
Brass Cab Hand Rails	DSENCB	£4.20
Brass Side Tank Hand Rails	DSENSTHR	£5.20
Brass Smoke Box Hand Rails	DSENSBXHR	£3.10
Cylinder Covers	DSENCYCV	£12.00
Brass Sand Boxes	DSENSBX	£12.50
Brass Tank Tops	DSENWTT	£9.40
Lubricating Oil	SWLUB30	£3.00
Meths Burner Wick	DSWWK6	£1.90
Curve Tipped Syringe	DSWCTS	£2.10
460 Steam Oil 500ml	DSW460SO500	£5.50
220 Steam Oil 500ml	DSW220SO500	£5.50
Solid Fuel Tablets	980001	£3.50
Water Filler Bottle	DSWWFB	£4.00
Meths Filler Bottle	DSWMFB	£3.00

MSS

Side Tank Locomotive (32mm/45mm)	909003	£200.00
Saddle Tank Locomotive (32mm/45mm)	909013	£230.00
Side Tank Locomotive Kit (32mm/45mm)	909011	£180.00
Maroon Tender (32mm/45mm)	911403	£53.00
Green Tender (32mm/45mm)	911405	£53.00
Black Tender (32mm/45mm)	911401-BL	£53.00
Blue Tender (32mm/45mm)	911402-BL	£53.00
Maroon Passenger Coach (32mm/45mm)	911201	£53.00
Blue Passenger Coach (32mm/45mm)	911201BL	£53.00
Log Wagon (32mm/45mm)	911501	£53.00
Goods Van (32mm/45mm)	911101	£53.00
Guards Van (32mm/45mm)	911001	£53.00
Coal Wagon Grey (32mm/45mm)	911505	£53.00
Coal Wagon Unpainted (32mm/45mm)	911505-1	£53.00
Pair of Flat Bed Wagons (32mm/45mm)	911301	£57.00
Straight Track	910003	£34.00
Curved Track	910005	£34.00
Left Hand Point	910001	£24.40
Right Hand Point	910002	£24.40

WE HOLD A FULL RANGE OF MSS SPARES
AND UPGRADES FOR OLD MAMOD & MSS LOCOS

MAMOD

Telford	MTLGO	£452.00
MKIII	MK3 From	£336.00
Saddle Tank	MST From	£336.00
Brunel	MBrunelOG	£440.00
Brunel Goods Set	BGS-CC-N	£520.00
Tender	MTDR	£39.00
Tanker	MTNK	£39.00
Goods Wagon	MGWN	£44.00
Guards Van	MGVAN	£50.00
Telford Tender	MTDR-T	£45.00

BACHMANN

16mm Scale Fireman and Driver	16-703	£19.95
16mm Scale Sitting Man and Woman	16-704	£19.95
16mm Scale Standing Man and Woman	16-705	£19.95

G Scale Grazing Cows	22-199	£24.95
G Scale Horses Standing and Grazing	22-201	£24.95



SUMMERLANDS CHUFFER

These highly developed and precision engineered chuff pipes that can bring the real sound of a working steam loco
A wide range always in stock!
Specials can be ordered on request

£29
inc. P&P



facebook

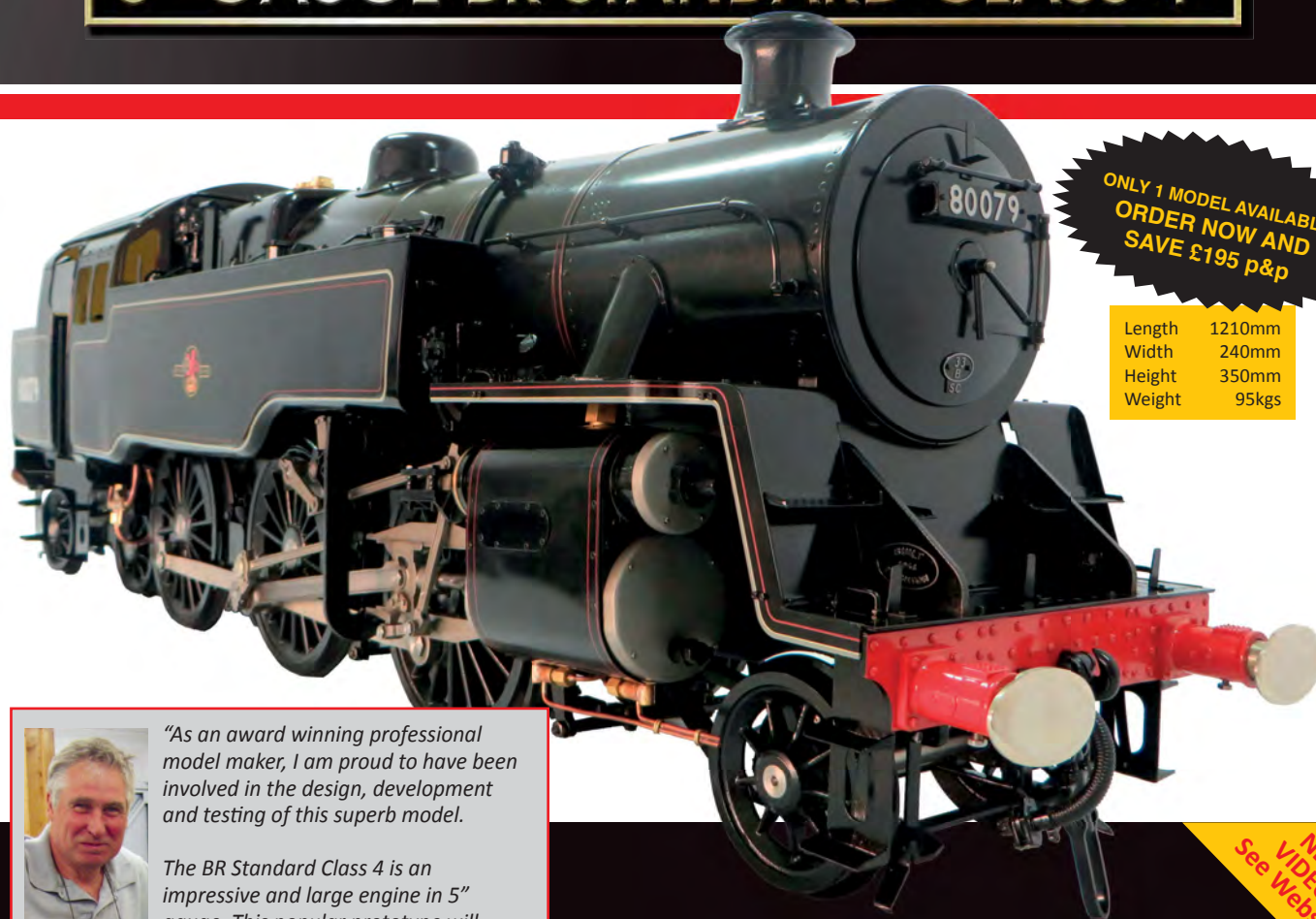
twitter

Dream Steam Ltd, Ground Floor Suite, Vanguard House, Mills Road, Aylesford, Kent, ME20 7NA

Call us: 01622 793 700 or send an email to sales@dream-steam.com

www.dream-steam.com | sales@dream-steam.com | @dreamsteamworks | facebook.com/dreamsteamworks

5" GAUGE BR STANDARD CLASS 4



ONLY 1 MODEL AVAILABLE
ORDER NOW AND
SAVE £195 p&p

Length	1210mm
Width	240mm
Height	350mm
Weight	95kgs

NEW
VIDEO!
See Website



"As an award winning professional model maker, I am proud to have been involved in the design, development and testing of this superb model."

The BR Standard Class 4 is an impressive and large engine in 5" gauge. This popular prototype will delight the serious track driver and its elegant lines will grace any showcase."
— Mike Pavie

Summary Specification

- 5 Inch Gauge
- Coal-Fired Live Steam
- 2 Outside Cylinders
- Walschaerts Valve Gear
- Cast Iron Cylinder Blocks (Bronze Liners)
- Steam Operated Cylinder Drain Cocks
- Displacement Lubricator
- Silver Soldered Copper Boiler (Ce Marked And Hydraulically Tested)
- Multi-Element Semi-Radiant Superheater
- Reverser
- Boiler Feed By Axle Pump, Injector And Hand Pump
- Stainless Steel Motion
- Sprung Axle Boxes With Needle Roller Bearings
- Etched Brass Body With Rivet Detail
- Two Safety Valves
- Available In Choice Of 2 Liveries
- Delivered Painted And Ready-To-Run
- 12 Month Warranty



Overall length 1210mm

BR Standard Class 4 2-6-4 T

We are delighted to introduce this magnificent 5" gauge model of the BR Standard 4 - the classic suburban tank locomotive in service from 1951 to 1967. The model will be the subject of a single batch production in 2018 with delivery scheduled for December. Following this there will be no further production of this model until 2021 at the very earliest. The Standard 4 is priced at just £7,995.00 + delivery. A great value price for a model of this size and quality. You can secure your order reservation with a deposit of £3,997.50. You will be asked for final payment of £3,997.50 by end November 2018 in advance of delivery.

With just one model remaining from our batch of 50 this is your final chance to acquire this fine model.

Request your free full colour brochure today...

Find more information at www.silvercrestmodels.co.uk
or e-mail info@silvercrestmodel.co.uk
Alternatively clip the coupon below, or call 01788 892 030.



FREE BROCHURE REQUEST FORM

Please send, without obligation, my free 5" gauge BR 80xxx Class full colour brochure

Name

Address

Post Code

To: Silver Crest Models Limited,
Bragborough Farm, Welton Road,
Braunston, Northamptonshire
NN11 7JG.

A.m.€ 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.



5" & 7.1/4"g Class 66

From £2995



Painted kit or Ready to run



Ready within
6 / 8 weeks

Choice of Liveries.
5"g 4 motors.
(2.29hp)
7.1/4"g 4/6 motors
24v.
Lights.
Two tone horns.
Add 66 Sound.
Choice of
Control systems
Mtroniks / 4QD.

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
(See website for products & updates)

www.ametrains.co.uk

CuP ALLOYS
METAL JOINING LTD

The no.1 Silver Solder Supplier for the Model Engineer

With over 100 years of brazing experience, you can count on us for the supply of various low temp, medium temp and high temp silver solders in a variety of sizes to suit every job.



Silver Solder Rods



Silver Solder Fluxes



Soft Solders



Brazing Ancillaries

All our products are fully labelled to state alloy, size and specification. You know exactly what you are buying! All from stock for immediate despatch.

Payments available at the exhibition:



We also stock the full range of
SIEVERT® HEATING EQUIPMENT

Order online with **free delivery**, or visit us at our exhibition stand to see the **comprehensive range** in person!

Grab yourself a bargain at our exhibition stand and receive **discounted prices!**

Visit us at Midlands Model Engineering Exhibition 2018

from Thursday 18th - Sunday 21st October 2018 - doors open at 10:00am Venue: The Fosse CV31 1XN- find us on **Stand 2** Purchase your ticket on the door or book in advance at www.londonmodelengineering.co.uk

web: www.cupalloys.co.uk | tel: 01909 547 248

All details correct at time of print. November 2017. Please check website for up to date information. Errors and omissions accepted.

The Steam Workshop

Now Incorporating D.Hewson Models

All steam models bought, sold, exchanged, valued, restored, repaired, finished, painted, lined,and of course,.....played with!



We always have a huge number of models in stock, and are always interested in anything from a set of castings to a gold medal winner. Please do visit our website, or simply give us a bell for the most friendly, helpful, fair and knowledgeable,..... (if we do say so ourselves),..... service available.



By Enthusiasts



For Enthusiasts

07816 963463

www.steamworkshop.co.uk



Model Engineering Supplies

Visit our website:

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



Garden Railway Specialists

Exclusive to GRS, the last available stock of these ready to run Kingscale Locos



BR 4MT 2 in BR lined Black £7995.00

Jubilee 4-6-0 Last 3 available. 'Galatea' & Leander in BR Green, Warspite in Maroon
£10995.00



5 Inch Coal Fired

7 1/4 Inch Coal Fired

A first from Kingscale in this impressive scale
14xx 0-4-2T
Two in GWR, one in Lined BR Green and one in lined BR Black livery **£9995.00**



45xx Prairie 3 in GWR livery, 1 in BR lined Green
£6995.00



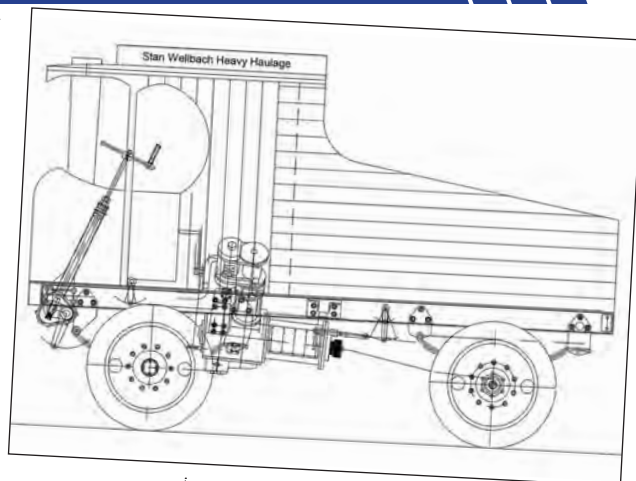
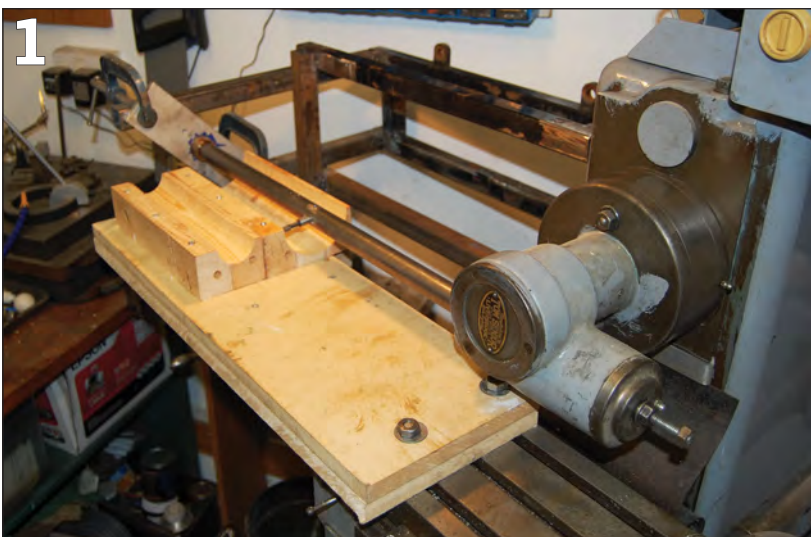
Garden Railway Specialists Ltd

Station Studio, 6 Summerleys Road, Princes Risborough, Bucks, HP27 9DT
E-mail: sales@grsuk.com Website: www.grsuk.com Tel: 01844 - 345158
Monday - Friday 09:00 - 17:30hrs Saturday 10:00 - 16:00hrs

Building a large-scale Fowler Steam Lorry

Martin concludes a two-part feature revealing his thinking behind the build, fascinating design conclusions and progress so far in his unusual 7-inch scale project.

BY MARTIN JOHNSON



I decided to tackle the project to build my 7-inch scale Fowler lorry in distinct stages:

- 1) Engine and gearbox
- 2) Front & rear axles plus steering box
- 3) Chassis and springs.
- 4) Issue order for boiler
- 5) Construct cab, bodywork and sundries while awaiting boiler delivery
- 6) Complete remaining items, enjoy!

This sequence would minimise financial risk on what was quite a large leap into the unknown. I reasoned that even if the project failed at the engine and gearbox stage, I would at least be able to sell on the parts to recoup some costs. There is also the storage of a part-built vehicle to consider, and again the sequenced approach minimises storage problems.

Pattern making

All the patterns for the engine are conventional wooden items and were made over an 18-month period. I spent some time during my apprenticeship in the pattern-making shop, but that was 40 years ago so one of the books by Camden Miniature Steam proved very helpful in refreshing my memories. This is another area that could provide material for another series of articles, but the photographs show a few highlights in the process.

Photo 1 shows a metalworker's approach to boring out core box halves to produce the semi-circular recess for such things as cylinders and trunk guides. For short boxes, this can

ABOVE: This drawing shows the look of the finished lorry.

PHOTO 1: Boring out the core box halves to produce semi-circular recesses..

PHOTO 2: V-twin engine requires a great many patterns for castings.

All photos and drawings in this feature by Martin Johnson



be done by a simple boring operation, but these boxes were rather too long and large for that.

The boring bar, outboard bearing and welded support arm may seem a lot of work just to make a core box, but the same equipment was used to machine the cylinder blocks, crankcase and trunk guides.

There are a lot of patterns to make for a complex V-twin engine, and **Photo 2** shows just the patterns during painting. There is roughly as much work again in the core boxes that go with these patterns.

The crankcase was of course the most complex pattern, even after a lot of simplification of Fowler's original design. **Photo 3** shows the patterns and core boxes for the crankcase only, there are further patterns to form trunk guides, which were cast integral on the Fowler crankcase.

Finally, the patterns were ready to go to the foundry in September 2012. Living in the more remote parts of Scotland, there was not very much choice for foundries. Specialist Castings of Denny obliged, and the castings were excellent. This foundry has electric melting and facilities for iron analysis prior to pouring – this produces cast iron of excellent quality and machinability – not cheap, but worth every penny. That is just the observation of a customer and model engineer who has had his share of chilled, porous and mis-shapen castings from various suppliers over the years.

While waiting for the castings, I pressed on with some of the smaller engine components.

Engine construction

Many of the engine components would push my machining facilities to (and a little beyond) the limit. My Tom Senior M1 mill has a 60mm raising block under the column, and cross travel has been marginally increased but is otherwise pretty standard. The crankcase was obviously tricky, but I had thought out most of the operations during the design stage.

One item that has been very useful is a large extension table for the mill. This had a previous incarnation as a flanging block for a 4-inch scale Burrell tender side, but was trimmed to the maximum size the Senior mill could machine. Then two welded brackets were manufactured and machined on the mill, and the plate bolted to them, it was then fly-cut in the X-Z plane on the mill, since this allows the largest machined area. The table was drilled with 10mm holes on 2-inch centres to match the Tom Senior table. **Photo 4** shows the operation in progress, and you will ►

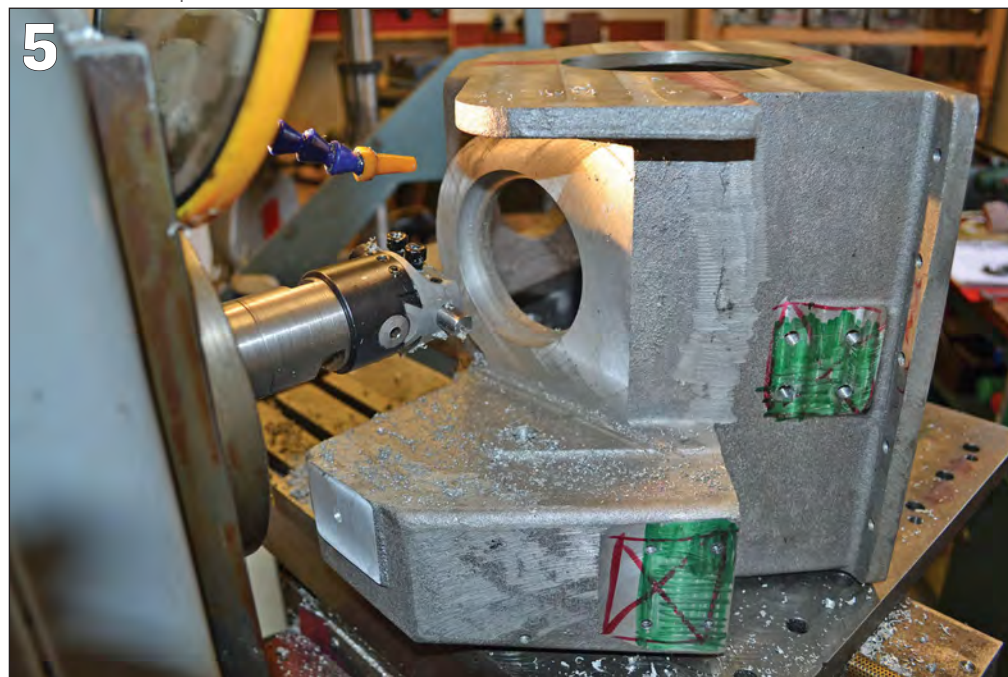
"The crankcase was of course the most complex pattern, even after a lot of simplification of Fowler's original design..."

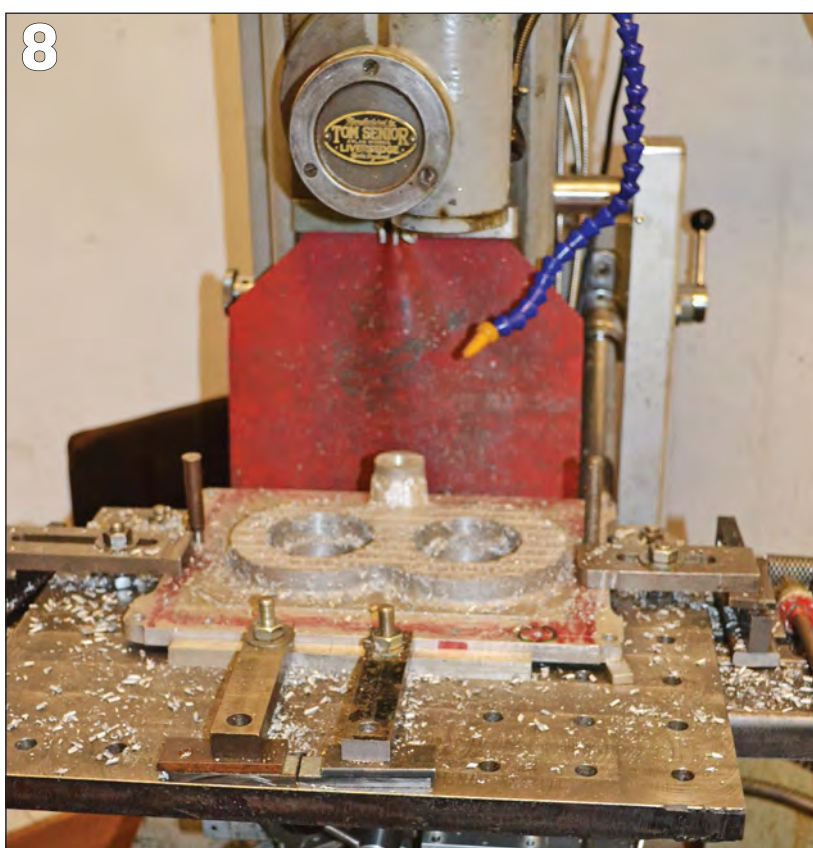


PHOTO 3: Most complex pattern was for the crankcase, shown here with its core boxes.

PHOTO 4: Drilling the extension table for the mill – this was fabricated due to the size of the project.

PHOTO 5: Milling operation being carried out on the crankcase, making full use of the extension table.





"I consider a digital readout system to be essential when tackling such a complex and expensive casting; in fact the casting was more expensive than the digital readout..."

PHOTO 6:

Trunk guide being bored using boring bar and outrigger.

PHOTO 7:

Facing the sump cover using welding brackets made to build extension table.

PHOTO 8:

Machining gearbox ends on the mill.

have to trust me that there is a milling machine under there somewhere.

The welded brackets for machining the table and the table were all used extensively for machining the larger engine components.

To give a few examples, **Photo 5** shows an operation on the crankcase while using the extension table. I consider a digital readout system to be essential when tackling such a complex and expensive casting; in fact the casting was more expensive than the digital readout.

Photo 6 shows a trunk guide being bored using the boring bar and outrigger used for pattern making.

Photo 7 shows the sump cover being faced while held on the welded brackets used to make the extension table, the same setup was used to face the gearbox ends. All three of these examples show work being machined with the horizontal cutter shaft, which in my view is what gives the Tom Senior its versatility.

The gearbox had to be radically re-designed for machining on the Tom Senior mill. It comprises a box section with no ends. The ends, complete with bearing seatings were machined on a jig on the mill and are located onto the box with fitted bolts. Just to show that the vertical spindle on the Tom Senior was used occasionally, **Photo 8** shows this operation, the extension plate forming the basis of the jig.

This was a rather roundabout route to making a gearbox, but seems to have worked quite well.

All the gears (**Photo 9**) were purchased as standard units, but then subsequently machined to provide a dog clutch for a 'straight-through' drive, plus splines to sit on the output shaft. I estimated it was cheaper to take this route rather than buy short sections of large diameter specialist steel, purchase cutters and then machine them myself.

The engine and gearbox unit were ready for running on compressed in the Autumn of 2015. The complexity of the engine unit can be appreciated from **Photo 10**, which shows a worm's eye view with the sump removed. The front of the engine and valve gear is at the bottom of the photograph, while the two connecting rods are toward the top. The size of the project can be appreciated from **Photo 11**, which shows the engine and gearbox unit on its building stand in front of my 4-inch scale Burrell traction engine.

The future

At the time of writing, I have a working engine and gearbox unit that has run on compressed air. When I have made a cylinder lubricator and a sump oil pump, I shall run it on steam from the Burrell. I have completed the

manufacture of the front and rear axles, and I am presently working on the steering box but the description of that is for another article. The boiler design (to British Standard 2790) has been completed and is away for approval while quotations for manufacture are sought.

As explained above, the project is being tackled in 'modules', so design of the whole is progressing as each module becomes clearer. However, the drawing on page 8 shows the vehicle side view as things presently stand.

I have decided to build a ballast tractor, since this keeps things short for transport. Even so, it is a big model at nearly nine feet long. I would love to build the lorry version, but even the short wheelbase option would be some 410mm (16 inches) longer. Fowlers drew up a proposed tractor version, but never made one; my model will reflect the many steam lorries that were 'cut down' toward the end of their working life as a tax avoidance measure.

An Interim conclusion

So what have I learned so far?

- 1) Going off the beaten track of published designs is challenging and rewarding in roughly equal measure
- 2) Design work takes a lot of time, and correcting my own drawings in the light of changes made during manufacture takes further time. Note to self: "Don't ever complain about the cost or standard of published designs again"
- 3) Pattern making has occupied nearly two years of the project so far. Note to self: "Don't ever complain about the cost of commercial castings again..."
- 4) Building a road vehicle needs almost fanatical attention to weight saving on every component
- 5) The scrap rate during manufacture of components has been surprisingly low. The only major problem was re-making the crankshaft when my intended method of assembly proved

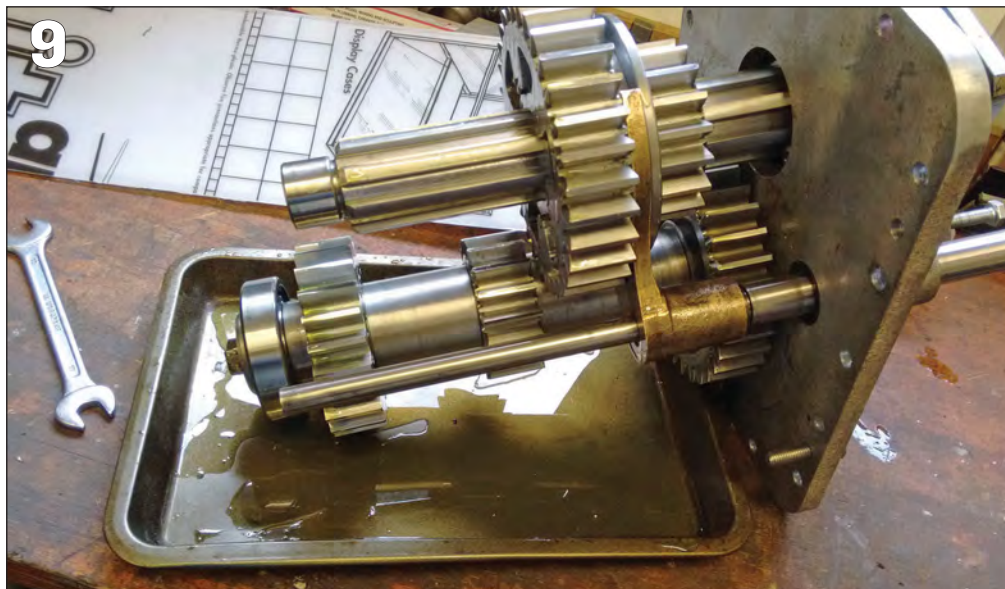
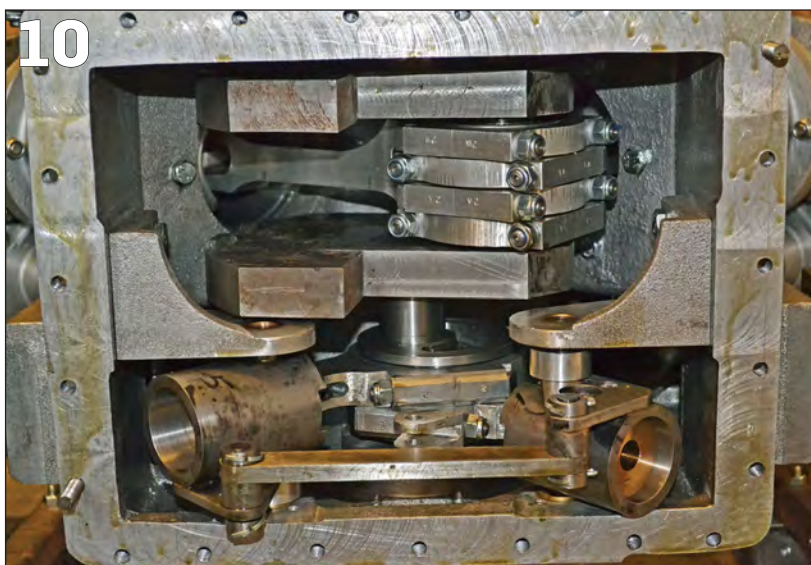


PHOTO 9:
Complete gear cluster – gears all bought as standard units.

PHOTO 10:
View from below emphasises complexity of the engine.

PHOTO 11:
While published last month this photo is worth using again to show the size of the project – behind is a 4-inch Burrell traction engine.

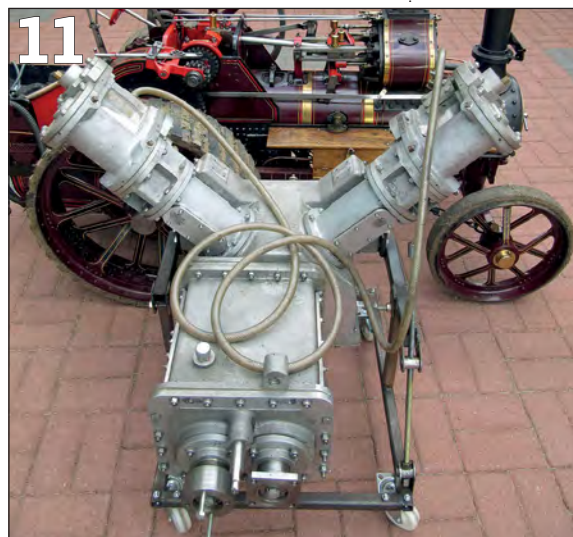
PHOTO 12:
Further progress beyond that described this month – Martin assures us he is avidly writing up the details!



to be simply not rigid enough.

- 6) The Tom Senior M1 mill is far more versatile than most people realise
- 7) Large scale models can be built on quite modest equipment – try it you might surprise yourself! However, you must carefully plan how you will tackle all the operations required on the larger components. **EIM**

■ Part 1 of this project appeared last month and **EIM** will carry further features as the build progresses, which it is rapidly as can be seen below. You can also follow construction of the chassis online at: www.flickr.com/photos/140734312@N06/sets/72157669955074511. The author can also be contacted via the editor.



Cutting-edge milling

John continues his series of best practice techniques on the milling machine...

BY JOHN SMITH

I'll begin with a useful lathe attachment for milling the edges of flat components – such as locomotive main-frames and stretchers. I made this for my first Myford lathe, an ML7. It's basically two rectangular 5mm mild steel plates (about 8.5 x 5 inch), separated by six $\frac{3}{4}$ in diameter mild steel spacers. The spacers are tapped M6 and the holes in the plates are countersunk to suit.

Both plates have a set of ten 8.1mm

holes to match the T-slot spacing on the ML7 cross-slide. All holes were drilled with both plates clamped together. The top surface of the top frame sits $\frac{1}{4}$ in below the lathe centre-line, allowing a $\frac{1}{2}$ in dia end mill held in a Clarkson-type collet chuck or a 2MT end-mill holder to run along a component clamped to the top surface using toolmakers' clamps.

There is a series of M6 tapped holes at both ends of the top plate to

“This increases the cutting resistance and most vertical mills will complain – you will notice a change in tone of the motor...”

allow a guide (a length of 1in x $\frac{3}{16}$ in gauge plate) to be set appropriately for the width of the workpiece.

The guide is set using a dial gauge mounted on a magnetic stand sitting on the lathe bed. **Photo 1** shows the attachment set up on my Myford Super Seven. One has to move the clamps about a bit, but the attachment produces good results

Since I bought my Myford VMB and, later, my secondhand Bridgeport, all milling has been undertaken on those machines. I keep a Röhms CNC machine vice bolted to the Bridgeport table – positioned accurately with respect to the X-axis by running a dial gauge along a parallel held in the vice. Most milling is done in the vice.

Although this vice has 'hold-down' jaws which push the workpiece down, I mostly do not use this feature, preferring the traditional method. The workpiece is supported on two thin ($\frac{1}{8}$ in/3mm) parallels, one against each jaw, and gripped lightly, then hit hard with a copper-faced hammer to force it down against the tendency of the vice jaws to lift. Then the vice is fully tightened.

The edges of sheet material can be milled by clamping it to an angle-plate gripped in the jaws (**Photo 2**). Alternatively, a box angle plate is very useful for this task; I used one on the VMB for years, as an end-mill gripped in a Clarkson-type collet chuck cannot reach a component bolted to the VMB table. A bit of a design flaw, Myford!

Long strips of sheet metal can be milled using a piece of mild steel bar or gauge plate clamped to an angle-plate held in the vice or to a box angle-plate. A guide is clamped to the bar and adjusted to be parallel to the X-axis of the machine by running a dial gauge along it. Toolmakers' clamps are perfectly adequate to hold the workpiece down (**Photo 3**).

Dealing with corners

My final milling tip relates to advancing an end-mill into a corner – such as when the inside of a valve chest is milled. When this is done, cutting takes place over a full quadrant of the end mill. This increases the cutting resistance and most vertical mills will complain (you will notice a change in the tone of the motor).

The tip is to set the quill stop such that the permitted travel is just greater than the thickness of the material.

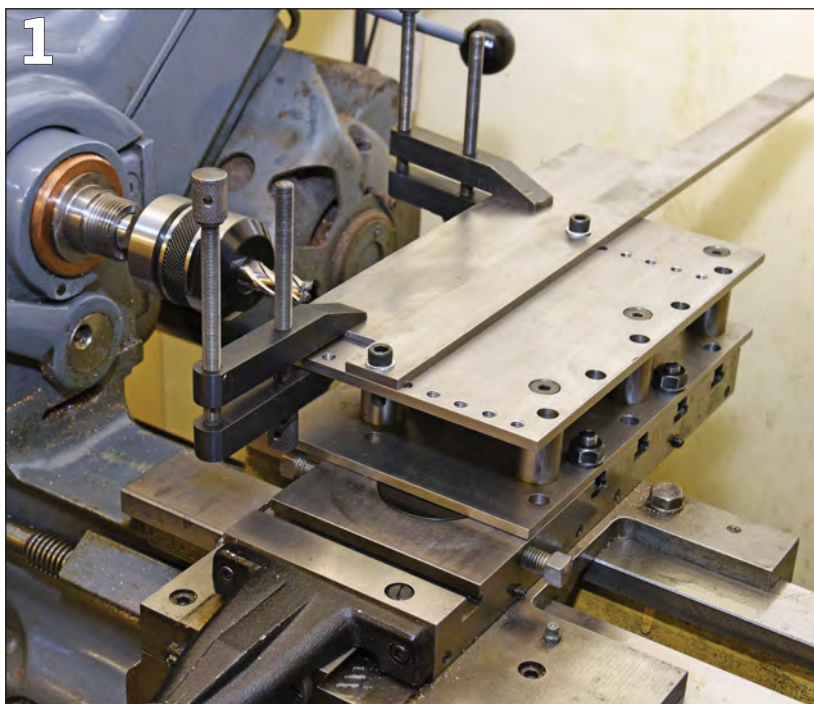


PHOTO 1:

Useful lathe attachment for milling the edges of flat components

PHOTO 2:

Clamping to angle plate can be useful way of milling edges of sheet material.

PHOTO 3:

Toolmakers' clamps used to hold long strip of material securely.

All photos by John Smith.



You then pull the quill down against the stop, clamp it and start to mill the recess, feeding the head down (or the table up) by 0.020in or so for each cut.

On the second or third cut, when the end-mill reaches a corner you will hear the change in tone. Slacken the quill clamp, lift the tool up using the quill feed handle, advance the table to its final position and then pull the quill down to the end of its travel and clamp it. The end mill bores a beautiful quadrant and you are ready for the next leg of the recess.

Finally, I must give you a recommendation. I use Drill Service of Horley, Surrey for all my milling cutter, reamer, drill, and tap and die requirements. The firm only stocks high-quality tools (many made in the UK or Germany) and, if you place an order online by 4pm and the items are in stock, the order is on your doormat next morning. Postage is free for orders over £10.

I have used the firm for years. It carries an enormous range, prices are very reasonable, the website is excellent and even I was surprised a week or so back when I ordered at 5pm. The items still arrived next day. **EIM**



START HERE

Introducing the cylinders

Latest in our beginners series unlocking the mysteries of steam locomotives.

Last time we looked at the two popular types of steam valve, slide and piston, controlling the entry of steam from the boiler to the cylinders, and its exit again when used. But what are the cylinders?

Quite simply the cylinders produce the 'power' of the steam railway locomotive or the traction engine. On railway locomotives they are almost exclusively mounted on the front end, their weight acting as a counterbalance to the weight of the firebox on the rear end. On traction engines they are usually mounted atop the boiler forward of centre, again putting weight over the front wheels.

The cylinder is a tube, in full-size locomotives made of cast iron or later of steel. In model engines gunmetal is also used, or even brass in the smallest scales. The tube is closed off at both ends, with a piston and rod running inside it.

Forced motion

Cast-iron piston rings mounted on the disc of the piston ensure it remains steam tight against the inside cylinder wall. The valves (see last month's issue) admit steam at

one end of the cylinder, forcing the piston along the tube, and then exhaust it.

When the piston reaches the end of its stroke, known as 'dead centre', steam is admitted behind it, forcing it back the other way, and the resultant back-and-forth-motion is converted by the valve gear and cranks on the wheels into a radial motion to move the locomotive.

While traction engines typically make use of a single cylinder, on railway engines there can be two, three or four. Typically tank engines and narrow gauge locomotives boast a simple arrangement of two cylinders mounted outside the frames. Other formats mount two cylinders inside the frames, while larger more powerful locos use two outside cylinders and an extra one or two between the frames.

On a typical two-cylinder layout, the motion will be designed to ensure the cylinders operate 90 degrees of a wheel revolution apart from each other. This is known as quartering – its purpose is to ensure one side of the propulsion cycle will be working while the other is exhausting to ensure the motion does not lock up. **EIM**



ABOVE: It is rare that the average observer sees inside a cylinder bore outside a workshop. This cylinder block was apparently on the scrap pile at Didcot. The smaller circular bore indicates this is from a piston-valve locomotive.

Photo: Andrew Charman

Gas-fired vertical boiler for The EIM Steam Plant

Martin returns to our pages with a new series describing the building of a suitable boiler to complete the EIM Steam Plant – a project aimed at beginners wishing to develop their skills or for those requiring a complete robust steam plant.

BY MARTIN GEARING– Part One of a series

The break in continuity of build instructions for the boiler of the EIM Steam Plant following the completion of the oscillating engine and displacement lubricator (December 2017 issue) came about after two further boilers were built by absolute beginners, making four in total at that time, all of which were built to my original submitted design – whilst the oscillating engine and displacement lubricator of the Steam Plant were being serialised.

For the original article, I had described the making of all the individual boiler fittings, with an aside that they could be purchased, this had now occurred in one example of the built boilers. Reviewing the feedback from these additional two successfully completed boilers suggested that I had pitched the level of complication perhaps a little too high. It was felt that a true beginner would be more interested in seeing the complete steam plant **actually run!** This would do more to encourage them to continue improving their skills, rather than running a risk of demoralising them because of making the high number of seemingly unrelated individual parts required in building of the fittings.

Finally a consistent comment from those

"This would do more to encourage them to continue improving their skills..."

who had completed my original designed boiler was that if a beginner was bitten by the live steam bug they most likely would want to build on the experience gained with the construction of a locomotive or traction engine, and it would be more advantageous to use sheet lagging rather than the wood-strip lagging I had originally specified.

Taking this on board, I have redesigned the boiler to be constructed using fittings that are commercially available. The boiler also has a greater number of smaller tubes, to make better use of the ceramic gas burner, while I will also be describing sheet lagging in detail.

Gas firing has been retained to give maximum ease of use and convenience. To comply with the boiler test requirements a hand

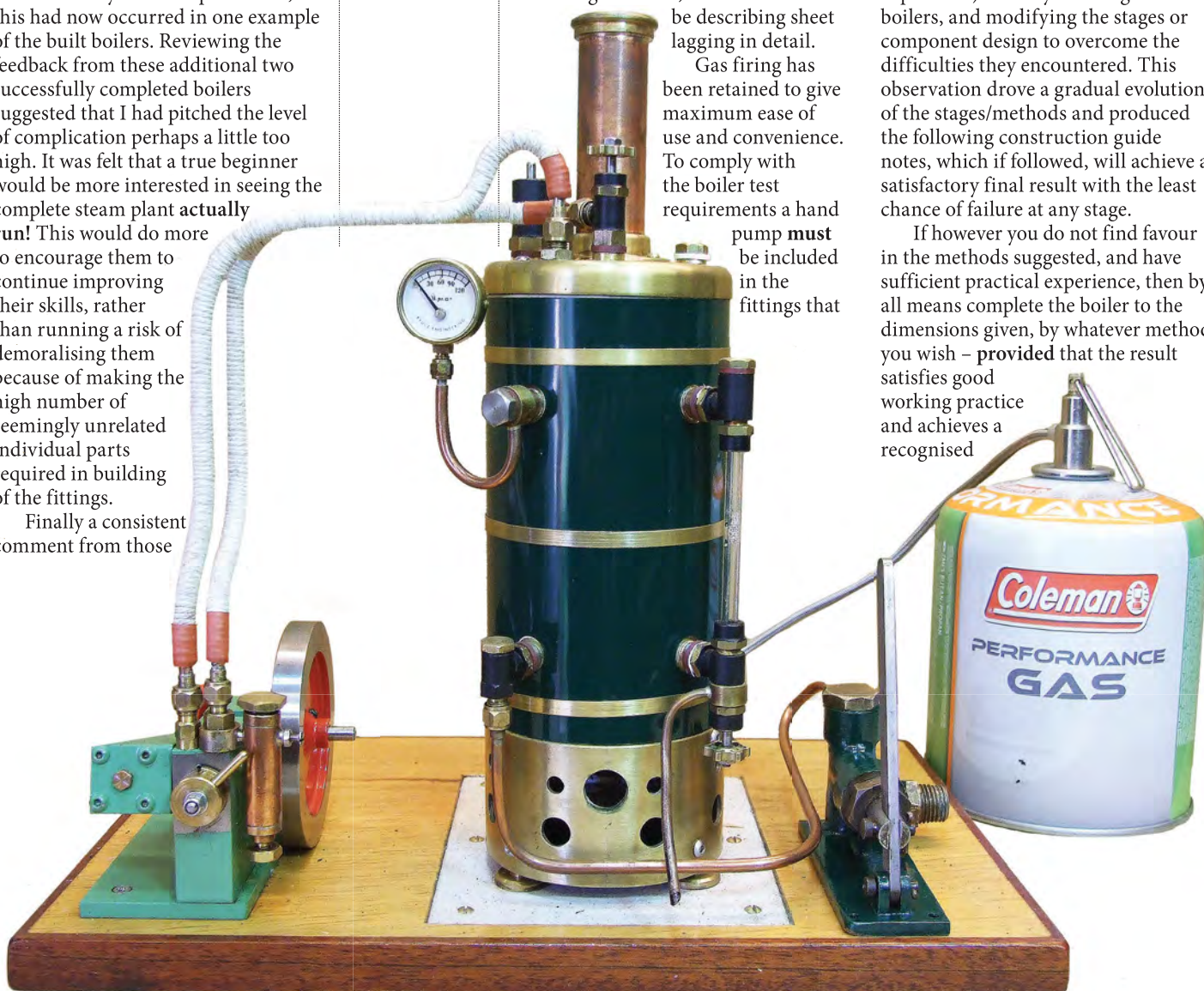
pump must be included in the fittings that

are required because of the type of gas supply described. I feel that the additional cost of a hand pump ensures that the use of the steam plant is as trouble-free as possible, and by removing the chance of running dry in use, makes the steam plant inherently safe.

I make no excuses or justification in what for many may appear the slight departures from convention in some of the methods and design chosen for the construction of this small gas-fired vertical boiler.

Some came about by observation of the constructors (with no prior experience) actually building these boilers, and modifying the stages or component design to overcome the difficulties they encountered. This observation drove a gradual evolution of the stages/methods and produced the following construction guide notes, which if followed, will achieve a satisfactory final result with the least chance of failure at any stage.

If however you do not find favour in the methods suggested, and have sufficient practical experience, then by all means complete the boiler to the dimensions given, by whatever method you wish – **provided** that the result satisfies good working practice and achieves a recognised



boiler test certificate as a minimum.

Remember! – recognising an error and starting again is NOT a failure – but making do with a substandard part is. And never making a mistake is a sure sign of someone not completely normal or a workshop without a resident Elf!

Also because of the break in this series of articles of which the primary aim was to provide experience in the practical skills required for the construction of small engineering mechanisms, I would suggest that beginners should refresh their understanding by rereading the information given in the detailed explanations for Drawing Conventions, Axis Conventions, *EIM* Oct 2016 (and correction Pg 180 Nov 2016), Machine Preparation *EIM* Nov 2016, and particularly *Silver Soldering* – *The Process* Pg 14 Dec 2017.

Enough of words – let's begin the process of making something.

Materials and sources

To begin with we need to list the materials required for the construction of the boiler, and suggested sources for the hand-feed pump, boiler fittings and gas burner.

The following lists give:

1. A metal-cutting list with the type and size where used.
2. A sundry items list – with suggested suppliers and alternatives.

Noggin End Metals (01782 865428 – ask for the *EIM* Steam Plant gas-fired boiler metal pack) has agreed to make a metal pack to cover the bulk of the materials required at a very reasonable cost, and will be found a great help if you are starting out and don't have 'preferred' suppliers or dad's workshop when he's out!

The mix of metric and imperial dimensions has been brought about because I've tried to obtain the lowest cost from a single source, which makes the whole fag of getting all the materials required very much easier and with a discount.

The original steam plant that is the subject of the supporting pictures was well underway during the negotiation to supply a materials pack for the construction; and in an effort to get the best value for money and the convenience of a 'one-stop shop' the more eagle-eyed reader may notice some of the materials suggested are different from the ones pictured. Any changes have been considered carefully and only accepted as equal or an improvement to those pictured.

I'm bound to say that I have no connection with any of the suppliers suggested other than that of a very satisfied customer over several years, and for this project in particular.

GAS FIRED VERTICAL BOILER TABLE 1 - METAL REQUIRED

(All in metal pack supplied by Noggin End)

Material	Material Dimensions	Required for
Brass Round		
Brass CZ121	Ø5 x 12"	B34 Pipe Cone. Gauge Glass Setting Rods
	Ø1/4" x 12"	B14 x 5 Protection Plugs.
	Ø10mm x 6"	B11x 2. B12 x 6. Protection Plugs.
	Ø12mm x 6"	B25. B32. Extension. Banjo
	Ø3/4" (19mm) x 4"	B21 x 4. B22 x 4. Mounting Pads and Washers.
	Ø30 x 1"	B30. Chimney Cap.
	Ø40 x 1"	B28. Chimney Base.
Brass Section		
Brass CZ121	3/8" x 1/2" x 3"	B19. Ceramic Burner Mount.
	Hexagon 10AF x 12"	B13. B 25 x 2. B26. B27.B28. B35. Fittings.
Brass sheet		
Brass CZ 108	16SWG 12" x 6"	B15. B16. B17. B18 x 2. B24. Fire and Smokebox.
	26SWG 12" x 12"	B37 x 3 Sheet Lagging
C106 Copper Tube – Solid Drawn		
C106 Cu Tube	Ø3" OD x 16SWG x 6"	B1 Boiler Barrel.
	Ø5/16" OD x 20SWG (98" Req) Three lengths @ 36"	B2 x 19 Firetubes.
C101 Copper Sheet		
C101 Cu Sheet	16SWG x 4" x 12"	B3. B4. Lower & Upper Tubeplates.
PB102 Phosphor Bronze		
PB102	Ø1/8" x 18"	B9 x 3 Stays.
	Ø1/4" x 6"	B7 x 3, B8 x 6, B10 x 3. Stay Nuts & Spacers.
	Ø3/8" x 6"	B5 x 3. B6 x 4. Bushes.
Stainless Round – Grade 303		
Stainless 303	Ø3mm x 12"	Scratch Stick for Silver Soldering. Flanging Former Pin
	Ø4mm x 12"	B20 x 4.
	Ø5/8" x 6"	Forming Rings for tube flaring. Double Ended Tube Flaring Drift.
Stainless Hexagon – Grade 303		
Grade 303 Hex	10AF x 6"	B32. Banjo Bolt.
Aluminium		
Grade 6082	Ø19mm x 6"	Mandrels
Grade 1050	3mm x 6" x 12"	Former Extraction Plates.

GAS FIRED VERTICAL BOILER TABLE 2 - FITTINGS

Specific boiler fittings items are available from the following suppliers suggested amongst others.

Blackgates Engineering. www.blackgates.co.uk 01924 466 000

GLR Kennions. www.glrkennions.co.uk 01279 792 859

Polly Engineering Supplies. Sales@pollymodelengineering.co.uk 01159 736 700

Description	Location	No Off
Water Level Gauge – Plain with Blowdown Ø5mm Glass 1/4" x 40 ME	Boiler Barrel	1
Gauge Glass Ø5mm – Plain	Water Level Gauge	1
Stop Valve – 90° Ø5/32" Pipe – 1/4" x 40 ME	Boiler Tubeplate Extension	1
Clack Valve – 90° Ø5/32" Pipe – 1/4" x 40 ME	Boiler Barrel	1
Safety Valve 5/16" x 32 ME	Safety Valve Tubeplate Extension	1
Pressure Gauge – Ø1", 0-100psi or 0-120psi (with nut and cone to suit)	U-Tube Nut & Cone Pipe end	1
Hand Pump – Ø5/16" ram Ø1/8" Pipe 1/4" x 40 – Pipe to Pipe	Steam Plant Mounting Board	1
Ø2" Ceramic Gas Burner	Boiler Firebox	1
No 8 Gas Jet	Ceramic Burner	1
Nipple/Cone for Ø5/32" pipe 1/4" x 40ME Nut	Water Feed. Steam Supply Exhaust.	7
Boiler Insulating Lagging 1mm thick 'Kaowool Paper'	Boiler Barrel	250 x 250
(Polly Supply only) – Pressure Gauge U-Tube 1/4" x 40 ME Banjo Bolt	Boiler Barrel to Pressure Gauge	1

PREPARING THE BOILER BARREL AND TUBES

(Boiler Barrel. Item B1 – Ø3" x 16SWG copper tube - Refer to Drawing B1).

Success of the boiler's construction is made easier if the ends of the boiler barrel are square to the barrel's length, but turning a length of thin-walled copper tubing presents a small difficulty with regards to holding.

The method I have used with great success requires two 'snug' fitting plugs and a spacer to be manufactured from either reasonable quality plywood, chipboard or MDF (old kitchen units or similar, provide ideal material) around 18mm thick.

Before starting, measure the bore of the tube in several places and average your readings, add 1 mm to this figure. You must accept that the tube is unlikely to be round, therefore the plugs will need to be 'fitted' (where did you think the term fitter and turner came from?) to the bore, by a process of trial and error.

Mark out two 80mm squares of your chosen material, draw diagonal lines from the corners, and lightly centre punch at the point of intersection. On this mark using either a pencil compass or dividers set to 40mm radius, mark an 80mm diameter circle. Saw out the two wood squares. Cut off the four triangular 'ears' from each of the squares that are outside the marked circle.

Move to the lathe and using a self-centring chuck set so that the jaw tips are a small distance inside the 80mm circle, hold the blank against the chuck jaws with a running centre mounted in the tailstock. To prevent the centre being forced too deeply into the chipboard place a Ø8 steel washer over the point of the running centre before applying pressure to the blank. **Photo B1.**

Taking light cuts with a sharp right-hand knife tool, produce a continuous diameter on the blank and measure. Calculate how much needs to be removed to produce the bore diameter plus 1mm calculated, and continue taking light cuts to achieve this figure. Chamfer the front edge 2mm x 45 degrees.

Slacken the tailstock, remove the blank, (taking care to catch the washer!) and check to see how near the plug is to actually fitting, it should be about 1mm too large.

Re-clamp the blank as before, picking up the centre, remembering to install the washer on the running centre. Take a skim off the diameter of 0.05mm (0.1 on a diameter dial), and retry. Repeat until the blank enters the tube without excessive forcing or slackness. When this is achieved measure the blank, and machine the second blank to the same size, not

GAS FIRED VERTICAL BOILER TABLE 3 – SUNDRIES		
Specific boiler fittings items are available from the suppliers suggested in table 2		
FIXINGS		
Description	Location	No Off
M2 x 6 or 8BA x ¼” Brass RH Screw	Chimney to Smokebox Cap Securing Screws	6
M2.5 x 10 Stainless Steel Pan Head	Banding Securing Screws	3
M3 x 6 Stainless Steel RH Screw	Firebox/Smokebox to Boiler Securing Screws	6
M4 x 25 Stainless Steel CS Bolt	B19. Gas Burner Mount	2
CZ108 Brass Sheet		
26SWG or 0.4mm thick 12 x 12		Sheet Lagging. Banding x 3
C106 Copper Tube Supply		
Material	Material Dimensions	Required for
C106 Cu Tube	Ø3” OD x 16SWG x 6”	B1 Boiler Barrel. (Alternative Supply)
	Ø5/16”OD x 20SWG x (98” Req) Three Lengths @ 36”	B2. Inner Firetubes x 19. (Alternative Supply)
	Ø5/32” x 22SWG x 48” Coil	Water x1. Steam x 2.
	Ø1/8” x 22SWG x 24” Coil	Pressure Gauge U-Tube. Gas Cartridge Connection Pipe.
Burner and Insulation		
Ø2” Ceramic Gas Burner – Number 8 Gas Jet		
1mm thick paper insulation (Kaowool)		250 x 250 x 1
CuP Alloys www.cupalloys.co.uk 01246 566814 Silver Solder suppliers		
Ø0.7mm x 500mm Silver Solder five-rod pack 455		Silver Soldering various parts as required
Ø1.5mm x 500mm Silver Solder five-rod pack 455		
Ø1.5mm x 500mm Silver Solder five-rod pack 438		
EF Flux 250gm pot		
Cleaning Salts – Alternative to 10% Sulphuric Acid solution		Alternative to Sulphuric Acid
H.S.Walsh. www.hswalsh.com 01959 543660		
Heat Resistant Millboard 275 x 200 x 6mm Ref TA12		B23. Display/Operating Base.
1		
Clevedon Steam www.clevedonsteam.co.uk 01275 340048		
Gas Can Valve for EN 417 Cartridge		Alternative Gas Can Valve & End Fitting
End fitting for Ø⅛” pipe		
No 8 Gas Jet		Alternative Gas jet supplier 1 (alternative)
Amazon ebay www.paroh.co.uk		
Hurricane Backpack Stove	Alternative Gas Can Valve Braided Flexible pipe & End Fitting	
		1

"A beginner bitten by the live steam bug most likely would want to build on the experience with the construction of a locomotive or traction engine..."

PHOTO B1: Machining plugs for boiler barrel.

All photos and drawings in this feature by Martin Gearing

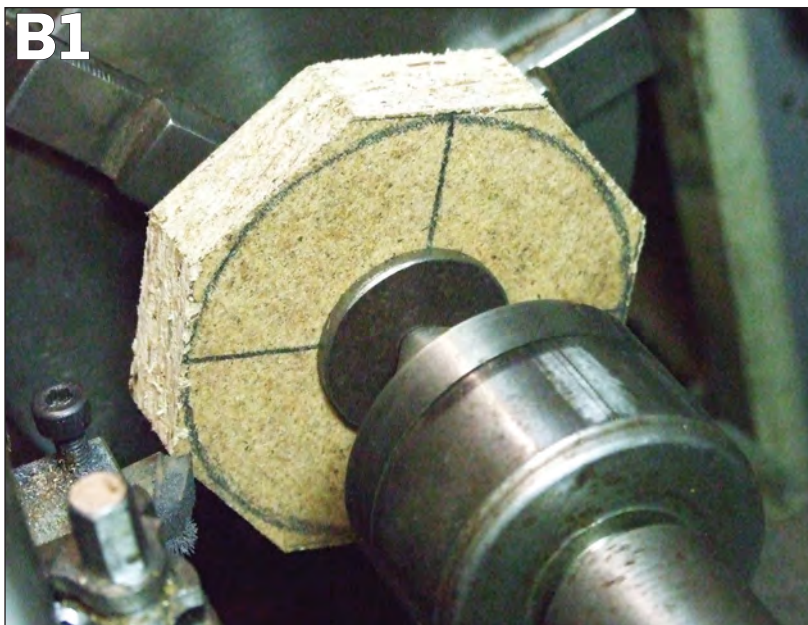
forgetting to chamfer one edge to ease its entry into the tube.

Now cut a rectangle to a width that loosely will fit into the bore of the tube across the centre line, making sure one end is square. **Photo B2.**

Deduct the combined thickness of the two blank discs just machined from 140mm, and mark the rectangle

with a square to that length, before sawing away the waste. The spacer will be fitted between the two discs allowing the running centre to support the free end of the tube whilst it is trued up. **Photo B3.**

Install the two discs – separated by the spacer inside the tube – gripping lightly one end in a self-



FREE GLASS DOME*

ENGINES THAT RUN FROM BODY HEAT



Choose from kit or assembled at
WWW.STIRLINGENGINE.CO.UK

* while stocks last. Offer limited to certain models. Limited time only.

NOGGIN END METALS

www.nogginend.com



EIM Gas Fired Vertical Boiler - Metal Required (All in metal pack supplied by NOGGIN END)

Material	Material Dimensions	Required for	Price
Brass Round	Ø5 x 12"	B34 Pipe Cone. Gauge Glass Setting Rods	£1.50
	Ø11/4" x 12"	B14 x 5 Protection Plugs.	£2.50
	Ø10mm x 6"	B11x2. B12 x 6. Protection Plugs.	£2.00
	Ø12mm x 6"	B25. B32. Extension. Banjo	£3.00
	Ø5/8" (19mm) x 4"	B21 x 4. B22 x 4. Mounting Pads and Washers.	£4.40
Brass CZ121	Ø30 x 1"	B30. Chimney Cap.	£3.00
	Ø40 x 1"	B28. Chimney Base.	£4.60
Brass Section	3/8" x 1/2" x 3"	B19. Ceramic Burner Mount.	£2.00
Brass CZ121	Hexagon 10AF x 12"	B13. B 25 x 2. B26. B27 B28. B35. Fittings.	£4.60
Brass Sheet	16SWG 12" x 6"	B15. B16. B17. B18 x 2. B24. Fire & Smokebox.	£17.00
Brass CZ 108	26SWG 12" x 12"	B37 x 3 Sheet Lagging	£15.00
Copper Tube	Ø3" OD x 16SWG x 6"	B1 Boiler Barrel.	£21.00
C106 Cu Tube	Ø5/16" OD x 20SWG (98" Req)	B2 x 19 Firetubes.	£29.70
Copper Sheet	16SWG 4" x 12"	B3. B4. Lower & Upper Tubeplates.	£10.30
Phosphor Bronze	Ø1/4" x 18"	B9 x 3 Stays.	£6.00
PB102	Ø1/2" x 6"	B7 x 3. B8 x 6. B10 x 3. Stay Nuts & Spacers.	£3.50
	Ø3/8" x 6"	B5 x 3. B6 x 4. Bushes.	£6.00
Stainless Round	Ø3mm x 12"	Scratch Stick for Silver Soldering. Flanging Former Pin	£1.20
Stainless 303	Ø4mm x 12"	B20 x 4.	£1.20
	Ø5/8" x 6"	Forming Rings for tube flaring. Double Ended Tube Flaring Drift.	£4.00
Stainless Hexagon	10AF x 6"	B32. Banjo Bolt.	£2.30
Aluminium	Ø19mm x 6"	Mandrels	£2.00
Grade 6082	3mm x 6" x 12"	Former Extraction Plates.	£8.00
Grade 1050			
		Total	£154.80
		less 10% kit discount	£129.95

MIDLANDS MODEL ENGINEERING EXHIBITION

THE SHOW FOR MODEL ENGINEERS



THURSDAY 18th to SUNDAY 21st OCTOBER 2018
 Thursday - Saturday 10am - 5pm
 Sunday 10am - 4pm

WARWICKSHIRE EVENT CENTRE

...more than just an exhibition - it's an experience...



Meet over 35 clubs & societies. **See** nearly 1,000 models. **Learn** from the experts in the workshops & lectures. **Buy** from over 50 specialist suppliers.

BOOK YOUR TICKETS NOW

ADMISSION PRICES	ONLINE TICKETS*	FULL PRICE TICKETS**
Adult	£9.50	£10.50
Senior Citizen	£8.50	£9.50
Child (5-14 yrs)	£3.00	£4.00

* Tickets are available via our website at discounted prices.
 ** Full price tickets are available on the day from the ticket office.
 Please call SEE Tickets on 0115 896 01547 if you would like to book a ticket by phone. Last admission 1 hour before closing.

SPONSORED BY
 THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING in Miniature

EXHIBITION LINK BUS
 from Leamington Spa Railway Station.
FREE PARKING Ample free parking for over 2,000 vehicles.
FREE SHOW GUIDE upon entry to the show.

GROUP DISCOUNTS: 10+ enter code GRP10 on website.
 Lecture programme, exhibitor list & bus timetables online.

www.midlandsmodelengineering.co.uk

Organised by Meridienne Exhibitions Ltd
 All information subject to change, correct at time of printing.

Meridienne Exhibitions LTD
 @MeridienneEx



DRAWING B1 – BOILER BARREL (reproduced approx full-size)

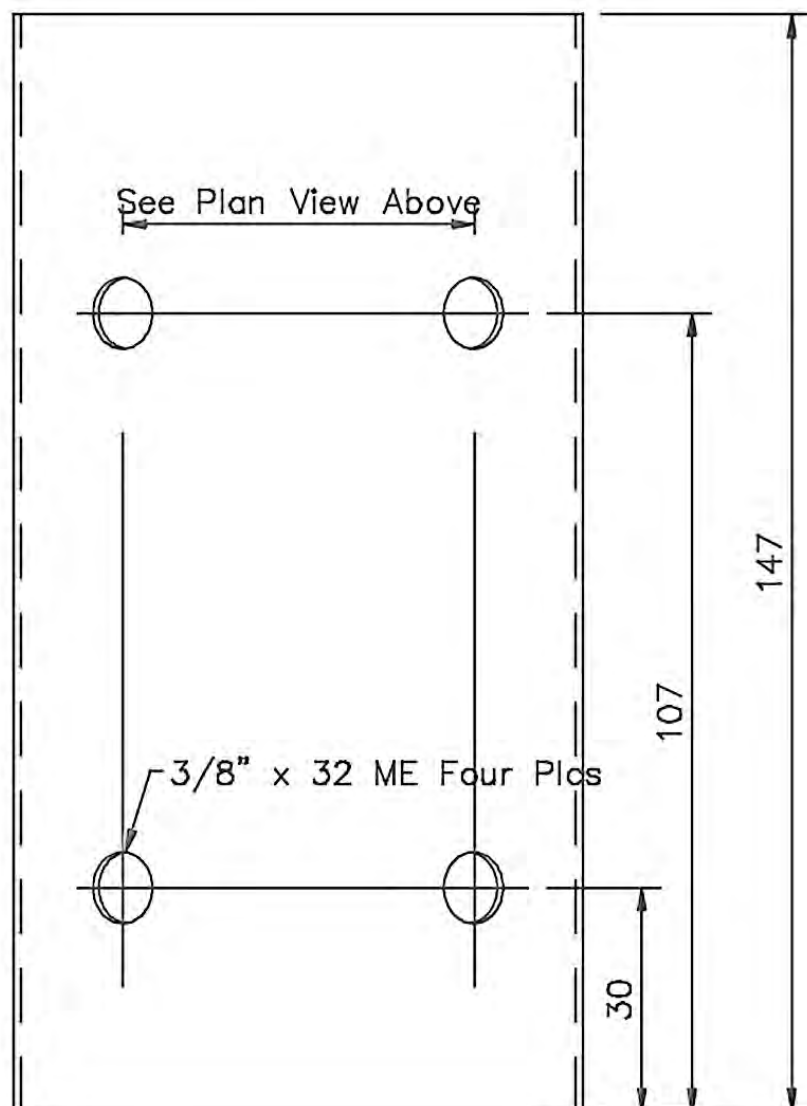
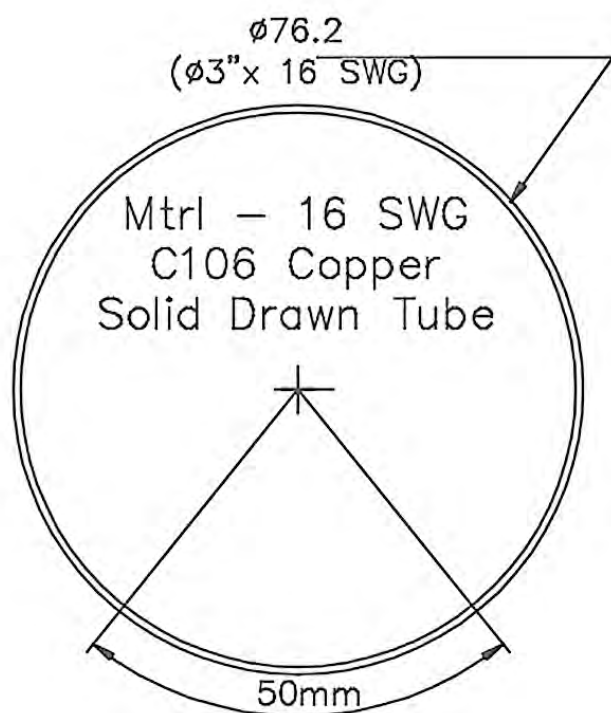


PHOTO B2:

Wood rectangle cut to fit bore of tube

PHOTO B3:

Checking overall length of the support formers

PHOTO B4:

Turning the end of the tube to ensure it is true.

PHOTO B5:

Beware – the turning operation produces very sharp swarf.

centring chuck (fitted with outside jaws) whilst the other end is supported with a running centre, again using a washer to prevent the centre forcing too deep into the blank. **Photo B4.**

Tighten the tailstock running centre, forcing the plugs and spacer together against the chuck jaws, sufficient to resist light cuts before tightening the chuck gripping the tube against the plug. Using a sharp RH knife tool, carefully take light cuts across the end face of the tube until a continuous surface is achieved. just removing any trace of the saw cut.

CAUTION The surface produced will most likely have burrs and rags that are **extremely sharp**. **Photo B5.** I would recommend wearing leather gloves when – with great care (after slackening the tailstock, catching the washer and releasing the tube from the chuck) you make sure all traces of the burrs are removed with a small chamfer from the outside diameter with a fine flat file, and the inside diameter with a fine half-round file or proprietary deburring tool.

Return the tube and spacers to the lathe with the machined end against the chuck jaws and support the sawn





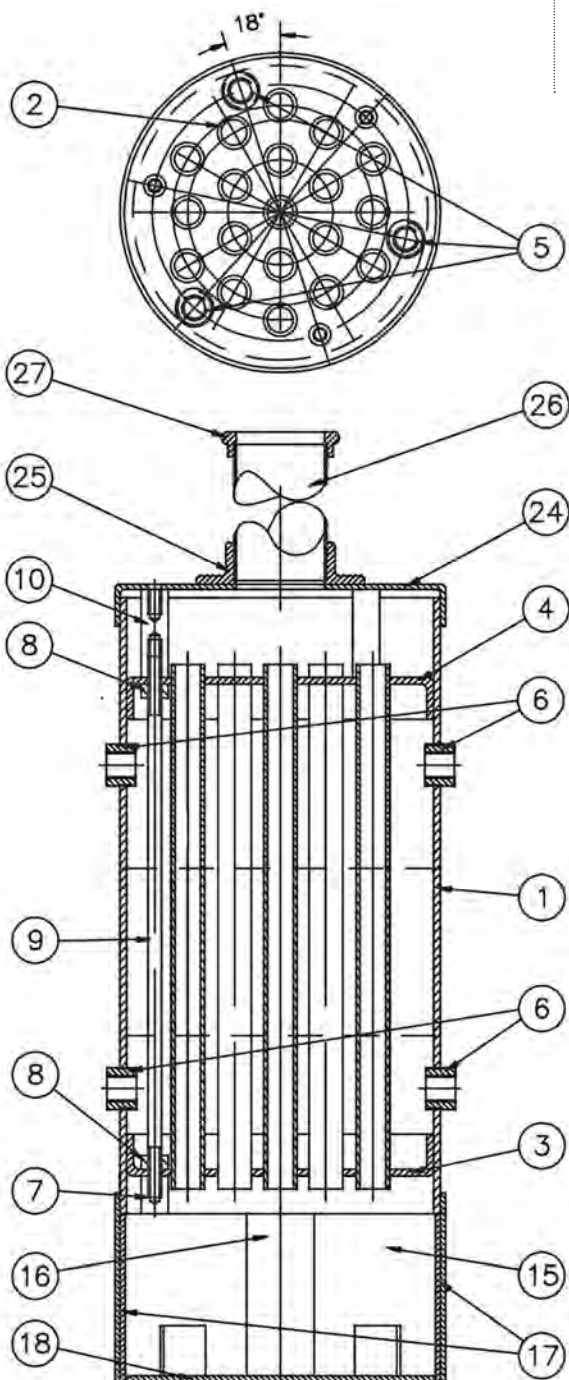
end as before. Carefully take light cuts across the end face of the tube until a continuous surface is achieved just removing any trace of the saw cut. Measure the length of the tube and deduct 147mm from this figure -



giving the amount that has to be removed carefully taking light cuts. Remove from the lathe and deburr as before - bearing in mind the comments about exercising caution, and put to one side. **EIM**

NEXT MONTH Drilling for bushes and making the firetubes

■ The build of the Steam Plant was serialised in the October 2016 to August 2017, and the November and December 2017 issues of **EIM**. Digital copies of these issues can be downloaded or printed versions ordered from; www.world-of-railways.co.uk/engineering-in-miniature/store/back-issues/ or from 01778 392484.



BOILER COMPONENTS – item location and reference

Tolerances - Non Functional (i.e. Parts not a fit or match) $\pm 0.1\text{mm}$

Functional (i.e. Parts having to match) $\pm 0.02\text{mm}$

Item	Description	Material
B 1	Boiler Barrel	$\varnothing 3'' \times 16$ – SWG SDCT
B 2	Firetube x 19	$\varnothing 5/16'' \times 20$ – SWG SDCT
B 3	Lower Tubeplate	16SWG – Copper Sheet
B 4	Upper Tubeplate	16SWG – Copper Sheet
B 5	Tubeplate Flanged Bush x 3	$\varnothing 3/8''$ – PB102
B 6	Boiler Shell Screwed Bush x 4	$\varnothing 3/8''$ – PB102
B 7	Lower Stay Spacer Nut x 3	$\varnothing 1/4''$ – PB102
B 8	Inner Stay Nut x 6	$\varnothing 1/4''$ – PB102
B 9	Tubeplate Stay x 3	$\varnothing 1/8''$ – PB102
B 10	Upper Stay Spacer Nut x 3	$\varnothing 1/4''$ – PB102
B 11	Protection Plugs x 2 (not shown)	$\varnothing 10$ – Brass
B 12	Test Plugs x 6 (not shown)	$\varnothing 10$ – Brass
B 13	Test Adaptor Fitting (not shown)	10AF – Brass
B 14	Protection Plugs x 5 (not shown)	$\varnothing 1/4''$ – Brass
B 15	Firebox Shell	16SWG – Brass Sheet
B 16	Firebox Butt Strap	16SWG – Brass Sheet
B 17	Boiler Support x 2	16SWG – Brass Sheet
B 18	Firebox Base	16SWG – Brass Sheet
B 19	Ceramic Burner Mount (not shown)	$1'' \times 5/16''$ – Brass
B 20	Mounting Studs x 4 (not shown)	$\varnothing 4$ – Stainless
B 21	Mounting Pads x 4 (not shown)	$\varnothing 18$ – Brass
B 22	Mounting Washers x 4 (not shown)	$\varnothing 18$ – Brass
B 23	Heat Resistant Millboard (not shown)	Purchased Item
B 24	Smokebox Cap	16SWG – Brass Sheet
B 25	Chimney Base	$\varnothing 40$ – Brass
B 26	Chimney	$\varnothing 22$ – DWP
B 27	Chimney Top Cap	$\varnothing 30$ – Brass
B 28	Tubeplate Extension x 3	10AF/ $\varnothing 12$ – Brass
B 29	Smokebox Exhaust Fitting (not shown)	10 AF – Brass
B 30	Exhaust Fitting Nut (not shown)	10 AF – Brass
B 31	Lagging Nut/Sleeve x 3 (not shown)	$\varnothing 5 \times 8$ – Brass
B 32	“U” Tube Banjo (not shown)	$\varnothing 12$ – Brass
B 33	Banjo Bolt (not shown)	10 AF – 303 Stainless
B 34	Pressure Gauge Cone Adaptor (not shown)	$\varnothing 5$ – Brass
B 35	Filler Plug (not shown)	10 AF – Brass
B 36	Burner Gas Jet Holder (not shown)	$\varnothing 5/16''$ – Brass
B 37	Gas Pipe End Fitting (not shown)	$\varnothing 5/16''$ – Brass
B 38	Gas Pipe End Fitting Mount (not shown)	16SWG – Copper

How many workshops?

David's multiple workshops were born of pure necessity and some clever solutions...

BY DAVID CONEY

Following on from the call from our esteemed editor for more articles in and around workshops, I thought readers might be interested in the following description of my own workshop(s).

I like to think that I have three workshops, this is due to me having varied interests! My original main interest was vintage/classic cars, I have three, a 1928 Alvis, a 1933 BSA (car not motorcycle), and a 1969 Morris Minor. So my original workshop was set up in my double-length garage, the third car having to be stored in a rented council lock-up.

I have always been interested in model engineering, but for many years, due to family and work commitments, this interest was limited to buying magazines and catalogues of plans and castings. I did buy a lathe, an Emco Compact 8, made in Austria, many years ago, but I did not get it set up until retirement approached and I could plan on having more time for things like model engineering. With this hobby in mind, a workshop was needed, so the easiest option was to extend the garage in length, build a partition wall and use that space as

"I love to reuse scrap materials for building projects and such like..."

the model engineering workshop.

I must tell readers that I love to reuse scrap materials for building projects and such like. So the garage extension was built using reclaimed bricks, the partition wall was constructed using timber collected from skips sitting outside building projects in our area, and the workshop was insulated using scrap wood for battens, and newspaper for the actual insulation material. This was an idea I got from Stan Bray's *Setting up your Home Workshop*, published by Argus Books Ltd in 1987.

Useful material

The workshop was fitted out with benches, cupboards and shelving that came from our old kitchen. Luckily the timing of having a new kitchen fitted coincided with when I was setting up the workshop; the old kitchen also provided much scrap wood that was used for the inner lining of the insulation.

My Emco Compact 8 lathe, along with a sensitive drilling machine, a bench grinder, and a simple arrangement for a power-driven wire brush and polishing mop were installed. Incidentally the electric motor driving the wire brush/polishing mop is the one I used for a simple wood-turning lathe I had more than 60 years ago! The Arc Eurotrade Sieg Super S3 milling machine came later.

Photos 1 to 3 show the model engineering workshop. It's quite a small space, 8ft by 10ft, but the one



advantage is that everything is close at hand. Unlike a lot of model engineers, I have managed to concentrate on just one project, building a 3½-inch gauge 'Rob Roy' steam locomotive. There are not too many part-built projects sitting around taking up space, apart from a Hemingway set of castings and materials for a Sparey 5cc model diesel engine, and a part built 'Princess Marina' 3½-inch gauge loco which I acquired for a very reasonable price so I could not turn it down.

Also fitted was a 2½-inch bench mounted vice. Additionally I had in my possession a much larger, 6-inch vice, so at first I wondered where I could put this, as it is occasionally used for larger jobs involving my cars.

Space saver

I then had the idea that I could build a bench at the end of the garage, and by making the underlying supports for the bench to be not vertical, but sloping inwards, this would not encroach too much on the space available for the cars.

This setup was based again on an idea from Stan Bray's excellent book where he describes someone who did not have quite enough space at end of a garage for a full workshop; he then illustrates how the bench of the workshop goes over the bonnet of the car on the other side.

So on this garage bench I installed my large vice, yet another drill press, and a small bandsaw. This arrangement is shown in **Photo 4**. Note how the sloping bench supports allow a few inches more space for the front/back of a car. Note too my collection of various meters on the shelf above.

Having obtained very cheaply about 15 years ago, a very rusty 1970 BSA Bantam motorcycle, which sat in the garage untouched, I decided that the only way I was going to get to work restoring it, was for it to have a dedicated workshop space. There was enough space in the garage to store it, but not to work on it. I considered scrapping an existing garden shed at the bottom of my garden and having a larger one built, but decided against that as, although more than 30 years old, it is much better constructed than most modern sheds.

So I decided on a new, motorcycle, shed. I managed to find a company that makes sheds to order and could make one very similar to the existing one. After erection was finished, I decided to insulate it in similar fashion to the model engineering workshop. Again I used mainly rolled-up newspaper, with the inner layer being USB board; luckily I was able to buy offcuts cheaply, bought from the company that built the shed.

PHOTOS

1-3: Views inside the main model engineering workshop, making the most of a compact space. Note the reused kitchen cupboards!

PHOTO 4: The garage workshop – angled shelf supports to allow space for car clearly visible.

PHOTO 5: The garden shed workshop, dedicated to the BSA motorcycle and with the walls suitably decorated.



All the shelving was made from deconstructed pallets.

Because I have inherited a lot of hand tools from my father and grandfather, it has been easy for me to have a duplicate set of most things, screwdrivers/hammers/spanners and such in this workshop at the bottom of the garden.

Photo 5 shows the interior of the motorcycle shed, note all the BSA posters lining the back wall. These posters are issued by the excellent BSA

Bantam Owners Club, I have often wondered where I could put them up, now I have plenty of wall space for them, and more.

So in conclusion, for a lot of people, one big workshop would suit all their needs, but for me it was more cost effective to modify/build on what I already had. Also if one is satisfied enough with less than perfect facilities, then there are many ways to do things cheaply using recycled materials. **EIM**



Bristol Model Engineering and Model Making Exhibition 2018

John checks out the highlights of this year's big south-west event.

BY JOHN ARROWSMITH



1

The Exhibition opened on Friday 17th August at its usual venue, the Thornbury Leisure Centre with a large crowd of visitors entering on the dot at 10am. The halls were full with a wide range of models and equipment and all the display and traders stands attractively laid out.

A number of demonstrations were arranged during the day both inside and out covering a selection of activities from complex and high-tech gas turbine engines to the more peaceful radio-controlled model hot-air balloons. An interesting lecture programme was also available covering topics from 3D CAD and printing to locomotive kits, so again there was something for everyone.

The diverse range of models was considerable and the quality overall excellent, with some outstanding examples. There are a couple of trophies awarded each year and the



2

PHOTO 1: Davinder Matharu's superb example of a 2-inch scale Fowler Showman's Engine, here showing the rear hoist, won the Best-in-Show trophy. Note the canopy lettering that is in different languages on each side.

PHOTO 2: Geoff Goodchild's 1:14th scale Kittoe and Brotherhood engine, built entirely without castings.

PHOTO 3: This horizontal 77cc four-stroke double-acting engine was built by Tom Pasco and demonstrated outside the halls.

PHOTO 4: A magnificent nine-cylinder Radial engine on display on the I/C Builders Group stand.



3



4

CuP Alloys Trophy for the Best in Show exhibit went to Davinder Matharu from the Bristol SMEE for his superb example of a 2-inch scale Fowler Showman's engine.

An exemplary finish complimented some excellent workmanship and something I had not seen before, the canopy lettering was different on each side – one side in English and the other in Punjabi, reflecting Davinder's heritage.

Another outstanding model was the 1:14th scale model of a Kittoe and Brotherhood beam engine built by Geoff Goodchild. It was a quality model that had been built entirely without castings, everything either fabricated or machined from solid.

A fine selection of internal combustion engines provided by the IC Engine Builders Group included a magnificent 9-cylinder Radial engine, while Tom Pasco had his latest freelance 77cc four-stroke double-acting engine in operation outside.

The large Bristol SMEE stand celebrated 50 years of the IMLEC efficiency competition with a range of locomotives that have been involved over the years on display. The double-chimney GWR Castle in 5-inch gauge was a rare model and looked a very capable locomotive.

Elsewhere in the displays another ►



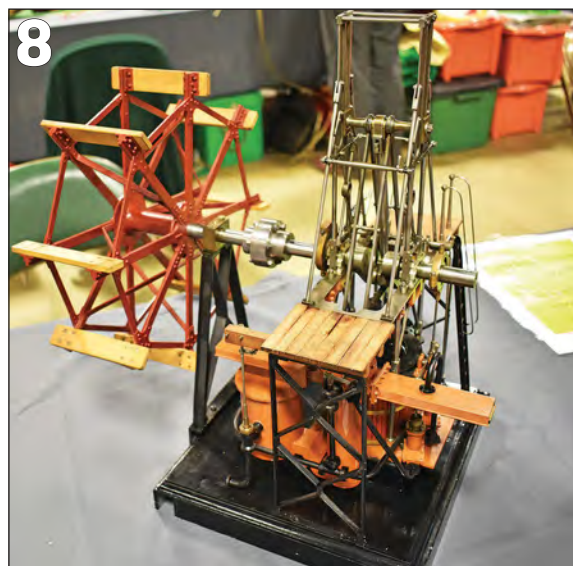
PHOTO 5: Part of the large group of IMLEC engines, the competition's 50th anniversary celebrated on the home club's stand.

PHOTO 6: This double-chimney GWR Castle class loco was one of the previous contestants in the IMLEC competition.

PHOTO 7: A very rare model of a Bristol and Exeter 4-2-4 locomotive under construction by Rob Spear.

PHOTO 8: Neil Carney's exquisite example of an 1842 Steeple Paddle Steamer engine.

PHOTO 9: Mamod models as far as the eye could see presented by B. Richings.



10



rare model under construction by Rob Spear was the broad gauge Bristol & Exeter Railway 4-2-4 locomotive – in 1/32nd scale it makes for quite a large model. The original was designed by James Pearson in 1853.

Neil Carney always presents a model with historical background and

PHOTO 10: Part of the winning club stand display presented by the West Wilts SME.

PHOTO 11: This rare Bassett Lowke traction engine was part of the West Wilts display.

PHOTO 12: A demonstration of fine hand engraving with an air-operated graver on the SMEE display.

PHOTO 13: The Meccano model of USS Missouri on the South West Meccano Group display.

11



12



this year his example of an 1842 Steeple paddle steamer engine in 3/4-inch scale was no exception. Beautifully made the attention to detail and finish was superb. In contrast to this was the large display of Mamod items, a very colourful selection of these basic steam models.

A good choice of club stands added a vast array of quality models to be enjoyed and the George Ganley Cup for the Best Society Stand went to the West Wilts SME with a comprehensive collection which included a 1913 Bassett Lowke traction engine.

On the SMEE stand Jake Sutton was busy demonstrating the art of fine engraving using an air-powered Lindsey hand engraver. It was fascinating to watch the tiny curl of swarf as Jake's steady hand moved over the surface of the metal.

The South West Meccano Group presented a wide range of models using this once popular model building system. The model of the USS Missouri was an incredible exhibit with the myriad number of components necessary to create the atmosphere of this great ship.

To conclude my notes I would like to thank the Bristol Society for its hospitality and help and to just mention the group's current difficulty with the local authority. You will notice in a couple of my photos the large banner stating 'Save our Railway' – the Bristol club is under threat of eviction from its site of 45 years, saying that the local council wants to increase ground rent on the site to an unacceptable level.

The petition that was available on the door of the show has already gained over 5000 signatures which is enough to force the council to hold an open discussion about the problem, but the club would be grateful for any other help readers may be able to offer.

Hopefully this problem will be successfully resolved in the near future but if it isn't then this exhibition in this form may be the last that the Bristol Society can host, and the club will have to find a new site with all the difficulties that entails. Let us all hope that the club do not have to go down that road and that common sense and pragmatism will prevail.

Editor's note – there is an update in this month's *Club News*. **EIM**

13





MIDLANDS MODEL ENGINEERING EXHIBITION

SHOW PREVIEW



THE SHOW FOR MODEL ENGINEERS

PREVIEW OF THE MIDLANDS MODEL ENGINEERING EXHIBITION 2018

We look forward to welcoming you to the 41st Midlands Model Engineering Exhibition, sponsored by Engineering in Miniature.

The exhibition is gearing up to be yet another superb display of model engineering in all its fascinating variety. With hundreds of models of locomotives and rolling stock, traction, stationary and hot air engines, boats etc. plus workshop equipment and clocks – virtually every interest is represented.

We will have over a thousand models on display for your enjoyment on over 35 club and society stands and in the competition and display classes.

We also have a full complement of specialist suppliers with over 50 companies represented so, in addition to viewing the model displays, you'll be able to purchase virtually anything you might need for your modelling activities.

Our lecture programme is detailed on the back page and the centre pages provide a full plan of both the clubs and societies as well as specialist suppliers so you can plan your day well in advance and organise your shopping list.

In addition to the hundreds and hundreds of models on static display we have live steam on the 16mm narrow gauge layout and outside the exhibition hall the model steam road vehicles and a miniature railway will be in action for your enjoyment.

We hope that you will join us and enjoy the exhibition, meet old friends and renew acquaintances.

Chris Deith
Exhibition Director

Tickets are available online at discounted prices or full price at the exhibition on the day of your visit.

**THURSDAY 18th
to SUNDAY 21st
OCTOBER 2018**

Thursday - Saturday: 10am-5pm
Sunday: 10am-4pm

Last admission 1 hour before closing

**WARWICKSHIRE
EVENT CENTRE**



**Meridienne
Exhibitions LTD**
@MeridienneEx

Sponsored by

**ENGINEERING
in Miniature**

Presented by

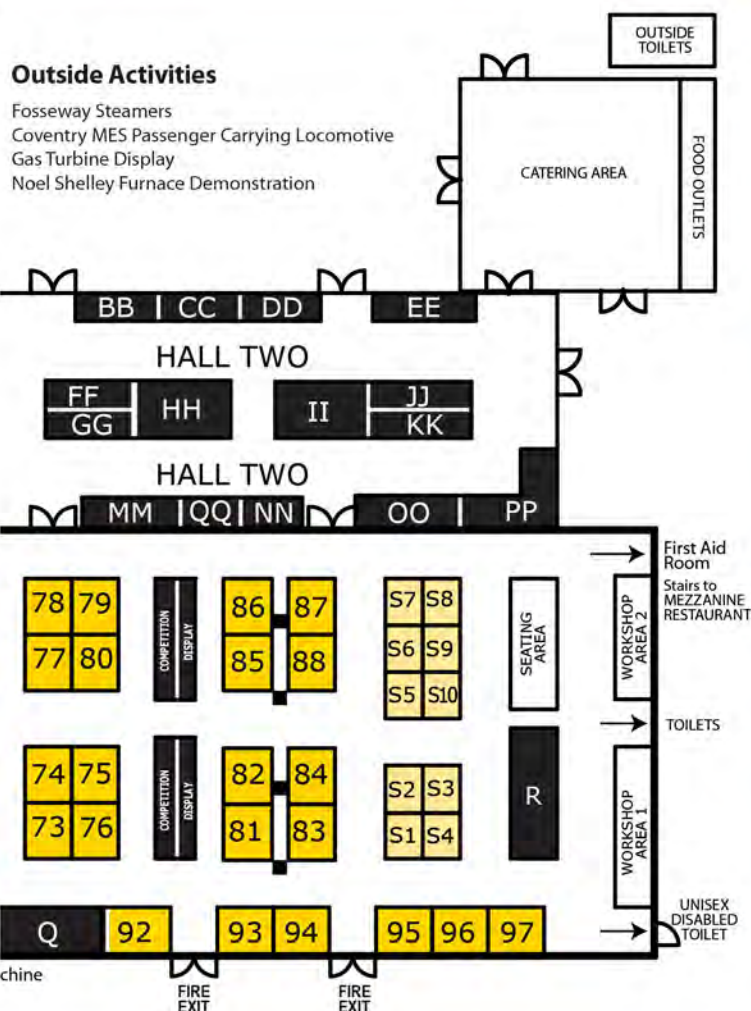


Meridienne Exhibitions

www.midlandsmodelengineering.co.uk

Outside Activities

Fosseway Steamers
Coventry MES Passenger Carrying Locomotive
Gas Turbine Display
Noel Shelley Furnace Demonstration



TEE PUBLISHING

The Fosse, Fosse Way, Nr Leamington Spa, Warwickshire, CV31 1XN
T: 01926 614101
E: info@teepublishing.co.uk
W: www.teepublishing.co.uk
Stands: 66+67

THE CRAFTLIGHT COMPANY

32 Gunton, Church Lane, Lowestoft, Suffolk, NR32 4LF
T: 01502 587598
E: info@craftlights.co.uk
W: www.craftlights.co.uk
Lamps magnifiers and worklamps
Stand: 58

THE LMS PATRIOT COMPANY

The Hub, 17 Eastgate Street, Stafford, ST16 2LZ
T: 01785 244156
E: office@lms-patriot.org.uk
W: www.lms-patriot.org.uk
Stand: 52

TRACY TOOLS

Unit 1 Parkfield Industrial Estate Barton Hill Way, Torquay, Devon, TQ2 8JG
T: 01803 328603
E: info@tracytools.com
W: www.tracytools.com
Stands: 70-72

TRANSWAVE CONVERTERS T/A POWER CAPACITORS

30 Redfern Road, Tyseley, Birmingham, B11 2BH
T: 0121 7084522
E: transwave@powercapacitors.co.uk
W: www.transwave.co.uk
Stand: 47

TRIPLE X TRADING

Unit 104, 91 Mayflower Street, Plymouth, Devon, PL1 1SB
E: triplextrading@gmx.com
Stand: 3

TURBOTRADE UK

T: 07926 256551
E: turbotradeuk@tesco.net
W: www.turbotradeuk.co.uk
Stainless steel nuts & bolts, engineering tools, abrasives and work gloves
Stand: 51

WALKER MIDGLEY INSURANCE BROKERS

The Balance, Pinfold Street, Sheffield, S1 2GU
T: 0114 2502770
E: enquiries@walkermidgley.co.uk
W: www.walkermidgley.co.uk
Stand: 13

WARREN MACHINE TOOLS (WARCO)

Warco House, Fisher Lane, Chiddingfold, Surrey, GU8 4TD
T: 01428 682929
E: sales@warco.co.uk
W: www.warco.co.uk
Stands: 34-41

WHOTZ HOT

8 Southway, Southwell Business Park, Portland Dorset, DT5 2NL
T: 01305 823888
E: whotzhot@btconnect.com
W: www.whotzhot.info
Hawks beak wrench etc
Stand: 54

WUHU BRANDS ARTS & CRAFTS CO.

Door 3, Fuda Industrial Park, Douth Fengminghu Road, 241007, Wuhu, Anhui, China
T: 0086-18655329399
E: bowande@vip.163.com
W: www.bowandeusa.com
Stand: 82

CLUBS AND SOCIETIES

7 1/4" GAUGE SOCIETY

Stand: N
www.sevenandaquarter.org

10 1/4" GAUGE SOCIETY

Stand: C
www.tenquarter.org

BIRMINGHAM SOCIETY OF MODEL ENGINEERS

Stand: K
www.birminghamsme.com

BLACKHEATH MODEL POWERBOAT CLUB

Stand: I

BROMSGROVE SOCIETY OF MODEL ENGINEERS

Stand: R
www.bromsgrovesme.co.uk

BURTON ON TRENT MODEL ENGINEERING SOCIETY

Stand: G
www.burton-upon-trentmes.org.uk

CITY OF OXFORD SOCIETY OF MODEL ENGINEERS

Stand: E
www.cosme.org.uk

COVENTRY MODEL ENGINEERING SOCIETY

Stand: L
www.coventrymes.co.uk

EREWASH VALLEY MODEL ENGINEERING SOCIETY

Stand: KK
www.ewr.org.uk

GAS TURBINE BUILDERS ASSOCIATION

Stand: DD
www.gtba.co.uk

GAUGE 1 MODEL RAILWAY ASSOCIATION

Stand: A
www.g1mra.com

GAUGE 3 SOCIETY

Stand: HH
www.gauge3.org.uk

GUILD OF MODEL WHEELWRIGHTS

Stand: LL
www.guildofmodelwheelwrights.org

HEREFORD SOCIETY OF MODEL ENGINEERS

Stand: GG
www.hsme.co.uk

IC ENGINE BUILDERS GROUP

Stand: QQ

KINGSBURY WATER PARK MODEL BOAT CLUB

Stand: EE
www.kwpmc.co.uk

KNIGHTCOTE MODEL BOAT CLUB

Stand: II
www.kmbcmmodelboatclub.com

LARGE MODEL ASSOCIATION

Stand: B
www.largemodelassociation.com

LONDON & NORTH WESTERN RAILWAY SOCIETY

Stand: OO
www.lnwr.org.uk

MELTON MOWBRAY & DISTRICT MODEL ENGINEERING SOCIETY

Stand: F
www.mmmes.co.uk

MIDLANDS MECCANO GUILD

Stand: AA
www.midlandsmecanoguild.com

MILTON KEYNES CLOCK CLUB

Stand: D
www.bhi.co.uk

MODEL STEAM ROAD VEHICLE SOCIETY

Stand: PP
www.msrvs.co.uk

NATIONAL 2 1/2" GAUGE ASSOCIATION

Stand: J
www.n25ga.org

NATIONAL TRACTION ENGINE TRUST

Stand: MM
www.ntet.co.uk

NORTHAMPTON SOCIETY OF MODEL ENGINEERS

Stand: JJ
www.nsme.org.uk

NORTHERN ASSOCIATION OF MODEL ENGINEERS

Stand: M
www.normodeng.org.uk

NOTTINGHAM SOCIETY OF MODEL & EXPERIMENTAL ENGINEERS

Stand: FF
www.nsmee.org.uk

REMAP (COVENTRY & WARWICKSHIRE)

Stand: NN
www.remap.org.uk

SOCIETY OF MODEL & EXPERIMENTAL ENGINEERS

Stand: P
www.sm-ee.co.uk

SOUTHERN FEDERATION OF MODEL ENGINEERING SOCIETIES

Stand: CC
www.southernfed.co.uk

STEAMBOAT ASSOCIATION

Stand: Q
www.steamboatassociation.co.uk

STIRLING ENGINE SOCIETY

Stand: O
www.stirlingengines.org.uk

WOLVERHAMPTON & DISTRICT MODEL ENGINEERING SOCIETY

Stand: BB
www.wolverhampton-dmes.net

SPECIAL DISPLAYS

GORDON SMITH DISPLAY

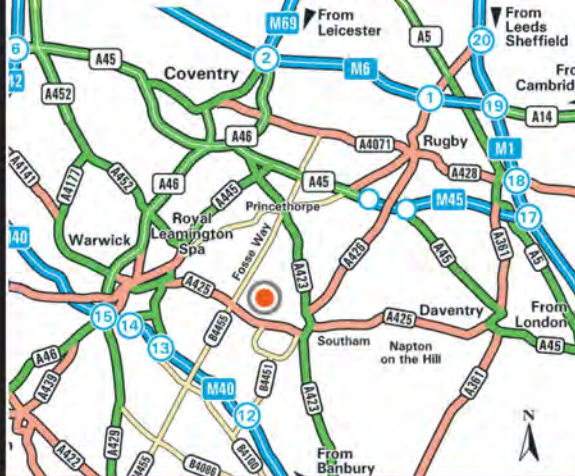
Stand: H

80TH ANNIVERSARY OF THE MALLARD WORLD SPEED RECORD

Stand: Various Club Stands

HOW TO FIND US

The exhibition will be held at the Warwickshire Event Centre, Fosse Way, nr. Leamington Spa, Warwickshire, **CV31 1XN** on the junction of the A425/B4455, which is readily accessible from most parts of the country. It is at the centre of the national motorway network, with the M1, M6, M40, M42, M45 and M69 all nearby; Leamington Spa Railway Station is only 3.5 miles away. Birmingham Airport, with its domestic and international flights, is just 30 minutes away.



FREE CAR PARKING

Exhibition Link Bus

Running from Leamington Spa Railway Station on Thursday, Friday and Saturday. Please check website for full details.

ADMISSION PRICES	ONLINE TICKETS*	FULL PRICE TICKETS**
Adult	£9.50	£10.50
Senior Citizen	£8.50	£9.50
Child (5-14 yrs)	£3.00	£4.00

* Online tickets see our website.

Call SEE Tickets on 0115 896 0154 if you would like to book a ticket by phone or have any questions when booking your tickets.

Meridienne Exhibitions cannot process any telephone orders for this exhibition and you must call SEE Tickets.

If you have a general query other than to order tickets please call 01926 614101.

** Full price tickets are available on the day of your visit from the cash box.

Group Discounts: Order 10 or more tickets online to receive 10% discount - please enter code GRP10.

VISITOR INFORMATION

Cash Machine

This is located at the exit door to the lecture theatre next to stand 89.

Exhibition Bus Link

This service operates between the exhibition and LEAMINGTON SPA Railway Station. The pick up/drop off point is at the end of the walkway in front of the exhibition centre.

The service runs continuously at 30 minute intervals. Journey time is approximately 10 minutes. There is no service on Sunday. Charges are £3.00 each way.

First Aid

If you require first aid please see any member of our security staff or go directly to the first aid room which is situated in Hall 1 at the foot of the stairs to the restaurant.

Lost Property

Please go to the organisers' office at the main entrance or see any member of our security staff.

Organisers' Office

Located by the main entrance.

Places To Eat And Drink

Restaurants are available in both halls. Hall 1 has a first floor restaurant whilst Hall 2 has event catering.

Toilets

Ladies and Gents facilities are located underneath the mezzanine in Hall 1 and outside behind Hall 2. There is also a disabled toilet at the end of Hall 1.

Opening Times

Thursday – Saturday: 10.00am – 5.00pm, Sunday: 10.00am – 4.00pm (Final Admissions 1 hour before closing)

Should you require any assistance whilst at the exhibition, please contact either the organisers or a member of the security team or go to the main entrance.

LECTURE PROGRAMME

Thursday 18th October

Time	Lecture Topic	Presented By	Location
11.00am	Some Thoughts on Shaping Sheet Metal	Peter Stevenson	Lecture Room
12.00pm	3D Modelling	Derek Brown	Lecture Room
1.00pm	Silver Soldering - A Simple Process Made Difficult	Keith Hale	Lecture Room
1.00pm	Running The Furnace LIVE DEMO	Noel Stevenson	Outside Event Area
2.00pm	The Music Box Society of GB	John Moorhouse	Lecture Room

Friday 19th October

Time	Lecture Topic	Presented By	Location
11.00am	Some Thoughts on Shaping Sheet Metal	Peter Stevenson	Lecture Room
12.00pm	3D Modelling	Derek Brown	Lecture Room
1.00pm	Silver Soldering - A Simple Process Made Difficult	Keith Hale	Lecture Room
1.00pm	Running The Furnace LIVE DEMO	Noel Shelley	Outside Event Area
2.30pm	Setting Up and Running a Small Scale Foundry for Model Engineers	Noel Shelley	Lecture Room

Saturday 20th October

Time	Lecture Topic	Presented By	Location
11.00am	Some Thoughts on Shaping Sheet Metal	Peter Stevenson	Lecture Room
12.00pm	3D Modelling	Derek Brown	Lecture Room
1.00pm	Silver Soldering - A Simple Process Made Difficult	Keith Hale	Lecture Room
1.00pm	Running The Furnace LIVE DEMO	Noel Shelley	Outside Event Area
2.30pm	Setting Up and Running a Small Scale Foundry for Model Engineers	Noel Shelley	Lecture Room

Sunday 21st October

Time	Lecture Topic	Presented By	Location
11.30am	Youngsters in Model Engineering	Angus French & Patrick Hendra	Lecture Room
2.00pm	PRESENTATION OF AWARDS		

Book your tickets at www.midlandsmodelengineering.co.uk

All details correct at time of going to press. Subject to change. Please check website for up to date information.



A Distinguished Gentleman

Mike concludes his short series on the design and build of his 5-inch gauge London & North Western Railway Claughton 4-6-0 No. 650 'Lord Rathmore'.

BY MIKE WHEELWRIGHT – Part Five of Five, Finishing Off

EDITOR'S NOTE: Mike is keen to emphasise that this is not a traditional 'blow-by-blow' account of the loco's construction but a description of what was special about the prototype and how he addressed replicating it in miniature. Included are some drawings, addressing particular areas and prepared strictly for Mike's own use and therefore not necessarily adhering to all conventions!

Cab and Fittings

I wanted No. 650 to be driven like the real thing so I spent some time in trying to replicate the arrangements of the controls. It all boils down to how fiddly you can make a scaled-down valve or clack and still have reliable operation. The full-sized cab arrangement was quite tidy with a manifold for the usual steam valves and pipes off for pressure gauge, brakes, heating, whistle and injectors and I was able to stick to it but with valves a bit overscale to ease operation.

Check valves of prototypical appearance for each injector were mounted on the door plate with a single water gauge on the fireman's side (right). Special Crewe features I wanted to incorporate were the inward-opening fire door, push-pull injector steam valves, vacuum brake and ejector valves with a linking control handle, blower handle on the boiler handrail, five-spoked circular hand wheels, pressure and vacuum gauges against the cab sides.

The fire door was based on the 'Etna' design and it looks nice and works well. The assembly is attached by screws into blind-threaded bushes incorporated as part of the boiler design, this was useful as after a few outings I replaced the scale frame and door with a simple hinged door with the same surround and dummy operating handle. I found my skills as a fireman were insufficient for me to fire the long grate through the partially obstructed door opening, I know it can be done but I needed things easy to use for regular passenger hauling.

The manifold was made by silver soldering gunmetal blocks into the required shape and the various screw-down valves were produced by judiciously reducing the body size of suitable commercial valves – there was no easier way of making the five-



"It all boils down to how fiddly you can make a scaled-down valve or clack and still have reliable operation.."

spoke handwheels other than by drilling and filing.

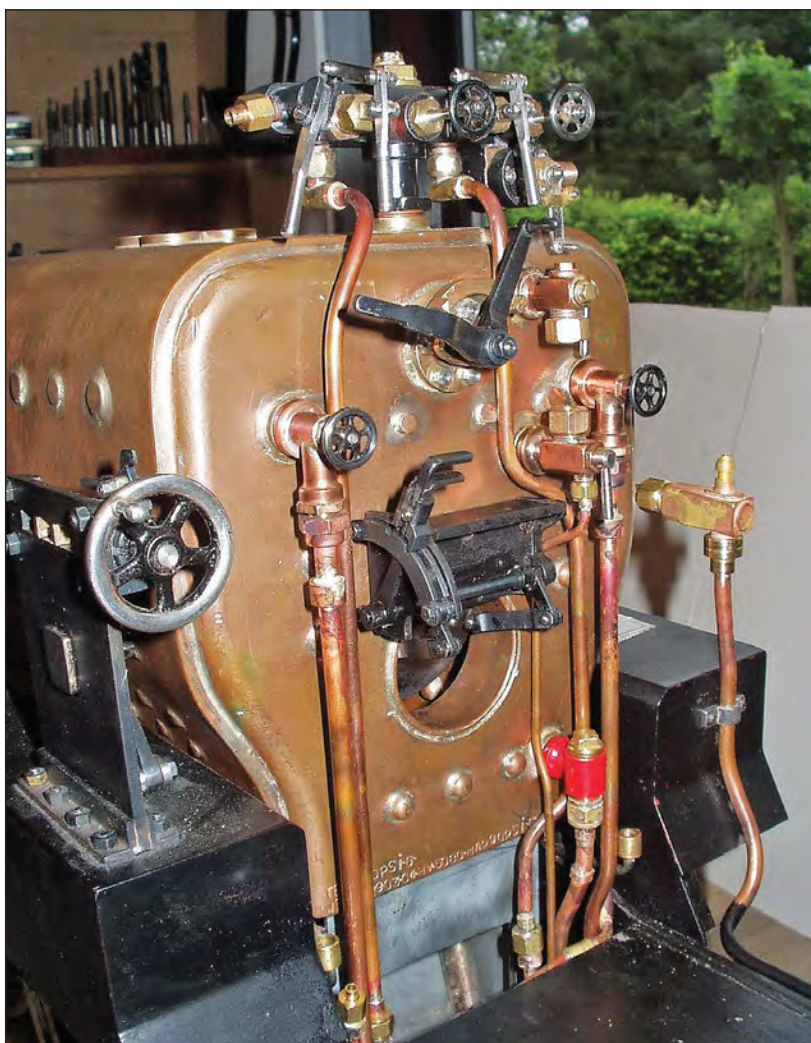
LNWR footplate floors are different in being made from a steel plate with 1 1/8-inch square holes into which oak blocks were hammered. I had a bit of a think of how to deal with that in 1/12th scale and ended up by using a steel plate floor with a grid

pattern of 3/32-inch holes and 1.5mm ply affixed to it with Araldite. Under pressure the adhesive squeezes through the holes below, when set the wood between the holes was then sawn away back to the plate in a grid pattern leaving dummy block ends, this has stood up to normal use.

Lever-operated push-pull injector ▶

RIGHT: Mike was very keen to replicate the driving experience of the full-size locomotive as much as possible so spent some time getting the cab controls prototypically correct as far as possible.

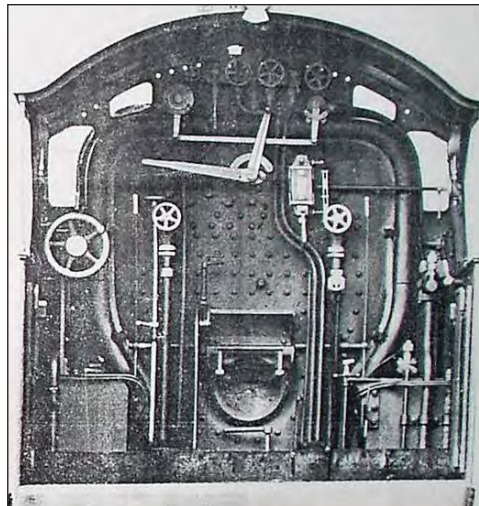
All photos and drawings in this feature by Mike Wheelwright unless credited otherwise





steam valves mounted on the manifold appeared on LNWR engines in the 1880s, so they were a 'must' on the model but getting them to work led me quite a dance. Manufacture was no problem as I had designed them around $\frac{7}{32}$ in O-rings: the valve is held shut by steam pressure holding the O-ring onto a face with a $\frac{5}{32}$ in port that guides a fluted spindle extension, when the spindle pulls the ring seal away the inrush of steam forces the valve back and the action has a switch-like toggle feel. The spindle is sealed by another O-ring in the gland as it is always under pressure.

They are delightful to operate, water flicked on, valve lever snapped back, *voila* – boiler feed. It really is as simple as that, but there is a secret to it. I have a bit of experience in plumbing injectors and when done properly I expect them to work reliably. The prototype, like other LNWR engines, had its injectors attached to the ashpan, something I declined to emulate, but there was no



ABOVE: A comparison with the full-size loco shows that Mike did a good job with his cab.

BELOW: This shot taken during construction shows the build of the smokebox to good effect.

difficulty in keeping them out of sight under the removable cab floor either side of the drag box, the pipe runs were nice and easy.

I fitted a pair of 24-ounce injectors from a reliable supplier but I could not get them to pick up. Water on, then steam with a 'click', result: just a rush of steam from the overflow. I went through the usual checking combinations, proving the injectors on another engine, trying other known injectors on No. 650, trying temporary direct external pipework.

It looked like my design of steam valve was the culprit so I replaced one with a screw-down valve: that did the trick, the injector worked. The problem had been narrowed down to the push-pull valves so I began a series of trials to increase the steam flow, this made no difference.

In one of the temporary set-ups I put in a stop valve 'upstream' of the push-pull valve so it could be isolated and worked on. While fiddling about I opened the stop valve when I had

inadvertently left the push-pull open and found that the injector picked up, clearly my valves did pass enough steam. Then I reversed the procedure leaving the stop valve open and operated the push-pull but again steam squirted from the overflow.

A length of transparent tubing in the water feed revealed what was happening: initially water flowed through the injector but when the steam valve was opened it was pushed back along the supply tube. The sudden opening of the toggle-like valve seemed to create a shock wave of air down the empty steam line pushing the water back out of the injector so when the steam arrived a split-second later there was no water present to start the 'pick up'.

I was eager to run my engine and in desperation I fitted temporary screw-down valves but I was very disappointed and started a process of recounting my woes to all and sundry in the hope that someone would provide a solution.

After a while a simple comment led to success: an acquaintance pointed out that if I fitted lifting injectors I could open the steam first and then run the water. I did just that and solved the problem, of course as that type of injector draws a vacuum with just steam flowing it worked in the usual order as well. Phew!

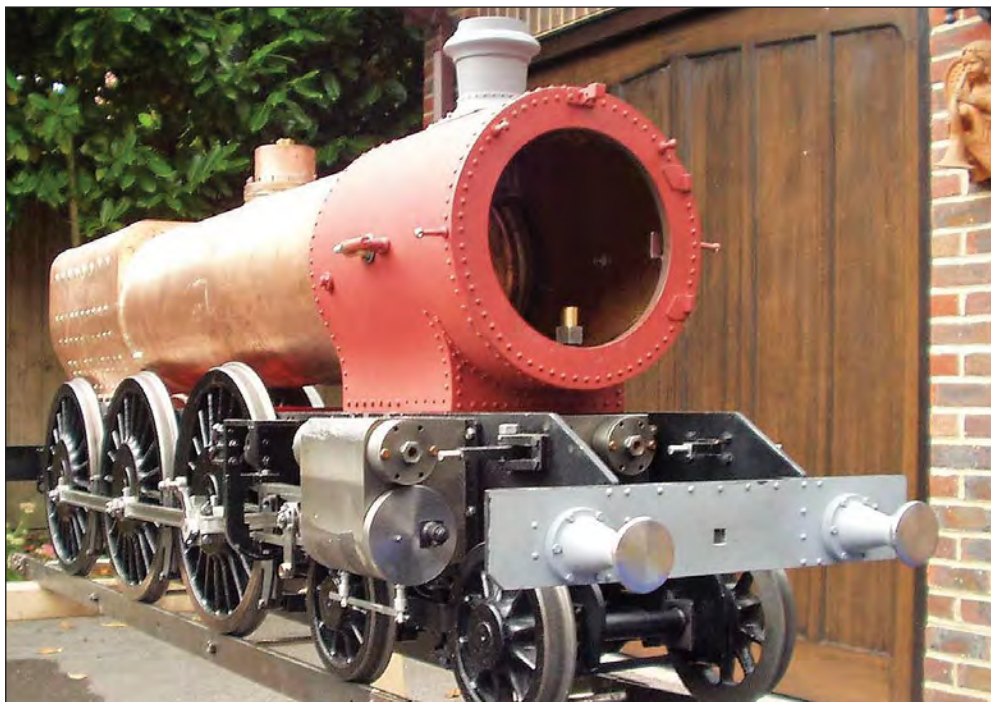
The pressure and vacuum gauges are mounted on the cab sides and are quite impossible to see from the usual driving position, but with a reliable engine who needs to see them? Following the prototype I put a miniature blower valve on the side of the smokebox and operated it by rotating the handrail on the fireman's side but the blower spurted water when braking.

The steam is taken from a bush on the smokebox tubeplate and it is affected by surges, something not easy to modify without removing the boiler so I make sure the blower is off when running. On a subsequent LNWR model I altered the arrangement without affecting the appearance.

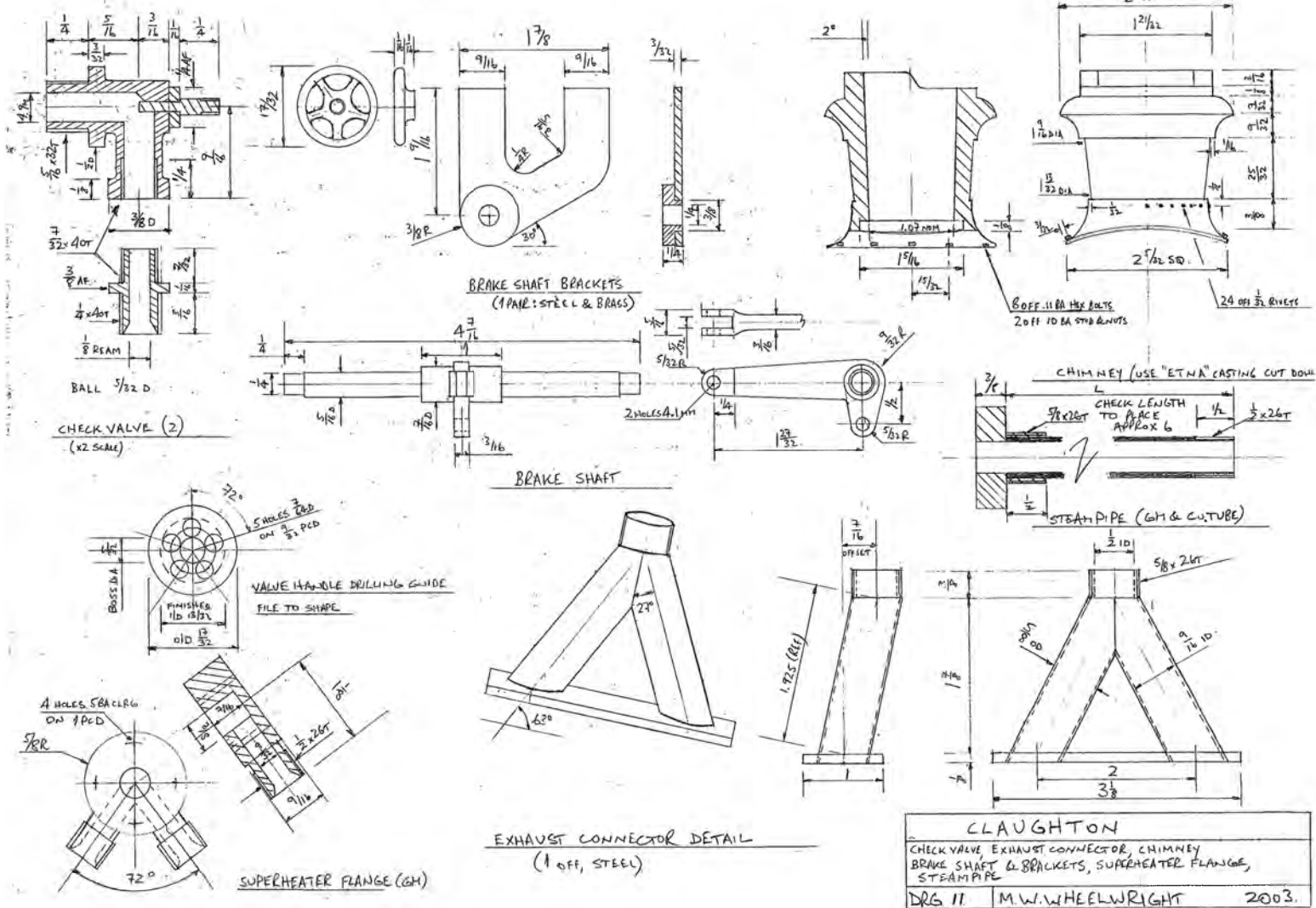
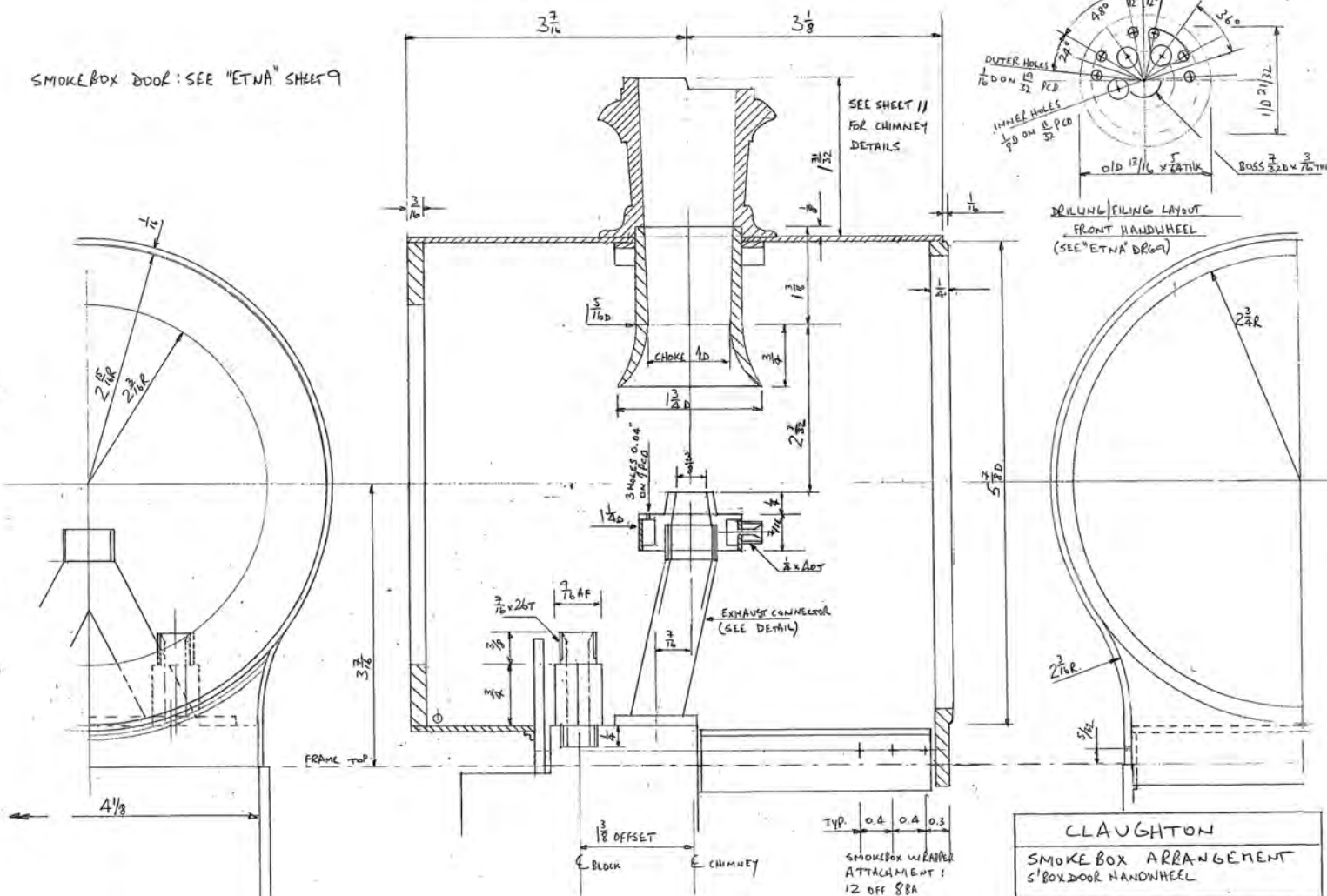
Smokebox & Chimney

Finishing the engine presented no real challenges. The smokebox was a novel experience because it is a combination of the open bottom wrap-round type with an additional circular extension at the front. My method was to roll and silver solder a 16G brass tube for the overall length then to slit the back part and open it to form the usual shape of a wrapper smokebox.

At the transition between the circular front and the open bottom at the back there is a sort of 'throatplate'. The details of the door are very much standard LNWR but in addition to the



SMOKEBOX DOOR: SEE "ETNA" SHEET 9





central closing handwheel (five spokes again) there are four dogs, Crewe knew from experience how hard this boiler was going to be worked. I fitted dummy dogs permanently to the door as I would be certain to lose proper ones on the steaming bay.

The smokebox draughting was as usual laid out to the rule of a 17-degree included angle from the edge of the blast nozzle to the chimney choke. For the blast nozzle diameter I have a formula based on total cylinder area, not from full size but from experience with models, with four cylinders of 1 $\frac{3}{8}$ in diameter it turns out to be 0.375in. It is a simple matter to open out a blastpipe so I usually test engines with a nozzle starting at about $\frac{1}{32}$ in less than my calculation and increase the diameter in very small steps until pressure is just maintained with a good fire when working hard.

Nobody wants to struggle for steam but I find sighting signals through a cloud above the safety valves very annoying, seeing the valves starting to lift when easing into the station is just right. Of course these are not awful noisy pop things but proper ones as used by nearly everybody in those days, and for ever and a day by the GWR.

At a pinch chimneys can be made from a length of steel bar plus an incredible amount of patience in

turning, cutting and filing but it is something I try to avoid. LNWR chimneys are quite distinctive with their particular shape and square skirt and luckily the modeller is assisted by standardisation. All North Western engines from Webb's time onwards share the same rim and base, the long 3ft 6in chimneys and the short one on the Cloughton only vary in height, and all can be produced from one model casting, in this case from Etna.

I removed $\frac{3}{16}$ in from the middle of the gunmetal casting and finished it after soldering the bits back together. There was one glitch, the capuchon – the raised bit at the front carried by some chimneys. These became fashionable at Crewe in the 90s for some engines although I cannot fathom out what was actually achieved especially as not all of the engines of a particular class carried them.

They were made as a curved plate riveted inside the chimney front so I finished my chimney plain ready to fit the plate. Just then I came across a reference to the Cloughton chimney being different with the capuchon being part of the casting, so having cut things to length I had to solder an extension back on to form the cast-in shape: I recently had confirmation of this when I came across a Cloughton chimney on the floor of the booking office at Ingrow (ex-Midland Railway),

“Capuchons became fashionable at Crewe in the 90s for some engines although I cannot fathom out what was actually achieved...”

ABOVE LEFT:

What makes it all worthwhile, Mike at the regulator of the Cloughton on passenger-hauling duties at Worthing.

BELOW:

The completed Cloughton, and its contented builder. Photo: David Baldwin



how strange! An Etna dome casting was also similarly modified.

Platwork is fairly extensive as it follows Victorian styling applied to a big engine, most of it is from 1mm steel sheet which I find doesn't look too thick but is reasonably resistant to knocks. The cab is fairly long and the roof is fitted with a slide-out section to facilitate driving.

To finish the buffer beams correctly I had to choose a date for my model, this determines the extent of the cut outs at the lower corners. Although the first engines had simple rectangular beams it was found that they trimmed off bits of platform edging in some places so the corners were then cut away in stages: I went for Stage 1, summer 1913, when No. 650 was newly out of works.

Running the Cloughton

I mentioned that I wanted to recreate the driving experience of a Cloughton and I believe that I have pretty well achieved it (I don't expect there is anyone still around to disagree). All the things you want to happen, do happen. The regulator can be pulled down smartly when starting and No. 650 begins to move away slowly. Picking up speed on the 1-in-100 at Hove Park, the wheel is run back four turns to settle into the climb. It is worth mentioning that North Western reversers have no indication of the setting (why ever would a driver adjust the cut-off by anything other than feel?) and they project into a box above the splasher so the nut cannot be seen. The trick is to start in full gear and then count off the turns, my engine is pretty close to the prototype and has 7 $\frac{1}{2}$ turns mid-to-full.

On the level and downhill another turn or so can be taken off and the exhaust note drops. The last part of the run is back on 1-in-100 with the odd steeper bit but a couple of heavy trolleys can be pulled at three or four turns back.

The injectors are put on and off according to the road and although I cannot be sure of the boiler pressure I can usually see the valves lifting as I ease back for the station. It's a doddle. By the way, as I pull up the bank with my twice-scale load at the correct speed of 2 $\frac{1}{2}$ mph (= 30) I daydream of being on a full-size Cloughton on Grayrigg, of course it's on a fine day and I'm not on the shovelling side of the footplate...

■ The first four parts of this series appeared in the June to September 2018 issues of **EIM**. Digital copies can be downloaded or printed versions ordered from; www.world-of-railways.co.uk/engineering-in-miniature/store/back-issues/ or from 01778 392484.

Walschaerts motion – but it's very easy...

Bernard continues his in-depth study into a propulsion system core to many railway locomotives by looking at the valves and their advantages.

BY BERNARD FARGETTE – Part Three of a series

We begin this month by looking at the advantages of the slide valve. So far we have studied only the form of steam distribution by a slide valve (a D-valve). Forms of this were first developed by William Murdock (in 1799) and Matthew Murray (1802) in place of the tapped valves used originally by James Watt.

The slide valve has certain advantages – it is easy to manufacture using basic means, and it provides efficient sealing by lapping the two flat surfaces of the valve and the port face to each one another. The steam does not pass directly (by cross leakage) from the steam chest to the exhaust without providing useful work in the cylinder. The slide valve may lift if too much steam is condensed in the bottom of the cylinder, and the drain cocks are closed or the loco carries water over from the boiler (priming).

On the other hand, the pressure exerted by the steam, which holds the

slide valve on the port face and is useful for sealing, leads to significant effort required to move it, and therefore to significant forces applied to the various elements of the valve gear. The following calculation allows us to realize this force: (Calculation in Imperial units between brackets)

Consider a slide valve for a locomotive of 5-inch gauge, with an area of $36 \times 28\text{mm}$ ($1\frac{7}{16}\text{in} \times 1\frac{1}{8}\text{in}$), about 10cm^2 (1.63in^2) and a pressure of 7 Bars (about 7 kgf/cm^2 100psi). The force exerted on the valve will be:

$10 \times 7 = 70\text{ kgf}$ ($1.62 \times 100 = 162\text{ lbf}$) or about 700 Newtons.

Taking a coefficient of friction of 0.05, the force to move this slide valve will be $700 \times 0.05 = 35\text{ Newtons}$ ($162 \times 0.05 = 8.1\text{ lbf}$), so the equivalent of several kilogrammes (or pounds) to lift.

Balanced slide valves were invented to avoid this disadvantage; they require a good seal of the device, which is difficult to achieve in a model engine.

The piston valve

At the beginning of the 20th century, the piston valve (Figure 19), balanced by its very design, supplanted the slide valve. This was mainly due to the development of superheating and the resultant increase of the normal working pressure of boilers, thus causing greater pressure on the slide valves. The length of a piston valve can be longer than a slide valve, and so reduce the length of steam passages to cylinder.

In the slide valve, the admission is always provided at the outer edges. In

the piston valve, admission by the inner edges is possible as in Figure 2. Thus the sealing of the gland on the valve spindle is less critical since the latter only seals cooled steam and an exhaust pressure that is well below that of the inlet pressure.

The main problem of the piston valve, however, remains that of sealing the piston in its liner, to prevent leakage and the steam passing directly from the inlet to the exhaust.

This requires careful machining of the piston and liner, with the possible use of segments, especially in our model scales.

So with a piston valve what changes in the valve gear? Simply because the admission is now via the inner edges and the exhaust by the outer edges, it is necessary to reverse the direction of movement of the valve. For movement coming from the expansion link, this is done by setting the eccentric pin of the return crank 90 degrees behind the crankpin, and for the movement coming from the crosshead, by reversing the upper pins, B and T, of the combination lever as shown in Figure 20.

While the movement from the expansion link to a slide valve was amplified by the combination lever, with a piston valve this movement is reduced by the lever.

Another consequence of the development of the piston valve for the locomotive is that the position of the point B is now above the axis of the valve spindle. It is therefore more difficult to keep 'all-square'

FIGURE 19:

Piston valve with inlet by the inner edges (internal admission).

FIGURE 20:

Walschaerts valve gear for a piston valve with inlet by the inner edges (internal admission).

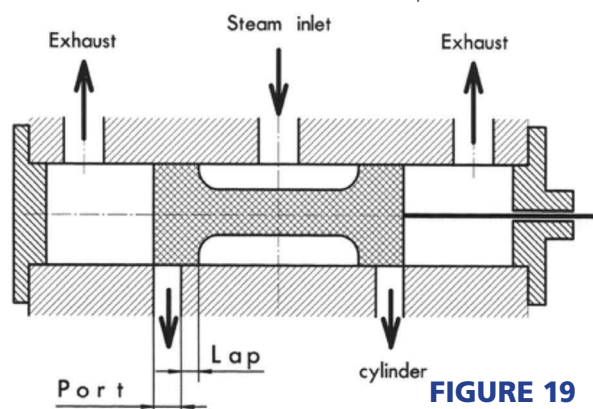


FIGURE 19

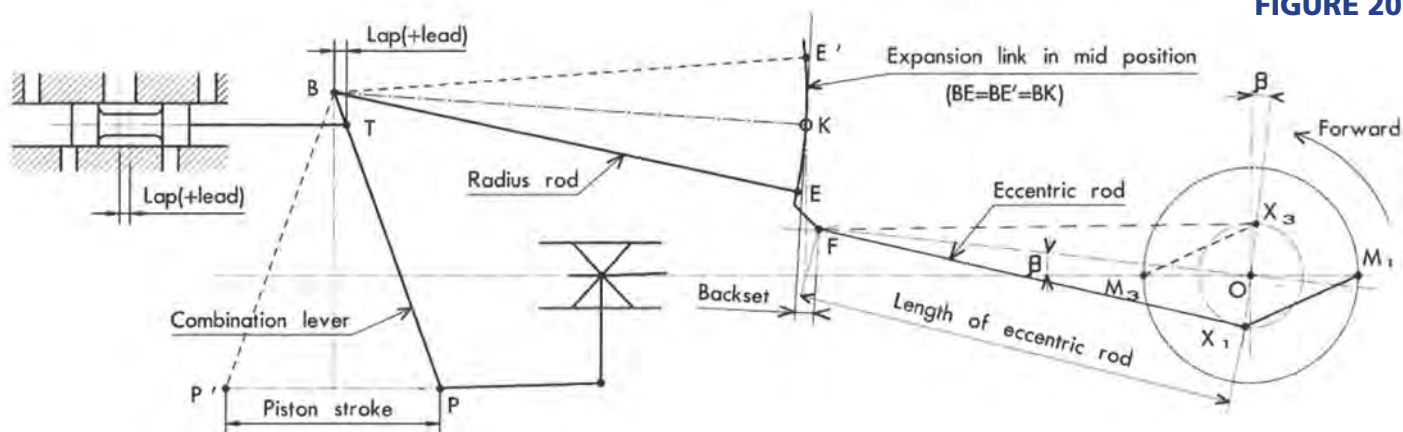


FIGURE 20

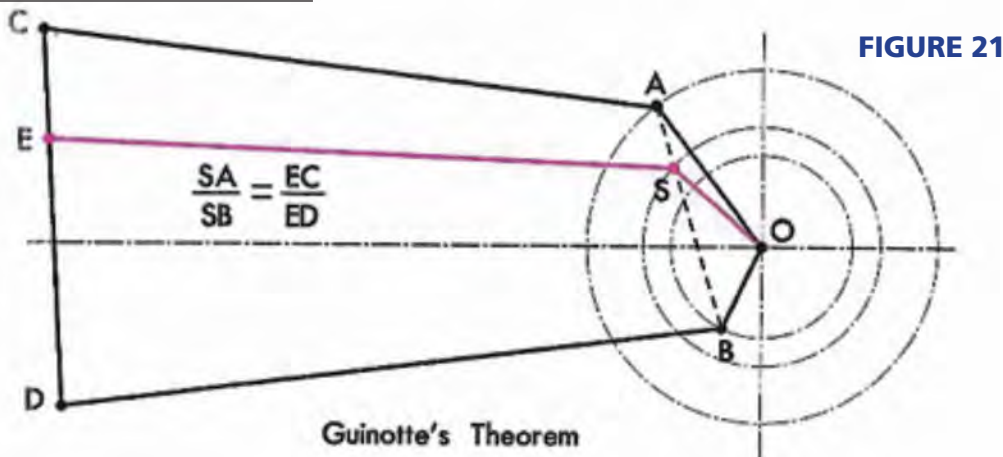


FIGURE 21

Guinotte's Theorem

positioning than with a slide valve.

The eccentric and radius rods are generally inclined, as in Figure 3, with the inherent complications. For instance $OX1$ is set to $90^\circ + \beta$ (behind OM) so that $FX1 = FX3$ when the expansion link is in its mid position. The backset is determined relative to the tangent in K at the curvature of the expansion link, to make the drawing and machining of the expansion link simpler.

Keeping the B and T names, but with reversed positions, the formula found for the slide valve remains valid:

$$\frac{BT}{BP} = \frac{2(lap+lead)}{\text{Piston Stroke}}$$

Equivalent Eccentric

We have seen that the movement of the valve is the combination of two synchronous movements, one from the crankpin via the crosshead, the other from the eccentric pin via the expansion link. We can apply

FIGURE 21:

Guinotte's Theorem. Equivalent eccentric OS corresponding to movement of E, when CD is driven by the eccentrics OA and OB.

FIGURE 22:

Slide valve; determination of the equivalent eccentric OS of a Walschaerts valve gear.

FIGURE 23:

The piston valve equivalent to figure 22.

Guinotte's theorem, Figure 21:

If two points C and D of a straight bar are respectively driven by two cranks OA and OB and connecting rods whose angularity is ignored, the movement of the valve caused by a point E of CD is the same as that given by a single crank OS whose S pin divides AB into the EC/ED fraction.

So, the movement of E is the one that would have been given by a 'Virtual' or 'Equivalent' eccentric OS.

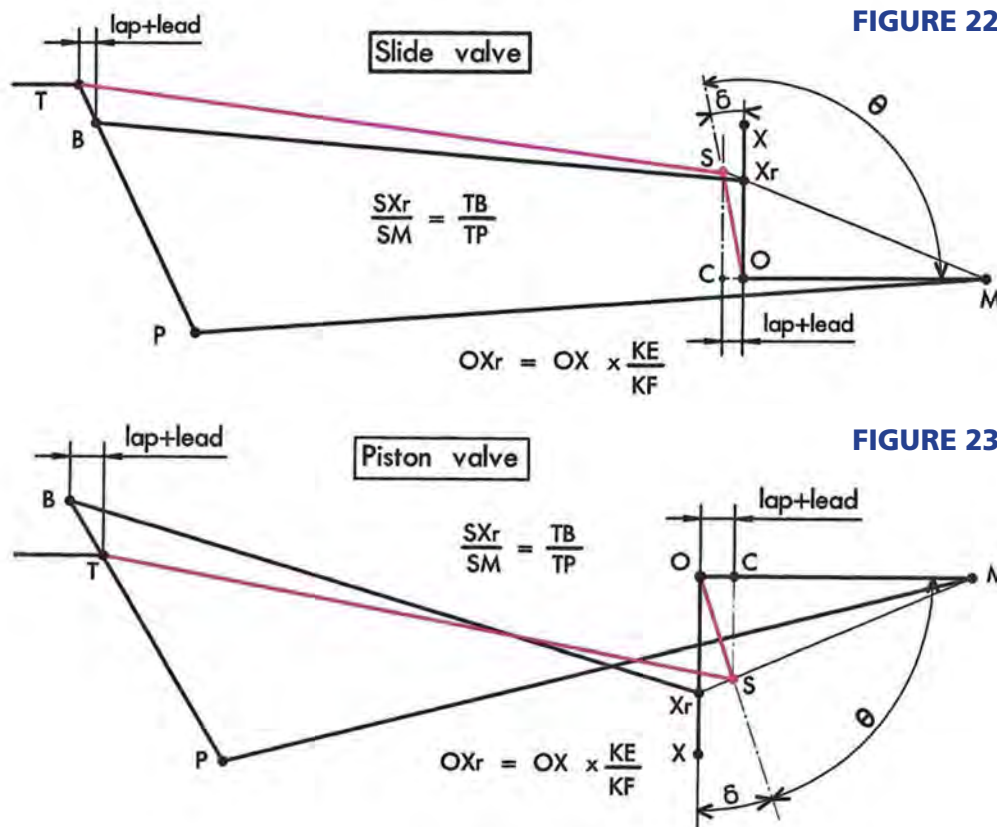
Figure 22 shows the example of a slide valve and Figure 23 that of a piston valve.

In the case of the Walschaerts valve gear, it must be taken into account that the movement coming from the eccentric pin X is reduced by a quantity KE/KF . Thus, the crank OX is replaced by a crank Ox_r such that:

$$Ox_r = OX \times \frac{KE}{KF}$$

FIGURE 22

FIGURE 23



By application of the Guinotte's theorem, the point S divides the segment MXr such that:

$$\frac{SX_r}{SM} = \frac{TB}{TP}$$

And as

$$\frac{BT}{BP} = \frac{2(lap+lead)}{\text{Piston Stroke}}$$

It is shown that the distance OC is equal to lap+lead.

The $\angle SOX$ angle (δ) that the equivalent eccentric makes to a 90-degree position of the main crank OM (as for an eccentric for a valve without lap) is called the angle of advance. The setting of angle θ (MOS) is therefore equal to 9 degrees plus the angle of advance δ for a slide valve (inlet by the outer edges, external admission), and at 90 degrees minus the angle of advance δ for a piston valve (inlet by the inner edges, internal admission).

What happens if the die block is moved in the expansion link to decrease the cut off or to reverse the engine by moving the reversing lever in the cab? The equivalent eccentric OS changes in $OS1, OS2, \dots$ as shown in Figure 24 for a slide valve, and Figure 25 for a piston valve. At mid gear, the equivalent eccentric becomes OC, which is equal to lap + lead; the ports are only open by a value equal to the lead.

The Walschaerts valve gear therefore has the same effect as a virtual or equivalent eccentric analogous to that eccentric $OX1$ of Figure 11 (see Part 2, August 2018 issue) for a slide valve, or $OX1$ of Figure 26 for a piston valve.

Other factors

To consider suspension, disturbances due to slipping of the die block (die slip), and Heusinger's motion.

Changing the direction of travel and adjusting the cut-off is done from the reversing lever or a screw reverser in the cab via the reach rod. A sequence of levers and links (reversing lever, lifting arm, lifting link) combines to hold the radius rod and die block in the correct position.

The oscillation movement of this lifting link (Figure 27) shows that for the same position of the reversing lever (or the screw), with the engine moving, the die block moves with a greater or lesser amplitude along the expansion link – this is called the die slip.

So, the distance KE is not constant, which disturbs by a greater or lesser extent the movement of the valve, not to mention increases wear on friction surfaces.

On most French locomotives, the suspension point L of the radius rod is located between E and B, as close as possible to E. It is therefore necessary



FIGURE 24: Slide valve; equivalent eccentrics OS, OS₁, OS₂... for different positions of reversing lever.

FIGURE 25: Piston valve; equivalent eccentrics OS, OS1, OS2... for different positions of the reversing lever.

FIGURE 26: motion of piston valve actuated by single eccentric. Eccentric pin X1 is set behind the crank pin M1 (at 180° to the setting for a slide valve).

FIGURE 27: Die slip for suspension of the radius rod by a lifting link. **FIGURE 28:** Die slip for a suspension of the radius rod by slotted extension.

to determine as wisely as possible the best position **A** for the weighshaft and the length of the different links to minimize these disturbances.

The ideal solution does not exist, so generally the choice is made by favouring a definite cut off for forward motion as in [Figure 27](#), unfortunately at the expense of other cut off and especially the backward motion. The swings of the expansion link and the lifting link can partially compensate each other for forward motion, while they oppose each other in reverse.

Diagrams Figure 27 and 28 are simplified because pin **B** actually describes a flattened figure 8-shaped curve instead of describing a straight line segment as in these sketches; only pin **T** moves in a straight line, the valve spindle being in parallel with the cylinder and the frame.

In Germany, the Walschaerts motion is called Heusinger motion. In 1849 Edmund Heusinger Von Waldege invented a similar motion, without knowing of the work of Egide Walschaerts. This motion was adopted very quickly in Heusinger's country, with some differences to Walschaerts. In particular, the radius rod was extended beyond the expansion link to hold the lifting link and even, (as in [Figure 28](#)), by a slotted extension, in which moves a die pinned at the end ►

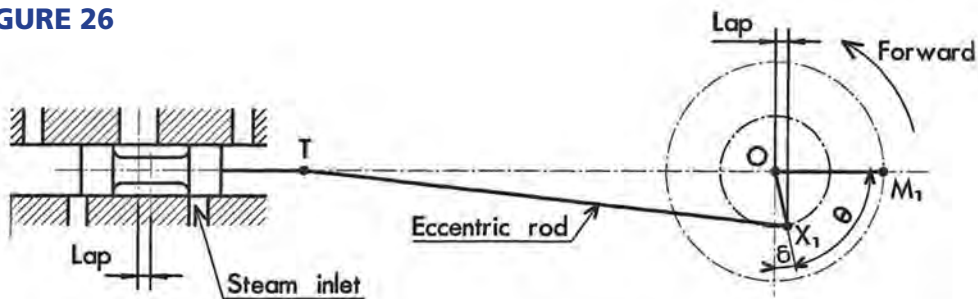


FIGURE 27

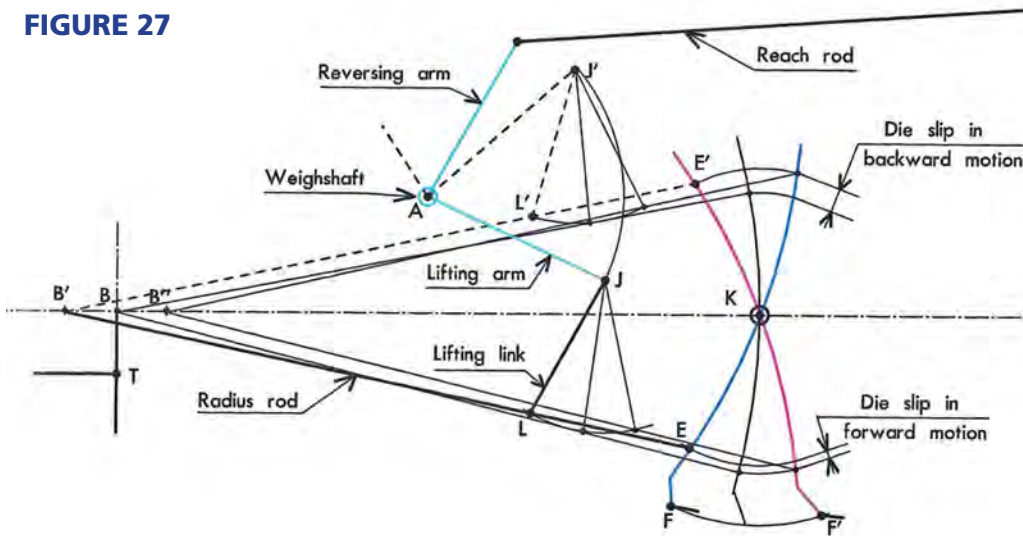
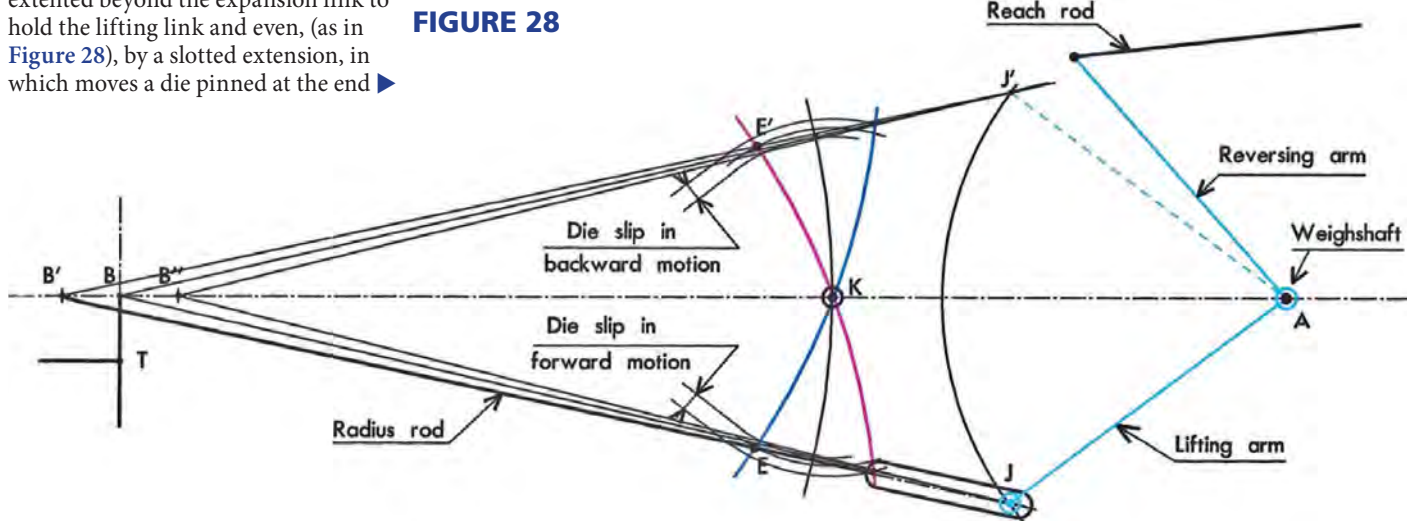
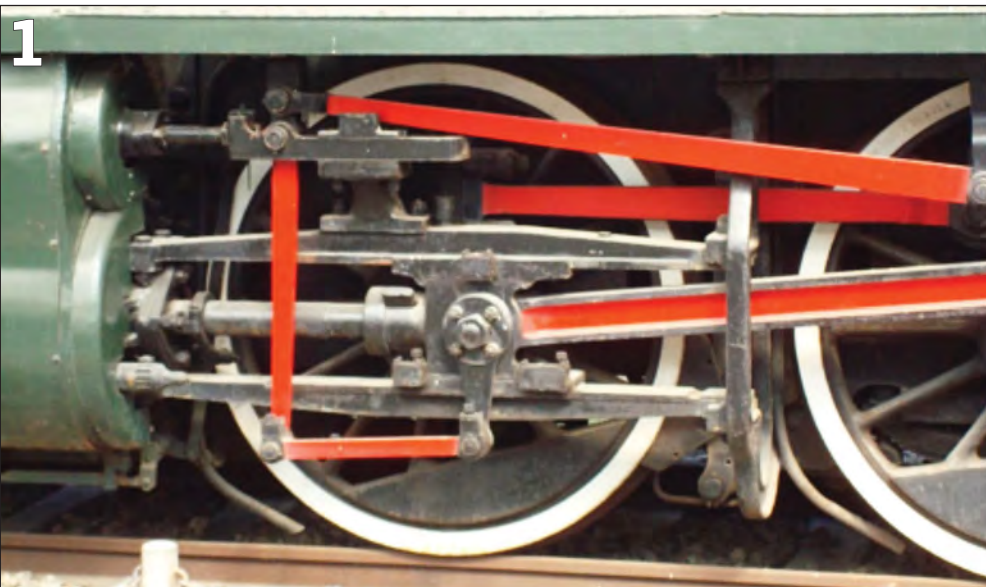


FIGURE 28





of a lifting arm. This last arrangement is the one that equalises (by symmetry) and minimizes the die slip in both directions.

This solution was chosen in France only for a few engines including the 232 U (called 'La Divine'; the ideal of the French steam locomotive, designed by Marc De Caso), but more extensively in England on LNER engines, and also in model engineering on the 'Simplex', the well known freelance locomotive designed by Martin Evans.

Photo 1 shows the valve gear of the French locomotive 140 C 313 (a 2-8-0) exhibited as a monument in Rheims railway station since 1979. This engine was built in 1917 by the North British locomotive Co in Glasgow, to be used by ALVF (Artillerie Lourde sur Voies Ferrées), French military haulage of heavy guns during the First World War.

The relative arrangement of the links between the combination lever,

the radius rod, the connecting link and valve spindle indicates, at a glance, that this is an internal admission arrangement, so thus must be a piston-valve design. A relief valve is fitted on each cylinder cover to release the condensed steam trapped in cylinder, if the drain cocks are not open.

Photo 2 shows the valve gear of the French preserved loco 231 K 8 (4-6-2) running in 2014. K 22 of the same class arrived at Carnforth in 1970, but due to the larger, French loading gauge it could not operated on UK lines and returned to the continent in 1995 – first to Nordlingen, then to Heilbronn in Germany.

These Pacific PLM 6000 series compound locos have inside low-pressure cylinders and outside high-pressure ones. There is only one reach rod, so the two valve gears are called conjugated gear as in LNER practice. The upper pin of the combination lever (point B of the

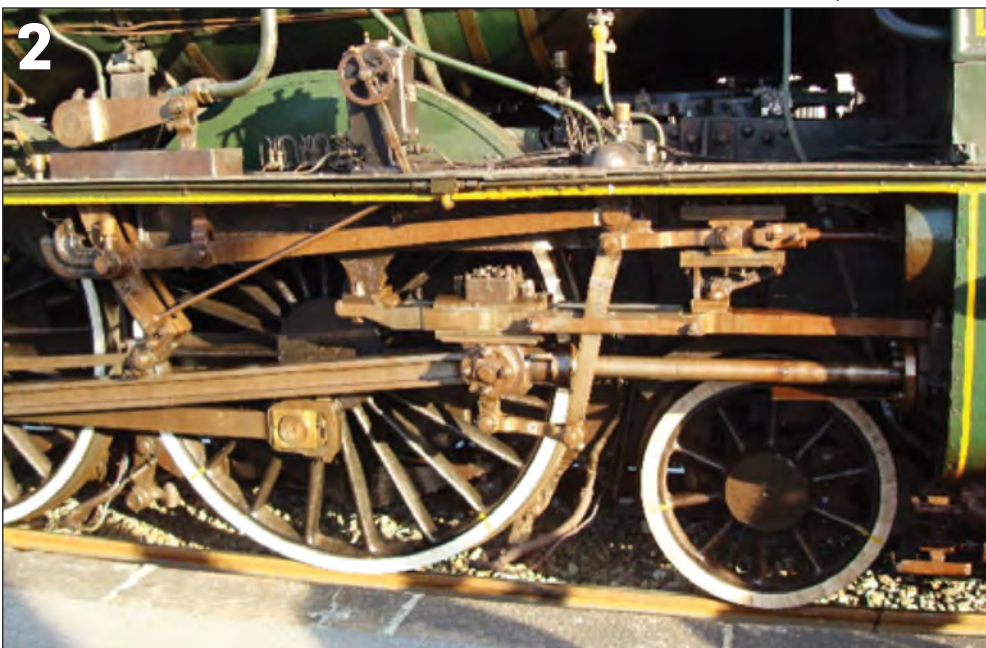
PHOTO 1:

French 2-8-0 1540, built by North British - see text for valve gear description of both pictures on this page.

PHOTO 2:

French 4-6-2 K8, as running in 2014.

All diagrams and photos in this feature by Bernard Farguette



BIBLIOGRAPHY:

Walschaerts Valve Gear, by Henry Greenly, revised by Ernest A Steel (reprint 1973), MAP publications.
Locomotive Valves and Gears, by J.H. Yoder and G.B. Wharen (reprint 1993), TEE Publishing Ltd. (The authors are American and describe US practice for full-size valve gears)
Locomotive Valve Setting, by F. Williams (reprint 1994), TEE Publishing.
Slide Valve Simply Explained, by W. J. Tennant (reprint 1987), TEE Publishing.
Design Procedures for Walschaerts and Stephenson's Valve Gears, by D.L. Ashton, self-published (reprint 2003).
Model Locomotive Valve Gears, by Martin Evans (reprint 2010), TEE Publishing Ltd.
The Evolution of Locomotive Valve Gears, by T. H. Shields (reprint 1999), TEE Publishing Ltd.
Valves & Valve Gears for Steam Locomotives by C.S. Lake and A. Reidinger (reprint 2008), TEE Publishing Ltd.
Model Stationary and Marine Steam Engines by K.N. Harris (reprint 1974), MAP publications.
Simplex 0-6-0 Tank, Simple Freelance Steam Locomotive, by Martin Evans (1977), MAP publications.
Model Steam Locomotives by Henry Greenly, revised by Ernest A. Steel (reprint 2005), Camden Miniature Steam Services.
Valve Gear Design with a Hand Calculator, by Richard E. Evans. *Live Steam* magazine April 1981

drawing) is here suspended by a link of a shaft which, swinging, transmits the movement from the outside expansion link to the combination lever of the inside motion.

The small link, visible in the photo, which connects the combination lever (point T of the drawings) to the valve spindle copes with the misalignment.

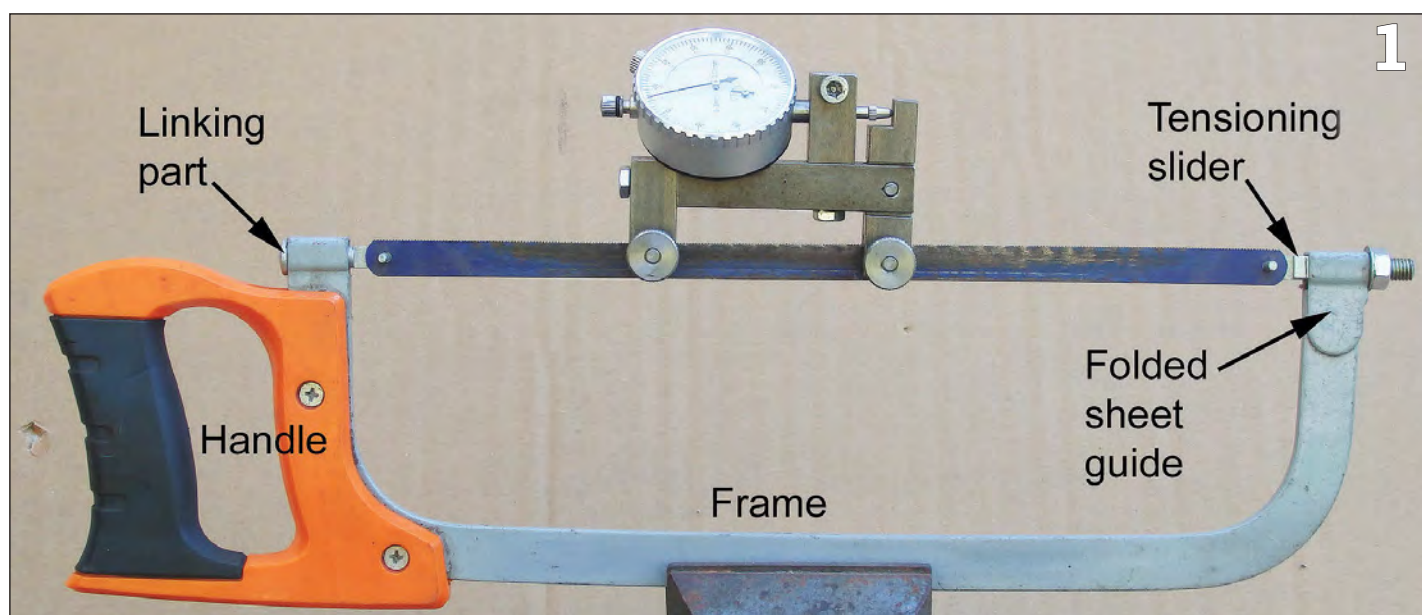
On other PLM Pacifics of the same period, 1909 to 1912 (series 6200), there were two reach rods, one for high pressure, the other for low. Therefore there were two independent screw reversers and Walschaerts motions; the valve spindle was then conventionally connected directly to each combination lever. **EIM**

■ Previous features in this series appeared in the June and August 2018 editions of **EIM**. Digital copies of previous issues can be downloaded or printed versions ordered from www.world-of-railways.co.uk/engineering-in-miniature/store/back-issues/ or by telephoning 01778 392484. Bernard will continue his study in a forthcoming issue. **EIM** technical editor Harry Billmore contributed to the English translation of this feature.

Improving a hacksaw

Jacques offers some ideas for better use of one of the most basic workshop tools.

BY JACQUES MAUREL



The hacksaw is one of the most used tools in our workshop, even if we own a bandsaw, I use my hacksaw almost every day, so was looking for improvements.

Tensioning the blade

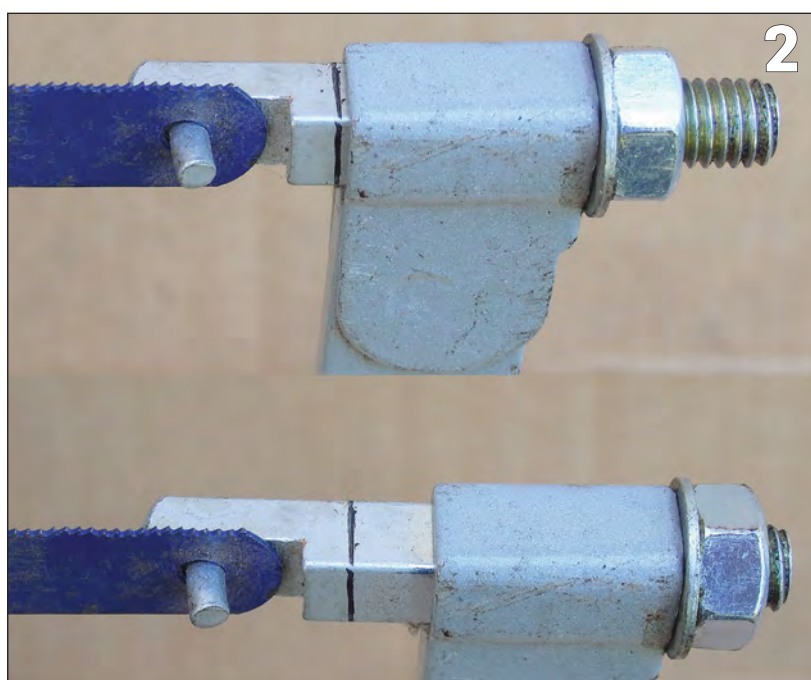
I began with tensioning the blade. Back in the January 2018 issue of *EIM* I described the build of an tensiometer to adjust the tension force in a bandsaw blade (too small a force leading to an inaccurate cut). So I thought, why not use it to test the hacksaw blade? (Photo 1).

As the hacksaw blade had the same cross section as my band saw blade (13 x 0.65mm) I thought I could set the same tension (here it could be more as there is no bending stress due to the blade wrapping around the pulley). So 0.06mm extension was read on the tensiometer DTI. This was set by turning the wing nut, but as this was not possible by hand, I replaced it by a hex nut driven with a wrench.

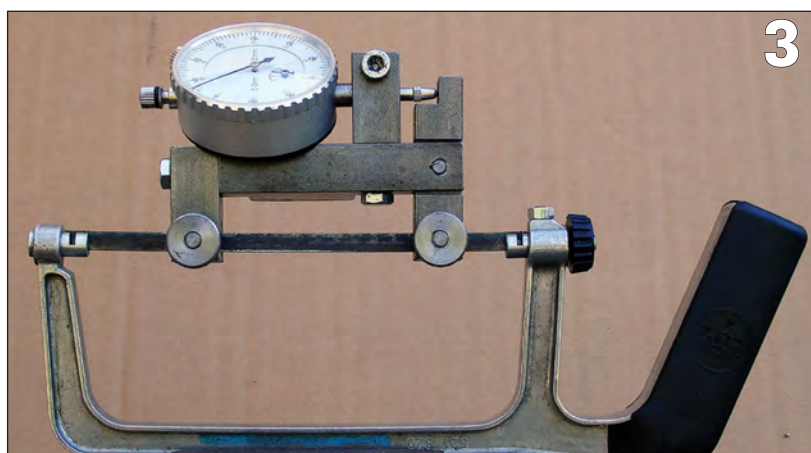
The elastic bending of the saw frame led the tensioning slider to have a 7mm throw. This was marked out with a felt pen (Photo 2), and used to get the right tension without using the tensiometer the next time. This has worked well for all the frames I've experimented on (the cross section being: a plain rectangle, rectangular tubing and elliptical tubing).

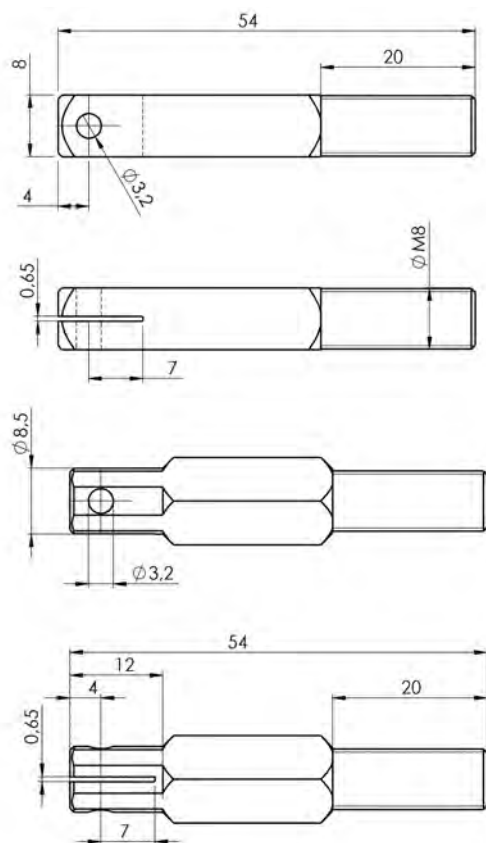
The tensiometer was also experimented with on small saws (Photo 3). This tension was far more than the result previously with the

"Examining the hacksaw showed that the blade links were often very badly made..."

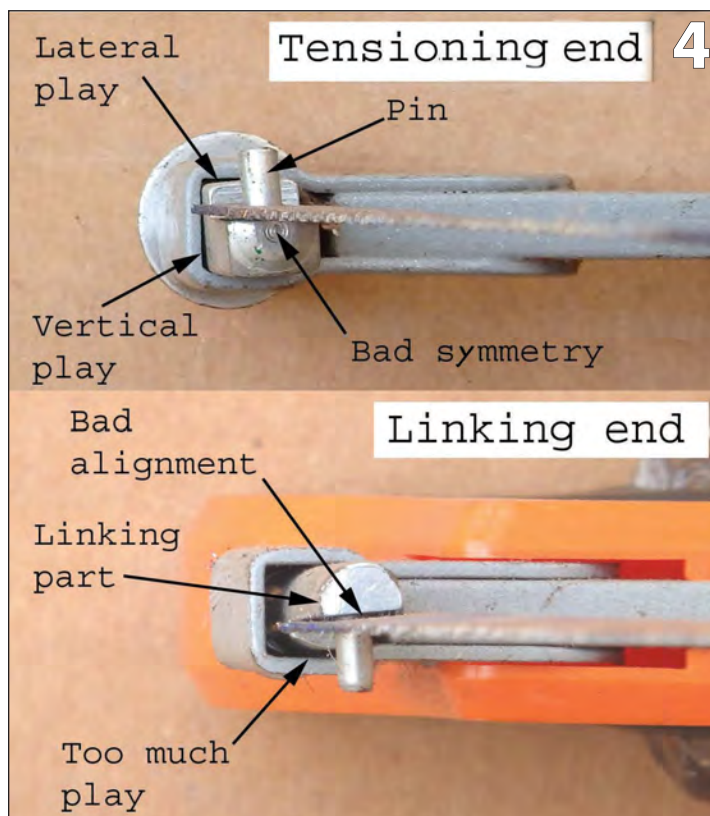


Descriptions of photos in text, refer to numbers. All photos and drawings in this feature by Jacques Maurel





DRAWING 1
(approx full-size)



wing nut, and the saw blades being stiffer proved to work far better.

Modifying blade links

A thorough examination of the hacksaw showed that the blade links were often very badly made (Photo 4) so I decided to make new ones. In place of the cantilever-type pin, I

used fork-type parts with removable pins (Drawing 1 and Photos 5-7).

Yes you can lose these pins easily when replacing the blade, but they are a far better solution to achieve a good symmetry and alignment and if lost, they are very easy to make using 3.2mm diameter standard nails.

To ensure there was no lateral play (there is

no problem with the vertical play), I put a piece of 8mm square rod in the square hole (folded sheet guide) and squeezed the whole lot in the bench vice. The rod is now taken out by hammering it with a pin punch. The resulting fit with the slider will be slightly tight but not too much (move it with a soft hammer). The linking part is riveted on the linking end.

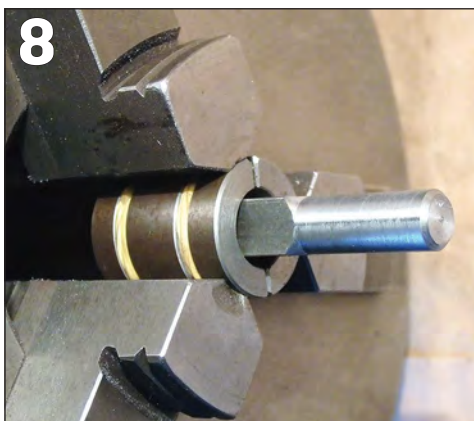
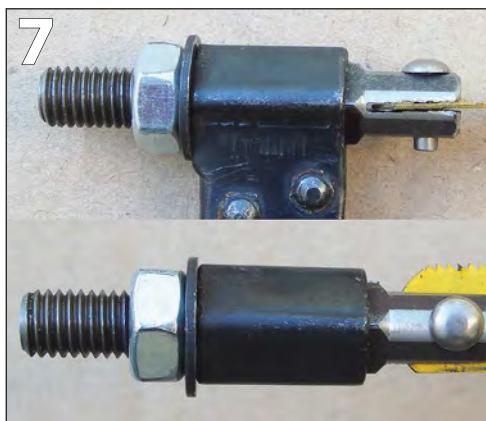
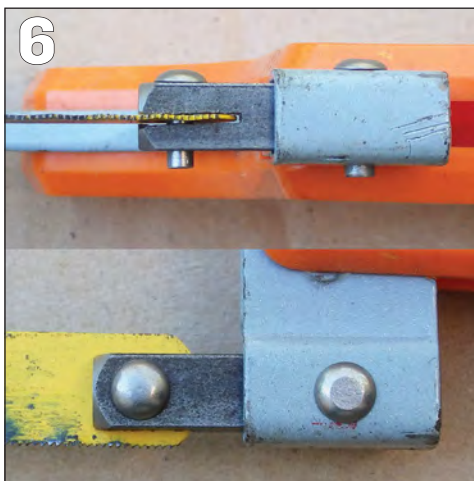
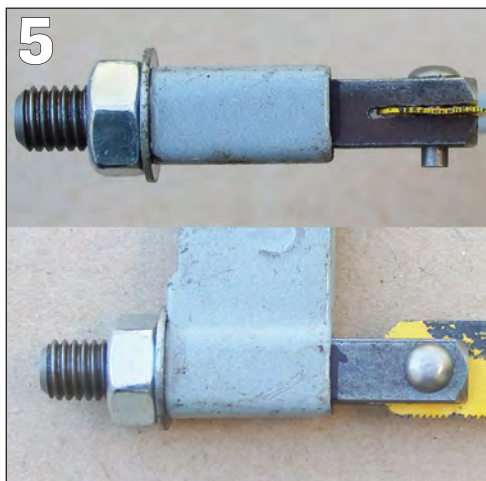
Machining

Photo 8 shows how to hold an 8mm square in the three-jaw chuck by using an 11mm diameter bore split tube; the two halves being tightened by rubber bands set in two grooves.

Photo 9 shows how to start the sawing of the slot, by making a notch with a triangular file to guide the saw blade at the beginning of the cut.

Types of blades/frames

Hacksaw blades are characterised by the number of teeth they have per centimetre of their length. The usual



ISO STANDARD SCREW SLOTS

Screw diameter	2.5	3	4	5	6	8
Slot width cyl and flat head	0.60	0.8	1	1.2	1.6	2
Slot width grub screw	0.5	0.6	0.8	1	1	1.6

Blade widths (including the set) are:
Standard blade: 1mm; two standard blades
1.7mm; small blade: 0.6mm

values are: (Photo 10)

- 12 teeth/cm for cutting thin sheet and hard steel: gauge plate, silver steel, hard screws (10-9, 12-9 quality) and rolled pins
- 10 teeth/cm for common use, the type usually found in DIY stores.
- 8 teeth/cm for sheet of 2.5mm thickness upward and rod of more than 5mm diameter. This is my most used type, but not easy to get.
- 6 teeth/cm for quite large pieces but not in steel. They are even more difficult to get than the 8 teeth versions. Mine are made from broken band-saw blades, the fixing holes being drilled with a 4mm diameter carbide-tipped masonry drill.
- 4 teeth/cm, useful for cutting plastics but much more useful for cutting branches in the garden.
- Variable pitch (2.5 to 4 teeth/cm). These are only for plastic as they hook so deeply in wood that making a cut proves impossible.
- Double blade: Two blades (from the same batch) set side by side for cutting screwdriver slots into screw heads. Of course you'll have to make special linking parts (with a wide slot) to use the blades in a dedicated frame.
- Small saws: Only 150mm long and used in small frames for tiny work.

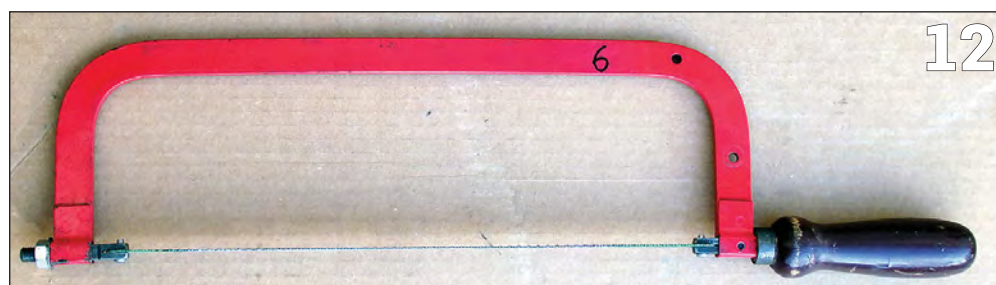
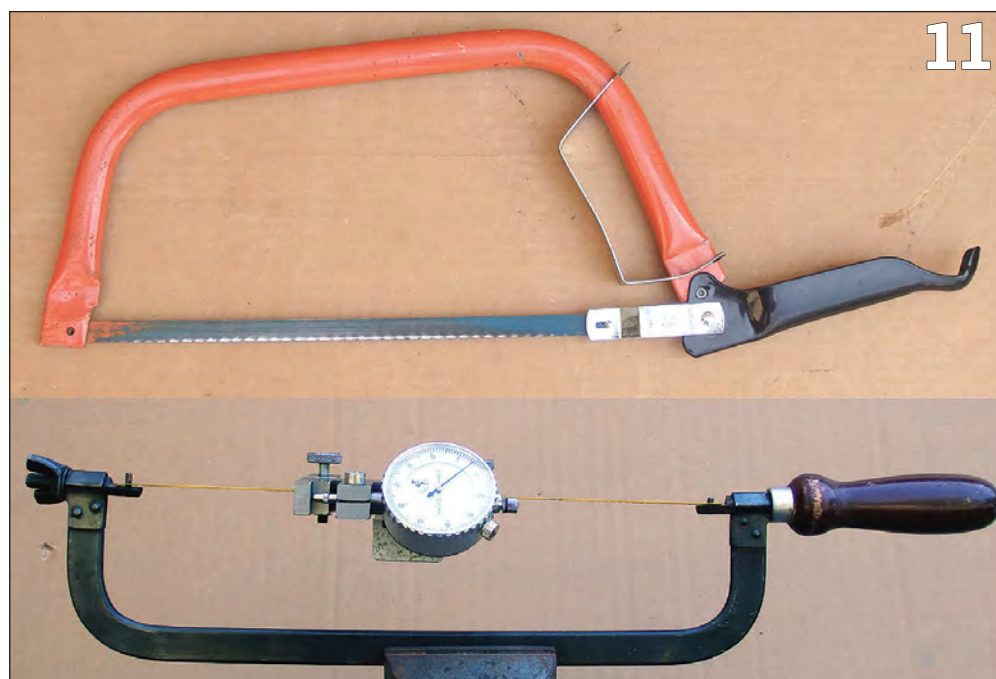
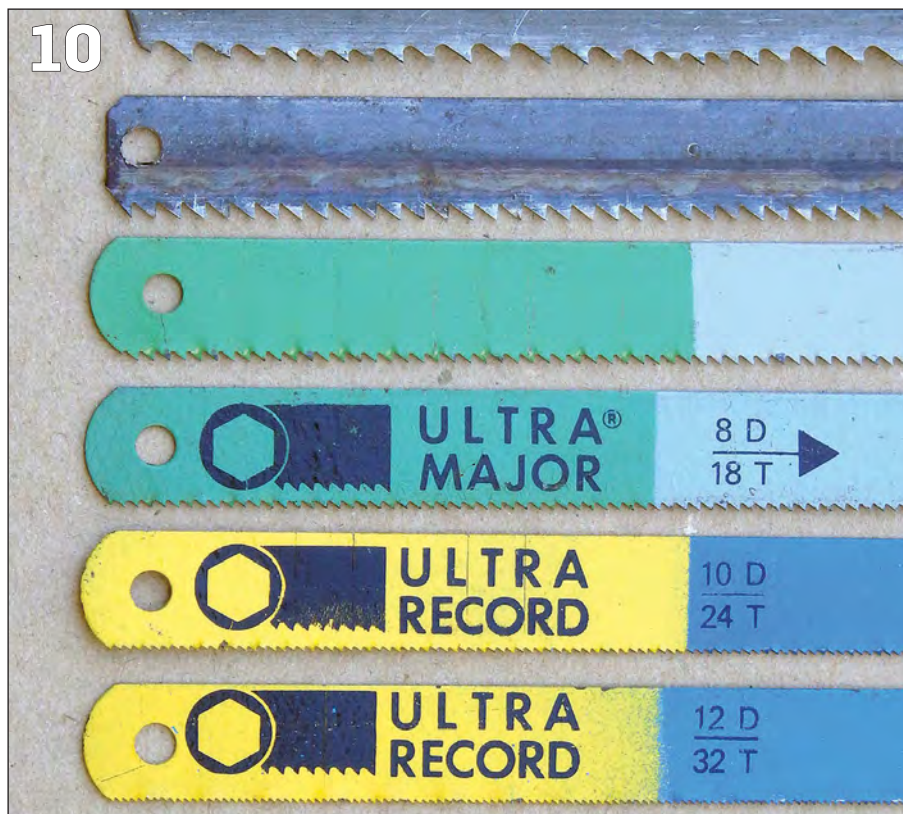
Alternative frames

Photo 11 shows that as well as the standard frame there are special versions available.

The **large frame** (from Sandvik) is worth using for cutting sheet metal. The tensioning is achieved by a toggle lever (no adjustment being possible). the DTI showed a 0.04mm strain, slightly low but sufficient.

The **axial handle** is very useful for cutting long strips of sheet by setting the blade perpendicular with the frame. These axial handle frames are now difficult to find, but it's easy to make one from a common frame (Photo 12). Photo 13 shows the components involved:

- A wooden file handle in which a 11mm diameter hole is drilled
- A ØM12, 30mm long piece of threaded rod in which a ØM8 thread is tapped
- A linking part of the same shape as the tensioning parts in drawing 1, but with the total length being 50mm and the threaded length 15mm. **EIM**



Uncertainties and anniversaries

Good and bad news in this month's round-up from across the clubs...

COMPILED BY ANDREW CHARMAN

Club news is a little truncated this month due to the need to squeeze in more construction features, but we must start with the alarming news that this month's end-of-season running on the **Bristol SME's** Ashton Court miniature railway could be the last trains on the line, apart from a single day of Santa Special trains on 2nd December.

Bristol City Council is proposing not to renew the club's lease on the site, according to a Bristol SME statement because there are plans to use the land for alternative activities.

The club, one of the oldest in the UK having been founded in 1901, has been running the Ashton Court miniature railway for more than 45 years, and it is very popular amongst visitors, holding several charity events and providing a venue for many children's birthday parties.

The club has started a petition at <http://bit.ly/SaveAshtonCourtRailway>, which by the time the Bristol show was held in mid August (reported in this issue) had gained more than 5,000 signatures. Supporters of the line have also been urged to lobby their local councillors encouraging them to support retaining the line.

As **EIM** closed for press we learnt that the petition was to be submitted to Bristol City Council, having by now reached more than 8,000 signatures including more than 6,000 from those who live and work in the Bristol area.

The railway's future was set to be debated at the council meeting on Tuesday 11th September at City Hall, and the club urged members of the public to join them at the meeting.

In the meantime club members are continuing to collect signatures to demonstrate the full strength of public support. We can only hope that when you read these pages in next month's issue we have better news to impart.

1.5 million and counting

From one club facing a threat to its future, to another celebrating a milestone. Saturday 25th August was a momentous day for the Beech Hurst Park Miniature Railway, run by the **Sussex MLS**, as the line welcomed its 1.5 millionth passenger.

Located within Beech Hurst Gardens in the town of Haywards Heath, the raised level 3½ and 5-inch gauge track first opened to the public in 1954 and was significantly extended in 1975 to its present length



ABOVE: A milestone for the Sussex MLS as mayor James Knight presents 1.5 millionth passenger Mr Tennant with a commemorative plate, followed by a special train (below).

running to just under half a mile.

In contrast to the Bristol club's problems the Sussex line's milestone event in the club's 64th season was fully supported by the local authority. Haywards Heath town mayor James Knight presented a commemorative plate to the lucky passengers, a Mr and Mrs Tennant of North Chailey who were visiting the railway with their two young children.

Commenting on the achievement,

long standing SMLS member Chris Saunders, who physically counted down the last 100 passengers, said; "This marks a very significant part of the club's history and shows how popular the railway is within the local community. To put the 1,500,000 figure into context it is nearly equal to the current population of Sussex riding on our railway".

Moving up the country, **Rugby MES** member Edward Parrott tells us ►



GS MODEL SUPPLIES

LTD Directors : Geoff Stait & Helen Verrall-Stait

Available to Order

LINCOLN GNR N1

0-6-2 Tank Locomotive

(designed by Martin Evans)



Various Diesel Classes available in

5" g & 7 1/4" g

(Class 08/10 pictured below in 7 1/4" g)



www.gssmodelengineers.com
info@gssmodelengineers.com
 01278788007

MULTI METALS



STEEL



COPPER



BRASS



ALUMINIUM

OVER 5000 ITEMS

Online suppliers of Metals and Engineering supplies

- No minimum order & Free Cutting Service

www.themultimetalsshop.co.uk

THE MOST VERSATILE TOOL FOR TURNING & FACING

It's easy to see why our best selling turning tool is the SCLCR. It can turn and face a bar without altering the toolpost, and the 80° nose angle gives much more strength than a 60° (triangular) insert. The NJ17 insert cuts steel, stainless, cast iron, phosphor bronze, aluminium, copper, brass etc. Please state shank size required - 8, 10 or 12mm square. Spare inserts £6.86 each for 8-10mm tools, £7.99 for 12mm.

SPECIAL OFFER PRICE £39.20

USE THE OTHER 2 CORNERS FOR ECONOMY!

Our SCRCR rough turning tool uses the same inserts as the SCLCR tools above. The good news is that it uses the other two corners! These very strong 100° corners are rigid enough for rough or intermittent turning. The insert is mounted at 75° to the lathe axis. 10mm sq section (for CCMT06 insert) and 12mm section (for CCMT09 insert).

SPECIAL OFFER PRICE £39.90

PROFILING WHEELS or SHAPING AXLES & PILLARS?

If you need to create complex shapes, our SRDCN button tool is invaluable. The 10mm square shank holds a 5mm dia cutting insert, and gives great versatility, superb strength and excellent tool life. The late Mr D Hudson of Bromsgrove SME used these tools for many years to profile the special form of tyre treads for his self-steering wheel sets with great consistency. Spare inserts just £5.79 each.

SPECIAL OFFER PRICE £39.20

TURN SMALL DIAMETERS with LIVE CENTRE IN PLACE!

The SDJCR tool uses a 55° insert, allowing access to small diameter components when using a tailstock centre. It can also profile back-angles. The NJ17 insert cuts steel, stainless, cast iron, phosphor bronze, brass, copper, aluminium etc. Shank size 10mm square section. Spare inserts just £6.86 each.

SPECIAL OFFER PRICE £39.20

A TOP QUALITY BORING BAR FOR YOUR LATHE

Here's your chance to own a top quality boring bar which uses our standard CCMT06 insert. Steel shank bars can generally bore to a length of approx 5 times their diameter. Please state bar dia required - 8, 10, 12 or 16mm. Spare inserts just £6.86 each.

Bar Dia.	Min Bore
8 mm	10 mm
10 mm	12 mm
12 mm	16 mm
16 mm	20 mm

SPECIAL OFFER PRICE £42.58

INTRODUCING THE GROUNDBREAKING NEW KIT-QD PARTING TOOL!

The new and innovative KIT-QD parting tool has a more secure insert location, stronger body and improved insert design compared to the original KIT-Q-CUT. It has an increased maximum reach of 23mm, giving over 1.3/4" parting capacity in solid bar. As previously, the tool fits the vast majority of ME lathes, including ML7 & ML10 machines, regardless of toolpost type. It comes complete with the key to locate and eject the tough, wear resistant insert. Cuts virtually all materials. Spare inserts just £10.75 each.

SPECIAL OFFER PRICE £69.50

EXTERNAL THREADCUTTING TOOL

These tools use the industry standard 16mm 'laydown' 3-edge inserts. With tough, tungsten carbide inserts, coated with TiAlN for wear resistance and smooth cutting, threads can be cut at very slow speeds if required. Tools are right hand as shown. 55° or 60° insert not included - order separately at £13.65. See our website for more info.

SPECIAL OFFER PRICE £43.80

INTERNAL THREADCUTTING TOOL

These tools use the industry standard 11mm 'laydown' 3-edge inserts. With tough, TiAlN coated tungsten carbide inserts, quality threads can be cut with ease. Tools are right hand as in picture. 10, 12 and 16mm dia's available. 55° or 60° insert not included - order separately at £11.37. See our website for more info.

SPECIAL OFFER PRICE £43.80

DORMER DRILL SETS AT 60% OFF LIST PRICE!

All our Dormer drill sets are on offer at 60% off list price. The Dormer A002 self-centring TiN coated drills are also available to order individually in Metric and Imperial sizes. Please see our web site for details and to place your order.

TURNING, BORING & PARTING TOOLS COMPLETE WITH ONE INSERT.

Please add £3.00 for p&p, irrespective of order size or value



Greenwood Tools Limited

2a Middlefield Road, Bromsgrove, Worcs. B60 2PW
 Phone: 01527 877576 - Email: GreenwTool@aol.com

Buy securely online: www.greenwood-tools.co.uk



that the 2018 Narrow Gauge Rally at the club's track on 28th-29th July was a great success again.

"The rally continues to grow, with many locomotives visiting us from all over the country," Edward said. "Around 25 models visited us over the two days, with the newly-extended 1-mile ground-level 7¼-inch line proving very popular once again."

Among the locos present the UK was greatly represented by models from Hunslet, American influence was seen in two examples of the Lynton and Barnstaple Railway's 'Lyn', and also a Mogul from the Philips & Rangley Railroad.

Germany was represented by a First World War Deutz, and South Africa by an NG6 Lawley. Several examples of the ubiquitous Sweet Pea/Sweet William were also to be seen running.

The highlight, however, was the

ABOVE: The Darjeeling loco visiting quartet certainly made for an impressive line-up at the Rugby club's narrow gauge rally in July.

BELOW: Among the visitors at the Rugby event were some sizable locomotives...



representation from India. Just days before the event arrangements fell into place to produce a mini Darjeeling Gala, with two A-Class models from the host club and a pair of visiting B-Class locos.

The two A Class versions were built by the same model engineer and haven't been together in some 30 years. The current owner of the one still to be finished is aiming for a complete and steaming engine ready for next year's event. "We have also been promised a return visit from examples of the B Class, and also the sole D Class Garratt," Edward said.

The 2019 Rally dates have been confirmed as 13th and 14th July.

Meanwhile at Rugby members have been continuing trackwork around the new station, despite punishingly hot temperatures in the latter weeks of July. Just before the narrow gauge event two gangs were at work, laying track to connect up with the straight panels already in the station, adding to the running possibilities on the line.

Golden ceremony

Just after this issue goes to press will see a big day for the **Bradford MES**, which on 15th September will be officially opening its rebuilt raised track, one of the club's miniature railways in Northcliffe Woods.

The event takes place 50 years after the opening of the first railway on the site. "We hope that the new railway will last at least another 50 years!" commented club president Jim Jennings. The Bradford Club believes it is the fourth oldest in the UK, having been in existence for 110 years.

Finally in this shorter-than-usual round-up (back to normal next month), we spotted an alarming piece in the latest *Vectimod* newsletter of the **Isle of Wight MES**, describing the intimate details of hanging, drawing and quartering... Interesting engineering discussion that one! **EIM**

OCTOBER

EVERY SATURDAY

(Weather permitting)

Burnley & Pendle MRS public rides, Thompson Pk Rly, Burnley, 12-4pm (last day 21st Oct)

North Wales MES, public running, West Shore, Llandudno, noon-4pm

South Lakeland MES Public running, Lightburn Park, pm.

EVERY SUNDAY

(Weather permitting)

Bournemouth SME Public running in Littledown Park 11am – 3.30pm. (Also Wednesdays)

Burnley & Pendle MRS public rides, Thompson Pk Rly, Burnley, 12-4pm (last day 21st Oct)

Canterbury SME (NZ) Public running from 1pm at Halswell Domain

Fylde SME Public running at Thornton Cleveleys from 1pm.

Grimsby & Cleethorpes MES public rides, Waltham Windmill, DN37 0JZ, noon-4pm

Harrow & Wembley SME public rides, Roxbourne Park, Eastcote, 2.30-5pm (until 21st)

Kings Lynn & District SME, Lynnsport Miniature Railway, 11am-4pm

Kinver MES Public running at Kinver 2pm – 4pm.

Portsmouth MES Public running, Bransbury Park, 2pm-5pm (not 28th)

Rochdale SME Public running in Springfield Park from 12 noon.

Sale Area MES Public running in Walton Park from 12 noon.

Southport MES Public running at Victoria Park 11.30am-4.30pm

Urmston MES Public running in Abbotsfield Pk 10am-4pm

Vale of Aylesbury MES Public running, Quainton Rly Centre, from 12 noon.

Wirral MES Public running, Royden Pk, Frankby, 1-3.30pm.

1 **Lancaster Morecambe ME** informal evening, Tarn Lane, near Yealand Redmayne, 7.30pm

3 **Bradford MES** meeting, speaker TBA, Saltaire Methodist Church, 7.30pm.

R DIARY

- 3** Bristol SMEE meeting, Sundials by Cyril Routley, Stapleton & Begbrook Social Club, BS16 1HY, 7.30pm
- 3** Southport MES monthly meeting, Victoria Park
- 5** Portsmouth MES members' small projects, Tesco Fratton Centre, 7.30pm
- 6** Isle of Wight MES open afternoon, Broadfields, PO31 7NN
- 6** SMEE Talk, William Fairburn the experimental engineer, Marshall House, London SE24, 2.30pm. Pre-book only at chairman@sm-ee.co.uk
- 6** Tiverton MES Steam Up, Worthy Moor from 11am.
- 6** Welling DME open day for visiting clubs, next to Falconwood rail station, 10am-5pm, contact Martin Thompson 01689 851413.
- 7** Bristol SME public running, Ashton Court, BS8 3PX7
- 7** Frimley Lodge MR Public running 11am-4pm, Sturt Rd GU16 6HT.
- 7** Lancaster Morecambe ME AGM, Tarn Lane, near Yealand Redmayne, 7.30pm
- 7** Pietermaritzburg MES (NZ), Public running, Pietermaritzburg 3201
- 7** Plymouth Miniature Steam public running, Pendean Crescent, PL6 6RE
- 7** Welling DME public running, next to Falconwood rail station, 2-5pm.
- 10** Southport MES Bits & Pieces meeting, Victoria Park
- 11** Worthing SME meeting, Gems from Youtube by Neil Furze, Field Place, BN13 1NP, 7.30pm
- 12** Tiverton MES meeting, Old Heathcoat School Community Centre, 7.30pm
- 14** Bracknell RS Public Running, Jocks Lane, RG12 2BH, 2-4.30pm
- 14** Bristol SME public running, Ashton Court, BS8 3PX
- 14** Cardiff MES Open Day, Heath Park, 1pm-5pm
- 14** Cambridge MES public running, Fulbrooke Rd, CB3 9EE, 1.30-5.30pm
- 14** Worthing SME public running, Field Place, BN13 1NP, 2-5pm
- 15** Lancaster Morecambe ME meeting, Darjeeling Railway by Peter Webster, Tarn Lane, near Yealand Redmayne, 7.30pm
- 15** Pietermaritzburg MES (NZ), Meeting, Pietermaritzburg 3201
- 16** Grimsby & Cleethorpes MES monthly meeting, Waltham Windmill, 7.30pm
- 17** Bristol SMEE meeting, Restoring an 18th century mill by Richard Ross, Stapleton and Begbrook Social Club, BS16 1HY, 7.30pm
- 17** Southport MES meeting, speaker from P2 Trust, Victoria Park
- 18** Midlands Model Engineering
- 21** Exhibition Warwickshire Exhibition Centre (show guide in this issue).
- 20** Isle of Wight MES Members Day, Broadfields, PO31 7NN
- 21** Plymouth Miniature Steam public running, Pendean Crescent, PL6 6RE
- 21** Rugby MES public running, Onley Lane, CV22 5QD, 2-5pm
- 21** Tiverton MES Autumn Open Day, Worthy Moor from 11am.
- 22** GL5 Association Rally, Bath & West
- 23** Showground
- 24** Southport MES meeting, subject TBA, Victoria Park
- 25** Worthing SME meeting, subject TBA, Field Place, BN13 1NP, 7.30pm
- 31** Frimley Lodge MR Halloween, pre-booked only, Sturt Road GU16 6HT, 5.30-8.30pm.
- 31** Southport MES meeting, mini talks, Victoria Park

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.

LIVE STEAM MODELS

SPECIALISTS FOR DRAWINGS, CASTINGS, MACHINING AND FITTINGS FOR A RANGE OF 3" - 6" TRACTION ENGINES INCLUDING RUSTON-PROCTOR, FOSTER, FOWLER, BURRELL, MARSHALL.



***NEW* Annual Service Kit**
Available to Purchase Through Our Web Shop
ONLY £50 Inc Post
Includes—Steam Oil, Boiler Treatment, Fusible Plug, Gauge Glass, & Seal and Graphited Yarn

Send £4.00 for our Catalogue which includes our MES list to -
Live Steam Models Ltd., Unit 7, Old Hall Mills,
Little Eaton, Near Derby. DE21 5LA 01332 830811
or visit
www.livesteammodels.co.uk
info@livesteammodels.co.uk

Like us on facebook

Coming next month in... **ENGINEERING in Miniature**



- 6-inch Marshall with just two castings
- Simple locomotive construction in 16mm/G
- Young engineers in action across the clubs
- Using a rotary table on the mill

Plus Dougal, the EIM Steam Plant boiler and more...

November issue on sale 18th Oct

Contents correct at time of going to press but subject to change

• NO RISK OFFER • NO RISK OFFER • NO RISK OFFER • NO RISK OFFER •

NO RISK OFFER • NO RISK OFFER • NO RISK OFFER • NO RISK OFFER

LYNX MODEL WORKS



WORKING LIVE STEAM SCALE MODELS, SPECIALIST PARTS MANUFACTURE. PRE-MACHINED KITS FOR WORKING STEAM LOCOMOTIVES IN 5" AND 7¼" GAUGES



- BESPOKE PARTS MACHINING
- STATIONARY AND MARINE ENGINES MANUFACTURED
- FULL PAINTING & LINING SERVICE
- EC COMPLIANT BOILERS FOR SALE
- UNFINISHED MODELS COMPLETED



ALL MAJOR CREDIT AND DEBIT CARDS ACCEPTED

LYNX MODEL WORKS

Dovecote House, Main Road,
Maltby Le Marsh, Alford, Lincs,
LN13 0JP

Tel/Fax: 01507 206006

Email: info@lynxmodelworks.co.uk

www.lynxmodelworks.co.uk



TEE
Publishing Ltd

SPECIALIST BOOK
SUPPLIER SERVING THE
MODEL ENGINEERING

TOPIC OF THE
MONTH

PAINTING AND FINISHING YOUR MODEL



How (not) to paint a locomotive

Christopher Vine



The Finishing Touch

Bob Shephard

AIRBRUSHING AND SPRAY
PAINTING MANUAL by I. Peacock
£8.95 +£2.07 p&p

AIRBRUSHING THE ESSENTIAL
GUIDE by Fred Crellin
£19.95 +£3.13 p&p

HOW (NOT) TO PAINT A
LOCOMOTIVE by Christopher Vine
£19.95 +£3.13 p&p

PAINTING AND LINING MODELS
by R. C. Rogers
£4.95 +£1.65 p&p

THE FINISHING TOUCH THE HOWS
AND WHYS OF PAINTING MODELS
by Bob Shephard
£6.00 +£2.07 p&p

UK postage only. Overseas please enquire.

Airbrushing



WE ALSO STOCK BOOKS COVERING:

- Boilermaking • Casting & Foundry Work
- Clockmaking • Electric Motors
- Garden Railways • Marine Modelling
- Hot Air Engines • In Your Workshop
- Lathe Work • Model Engineering
- Model Steam Locomotives
- Model Steam Road Vehicles
- Standard & Narrow Gauge Railways
- Tractors & Stationary Steam Engines

SEE OUR WEBSITE FOR FULL DETAILS

MIDLANDS MODEL ENGINEERING EXHIBITION OFFER

ANY 12 ISSUES

- PRE-1997 WAS £21 NOW £17.50
- 1998-2006 WAS £28 NOW £25
- 2007-2011 WAS £32 NOW £27.50

To receive this offer, please pre-order before the show from the offers section on our website and email us with the details of which issues you require, alternatively order by emailing info@teepublishing.co.uk or by phone 01926 614 101. Closing date for pre-orders is Monday 8th October. All pre-orders to be collected at the show.

ORDER NOW

www.teepublishing.co.uk

f TEEPublishingLTD CALL 01926 614101 @TEEBookshop



MIDLANDS
MODEL
ENGINEERING
EXHIBITION

THE SHOW FOR MODEL ENGINEERS

THURSDAY 18TH - SUNDAY 21ST OCTOBER 2018
WARWICKSHIRE EVENT CENTRE

www.midlandsmodeleengineering.co.uk

MAIDSTONE-ENGINEERING.COM



Metals
O Rings
Gauge Glass
Graphite Yarn
Jointing
Steam oil
Cutting tools
And so much more.



For all your model
engineering needs.



Copper TIG
welded Boilers

TEL: 01580 890066 PROMPT MAIL ORDER

Browse our website or visit us at
10/11 Larkstore Park, Staplehurst, Kent, TN12 0QY

BUILD THIS WORKING MODEL RADIAL ENGINES 11" Diameter



1" Bore x 1-1/8" Stroke Spark Ignition
Oil Pressure & Scavenge Pump
9 CYL. 234 pgs. CAD drawings
& Op sheets. Postpaid \$165 *



18 Cyl 286 Pgs CAD drawings & Op sheets postpaid \$180 *
* Casting – Add \$50 * US Dollars

LEE K. HODGSON. 7895 Mitchell Farm Lane
Cincinnati, Ohio, 45242 USA PH 513-791-3098
www.AgelessEngines.com

GB BOILER SERVICES

COPPER BOILERS FOR
LOCOMOTIVES AND
TRACTION ENGINES etc.
MADE TO ORDER

Constructed to latest European Standards
7 1/4" Gauge and P.E.D. Category 2 Specialist

Enquiries, prices and delivery to:
☎ Coventry 02476 733461 / 07817 269164
Email: gb.boilers@sky.com

HORLEY MINIATURE LOCOMOTIVES

7 1/4" 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.

7 1/4" Castings only

Dart. Roedeer. Green Queen

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

www.horleyminiaturelocomotives.com

CLOCK CONSTRUCTION & REPAIR

Books by: John Wilding MBE FBHI,
E. J. Tyler, John G. Wright,
Eric Woof, John Tyler
and others

**SPRINGS • BEARINGS
FRAMES • DIALS etc.**

FREE catalogue

☎ +44 (0) 1420 487747

www.ritetimepublishing.com



AP MODEL ENGINEERING

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,
7 1/4" scale and 3 1/2" scale. Quality
products at affordable prices!

www.apmodelengineering.co.uk



CASTLE STEAM

**We build 16mm boilers!
Also most other gauges of
boiler from 'O' to 5" gauge.**

Castle Steam can build you a
boiler that will exactly match
your needs. Boiler plan not
quite right for your
locomotive? Talk to us as we
can modify the design or
update the plans for you.

info.castlesteam@gmail.com

ADVERTISING INDEX

Abbotts Model Engineering.....	6	Lynx Modelworks.....	45
Ageless Engines.....	46	Macc Model Engineers.....	50
AP Model Engineering Ltd.....	46	Maidstone Engineering.....	45
Castle Instruments.....	46	Maxitrak Ltd.....	47
Cup Alloys (Metal Joining Ltd).....	6	Meccano Spares.....	50
Dream Steam Ltd.....	4	Meridienne Exhibitions Ltd.....	17
Eccentric Engineering.....	48	Model Engineering Supplies.....	50
Filcris Ltd.....	46	Noggin End Metals.....	17
Garden Railway Specialists.....	7	Phoenix Locomotives Ltd.....	47
GB Boiler Services.....	46	Polly Model Engineering Ltd.....	47
Greenwood Tools.....	41	Pro Machine Tools Ltd.....	50
GS Model Supplies Ltd.....	41	Ritetime Publishing Ltd.....	46
Home & Workshop Machinery.....	52	Silver Crest Models Ltd.....	5
Horley Miniature Locomotives.....	46	Station Road Steam.....	51
Iseasteam.....	50	Stuart Models.....	2
Items Mail Order Ltd.....	50	Tee Publishing Ltd.....	45
JD Multi Metals.....	41	The Steam Workshop.....	6
Jim Marshall.....	50	Tracy Tools Ltd.....	7
Kontax Engineering Ltd.....	17	View Models.....	50
Laser Frames.....	50	Walker Midgley Insurance.....	47
Live Steam Models Ltd.....	43	Warco.....	49

Recycled plastic sleepers
Permanent, maintenance free and rot proof



- 100% recycled polymer
- Rot proof
- Maintenance free
- UV stabilised
- Frost resistant
- Trade prices available
- Fast lead times
- No minimum order quantity
- Flexible customer service
- Excellent value for money
- Free samples

Used by dozens of Model
Engineering Societies across
the UK including:

- North London SME
- Surrey SME
- York & District SME
- Northampton SME
- Guildford SME
- Cambridge MES
- Bedford MES
- Malden and District SME
- and many many more!

FILCRIS

The Old Fire Station, Broadway, Bourn, CB23 2TA
Tel: 01954 718327 Fax: 01954 719908
Email: info@filcris.co.uk Web: www.filcris.co.uk

Druid

The iconic Abbey Light Railway loco is now available in 7¼" gauge



All steel construction.
All parts finished in your choice of colours.
Bolt together kit, build in a weekend.
1 HP motor with digital control.
ALR graphics available.

£1895 (inc VAT)



www.phoenixlocos.com
01704 546 957

MAXITRAK.COM

The best of model rail and road

40 YEARS
EXPERIENCE



5" Class 25
From
£2,015



5" Class 73
From
£2,015

PAY MONTHLY
TERMS
& CONDITIONS
APPLY

CATALOGUE
£3.50

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



INSURANCE FOR CLUBS SOCIETIES & INDIVIDUALS

Club & Society Public Liability automatically includes all members anywhere in the UK or Europe without extra charge.

Road Traffic Act insurance for miniature road vehicles
Models & Home Workshops, Road Trailers, Portable Track,
Personal Accident, Directors & Officers
Boiler Testers Professional Indemnity
Modelling & Model Engineering Businesses
Commercial Miniature Railways up to 2ft gauge
PLUS

Vintage Tractors, Stationary Engines, Traction Engines, Motor Rollers
Lorries & Low Loaders, Steam Cars, Memorabilia & Collectables
and, of course, Home Buildings & Contents and Cars



Insurance for
Modellers and
Model Engineers

Please contact us for details

Suite 6D, The Balance, Pinfold Street, Sheffield S1 2GU
Tel: 0114 250 2770 www.walkermidgley.co.uk

Walker Midgley Insurance Brokers is a trading name of Towergate Underwriting Group Limited
Registered in England No. 4043759 Registered address: Towergate House, Eclipse Park, Sittingbourne
Road, Maidstone, Kent ME14 3EN. Authorised and regulated by the Financial Conduct Authority



POLLY MODEL ENGINEERING LIMITED



You don't have to be a spectator!



Build and drive your own 5" gauge 'POLLY Loco'!
British Made with a Proven Track Record



No previous experience or specialised facilities required,
can be assembled with hand tools!
A range of 11 different kit build 5" gauge locomotives.
Typically, spread the build & cost over 12 months.
Fully machined kit prices from £5716
Enquire for ready to run models.



Catalogue available £2.50 posted and enquire for further details or visit our website where you will find other Polly Loco Kits, drawings and castings for scale models and comprehensive ME Supplies.



Polly Model Engineering Limited
Atlas Mills, Birchwood Avenue,
Long Eaton, Nottingham, NG10 3ND

www.pollymodelengineering.co.uk
Tel: 0115 9736700 Find us on f
email:sales@pollymodelengineering.co.uk



SUBSCRIBE TO THE DIGITAL **ENGINEERING** *in Miniature* FROM

JUST £29.99

www.warners.gr/ElMdigital



Eccentric Engineering

TURNADO

FREEHAND METAL TURNING SYSTEM

Produce items you never thought possible with a standard metal working lathe.

- Turn large and small internal and external radii at any position on the workpiece.
- Generate internal and external hemispheres as well as complete spheres from 2mm to 50mm diameter.
- Turn Freehand curves and irregular forms to whatever shape you like.
- Reproduce multiple identical shapes such as chess pieces, canons for model ships and miniature candlesticks etc using the additional Tracer Arm accessory and a simple sheet metal template.
- Turn radii up to 125mm (5") using the Large Radius Shoe, or huge radii as big as you like using a curved template with the Tracer Arm.
- Adaptable to fit on the cross slide of most small to medium sized lathes and quick to swap in place of the top slide.



Basic system



Tracer Arm & Template



Large Radius shoe

For more details and to see our full range of products go to our website at
[**eccentricengineering.com.au**](http://eccentricengineering.com.au)



2MT arbor Item No. 8139A £12



Keyed drill chuck B16 1 – 13mm
Item No. 8140 £26



Clamp type knurling tool
Item No. 9010 £17.50



Live centre
Item No. 8004
£26



NEW

GH600 GEAR HEAD LATHE

Selection of metric and imperial thread cutting through gear box. No more change gear selection. Only one 127T change gear necessary to switch from metric to imperial. This feature not usually found on smaller lathes.

Compact gear head lathe
Power cross feed
Saddle controlled forward and reverse
Telescopic leadscrew covers
Tee slotted cross slide
Cam operated tailstock lock
Offset facility to tailstock
Bright LED light
Reversible leadscrew for left hand threading
Wide, double vee, hardened and ground bedways
CE electrical control box incorporating low voltage circuit, fitted with isolating switch
Adjustable tapered gibs to cross slide



Standard equipment includes:

Stand
Face plate
3 jaw self centre chuck with inside and outside jaws 125mm
4 jaw independent chuck 125mm
Fixed and travelling steadies
2 dead centres
Calibrated compound slide
Thread dial indicator
4 way indexing toolpost
Interlock chuck guard



Milling slide
Item No. 9628 £130



Centre drill set
Item No. 9053M £10



Indexable
lathe tools 12mm
Item No. 8947 £79

SPECIFICATION

Centre height.....	140mm	Tailstock taper.....	2MT
Maximum swing.....	280mm	Tailstock quill travel.....	60mm
Swing over cross slide.....	158mm	Top slide travel.....	65mm
Distance between centres	600mm	Cross slide travel	130mm
Bed width.....	150mm	Headstock bearings.....	Taper roller
Longitudinal travel	560mm	Compound slide swivel.....	360°
Spindle taper	4MT	Chuck mounting.....	Flange
Spindle bore	26mm	Motor	1.1kw
Maximum tool size.....	12mm	Power supply	240v
Range of spindle speeds rpm (12)	45 - 2000	Dimensions L x W x H to end of handle grips	1260 x 580 x 600mm
Range of metric threads	0.25 – 5.0mm	Weight.....	160kg
Range of imperial threads	4 – 96 tpi		

£2,150 including VAT and UK mainland delivery

Our next **Open Day** is on **Saturday, 10th November 2018, 9am to 1pm, at Warco House.**

CLASSIFIED ADVERTISEMENTS

RATES: Display box: £10.50 for scc (plus VAT) (min 25mm), Classified lineage 70p per word (inc. VAT) (min 20 words)
All classified advertisements must be prepaid. ALL ADVERTISEMENTS SUBJECT TO VAT AT RATE AT TIME OF PRINT

THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING in Miniature

BACK ISSUES

Vol. 1 No. 1 (Apr 1979) to Vol. 18 No. 6 (Dec 1996)	£2.20 each
Vol. 18 No. 7 (Jan 1997) to Vol. 2 No. 4 (Oct 2000)	£2.40 each
Vol. 22 No. 5 (Nov 2000) to Vol. 28 No. 3 (Sep 2006)	£2.60 each
Vol. 28 No. 4 (Oct 2006) to Vol. 30 No. 6 (Dec 2008)	£2.70 each
Vol. 30 No. 7 (Jan 2009) to Vol. 18 No. 6 (Jun 2011)	£2.95 each
Vol. 33 No. 1 (Jul 2011) to Vol. 34 No. 2 (Aug 2012)	£3.10 each
Vol. 34 No. 3 (Sep 2012) to Vol. 36 No. 6 (Dec 2014)	£3.30 each
Vol. 36 No. 7 (Jan 2015) to Vol. 38 No. 2 (Aug 2016)	£3.50 each

Early issues may be facsimiles (Photocopies - not original)
Individual issues postage (UK) - quantity/cost 1/£1.35 2-3/£1.75 4-5/£2.35 6-12/£2.95
ANY 12 ISSUES pre-1997 for **£21.00**, 1997-2006 for **£28.00**, 2007-2012 for **£32.00**
BOUND VOLUMES (All subject to availability - no stock of Volume 1):
Volumes 2-19 inc. **£32.95** (F) each, Volumes 20, 21 & 22 **£35.95** (F) each
Volumes 23-25 inc. **£38.95** (F) each, Volumes 26-37 **£42.95** (F) each
All volumes, Unbound, Loosebound or Bound are subject to availability
UK Postage £5.95 per volume. Order over £50.00 sent free. Overseas postage please enquire.

ORDER NOW www.teepublishing.co.uk or Call 01926 614101
TEE Publishing, The Fosse, Fosse Way, Nr. Leamington Spa, Warks. CV31 1XN

**TO
ADVERTISE
HERE CALL
ALLISON
ON
01778
395002**

WANTED

**Myford 7 & 10 Lathes
Small Milling Machines**

Home workshops cleared for

CASH

Distance no object

Please contact John on

01205 480 666

Iseasteamdesigns.uk

Boiler gauge glasses

Vacuum brake fittings

Scale lubricators for 31/2" - 5" - 71/4" gauge locomotives.

2" - 4" scale traction engines fittings.

Built to order

Contact Ian: iseasteam2@gmail.com

01485 541627 / 07511 198943

MODEL ENGINEERING PRODUCTS (Bexhill)

www.model-engineering.co.uk

E: modelengineerssupplies@gmail.com

**Manufacturer of 5 inch gauge
diesel outline battery electric locos
and accessories**

PHONE: 01424 223702 MOBILE: 07704 256004

17 SEA ROAD, BEXHILL-ON-SEA
EAST SUSSEX TN40 1EE

LASER CUTTING

**CNC Folding and Machining
Fabrication and Welding**

All Locomotive & Traction Engine parts.

Your drawings, E-files, Sketches.

e: stephen@laserframes.co.uk

m: 0754 200 1823

t: 01423 734899 (answer phone)

Well Cottage, Church Hill, North Ripton, Leeds, LS17 0DF

www.laserframes.co.uk

ITEMS MAIL ORDER LTD

MAYFIELD, MARSH LANE, SAUNDBY,

RETFORD, NOTTS, DN22 9ES

Tel/Fax: 01427 848880

BA SCREWS IN BRASS, STEEL AND
STAINLESS. SOCKET SCREWS IN STEEL
AND STAINLESS. DRILLS, RIVETS, TAPS,
DIES, END MILLS, SLOT DRILLS ETC

PHONE FOR FREE LIST

VIEW MODELS

We trade in locomotives and traction engines in the model engineering scales. We have various models in stock for which a list is available on request. We are also interested in purchasing models and can provide a repair and restoration service for those without facilities.

Telephone 01252 520229 or e-mail:
viewmodels@yahoo.co.uk

MACC Model

Engineers Supplies LTD

0161 408 2938 www.maccmodels.co.uk

We supply a vast range of materials
Brass, Steel, S/Steel Phos Bronze
Sheet and Bar.

Copper and Brass tube upto 6" dia

We also stock a range of high
quality, British made steam fittings.
BA Nuts and bolts, taps and Dies....

THE MAGAZINE FOR MODEL ENGINEERS
ENGINEERING in Miniature

**Subscribe
from just
£16 for 6
months!**

Call: 01778 392484

Online:

www.engineeringinminiature.co.uk

**PRO
MACHINE
TOOLS LIMITED**

Tel: 01780 740956

Precision machines made in Germany
for the discerning engineer!

**EXCLUSIVE
IMPORTERS FOR**



We regularly ship worldwide

Please contact us for stock
levels and more technical detail

**All of our prices can be
found on our website**

sales@emcomachinetools.co.uk

www.emcomachinetools.co.uk

Meccano Spares



Reproduction & Original
Meccano Parts.

www.meccanospares.com

Tel: 01299 660 097

STATION ROAD STEAM

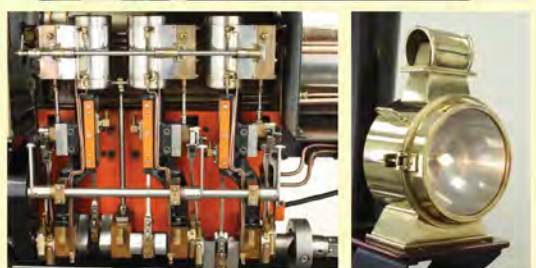
ENGINEERS • LINCOLN

LOCOMOTIVE BUILDERS • BOILERMAKERS

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



3 1/2 INCH GAUGE GWR PRAIRIE
A 3 1/2 inch gauge GWR small Prairie to Martin Evans' "Firefly" design, unsteamed from new. The locomotive has a silver soldered copper boiler by Western Steam with manufacturer's original shell test certificate; needs some work to commission for steaming. **£2,650**



5 INCH GAUGE PINOS ALTOS & MOGOLLON RAILROAD SHAY
This engine has been built to an exhibition standard; workmanship is first class throughout, with much nice detailing - the longer you look the more you see. The backhead is neatly laid out, valves are elegantly proportioned with finely turned wooden handles making them easy to handle when hot. A thoroughly well-sorted machine with silky smooth power from the three cylinders. Front lamp is an ornate brass reproduction of the prototype, wired up and working. Technically interesting, usefully powerful and beautifully made. **£17,500**



2 INCH SCALE FOWLER DCC SHOWMANS ROAD LOCOMOTIVE
A particularly well-made Fowler DCC Showmans Road Locomotive "Princess", to the Plastow design, displaying a high standard of workmanship throughout. Fit and finish of machined parts is excellent, platework is crisply executed. **£9,750**



3 1/2 INCH GAUGE NORTH EASTERN R1
A finely made 3 1/2 inch gauge North Eastern R1 to LBSC's "Miss Ten to Eight" design, the work of the late Keith Massey. Quality of machining, fit and finish, is excellent throughout. **£3,950**



ANTIQUE HORIZONTAL MILL ENGINE WITH REGULATOR VALVE
An old horizontal mill engine, nicely made it runs beautifully on air - fitted with a heavy flywheel it will tick over slowly. Nice oilers and a regulator valve with knurled knob. **£350**

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



NEW BUILD LOCOMOTIVES "STAFFORD" & "FELDBAHN"

We build a range of narrow gauge inspired locomotives in a variety of styles and sizes - from 5 inch gauge engines that fit into an estate car up to 10 1/4 inch gauge engines weighing over half a ton - suitable for all applications, from small garden railways to large commercial operations. Designed and built at our works in Lincolnshire, see our website for full specifications of the entire range,



PARTS SHOP

We manufacture an ever-growing range of parts and accessories.



- safety valves
- mechanical lubricators
- whistles
- vacuum brake valves
- reverser stands
- fusible plugs
- narrow gauge castings
- Boilers

For more information please visit our website

We are always interested in acquiring engines of the type that we sell. If you know of a steam engine for sale, in absolutely any condition, please let us know. Engines bought outright, or we are happy to take them on a commission sale basis, or pay you a finder's fee if you put us in touch with an engine which we later purchase. All engines listed are on our premises, available for inspection by appointment.

Please do contact us, even if all you have is a rumour of an engine being available!

For full details, high resolution photographs and video see our website
Unit 16-17 Moorlands Trading Estate, Metheringham, Lincolnshire LN4 3HX - visitors welcome by appointment
email: info@stationroadsteam.com www.stationroadsteam.com tel: 01526 328772

HOME AND WORKSHOP MACHINERY

Genuine Used Machines & Tooling

144 Maidstone Road, Fools Cray, Sidcup, Kent DA14 5HS

Tel: 0208 300 9070 - Evenings: 01959 532199 - Fax: 0208 309 6311

www.homeandworkshop.co.uk • sales@homeandworkshop.co.uk

Opening Times: Monday-Friday 9am-5.30pm • Saturday Morning 9am-1pm

10 minutes from M25 - Junction 3 and South Circular - A205



£3250

Colchester Colt 6.5" x 40" centres



£1725

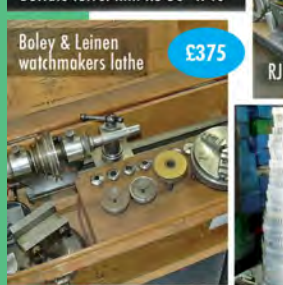
Boxford MK111 CUD 5" x 28" long bed



£2950

just arrived!

Buffalo turret mill R8 50" x 10"



£375

Boley & Leinen watchmakers lathe



£375
very nice example!

Startrite Mercury drill



Very nice!
£950

Morgan Rushworth 50" x 16g



£375

Burnard LO collet chuck + collets



£375

Fobco 240V drill



£625

Micrometers Various! 0-16" / 300mm



£325

SIP stratus 41050 3HP compressor



£195

Back in!

Stanier 55mm precision swivel machine vice from NEW ZEALAND 'Finest Engineering'

MYFORD GENUINE PARTS
Running out fast!
Purchased from Nottingham
Check the web site for full list!



£345

MKS Standard staking tool set



£65

WV150

£240

WV2

WOOD

extractor



£425

RJH buffer



£10-£49

Coldchester steadies to fit Student, Master, Bantam 2000, Triumph, Mastiff!



£625

Myford capstan attachment + tooling (some to be adapted)



£3750

Harrison M300 lathe + gap



£345

Waltons jenny



£325

Hegner Multicut-1 + blades



£345

Britan bank of grinding wheels



£20 Each

Diamond grinding wheels



£345 original as new!

Burnard D13 8" 4 jaw chuck



£425

Boxford Little Giant toolpost grinder



£3950

Denford Turn 270 Pro CNC



£1250

Cowells 90 ME lathe, tooling, vertical slide



£425

Clarke 917 vacuum forming machine



£425

Clarke 917 vacuum forming machine



£20 each

DP/MDG gears

Just arrived!



£30 each

Myford ML7 / Super 7 Rifle / Bridge bed felts



£90

Tripus (German) on/off switch



£525

Union 10" pedestal grinder



£625

Union 12" pedestal grinder

Please PHONE 0208 300 9070 to check availability or to obtain our list
DISTANCE NO PROBLEM! • DEFINITELY WORTH A VISIT • ALL PRICES EXCLUSIVE OF VAT
Just a small selection of our current stock photographed!
We are currently seeking late 'Myford Super 7B' & 'Super 7 large bore' model lathes!

SHIPPING
WORLDWIDE

