

MODEL ENGINEER

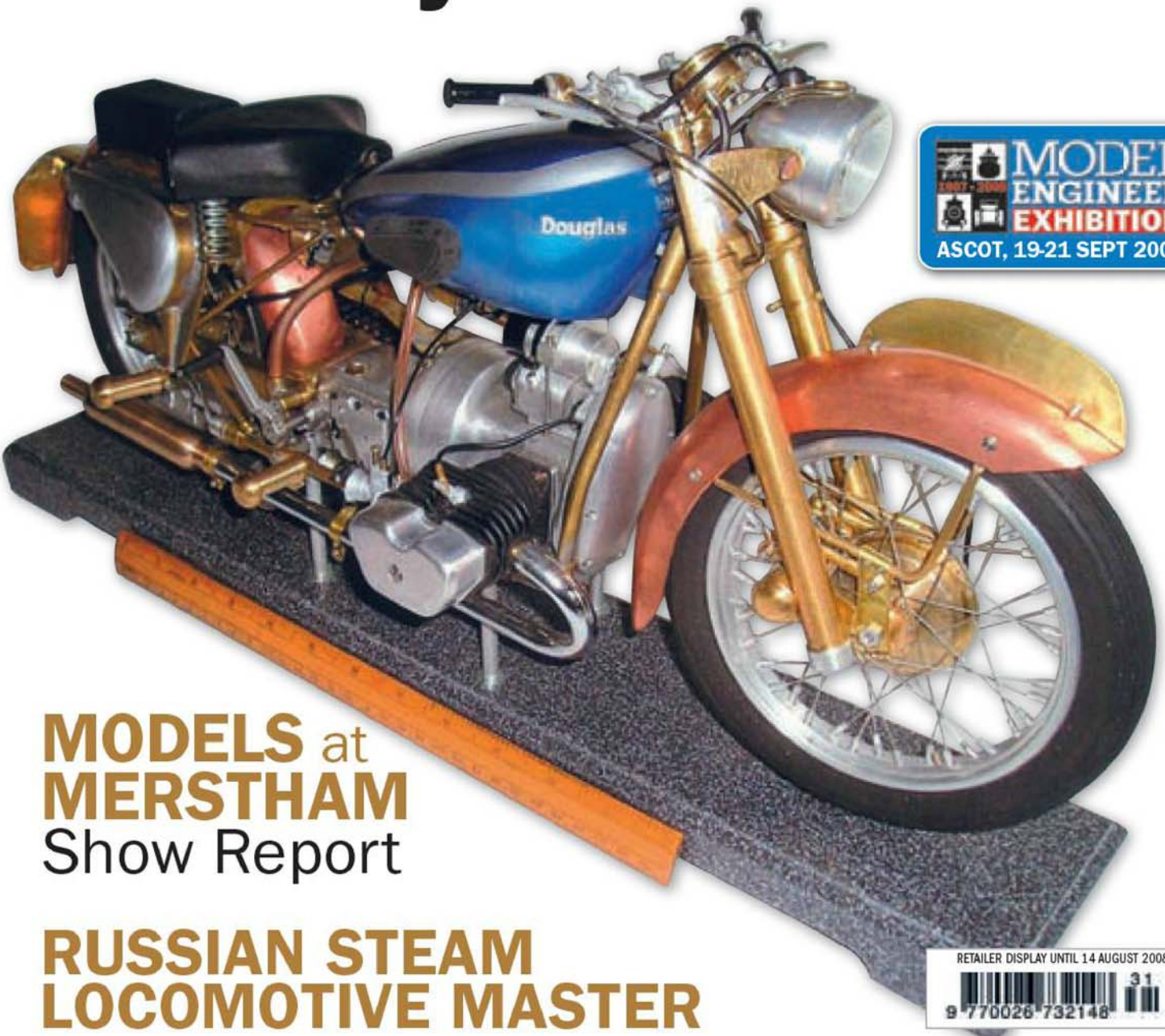
Vol. 201 No. 4331

1-14 August 2008

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INSERTS

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2 MORSE TAPER SHANK - TAPPED 10MM

3 MORSE TAPER SHANK - TAPPED 12MM

10MM PARALLEL SHANK

3 ASSORTED 8MM DIA HSS BORING BARS

1 TOOL STEEL ADAPTOR TO ACCEPT 5MM HSS TOOL STEEL

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SO AS TO MAGNIFY AND ILLUMINATE

THE WORKPIECE TO BE PUNCHED.

THE 48MM INCH DIAMETER BODY IS FITTED

WITH A SLIP RESISTANT BASE

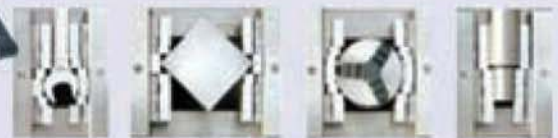
PUNCHES 9.5MM DIAMETER 60° OR 90°

SOBA HSS CENTREDRILL SETS

QUALITY HSS CENTREDRILLS
IN A HANDY STORAGE CASE
ASSORTED QTY'S OF EACH

CODE	TYPE	PRICE
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133100	SET 12 MET 1-5mm	£22.00

NEW SOBA MAGIC VICES



Ordering No.	Length		Width		Height		Jaw Width		Jaw Opening		Jaw Depth		PRICE
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	
110035	10.5/8	270	4.3/8	110	2.1/2	63	3	75	3.1/4	82	1.1/2	38	£149.00
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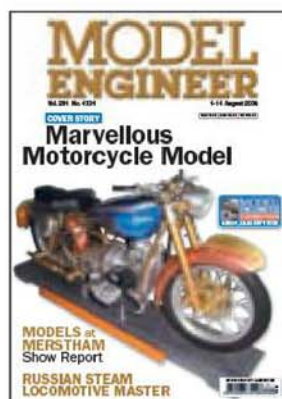
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ON THE COVER...

Neville Heath decided to combine his model engineering hobby and his passion for restoring and riding Douglas motorcycles. The cover features his 1:4 scale 1950 Mark IV Douglas which he built partially using old spare parts as the raw materials for the model. The story starts on page 133. (Photograph by Neville Heath)

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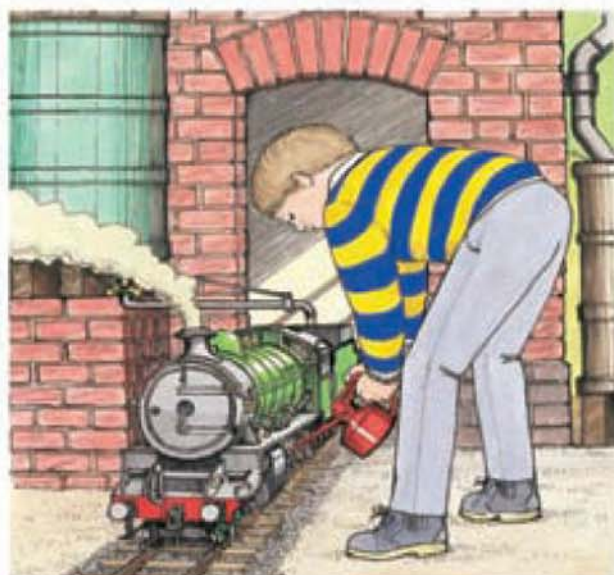


Practical Scale: Drawings, Castings, lost wax parts, laser cut frames, CNC rods, CNC platework, etc for the range of locos designed by Neville Evans and serialised in Model Engineer.

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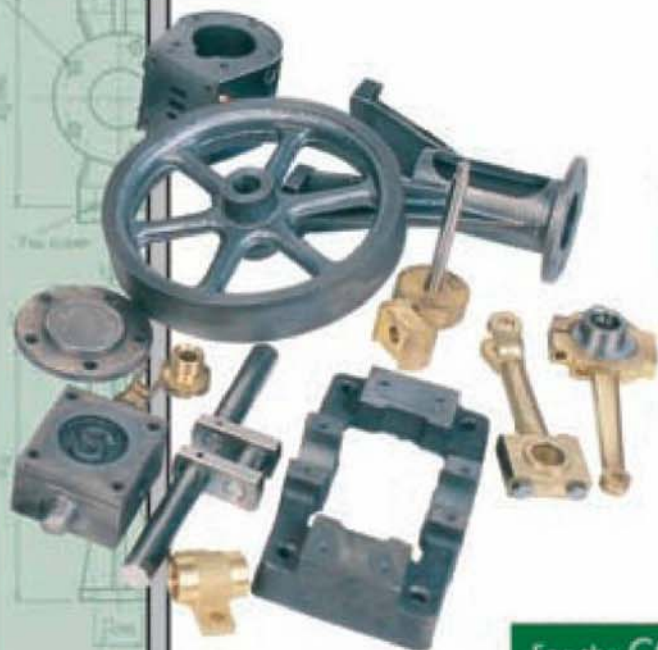
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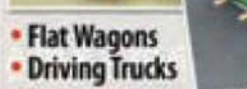
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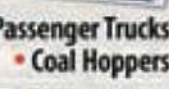
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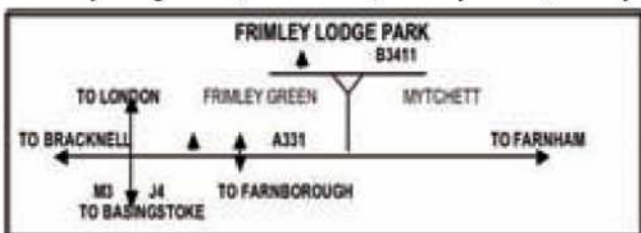


**FRIDAY 15th
AUGUST**

**SATURDAY 16th
AUGUST**

AT FRIMLEY LODGE MINIATURE RAILWAY

Frimley Lodge Park, Sturt Road, Frimley Green, Surrey



Visitors from all clubs are invited to run their locomotives on our ground level 3,000ft continuous multigauge track for 3 1/2", 5", 7 1/4", and will be welcome any time on or between the above dates. For further details, information on acceptable wheel standards etc and bookings for camping, please contact Peter Gardner on 01252 541999 or www.flmr.org or E-Mail info@flmr.org

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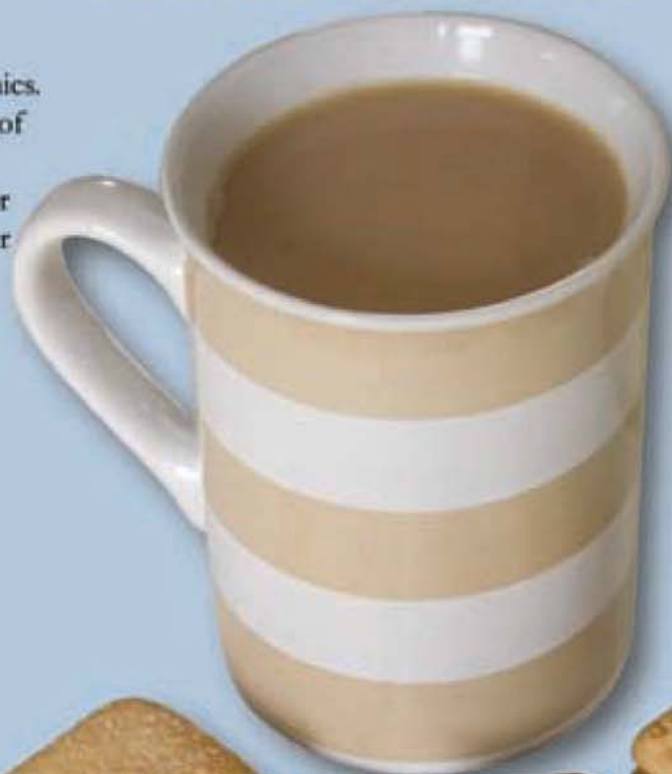
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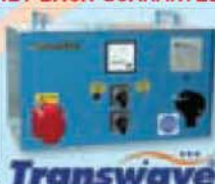
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	1 - 2 - 3 - 3/32 x 3/4, 1.		20mm x 20mm x 3mm, 25mm x 25mm x 3mm
A1	1/8 x 3/8 - 1/2 - 5/8 - 3/4, 1.		
A2	3/16 x 3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1.	J1	1/16 x 28g - 3/32 x 28g - 1/8 x 24g - 5/32 x 24g
A3	1/4 x 3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1.	J2	3/16 x 22g - 1/4 x 20g - 5/16 x 20g - 3/8" x 22g
A4	5/16 x 1/2 - 3/4 - 1 - 1.1/2		STAINLESS STEEL ROUND 303 F/C
A5	3/8 x 1/2 - 3/4 - 1 - 1.1/2. EN8M	K1	3/32 - 1/8 - 5/32 - 3/16 - 7/32 - 1/4
A7	1/2 x 3/4 - 1 - 1.1/2.	K2	3/16 - 7/32 - 1/4 - 5/16 - 3/8 - 7/16 - 1/2
B.M.S. ROUNDS			BA STAINLESS STEEL HEZAGONS 303 F/C
B1	1/8 - 5/32 - 3/16 - 7/32 - 1/4 - 5/16 - 3/8.	L1	152" - 193" - 220" - 248" - 275" - 312"
B2	1/4 - 5/16 - 3/8 - 7/16 - 1/2 - 9/16 - 5/8.		BA BRASS HEXAGONS
B3	5/8 - 3/4 - 7/8 - 1.	M1	152" - 193" - 220" - 248" - 275" - 324"
B5	3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1 EN8M		BA STEEL HEXAGONS
B.M.S. HEXAGONS		M2	193" - 220" - 248" - 275" - 324"
C1	3/16 - 1/4 - 5/16 - 3/8		BRASS FLATS
C2	1/4 - 9/32 - 5/16 - 7/16 - 1/2 - 5/8	N1	1/16 x 1/4 - 3/8 - 1/2 - 3/4 - 1
B.M.S. SQUARES		N3	1/8 x 1/4 - 3/8 - 1/2 - 3/4 - 1
D1	5/32 - 3/16 - 1/4 - 5/16 - 3/8	N4	3/16 x 1/4 - 3/8 - 1/2 - 3/4 - 1
D2	7/16 - 1/2 - 5/8 - 3/4	N5	1/4 x 3/8 - 1/2 - 3/4 - 1
BRASS ROUNDS			ALUMINIUM ROUND F/C
E1	1/8 - 3/16 - 1/4 - 5/16 - 3/8 - 1/2	P1	3/16 - 1/4 - 5/16 - 3/8 - 7/16 - 1/2
E2	1/16 - 3/32 - 5/32 - 7/32 - 9/32 - 7/16 - 9/16 - 5/8	P2	5/8 - 3/4 - 1
BRASS SQUARES			PHOSPHOR BRONZE ROUND
F1	1/8 - 3/16 - 1/4 - 5/16 - 3/8	Q1	1/8 - 5/32 - 3/16 - 1/4
F2	1/4 - 5/16 - 3/8 - 7/16 - 1/2	Q2	5/16 - 3/8 - 1/2
BRASS HEXAGONS			SILVER STEEL
G1	5/32 - 3/16 - 7/32 - 1/4 - 9/31 - 5/16	S1	3/32 - 1/8 - 5/32 - 3/16 - 7/32 - 1/4 - 9/32 - 5/16 - 3/8 - 7/16 - 1/2
G2	1/4 - 9/32 - 5/16 - 3/8 - 7/16 - 1/2 - 5/8	S2	3mm-4mm-5mm-6mm-7mm-8mm-9mm-10mm-12mm
BRASS ANGLE			ALUMINIUM FLATS
H1	1/4 x 1/4 x 1/16	R1	1/8 x 1/2 - 1/8 x 1 - 1/4 x 1/2 - 1/4 x 1 - 1/4 x 1.1/2 - 1/4 x 2
	3/8 x 3/8 x 1/16	R2	3/8 x 1/2 - 3/8 x 1 - 3/8 x 1.1/2
H2	5/16 x 5/16 x 1/16	R3	1/2 x 1 - 1/2 x 1.1/2 - 1/2 x 2
	1/2 x 1/2 x 1/8	R4	1/2 x 2.1/2 - 1/2 x 3
	3/4 x 3/4 x 1/8		

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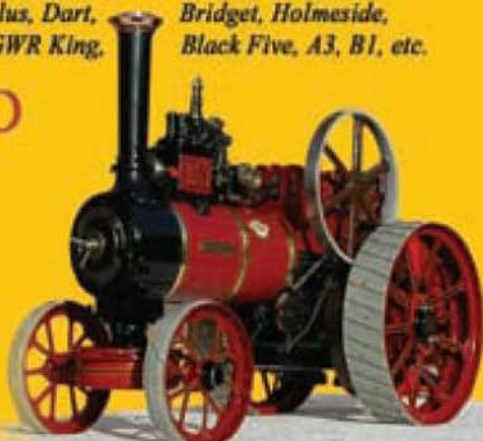
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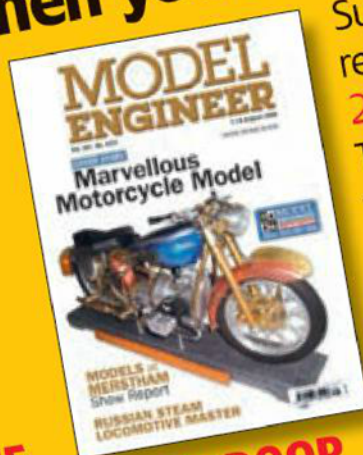


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The International Model Engineer Exhibition at Ascot

Planning for the 101st year of the International Model Engineer Exhibition held at Ascot is well underway. Locomotives from European countries other than the UK will be able to run, too, provided they have valid boiler certificates, of course. We hope to see an interesting mix of continental and UK railway equipment. To enter a locomotive (steam, electric or I/C) fill in the form on this page.

Caravan parking will be available, too. The site is next to the Ascot Locomotive Society. There is access to portable water and there are men's and women's toilets as well.

Advance tickets are available on-line and up-to-date information about what's on can be found on our International Model Engineer Exhibition website. W. <http://www.model-engineer.co.uk/>



At the recent IMLEC 2008 hosted by Southport MEC, Jim Elliot's 5in. gauge 'Speedy' was captured at speed in the rain. A full report on the event will be appearing soon in a future issue of 'Model Engineer'.

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Brief details of entry(ies)

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Enter now

It's not long to go now before the Model Engineer Exhibition at Ascot. Regular readers will know that we are highlighting locomotives at this year's event, and hope to see a good display of locomotive designs, including those that originated on these pages.

Our exhibition is best known for its competition models. Every year the standard seems to get higher and higher and last year a large number received Gold Medals, the top accolade in model engineering.

The exhibition is also a chance to show work in progress in the 'loan' category, which does not come under the judges' scrutiny. Good, honest, working models are also appreciated and admired in the loan category, especially if they can be shown working.

Your entry form is on page 143. Be sure to fill it in. It is your show. It is as good as you make it.

This year we also have the chance for locomotive people to run 5in. gauge engines on the famous ground level track from Sinsheim. For those that need them, we will have available some driving trucks and passenger wagons.

To run on the Sinsheim rails, see the entry form below or our website www.model-engineer.co.uk Or contact the editor on 01689 899255 or email david.carpenter@magicalia.com

Model engineer suppliers to the rescue

Since Modelworks International (Sales) Limited ceased trading recently, the model engineering trade has a word of advice for 'Duchess' locomotive builders: Don't Panic! Several well-known suppliers such as Model Engineers Laser and Maxitrak have offered to supply some of the missing components needed to complete these long-dreamt of projects. They'd like to see you finish your engine, too, but first, they need to know where you are and that you're interested. Ian Gordon (E. ian.gordon@peak-translations.co.uk) is coordinating the efforts by e-mail to contact with the other 'Duchess' builders for mutual support and shared expertise, or locating whatever parts they still need.

Contacting Model Engineer

We recently received some items in the post addressed to magazine publishing companies (owners of *Model Engineer*) which ceased trading seven years ago and more. So, we would like to remind all readers, particularly those sending in items for 'News' or 'Diary' that these should be addressed to 'The Editor' at *Model Engineer*, Berwick House, 8-10 Knoll Rise, Orpington, Kent BR6 0EL, F. 01689-899266 or E. david.carpenter@magicalia.com

Items should not be addressed to individual editors as this causes delay. Also, could all those responsible for sending items to *Model Engineer* please check their mailing lists?





Cleaning aluminium

SIRS, - It was not clear whether the hint given to Melton Mowbray DMES (*News, M.E.* 4318, 1 February 2008)

re. using wire wool when cleaning before brazing was a universal hint, or applied only to aluminium bronze. I would be grateful for a clarification.

Some years back, as a tech volunteer with Technical Aid to the Disabled, I did some braze/welding of aluminium. I used filler rod of 10% silicon - the rest aluminium, and found it slightly tricky (I am a rank amateur). 'Scrubbing up' before operating, I used a brush with stainless steel 'bristles' or one of those kitchen 'pan-scrubs', aka 'pan scourers', made from stainless steel. The latter are splendid for rubbing down the filler rod before starting. If I should need to use the process again, an hour or two of practice will be called for! Aluminium in this context means aluminium alloys of the 6000 series.

Derek Cooke, by e-mail.

LPG firing

SIRS, - In response to Mr. Graham's letter (*M.E.* 4324, 25 April 2008) I started struggling with exactly this same problem many, many decades ago. I tried many possible solutions and finally evolved the system that I now use in all my small steamboats. If you look back in *Model Boats* June 2005, starting on page 40 and especially page 45, this may give some of the answers. Also, in *M.E.* 4307, 31 August 2007, pages 274 up to 277 you should find a section headed 'Heat Shunt'. Two of my ideas have consistently worked well over many years in many boats. The smallest gas tank that I have built has a working volume of 35cc and minus the heat shunt, the flame dies in five minutes. The smaller the tank, the faster it freezes. With the shunt in place the tank will stay comfortably warm and happily runs until the gas is empty. The shunt is designed to take a small amount of heat from

the rear of the burner and feed it into the gas tank, usually a piece of copper sheet about 1/4in. in thickness is employed for the actual transfer of the heat.

So how much heat is needed? Very unscientific really because the size of the copper is trimmed with tin-snips until the temperature (and hence the pressure) stays steady. A cold tank is no use because the pressure drops to nearly zero. A hot tank is nearly as bad because the pressure rises far too much and usually blows the flame out. Ideally the tank temperature should stay the same throughout its running time. Mine usually end up falling slightly, e.g. from 35 down to 28psi.

Obviously another gauge is needed to check the gas pressure. I used to fit a gauge on the tank itself, but slowly evolved the idea of fitting the gauge on the supply line to the actual burner. This turned out to be extremely useful as it shows many things: for an empty tank the gauge reads zero and there is no flame anyway: for a very cold tank the gauge reads maybe only 10psi or less: if the gas jet is blocked the gauge shows full tank pressure but the flame goes out: if the tank is heating up the reading rises: if the tank is cooling down the pressure drops slowly. The gauge size that I use is 3/4in. dia. with a range of 0-60psi. This assumes you are using butane or butane-propane mixture, I have never had any problems using this mixture, usually in a 350gm canister straight out of a certain DIY supermarket. The only thing that has been noticed is slight variations in the gas itself, I do not know how accurately the two gases

are mixed, but sometimes have wondered if the canister should carry a notice that says "SHAKE BEFORE USE" possibly someone may know if the gases can settle to opposite ends of the canister. The effect is certainly there.

This method with a heat-shunt is the most stable that has been discovered so far, some of my early boats have been altered to include the system. The reason it is very stable is because the heat is only transferred when the burner is running. If ever you run your boats on a very hot day the heat shunt can easily be swung out of contact with the burner. This method does mean the gas tank needs to be adjacent to the burner which actually produces a very compact assembly, remember there needs to be enough room between the burner and gas tank to fit the heat shunt and to be able to reach it, so far my smallest boat is an open launch only 21in. in length with a displacement of less than 5lbs. The local management keeps insisting the lawn needs cutting, but given time I would like to miniaturise the system and build something half that size. I do have lots of drawings of burners, boilers and gas tanks (all home-designed) if they are of any interest.

Martin Ranson, East Yorkshire.

Superheating

SIRS, - As an interested watcher on the sidelines I compliment Doug Hewson on his well-founded letter (almost an article) in *Postbag* (*M.E.* 4324, 25 April 2008). I am a CEng so I know something about thermodynamics and behaviour of gasses although regretfully I have never built a locomotive with its special construction

Write to us

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Responses to published letters are forwarded as appropriate.

Small screw plates

SIRS, - I thought readers might like to see these, which probably preceded BA. I have the taps to go with them.

John Day, by e-mail



The small tap holder and screw plate sent by John Day.

and performance problems. I have been involved in making stationary steam engines and therefore boilers.

Among all the recent discussion Doug has given us a clear experimental result of applying significant amount of superheat, something that has been missing from the reports. Congratulations.

There is one thing that is not clear from his write-up (at least to me). There are four pairs of heater tubes all fixed to the firebox header and, apparently, one return pipe to the steam chest. Is this correct? Presumably the wet steam goes from the boiler to the steam chest at the front of the locomotive. What is its route from there? Is it subject to heating in all 16 pipes before it goes back to the steam chest? Could Doug provide a diagram drawing showing all the tubes, in both directions, and the steam route through them please?

One last comment; again congratulations to Doug on the firebox (brass?) manifold; it is a beautiful answer to the installation problem as well as surely adding to the performance.

Ted Wale, Canada.

Don's swarf 'picker-upper'

SIRS, - We were cruising on the QE2 on its last world cruise, when one evening I happened to say that I had always had a problem with swarf, to my fellow passengers, Don Bradshaw, a 5-stripe retired marine engineer from NZ, restoring a full-size ship; and Pete Fitness, heavily involved with the NSW branch of Model Engineers.

I pointed out that every time you try and brush it up it clogs the brush, and takes ages. Don chipped up "a plastic bag", "yes" we both said we use them, in fact I have a swing bin in my workshop because she who has to be obeyed changed the colour of the kitchen, thus the colour of the swing bin, I inherited an almost new swing bin.

Next question "do you have any old speakers in the garage", answer "yes".



Ted Goode's 5in. gauge 2-6-2T in the yard at Gilling. (Photo: Tim Coles)

Mickey mice at Newport

SIRS, - Following Peter Rich's article *Mickey Mice at Newport* (M.E. 4328, 20 June 2008), I thought readers might like the photograph of Ted Goode's 5in. gauge locomotive in the yard at Gilling.

Ted and I (Well, Ted mostly!) built a pair of these some years ago as tender engines. Ted then decided he preferred the tank engine version, so he sold the tender and converted the locomotive as seen. We worked to Don Young's drawings which were not bad, but I think Don himself admitted they were more for guidance than for total build detail. Ted famously carved the cylinders, valve chests and cylinder covers for both our locomotives from a single block of cast iron which we bought from the foundry in Loughborough.

I'm puzzled by Peter's comment about the valve chest in Don's design - Peter says Don placed the valve chest directly above the cylinder bore. I have the drawing in front of me and the valve chest is placed $\frac{1}{4}$ in. out from the main bore centreline. However the cylinder cleading plate is vertical, where in Peter's drawing it clearly cants outwards.

Peter also says that Don produced drawings for both the tender and tank version, but I don't think Don ever finished the tank drawings. Ted certainly produced his own design, mainly from photos. Ted and I also built the wagons forming the train seen in the photograph.

Tim Coles, Cambridge MES.

Good now do you see occasionally a pile of old toys put out for collection by family including some with two wheels and an axle! "Yes", good and do you have a small strip of MDF or wood around in the garage or in the workshop, "Yes" good.

Take the two wheels and axle and bolt them to the strip of wood, take the magnets out of the speakers and screw them to the wood, attach an old broom handle to the wood, use your plastic bag wrapped around the magnets and wood and tied with duck tape. Run the assembly over the floor, when full take to your swarf bin take off plastic and swarf drops nicely into it.

Don has used this successfully over a number of years now where, when they turn or mill up large new components for the ship, they generate a huge amount of swarf.

I am sure that this idea albeit so simple can be expanded on. But it is the really simple ones I feel are the best.

Bob Thomson, by e-mail.

Boiler materials

SIRS, - As a former technical employee of a major model engineering supplier may I comment on the materials supplied to Julia Old for her Railmotor boiler? Over many years and under the supervision of Alec Farmer, Director of A. J. Reeves & Co. Ltd., I was often part of the process of making the steel flanging formers to make the copper end plates for new designs as and when required.

All formers were deliberately made oversize for the reasons that (a) the hammering process reduces the thickness of the flange from that of the nominal plate and is not therefore of a precision nature, (b) will allow for hand finishing using files, belt finishing, or machining of circular plates and (c) to allow for cleaning up the former on its return from cutting out. Depending on the physical size of the boiler, the oversize could vary between $\frac{1}{16}$ in. and $\frac{3}{32}$ in. overall.

Originally the start was to make an HB pencil drawing of

the finished former including the oversize, which would be sent to the flame-cutters who had a marvellous machine with a photo-electric 'eye' that followed the carbon-black line and allowed for half the diameter of the oxy-acetylene flame. The cut plate on its return had to be hand-finished on its edges and a suitable radius put on one edge. The hand angle-grinder was used for trimming off the often locally hardened flame cut edges. We tried to do this - out doors of course - on a sunny day in spring or autumn for in mid-summer perspiration was extreme in the mid day sun when "mad dogs and Englishmen" do silly things like this. This was followed by hand filing in the indoor bench vice.

Then in the early 1990s, computer control reared its ugly head. I use the word 'ugly' deliberately. The flame-cutters discarded their machine with the line-following eye and installed a new machine with CNC control. Now they wanted a fully-dimensioned drawing



to work from, something that had been singularly lacking in published designs from the previous hundred years or so. No longer was it possible to write "blend curve to suit". CNC won't do that, will it? No. It demands datum points and exact radii. Trying to re-assess these with a pair of dividers from a not-necessarily-to-scale print was next to impossible to get these exact and some very strange dimensions to three decimal places resulted. Such was progress for with a handmade boiler construction was impossible often to sixteenths, let alone thousandths of an inch. Sadly the hand-finishing process was not computerised and we continued to perspire.

The other factor hinted at by Julia is that of the flange not being at right angles to the plate. I believe that Alec's original formers, and the later Reeves ones, are still with Reeves 2000? Assuming that hand-flanging is still being used by them I can only suggest that more practice and attention to details like these are given by the person involved. Alec always made sure that his employees paid strict attention to quality accounting for why

his finished boilers received international acclaim. His book *Model Locomotive Boilermaking* first published in 1988 and reprinted in 1992 and 1996, copiously illustrated, is well worth obtaining, studying and following.

Again from Alec's tuition, I am pleased that Julia stresses the need for joint integrity to come from the silver solder flowing right through the joint. In fact there is no actual need for a flange at all; all that the flange is for is as an aid to construction. Going back in *Model Engineer* to 1953 readers will find that a Mr. Austen-Walton described a 5in. gauge locomotive with such a boiler, difficult to assemble, but perfectly safe provided that the solder flowed right through the joint. What a pity that our Australian cousins did not realise this factor when their boiler code of practice was formulated for they actually, and un-necessarily increased the depth of flange making it more difficult for the solder to flow through, and using more expensive solder too.

I do hope Julia enjoys her Railmotor when finished. It is an ideal 'starter' locomotive for a newcomer to the hobby.

It is small enough to be easily handled by one person when finished, but large enough to give a good track performance and hauling capacity. Also components, should one be unlucky enough to have a 'scraper', are not too expensive to replace.

David Piddington, Birmingham.

Boiler water

SIRS, - Our window cleaner is using a system that involves the use of 'pure water'. He produces this in a small plant by a system called reverse osmosis. The windows are cleaned simply by spraying this water on the panes, giving them a clean with a sponge on the end of the wand and leaving them to dry of their own accord. No messing about with a chamois leather! When the droplets dry there is no sign of them, if you do the same thing with tap water you are left with white marks. Presumably this is lime which in a boiler produces limescale.

Since limescale is an enemy of clacks and injectors I wonder if it is a good idea to use water produced by reverse osmosis in our boilers. I am not in any way conversant with chemistry but

I know from reading previous readers letters that some of your correspondents are. It has been suggested to me that although the water would probably have no detrimental effect on the copper, it is possible that the silver solder may not like it! I would be pleased to hear from anybody who may know the answer, **Ron Bettell, Bournemouth DMES.**

3-phase supplies - thanks

SIRS, - Little did I realise just what I would stir up when I made my initial enquiry about 3-phase supplies for a workshop and my initial rather dispiriting experiences.

As many other readers will admit, I can only also admit to being amazed by the professional expertise of some of M.E. readers and how I have learned a great deal from the correspondence on this subject.

Could I request a little space to express my sincere gratitude for all the help and advice that has been given? I can now approach the subject of 3-phase supply to my new workshop with considerably more confidence than previously.

James Wells, Saudi Arabia.

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Plus all your regular favourites

Contents subject to alteration

ON SALE 15 AUGUST 2008

A Mk. IV Douglas motorcycle in 1:4 scale

Neville Heath describes the construction techniques and unique materials he used to create a wonderful 1:4 scale motorcycle model.

I have two main hobbies (three if you count the wife). One is restoring and riding Douglas motorcycles, the other, making models. It seemed a good idea to combine the two, hence this model. Standing in my workshop waiting to be measured-up was a 1950 Mk. IV Douglas (see model, **photo 1**). I had already made a 1:8 scale model of it (see photo in *M.E.* 4086, 29 January 1999), this time 1:4 scale was chosen.

Engine and gearbox

The main obstacle at the time (would you believe 40 years ago?) seemed to be the engine so that was tackled first. A combined pattern for the crankcase and gearbox was made from balsawood and authentically painted red (**photo 2**). The casting was cut in two at the bell-housing joint, and work commenced.

The interior of the crankcase was milled out partly on a



1. The completed 1:4 scale 1950 Mk. IV Douglas motorcycle.
2. A balsawood pattern for the engine crankcase and gearbox.
3. Milling out the interior of the crankcase.
4. Cooling fins for the cylinder and cylinder head were cut with a slitting saw.
5. The size of the prototype cylinderhead contrasts with the two model ones (note the 6in. rule).
6. Dummy carburettor mounted on the cylinder head.
7. All the parts for the engine and crankcase are laid out for inspection.

Unimat (**photo 3**) and partly on a Myford.

Brass inserts were let into the walls in readiness for the bearings for the crank and camshafts.

The cylinder heads and barrels were machined from the solid, the fins being formed using a thin slit saw (**photo 4**).

The barrels have cast iron liners made from worn out valve

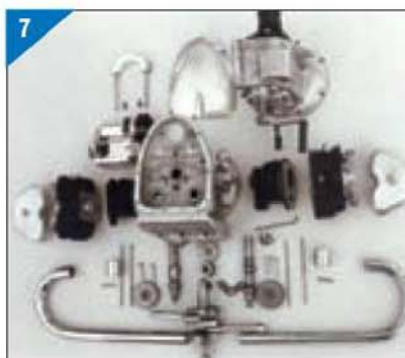


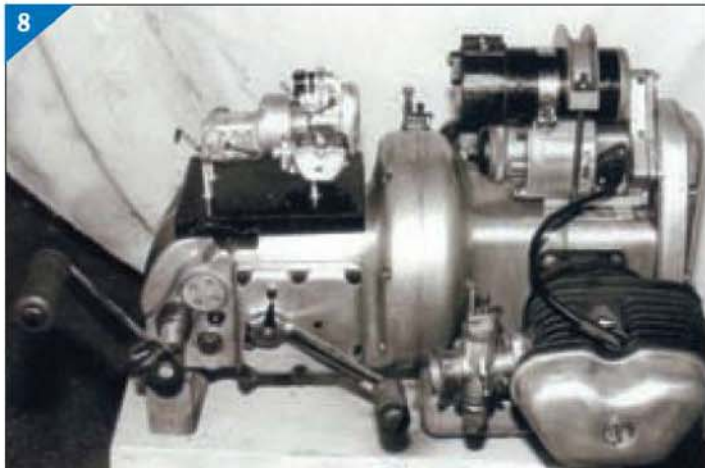
guides removed and saved from the full-size motorcycle many years ago during an overhaul. These also provided the material for the piston rings.

The valves were also made from 'authentic' material; machined from the stems of discarded (but kept!) worn out full-size ones. Machining the correct angles for the valve guides proved tricky many hours being spent on setting up for just a few minutes of drilling. **Photograph 5** illustrates the size difference in engine components between the model parts and the prototype.

The carburettors are non-working (**photo 6**) and were made by turning up various shapes, tinning them to resemble light alloy, and persuading them to merge together by adding more solder and waving a blowtorch at them.

Photograph 8 shows the completed engine and gearbox placed on the full-size one for comparison. It is mounted





8. A full-size engine and crankcase support the model version (mounted on a black board).

9. Full-size drawing of side toolboxes was scaled down. Scale toolboxes are shown as components and sub-assembly.

10. Completed rear frame assembly with toolboxes (and lids).

11. Front fork components with a full-size reaction link for comparison.

12. Wheel rim blank and partially completed part in the lathe.

on a base and production halted at that stage for several years awaiting a new wave of enthusiasm. I filled in the gap by converting the full-size one to a transverse 90deg. V-twin. But that's another story.

Frame

The tubes of the main frame of the full-size motorcycle are 1in. dia. O/D which meant $\frac{1}{4}$ in. dia. brass rod could be used for the straight sections and front part which only had one-way bends. The cross-bar (or bars) part consist of two tubes which start at the steering head and culminate in castings either side at the rear. These were made from $\frac{1}{4}$ in. dia. copper fuel pipe which was easier to fashion into the complex bends and being thick walled did not kink.

The castings were replicated by turning up all the bosses and tubes and cutting the gussets from sheet brass. The parts were then soldered together by laying them on a fire brick and using a small needle flame butane torch. This tool was to prove invaluable many times over. Its flame could be

adjusted to suit, and with its piezo-electric ignition system, it switched on and off as required without the need to rub two sticks together.

The technique was to join the larger parts first then work down to the smaller ones. Needless to say, there were frustrating deviations to this process. Lathe tools came in handy to prop things up and act as heat sinks.

The sub-frame at the rear of the bike was made from brazing rod with the ends shaped from the solid, drilled to suit the rod, and soldered on.

Fixed to the sub-frame are two teardrop shaped tool boxes which also serve as a mounting for the pillion riders' footrests. **Photograph 9** shows the various parts ready for soldering and also gives an example of how many of the parts were scaled down. The full-size part was drawn on a large piece of paper-the back of last year's calendar. Overall 1:4 size measurements were plotted and then the rest sketched in by reproducing all the angles. The sub-assembly is shown in **photo 10**.

Front forks are of the leading link pattern. The main stanchions were turned from brass rod and the bottom yoke below the steering head cut from thick brass sheet. The pivots for the links were formed from brass. These together with the yoke were soldered to the two legs. The links were made from thick brass milled out to an 'I' section and drilled as a pair to ensure correct alignment of the wheel spindle. **Photograph**



11 shows the various parts together with a full-size reaction link and a £2 coin (28.40mm dia.) for size comparison.

Uniquely, the full-size rear suspension uses torsion bars. They run inside the bottom rails of the frame and are splined and fixed at the front. At the rear the torsion bars are splined to a linkage system which is connected to the swinging arm forks. The various parts for the model were made from brass and either soldered or bolted together depending on whether they were required to pivot or not. The hollow square section swinging arm was made by milling from the solid as it was thought that a more realistic finish could be obtained than by trying to bend thin sheet.

Wheels

Two annular blanks were turned up from a $6\frac{1}{2}$ in. dia. dural billet. The jaws of a 3-jaw chuck were expanded onto the inner dia. and the outside of the rim finished to size. A well was incorporated as per full-size to accommodate the end of spoke fixings. It was then transferred to a 4-jaw, gripped on the outside, and one half finished, followed by reversing and finishing the other half (**photo 12**).



There are 40 spokes per wheel, set 20 to either side of centre. These were made from the stainless steel locking wire used to lock nuts, etc., on full-size machines. Nipples were made from aluminium rod. Squares were filed on each one whilst still in the chuck using a short length of tube as a gauge for the length and moving the chuck round by hand 90deg. at a time.

Accessories from a Unimat lathe were utilised to index the



spoke holes, but a disc was plotted with alternating red and green radial lines as a double check that I was drilling holes in the right place (**photo 13**). The resultant holes were, of course, radial, whereas they needed to be at various angles. Many hours were spent with a burr in a Dremel drill copying the angles from a full-size wheel making sure the metal removed from the well did not encroach such as to elongate the holes on the inside surface of the rim.

Hubs were turned from brass and again the Unimat set up used to index the spoke holes (**photo 14**). Both wheels run on tiny ball races salvaged from an ex-aircraft instrument bought from Proops in the 1950s. I knew there would be a use for them one day!

A Perspex cruciform jig was made to hold the rims and hubs in correct relation and the nipples and spokes were fitted (**photo 15**). It was very satisfying to find the wheels quite rigid and spinning true when they were removed.

Tyres

Over the years I had often wondered how the problem of making the tyres could be solved. It transpired that I had picked up an old scrap shopping trolley at some time with solid tyres (well you do don't you?). These provided the answer. They were bigger than needed so I started by cutting through them and marking the outside circumference of the model rims on the inside surface. Then they were cut to length and the edges, which had to be cut very squarely so as not to show the joint, were super-glued.

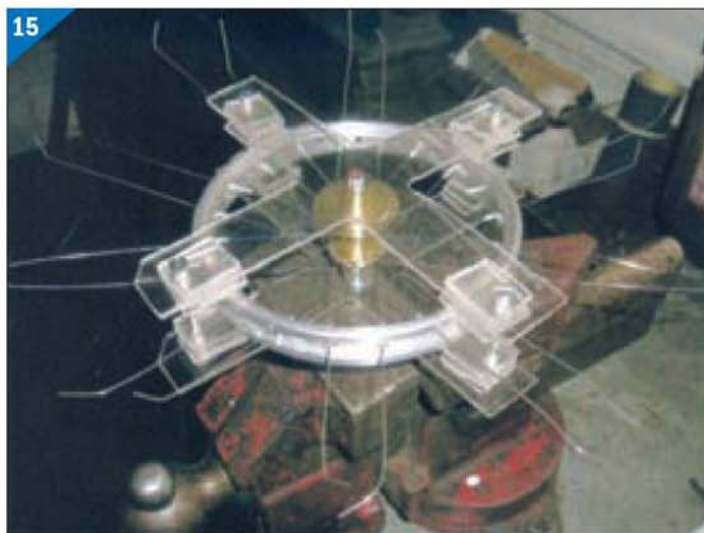


When satisfactory blanks were made, they were turned to size. A snag arose with this operation as the expanding jaws of the chuck distorted the shape if gripped too much. Also, the centrifugal force expanded the rubber off the jaws. It required slow speeds and small cuts.

The full-size front tyre tread consists of annular grooves which were easily replicated using a fine parting off type lathe tool. The rear needed a zig-zag pattern which was cut using a dental burr in the Dremel.

Chain

That left just the sprocket. The only thing on the bike that is not home made is the chain, and the smallest I could locate has a pitch of slightly larger than is correct for the scale. The full-size sprocket measured 10in. pitch circle diameter (PCD), so the model one needed to be about 2½in. diameter. I say 'about' as it also had to have a diameter that could contain a number of teeth compatible with the chain pitch. The circumference of a 2½in. circle is 7.8in., so with a pitch of ¼in. it can be seen that 30 teeth would do the job. By multiplying 30 by ¼in. the pitch circle circumference was established and hence the PCD of 2.4 inches. A 2¾in. dia. disc was cut from ½in. thick aluminium. With my equipment I could not index 30 so successive 12deg. were marked out using a protractor. A root circle smaller than



PCD circle was needed which turned out to be 2¼ inches. A ring of ¾in. dia. holes was drilled along this. These provided the roots of the teeth which were then hand finished with a mini-hacksaw and a file. The final finish and fit was obtained by wrapping the chain around the sprocket until it mated.

Mudguards

Making these posed a particular problem due to the two-way bends. Many spare moments over the years as the model progressed were spent trying to think of a way of making a satisfactory job. The answer was hanging up in the roof of my workshop all the time. Douglas exhaust pipes turn through 180deg. at the front end and it transpired that the full-size ones were just about the diameter and radius that were needed. About 50

years ago I had made up a set of exhausts for a bike I owned at the time from copper tube. I still had them. Using a thin cutting wheel mounted in a Dremel drill a curved section was removed (**photo 16**). A former was then turned from hard plastic - an off-cut from a kitchen worktop. By careful use of a rubber mallet, the required curved shape was formed.

>>

13. Drilling holes in the rim with the milling machine. Red and green lines assure that the holes are located correctly.

14. Holes were drilled in the hubs using a Unimat milling accessories.

15. The wheel rim and hub were held in a jig while spokes were laced up.

16. Sections sawed out of a Douglas exhaust pipe were formed to make mudguards.



DOUGLAS MOTORCYCLE



17. Front mudguard components with full-size equivalents for scale.

18. A complete, painted fuel tank.

19. Throttle components which are electrified to operate a micro-chip sound generator.

20. An off-side view of the completed Mk. IV Douglas motorcycle model.



The extended sides however needed to be flat. That was taken care of by filing, as they lay flat on the bench, and finishing off with fine glass paper in a block. The stays for the front one were made from some odd lengths of brazing rod and fixed to the flat plates with 12BA screws. Where the stays and other fixing points joined the copper was tapped 10BA and hex-headed screws used. I ran out of my stock of these and made several up from 10BA studding and soldered on nuts. **Photograph 17** shows the parts for the front one together with two components from the full-size bike for comparison.

Fuel tank

Several exterior cross section templates were made in cardboard from the full-size one. These were scaled by drawing them on a 1in. square grid on them and then transposing the shapes onto a 1/4in.-square grid. The shapes were then reproduced in 1mm ply and interlocked to make an open 'egg crate' structure. The spaces were then filled in with balsa wood and the whole sanded down to the plywood profiles. Sanding sealer and primer were applied

and holes drilled for the filler cap and petrol taps.

There is a special way of fitting the full-size one. It needs to be pushed forward and then the rear end manoeuvred past the saddle bracket before it can be settled down on the mountings on the frame. It was satisfying to find that the model tank needed the same treatment.

Special stickers had been produced by the London Douglas Club to commemorate the start of Douglas motorcycle manufacture 100 years ago. The lettering on them happened to be exactly the right size for the name transfers.

After painting, filler cap, taps and knee pads were added to complete the job (**photo 18**).

Cables

The Bowden cables for the brakes, etc., were made from black, small sized electric cables with the multi-strand conductors removed and replaced with a more rigid single copper wire which came from the middle of an old TV aerial cable. Slitting the levers to enable the nipples to fit in was achieved with a thin cutting disc mounted in a Dremel drill.

Electrics

The headlight shell is of aluminium and the parabolic shape was generated in the lathe using a template. The method was remembered after it was described by Paul Horth in his feature on making a Nested Dodecahedra (*M.E.* 4276, 23 June 2006). I have used it for several items since.

Even the voltage is to 1:4 scale, the full-size motorcycle uses six volts and the model is 1 1/2 VDC! The battery is hidden in one of the toolboxes. Bulbs and holders were taken from two torches bought for £1 each from a local cheap store. The lights operate from the headlight switch which had to be a rotary type for realism. Part of a thermostat control from an old iron was the main ingredient allied to a small section of circuit board.

My 1:8 scale model featured a chip which produced an engine-like sound when the kick start was depressed. I felt something similar would be expected on this model. As a variation, a switch was fashioned in the twist grip by insulating the part where the cable

enters from the handle bars, and leading a conductor to it instead of a Bowden cable. An insulating washer was placed between that and the rotating hand grip. A slot was machined in the end face of the grip into which a pin protruded from the insulated section. Because the pin diameter is smaller than the width of the slot, it only completes the circuit when the grip is turned and the pin touches the end of the slot. The grip is brass and completes the circuit via the handle bars (**photo 19**).

Conclusion

There were mixed feelings when the model was finished (**photo 20**). For years there had always been a challenge to work out how to make the next part. The model completed, but unpainted, is extremely satisfying and also bittersweet, as all the problems have been solved.

No doubt second time round would be considerably easier and quicker. One person asked if I would make him one; I think he is out of luck somehow! **ME**



Three generations of small diesels

Andy Probyn concludes his look at the Maxitrak range of 5in. gauge battery-powered diesel engines with a look at their third generation models.

11

Continued from
page 36
(M.E. 4329,
4 July 2008)



11. The new Sentinel shunter Jubilee.
12. The author's weathered version
of a Jubilee shunter.



12

Over the decades production methods change and, since the start of the aluminium chassis engines, we have seen the introduction of laser and water jet cutting plus the CNC machining of small components. These either did not exist, or were not economic for the kind of quantities we needed for engine manufacturing when the second generation of engines were designed. Some 20 years later castings were becoming expensive and erratic in supply. In addition, every chassis needed quite a bit of machining along with all the wheel quartering and setting up for the rod drive. All this conspired

to push up the price to a point whereby in 2002 the cheapest kit was over £1,000. One of the main ideas of this type of locomotive is that it should be an introduction to passenger-carrying garden lines and as such it should be as cheap as is practical. We were in danger of losing sight of this with the then current range.

On a visit to the Sinsheim exhibition in Germany I was struck by the popularity of some of the very small 5in. engines, the K.O.F. diesel in particular. This locomotive was far too small to get the battery into the engine so it was carried in the riding car, which did not appear to inhibit its performance.

I looked around for a suitable British locomotive of this size with an idea of reducing the overall cost. The Sentinel range of diesel shunters came to mind as their stylish body design had always appealed to me, and also to industrial users judging by the popularity of the prototypes. The body was designed to be made in steel sheet with scored fold lines to form the cab and footplate shapes. The sloping faces of the cab were quite a challenge, the back in particular has to be folded in five different planes. The two valances and footplate sides are also a good bit of metal origami, incorporating sides of the battery tray and the end footsteps.





13. Third generation of the Ruston.

14. Simplicity 2, petrol hydraulic version faces off a full-size locomotive!

We were by this time also using cold cast resin for many small parts. This lent itself well to the detailing on this engine including sand boxes, lifting eyes, steps and the distinctive exhaust. It was even used to produce the front radiator and fuel tank rear with their heavy iron protective frames. A lot of detailing was achieved in a cost-effective manner. As the bodywork was quite light a good substantial steel chassis was called for, along with 6mm thick buffer beams.

To power the new engine I was looking for a different motor setup, one motor on each axle with a direct gear drive. This was eventually found in a permanent magnet motor designed for large model boats. This motor is rated at 80 Watts, two of them giving 160 compared to 120 Watts on the old single motor. On test a single new motor has given 125 Watts and runs at about 80% plus efficiency right up to maximum running speed.

Watts alone are a crude judge of a motor's capability, in the first place the limiting factor is the heat that the motor will

take without burning out. And in the second, Watts measure the power going in, not the work coming out so no idea is given of how efficiently the motor is running. We are well pleased with the power of this little motor considering it to be a generation up in efficiency compared to its predecessors. The motor is mounted on a small frame along with the axle and bearings, the whole assembly being spring mounted on the chassis, doing away with the three-point suspension of all the earlier small diesels.

An electronic control was supplied as standard continuing on from the last engines, though as the controller gives all speeds from crawl to flat out it was not considered necessary to offer the two gear ratio options. This was 'Hobson's choice' really as there was no room for the extra gear reduction once the motor had been squeezed between the backs of the wheels, especially in the American 4 $\frac{1}{4}$ in. gauge where it all literally only just fits.

The design was called Jubilee to celebrate Maxitrak's 25th year of locomotive manufacturing, the first examples going on sale in 2003. It has proved quite capable of hauling four adults, though extra adhesion weight is required if no battery is fitted to the locomotive. The kit price of £895 was a good reduction on the cheapest second-generation engine and pushed sales up, soon only the Coronation was still listed from the older locomotives.

My own Jubilee has now seen three years of hard work, visiting tracks in Germany and Switzerland several times, it has also acquired a good dose of weathering. This is not to everyone's taste but to me has an authentic industrial appeal; including what my son assures me is an authentic and original

graffiti 'tag'. It also has LED headlights and an all-singing and dancing sound system with engine start up, brake squeal and station announcements (in German!). The smallest engine definitely makes the most noise.

The Jubilee wheel and motor setup has been so successful that even the larger mainline locomotives were converted to use this system, doing away with their old tooth-belt drive. The new design Class 66 heavy freight locomotive had six of these wheel sets from the start, giving it prodigious pulling power.

New version of Ruston

Once the Jubilee chassis design was proved it was then adapted to a new version of Ruston. No longer restricted to the dual use cast chassis we were able to widen the buffer beams near to the original Simplicity size. The valance on the side of the old Ruston chassis became integral with the footplate with the battery tray bolted to its under side. The outside coupling rods were gone, replaced with a moulded axlebox and spring set up from the Jubilee. The only familiar item left was the body though even this now used the full front cab from the Deutz. In spite of having more metalwork, this cab was cheaper to make than the old Ruston open cab with its brass trim and shaped roof supports. While early engines had the old aluminium radiator it was not long before this item found its self made in resin like much of the other detailing on the new designs. I did think there might be some complaints with this but, once painted, it looks identical and there has never been a single comment on the subject. It may be because the new Ruston has the battery under its bonnet, or because it stands a lot taller with easier access to the controls, but the new Ruston has always outsold the Jubilee. I am quite sure the fact that it was £100 cheaper had nothing to do with it!

Like the second type of Simplicity before it there was virtually nothing interchangeable between the





old and new Ruston apart from the bonnet, radiator and controller. Both Deutz and Plymouth were given a dose of the same treatment to increase the third generation locomotive family to four, Deutz has the same cab as Ruston with only the radiator and headlight changed, while Plymouth has a cab change as well.

It was with the popularity of the new Ruston in mind

that we chose this design for our first venture in to Far East production. The design was sent out and after an appropriate length of time a sample engine returned. It was pretty good, some parts made from stainless or brass while ours were mild steel or resin-moulded. The only thing of less than the usual Maxitrak standard is the quality of paint finish. At a painted kit price

of £750 and ready to run at £795 customers have been happy to accept the less than Rolls-Royce paintwork. We have always used the same motors and controllers as the UK built engines, fitting them after the engines arrive from China.

We started by sticking our necks out and ordering a batch of 30, these were gone in eight months so the next batch was 50! These lasted barely a year, and were followed by subsequent orders making total production figures for the new generation of locomotives over 200 so far (June 2007). It was one of the first batches of these imported Rustons that appeared in the *Guardian* newspaper with a water tanker train in Mr. Douglas Dick's garden keeping the flowers in bloom during last year's water shortage. So far new generation engines have found their way to customers in France, Germany, Spain, USA, Taiwan and Japan.

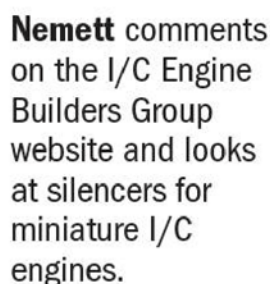
15. Simplicity 2, rack version.

16. The new Plymouth.

17. 7 1/4 in. gauge Ruston 2 in action.

I like to think that we have been able to keep our little diesel designs abreast of a changing world and kept people starting in to the hobby with an economical way in. We are already underway with an update on the old 7 1/4 in. gauge Simplicity 2 design. This has remained relatively unchanged since the days of the original 5 in. gauge Simplicity, and is about to be replaced by a 7 1/4 in. version of the new Ruston. **ME**





1. A complex balanced four-branch exhaust manifold on a 4-cylinder engine.
2. A split clamp exhaust pipe joint is neat and tidy and reasonably easy to make.



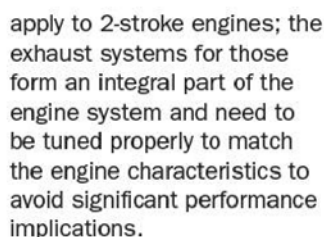
The I/C Engine Builders Group website has been removed from the internet. The reason for the removal was that the site contact address had been found by the 'spammers' and the address was at the last count receiving over 300 e-mails a day offering an assortment of dubious services and items. Hopefully this will be a temporary situation and when a new (safer) site is set up I will notify readers via these pages. In the meantime, those interested in contacting the group can use the address for this column; nemett@vodafoneemail.co.uk or the group has a presence at several shows.

4-stroke engine exhaust systems

I know most readers of this column will delight in the wonderful noise made by a well-tuned engine doing what it does best. The trouble is that there are many who find such noises obtrusive, particularly on a sunny Sunday afternoon in the summer when it is time for the post lunch nap!

For this and other reasons (such as routing the engine exhaust products out of the model) engines that are run regularly, or in models, are often fitted with a proper exhaust system and silencer. I have had a couple of questions about silencers and will suggest some types to consider. These comments are based on practical experience with a couple of basic rules to apply.

The first point to make is that these comments do not



Exhaust manifolds

The exhaust manifold is the part that connects the engine exhaust passage to the rest of the exhaust system and will range from a simple flanged pipe for single-cylinder engines to a more complex balanced arrangement for multi-cylinder engines as seen on a Schillings 4-cylinder DOHC engine (**photo 1**).

From a silencing point of view, the most important thing is that the manifold is properly sealed where it joins the engine. A thick bolted flange is the one option with proper high temperature sealant or a sealing gasket between it and the engine. On some engines, a screwed point may be suitable.

If the manifold is of built-up construction, it will need to be silver-soldered, both to withstand the high temperatures involved and to provide the required mechanical strength. The Schillings manifold appears to be welded stainless steel.

The benefit of the balanced exhaust is that because the length of pipe from each cylinder port to the point where they join the exhaust pipe are equal, the gas pulses in the pipe are evenly spaced making

the exhaust more efficient and the exhaust note more even. The reason is that with uneven length pipes, it is possible that the exhaust pulse from one cylinder may reach the main pipe at the same time as that from another cylinder which fired earlier but had further to travel. This results in the exhaust having to cope with two pulses of gas at the same time.

The design of balanced exhaust used will depend on the layout and firing order of the engine. With some engines the cylinders can be grouped to provide the even pulses, rather than each having its own separate link pipe as with the Schillings. I should stress that with individual pipes, the exhaust will be even, provided the engine firing order is even.

The size of the gas passages (pipes) needs to be such that the gas flow is not unduly restricted at this stage, and for the same reason, sharp bends are to be avoided. I tend to use a pipe diameter which gives the same area as the engine valve passages. For engines of up to four cylinders, there is no need to increase the size of the main pipe, as long as the exhaust is balanced, because a normal in-line four cylinder 4-stroke still has only one cylinder exhausting at any one time.

This is not the case with flat twin or 4-cylinder engines with cylinders firing in pairs. In these cases it may be beneficial to have a slightly larger main pipe.

The joint between the manifold and the exhaust

pipe can be of any type which has the required mechanical strength and provides the necessary good seal. Examples include, bolted flanges, screwed unions, and the split clamp (**photo 2**) which is reasonably easy to make and is also one of the neatest. The split only goes part way down the clamp so that the manifold pipe terminates in the plain part, thus providing a good seal.

Silencers

At this point I will state that I am not going to come over all technical, I intend to provide some basic silencer layouts in order that readers can experiment.

The type of silencer used will depend on the application. Obviously engines used in aircraft will need to be lighter and probably smaller than those used for stationary or marine installations. Aircraft silencers will for that reason, very often be made from aluminium alloy with screwed or bolted construction.

Those making true to scale engines will no doubt provide scale manifolds and possibly silencers, although hopefully, the layouts I discuss will provide some ideas for the internals.

In order to provide good silencing, it is generally accepted that the silencer volume must be sufficient to allow the exhaust gas to expand and that better silencing can be gained by forcing the gas to change direction during its passage through the silencer. Forcing the exhaust gas through small holes will also improve silencing but if overdone may cause excess backpressure, possibly resulting in loss of power.

In order to allow for adequate expansion of the exhaust gas, the size of the silencer chamber must be related to the size of the cylinder. A figure of approximately six times that of the cylinder capacity seems to be the accepted figure, although this may be reduced for applications such as aircraft where space/weight are at a premium.

So for a single-cylinder 15cc engine, a silencer volume of 90cc is a good starting point. I think the same comment about volume applies to multi-cylinder engines as for the size of the exhaust pipe (above). I am not sure if there is any benefit in increasing the volume for engines with more cylinders. The situation is no doubt a lot more complex than my brain can cope with.

One other point to make is that the material used for the construction of silencer bodies should not be too thin. Use of thin material can result in an irritating high-pitched resonance effect, which is not what we require. I tend to use 18swg material as a minimum, but as is they way with these things, whatever is to hand is often pressed into service.

Silencer designs

The types of silencer I am going to describe here are those I have used successfully, but readers will see that the types can be adapted to suit different needs. I have listed them in approximate order of silencing effect.

Straight-through silencers

In this type of silencer (**fig. 1**) the exhaust pipe is not obstructed in any way allowing the exhaust gases to pass straight through. The silencing effect is provided by a series of cross-holes in the pipe which allow the gases to expand into the expansion chamber. This quietens the high exhaust notes with minimal effect on gas flow. This type is easy to construct, has minimal effect on engine

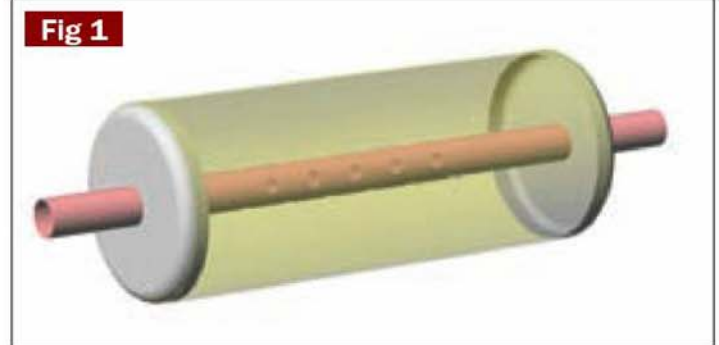


Fig 1

performance, but does not provide the best silencing.

In order to allow any liquid (oil/water) to be drained from the silencer body, the end cross-hole in the pipe should be adjacent to the end cap, preferably at the exhaust end.

Straight-baffled silencers

A variation on the straight through silencer is to fit a baffle at the mid point of the through pipe (**fig 2**). In this case, the pipe is in fact in two parts with a solid plug joining them inside the silencer. When making this type, I silver solder the pipe halves to the plug and then assemble the rest as before. In fact the plug could be a light press fit and does not need to be a gas tight fit. It is important that the total area of the holes in each half of the pipe is at least equal to the cross-sectional area of the pipe. The effect of the plug is that the gases are forced out into the expansion chamber

3. A home constructed straight baffled silencer for the 4-cylinder engine.

Fig 1. The simplest form of straight-through silencer.

Fig 2. Adding a centre baffle in the pipe improves things.

(i.e. a change of direction) before finding their way into the outlet pipe.

The silencer (**photo 3**) is of this type and is constructed from silver-soldered brass tube and was chrome plated to match the 4-cylinder engine. If you do want silencers plated, it is best to do it before any use because platers do not like to be given oily parts to deal with, especially if they are difficult to drain.

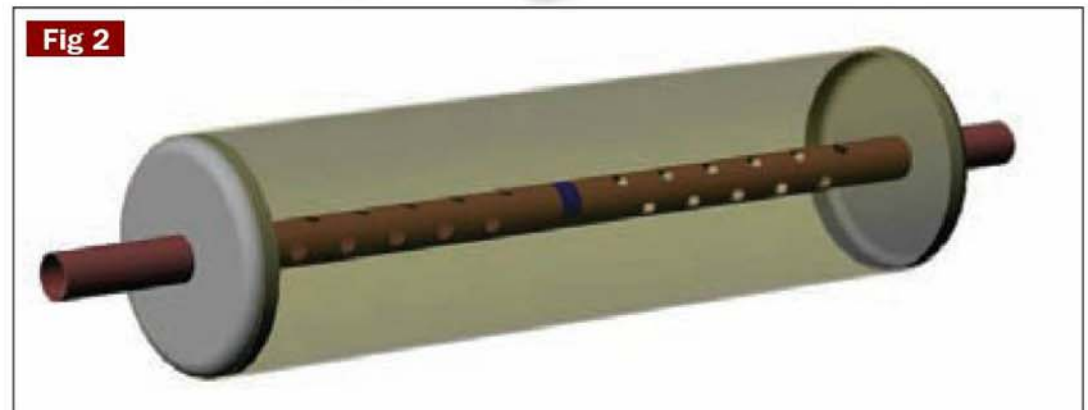
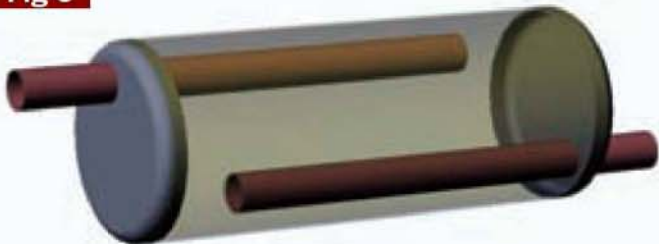


Fig 2

Fig 3



Offset silencer

In this type of silencer, the inlet and outlet pipes are offset (**fig 3**) and do not have any holes. The silencing effect is provided by the expansion and also the fact that the gas changes direction twice on its passage through the silencer. One of the practical problems with this type of silencer is that of draining combustion products out of the body. It is beneficial to provide a drain plug in one end cap for this purpose.

Baffled silencer

This is a variation on the offset silencer and has one (or more) internal disc baffles introduced to further restrict the gas flow between inlet and outlet (**fig 4**). If more than one baffle is used, the holes in the baffles should not be in line. The objective is to introduce direction changes to the gas flow.

Labyrinth silencer

In this type of silencer, more baffles are introduced and the exhaust gases are forced through several changes of direction (**fig 5**). Some of the baffles are linked with pipes, and in the example shown the internal volume is divided into four chambers. Numbering the chambers from the left (engine) end as 1, 2, 3 and 4, the exhaust enters chamber 1 and expands before travelling down the two parallel pipes to chamber 3 where it expands and undergoes a reversal of direction before travelling up the single short pipe to chamber 2 where it undergoes another change of direction before travelling to chamber 4 and eventually out of the exhaust. In this type of system it is important that individual chambers are isolated from

Fig 4

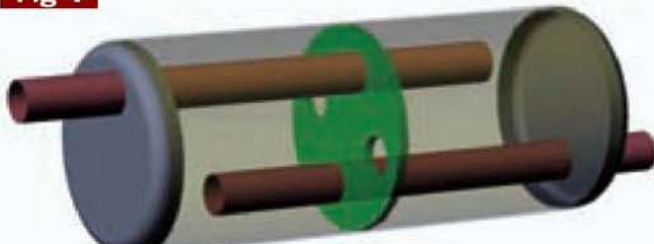
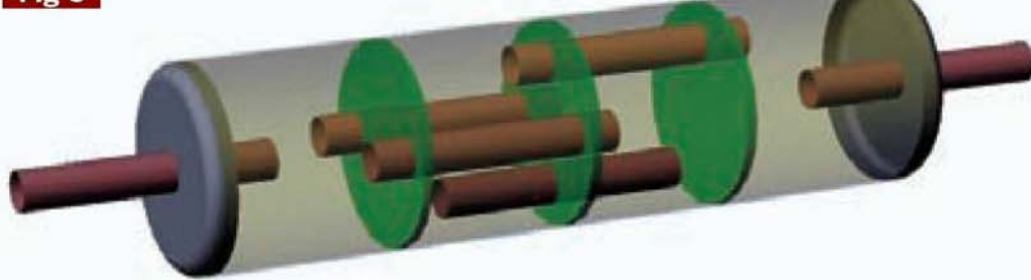


Fig 5



each other, so they will need to be soldered or pressed into position. Drainage is also a problem.

I am sure that readers can come up with variations on this theme incorporating such things as side entry, different baffle arrangements and so on. Remember, you have got to be able to assemble it!

Filling silencers

In order to improve silencing, it is often suggested that the silencing chamber(s) are filled or part filled with some form of damping medium such as steel wool or glass fibre. My own experience is that this is more trouble than it is worth, both in

use and during construction. I have not found a marked difference in silencing effect and such things can cause undue restriction to gas flow with anything other than straight through designs. They also trap oil and in the case of steel wool can corrode. If you do decide to go down this route, I would make the silencer in such a way that you can remove the insulation if needed (bolted or screwed construction). Also do not pack the insulation tightly.

I hope the above has provided some useful hints for those wishing to silence their engines; I look forward to hearing (or not!) the benefits of your labours. For those that refuse to be silenced,

4. What silencing? None at all for this 6-cylinder 2-stroke engine.

Fig 3. An offset silencer with no baffles is easy to make.

Fig 4. As before, adding a simple disc baffle improves the silencing.

Fig 5. A more complex labyrinth type of silencer layout provides good silencing but is more difficult to make.

the exhaust system (**photo 4**) will no doubt appeal. It is from a 60cc 6-cylinder 2-stroke engine and is nothing more than six stub exhausts which do nothing to quieten things. Believe me, it is noisy!

ME



THE MODEL ENGINEER EXHIBITION

19th - 21st September 2008 Ascot

Please return completed form to:
Model Engineer Competition,
9 Tranmore Lane, Eggborough,
E. Yorkshire DN14 0PR

ENTRY NO.

OFFICE USE ONLY

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CLASS	ENTRY NO.

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname _____ Forename(s) _____ Age: _____

Address _____

Post Code: _____

Home Tel No _____ Daytime Tel No _____

Model Club or Association _____

Have you entered before? (Y/N) _____

Do you purchase or subscribe to a Magicalia Publishing Ltd magazine? (Y/N) _____

How many years have you been a modeller? _____

Mail Order Protection - please tick this box if you would prefer not to receive mail from other companies which may be of interest to you ☐

MODEL DETAILS - PLEASE TICK BOX IF MODEL IS FOR LOAN ☐

Entry Class (competition entries only) _____

Model Title (to be used for catalogue and display card) _____

Model Description _____

Model Scale _____ Length _____ Width _____ Height _____ Weight _____

Type of construction _____

Parts not made by you and commercial items _____

Have you supplied a photograph? (Y/N)

Are you supplying Judges Notes? (Y/N)

Value of Model (Magicalia Publishing Ltd will not insure the model unless a value is entered) £ _____

Name and address of your local newspaper _____

To help you get the best from The Model Engineer exhibition

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them.

The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achievable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect.

We look forward to seeing a sample of your work at the show!

Engineering Section

- A1 Hot air engines.
- A2 General engineering models (including stationary and marine engines).
- A3 Internal combustion engines.
- A4 Mechanical propelled road vehicles (including tractors).
- A5 Tools and workshop appliances.
- A6 Horological, scientific and optical apparatus.
- A7 General engineering exhibits – not covered by the above

Railway Section

- B1 Working steam locomotives 1" scale and over.
- B2 Working steam locomotives under 1" scale.
- B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
- B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered steam prototypes.
- B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
- B6 Kitbuilt model locomotives gauge 1 (10mm scale) and under.
- B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
- B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
- B9 Passenger or goods rolling stock, above 1" scale.
- B10 Passenger or goods rolling stock, under 1" scale.
- B11 Railway buildings and lineside accessories to any recognised model railway scale.
- B12 Tramway vehicles.

Marine Models

- C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
- C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384

- C3 Non-working scale models (from any period). Scale 1:1 to 1:48
- C4 Non-working scale models (from any period). Scale 1:49 to 1:384
- C5 Sailing ships and oared vessels of any period – working.
- C6 Sailing ships and oared vessels of any period – non-working.
- C7 Non-scale powered functional models including hydroplanes.
- C8 Miniatures. Length of hull not to exceed, 15in for 1:32 scale, 12in for 1:25 scale, 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
- C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

- D1 Scale radio control flying models
- D2 Scale flying control-line and free flight
- D3 Scale non-flying models, including kit and scratch-built
- D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

- G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

- J1 For any type of model, mechanical or engineering work, by an under 14 year old.
- J2 For any type of model, mechanical or engineering work, by an under 16 year old.
- J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medal.

Model Vehicle Section

- K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
- K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
- K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
- K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
- K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit,) scale from 1/43 or smaller.
- K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
- K7 Functional model cars/vehicles which must be able to move under its own power of any type. Can be either free-running, tethered radio controlled or slot car, but must represent a reasonable full size replica.

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of MAGICALIA PUBLISHING LTD.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of MAGICALIA PUBLISHING LTD., in his/her possession until required for renovation and display at the following Model Engineer Exhibition.

4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by MAGICALIA PUBLISHING LTD
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
 - (a) That exhibits are their own bona-fide work.
 - (b) Any parts or kits which were purchased or were not the outcome of their own work.
 - (c) That the model has not been structurally altered since winning the qualifying award.
7. MAGICALIA PUBLISHING LTD. may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date. LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
 - (a) Insured value of their model.
 - (b) The exhibit is their own work and property.
 - (c) Parts or kits purchased.
 - (d) Parts not the outcome of their own work.
 - (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of MAGICALIA PUBLISHING LTD.
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'. Past winners at any of the exhibitions promoted by MAGICALIA PUBLISHING LTD. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
7. MAGICALIA PUBLISHING LTD reserve the right to:
 - (a) Transfer an entry to a more appropriate class.
 - (b) Describe and photograph any models entered for competition or display and to make use of any such photographs and descriptions in any way they may think fit.
 - (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
 - (a) Professional model makers.
 - (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

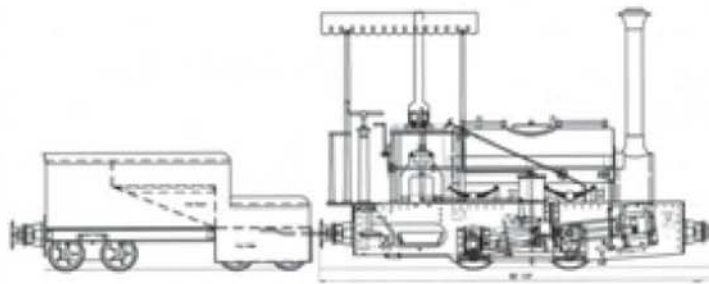
NOTE: If unsure, please contact the Competition organisers prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE: PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS MAGICALIA PUBLISHING LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 3RD SEPTEMBER 2008

ANNA



A Manning Wardle locomotive for 7¼in. gauge



D.A.G. Brown & Mark Smithers fabricate some of the sundry components which give the locomotive its Victorian appeal.

*Continued from page 32
(M.E. 4329, 4 July 2008)*

1. Finished locomotive, left-hand side. This view shows the Giffard injector.

2. Buffers are set exactly 4in. apart on the same Y-axis.



The Giffard injector, whose construction was discussed last time, is clearly visible on the left-hand side of the locomotive (**photo 1**). Space constraints forced it to be held over until this instalment.

Buffer stocks

I left the machining of my two tender buffers until the tender body was under way, but that prompted me to recall a method of making sure that the group of parts is not only symmetrical but that all are interchangeable. Furthermore, this method is economical in time, since a number of operations are repeated without changing tools. The first task is to tackle the basic turning of the bore and drilling the hole through to the back of the casting. The main bore, which is to take the head, is cored under size and this enables the cast iron to run well into the surrounding

wall, thus avoiding porosity. The outside surface may be left rough-cast or it lends itself to some freehand profiling to a better finish. In any case, there is metal to be removed from the flanges at the front and back of the buffer stocks to bring them to the dimensions drawn. Reversing the turned component in the chuck, the rear face can be finished to thickness and the clearance hole for the operating gear opened up as drawn. Turn the corners of the flanges just to clean up, so that they will eventually blend with the flange sides after milling. These four sides of the rear flange of the casting are rough from the foundry, with slightly too much metal; in addition, the four fixing holes must be drilled on the correct pitch circle for marrying up with the studs in the buffer beams. The following method does the whole lot at a single setting, using coordinates for accuracy.

In **photo 2**, the two buffer stocks are bolted to the milling machine table by a single M10 stud and nut into a tee-nut in the middle tee slot in the table. The castings are aligned by sight so that the outer edges of the flange lie in the machine directions; note the thin paper packing to avoid slippage on the table. Now with a short length of silver steel in the chuck, this is inserted into the large hole in the flange surface and wound up and down to determine the middle of the casting. At this point the DRO is set to zero in both directions.

A second operation is carried out exactly 4in. to the right of the first casting, so as to locate the second buffer on the same Y-axis, and a precise distance removed in the X-direction (in this case 4in.). It is quite simple to position the hole around the silver steel stub and to move it a little at a time with the M10 nut only lightly caught, so that the DRO readings are the same plus and minus, say to the nearest 0.002in. Tighten the fixing nut, insert an 8mm drill (⅝in. clearance) and drill all the holes to coordinates 1.547in. in all senses, as indicated in the photographic evidence. The right-hand unit can either have the DRO reset to zero at X = 4in., or you can do the required arithmetic contortion to compensate. The other operation at this setting is to run around the four outer sides of the flanges with an end mill, at the same settings in all four cuts on each item.

The end result of this method is buffers which are evenly machined and identical. Moreover, they fit the buffer beam studs which are positioned in laser-cut holes. Happily, I discovered that I had already machined the required eight studs, during my stud run on the locomotive.

Some aesthetic components

The bits around the cab and the canopy form a striking trademark feature of this design. The procedure for machining the columns was covered during the main series of articles, but nothing was said about rolling the large radius on the rear handrail and blending it to fit the three rear cab columns. During the design process I was unsure whether it would be possible to drive the locomotive with the rear handrail in position, or whether it would prevent shovel access to the firehole door. Accordingly, the design allowed for easy removal; in the event, it does not present an impassable obstacle. Here is my method for producing the curved back handrail. Not being able to source any $\frac{3}{8}$ x $\frac{5}{16}$ in. stainless material, I cut some larger section down to suit and finishing up with a 2ft. length, to allow for the possible inability to make a neat bend right up to the ends. The edges were neatly chamfered to taste, this being easier to do in the straight state.

For the bend to 22in. radius over the 'thick edges', I took it in stages in my small hydraulic press, forcing a couple of inches at a time into a gentle bend.

First, an 'anvil' was prepared, thus: round bottomed slots were milled in a 4in. length of 1in. x $\frac{5}{16}$ in. bar. Three slots of increasing depth were cut as shewn in **photo 3**, and these were mirrored about the centre line of the metal. Small pieces of steel bar perched in the slots formed an anvil to counteract the thrust of the press. My thought in making slots of varying depth was to limit the deflection of the component in the press operation, by letting it touch the anvil half way between the supports. In the event, the process was quite controllable and the different slots were not used.

The pressing operation could just as well be carried out in a vice, although it may be desirable to fix the anvil bits to stop gravity from having its own way.

In **photo 4**, the anvil just described is pictured supporting the stainless bar, with pressure brought to bear by the press ram, gently every 2 inches. You can distinguish magic marker dots every 2in. apart; the procedure was to press slightly, with each dot lining up with the anvil support rods; after 12 such operations, the next procedure was to repeat, with the dots under the press ram. The whole procedure took only a few minutes to complete, until trial and error determined that the correct radius had been achieved. There is a risk of over-bending the stainless bar, so go very gently on both passes under the pressure point. Furthermore, a small diameter pressure pad over the job may tend to form a crease, instead of a gentle bend; both of these problems can be avoided if the progress is deliberately slow. I think that you can now see the wisdom of providing a couple of inches of wastage at each end; the ends tend to lag the main body of the metal in their curvature.

With the radius satisfactorily completed, the three fixing points need to be addressed. I had decided to bolt my centre column to the underside of the curved rail so, having determined the mid point, it was a simple matter to drill $\frac{3}{16}$ in. clear for a stainless fixing

bolt. The end columns are positioned 20in. apart, so it was a simple piece of marking out to determine where their centres should go. Then it was a visit to the milling machine table to bore the ends of the handrail to fit the 1in. dia. knobs on the columns. If the centre points are marked out, most of the material can be sawn away before the final boring operation. Saw almost completely through before bolting to the table, align the machine spindle over the hole centre and clamp everything up firmly. The unwanted bit can then be separated either by sawing, or by breaking it off like a stick of rock. This leaves only a small amount of metal to be removed by boring.

As drawn, a cross hole is drilled through the centre of the column knob for a 4BA set bolt. This hole is then used as a pilot for drilling the tapping hole in the end of the handrail, while the latter is clamped in the drilling machine vice. I managed to source some long 4BA screws at great expense through Items Mail Order of Retford. I suppose that they are only made in small batches and their very slenderness makes manufacture rather difficult, hence a high price. Judge the result for yourself in **photo 5**. This view not only highlights the said screws, but also shows what good visibility there is for the firehole door. Also it will be noted that, although the water gauges are in place, their glasses have been placed

in store until after painting. The four dummy stay heads, prominently lined up above the firehole, have been fixed to the backhead cladding by Loctite 603; they are merely ornamental.

Metal spinnings good and bad

Photograph 5 also acts as a good advertisement for those lovely pieces of brass embellishment so typical of a Victorian locomotive. The half-round bezels at the front and back of the firebox started life as a single spinning in 1mm brass. I turned up the former for this job from some heavy duty MDF, taking advice about dimensions from the spinner who does the production runs for me. I was quite amused to run to ground the selfsame metal spinner who appeared in one of Fred Dibnah's last series of programmes on engineering techniques. So my former sits on his shelf, alongside full-size traction engine chimney tops and other more intricate pieces. You will see in **photo 6** how the spun item appears; slit into two without any great drama, there is some movement near the areas of the cuts, caused by the pent up stresses in the metal. This is not of a serious dimension and can be accommodated after joining the straight leg sections.

Metal spinning produces offcuts both from the inside of the large hole, and from the margins of the metal sheet. So I provide suitable offcut material



3. Machining slots in an 'anvil' to bend the rear handrail section.

4. Pressing the rear handrail a little at a time.





with the spun ring to allow the fabrication of the two sets of straight legs (front and back). Not only does this guarantee the correct thickness, but also colour and type of brass material. The pieces of flat sheet are cut very slightly over size, to allow for trimming after fabrication. The rear bezel runs right down to the rear sunken footplate panel between the frames, whereas the front one stops short just above the suspension springs on each side. The flat pieces are easily rolled to conform to the curve of the spun section; this is nominally a right angle of 1in. radius, flanked by straight profiles at each side. We are looking to silver solder the joint, so the bits have to be clamped accurately together while the heat is applied. I employed two 2BA set screws with two washers under the nut. One washer was clamped each side of the brass, holding it with just enough strength and precision to allow the joint to be silver-soldered from the inside. It was possible to avoid heating the screws too much, so that the solder ran only into the brass. Removal of the screws revealed slightly imperfect ends to the joints, which were easily rectified by gentle local heating, thus avoiding melting the bulk of the joint length.

When the complete bezels were pickled and cleaned up to correct width as explained at the beginning of this section, the polished joints were virtually invisible. Fixing to the backhead and firebox cladding

panels is by means of 6BA brass screws, clearance holes in the bezels and tapped into the steel cladding. The result makes the assembly rigid, however, it is worth elongating all the holes except the top ones, by about $\frac{3}{32}$ in., to facilitate subsequent assembly processes, particularly allowing for a layer of paint on the steel!

Safety valve chimney

That is the successful side of metal spinning. So, when it came to fabricating the brass safety valve chimney I thought that I would try my hand at spinning the lower part of the fabrication. Accordingly I turned up a wooden former and rolled a piece of sheet brass to form a tube which neatly fitted the dome flange; thought I to myself, it must be a piece of cake to move that metal round like some of the small pieces which the metal spinner had shown me. Well, how wrong could I be? That metal had a mind of its own and the last thing it was prepared to do was to cling to my former, no matter how I annealed it. At the third attempt I decided to eat humble pie and to do a partial fabrication. Again I rolled up the cylinder, but this time it had four vee nicks in its top edge, leaving a series of four short edges whose combined length was equal to the circumference of the $1\frac{1}{2}$ in. dia. tube with which it had to mate. So I was able to beat down the top of the cylinder into the form of a conical reducer, i.e. from 3in.

to $1\frac{1}{2}$ in. dia. over a length of about $1\frac{1}{2}$ inches. After a small amount of beating, the piece was ready for silver-soldering and the four longitudinal joints in the top section of the metal filled easily with solder. Now, using my original wooden former, the desired shape began to emerge, with no detriment given by the three extra joints within the neck. Being still less than happy with the possible joint between this component and the brass tube which pokes through the hole in the canopy, I decided to fit a small collar to disguise the joint, which was finally silver-soldered to the finished form. This can just be discerned in photo 5, which is I reckon a good conclusion to a couple of days of agony and frustration.

Having fabricated the safety valve chimney to be a reasonable fit over the dome flange, it needs to be easily removable for access to the safety valves. The drawing calls for dummy Salter spring balance valves, whose tails penetrate the safety valve chimney. The holes which accommodate these tails, instead of allowing movement as the valves operate, are used to clamp the chimney into place. At the tops of the spring balances, the knurled nuts are adjusted to apply gentle downwards pressure on the brass chimney. Removal and replacement is now easy.

Main chimney - the one that got away

I have been asked why I have not opted for a spun copper chimney cap? The answer is

purely cost. A casting comes out significantly cheaper than a spinning, which of necessity has to be in two sections, spun together at its widest part, as is done in full-size practice. The casting, however, comes from a cleverly thought-out pattern assembly, in which the core is not just the normal run-of-the-mill cylinder of sand. When Paul made the core-box pattern, the first job was to turn a wooden pattern which ghosted the outside of the chimney cap, but is merely about $\frac{1}{8}$ to $\frac{3}{16}$ in. smaller all round. This pattern was imprinted into a pattern-maker's resin to form one half of the core-box; this may be seen in red and white in **photo 7**. The other half of the core-box was then made around the wooden core pattern, which could be removed before painting the critical surfaces.

In the foundry, the two halves of the core-box are clamped together and sand is rammed into the (red) void from the right-hand side referring to photo 7; the sand core will then fit into the chimney sand mould, which is produced from the main chimney pattern. This pattern is split and is assembled onto a board, painted yellow in photo 7. Two complete patterns are moulded side by side for economy in labour. The foundryman has assembled them on his board, ➤

5. Rear view of the finished locomotive. Note the brass work.

6. A spun bezel and offcut of brass to form the vertical legs.





7. Foundry pattern and corebox for chimney casting, with chimney at top.
8. Machining the groove in a cab handrail.
9. Water tank filler support - saddle tank pictured.

being doweled through from front to back, and has fitted a runner assembly to give a good supply of metal when the mould is poured. Note the foundry box dowel holes, which make sure that the top and bottom of the mould are correctly registered for pouring. Sand is rammed on the top surface of the pattern shown, with a metal mould box sitting over the dowel holes; the bottom surface receives similar treatment, the metal foundry boxes only coming together after the pattern assembly has been removed. This procedure speeds the process, compared with the traditional method in which the two halves of the pattern are treated individually.

The final casting (at top right of the picture) is of good quality and weighs only about 50 per cent that of a casting made without the elaborate core shape developed.

Returning to the handrails

The cab details were dealt with during the main series and the results can be judged from the pictures of the finished machine, not the least being photo 5, which depicts both the coal box assembly and the 'modesty panel' on the right-hand side.

Having fabricated these using the technique of halving the metal along the fold lines, and thereafter riveting them to the bottom angles, the top ends lacked rigidity until such time as the handrails were fitted. The drawing calls for long slots in the undersides of the handrails to accommodate the 1mm steel sheets. Don't try to mill these slots too narrow, since any slight unevenness or a silver-soldered joint would cause great anguish. For 1mm steel sheet I recommend a slitting saw of about 1.5mm (0.060in.)

In photo 8 an angle plate has been bolted to the milling machine table and clocked to lie parallel with the X-axis. The stainless bar, too long for a single pass on the machine, is supported on blocks (old roller bearing bits) on both sides of the angle plate, to which it is clamped. The slitting saw is brought down just to touch the top of the stainless edge and the table is then brought up to give the correct distance of the slit

from the edge. The 2½in. dia. saw is run at about 130rpm and a single cut is taken at a feed rate of about 0.9in. per min. As will be seen, the cut is done under suds and the results have proved excellent. This set-up allows the work to be indexed for a joint-less cut outside the scope of the length of the angle plate. It is one of those occasions where, if your machine is rigid and your nerve does not fail, climb milling produces excellent results, that is to say the work passes from left to right under the cutter and 'climbs' into the job. My machine is not fitted with backlash eliminators, but it is quite rigid and I get away with it by slightly tightening the table gibs, thereby causing drag during the feed process.

After cutting the long slots as described, it is necessary to machine some very short lengths in the transverse direction, to accommodate the joints in the two cab side units. Clamp the handrails to the table and cut the short slots with a small slotdrill, say 2mm diameter. This extra clearance lets the transverse sections of the cab sides find their way in, even if there is a minor misalignment. At the junction points sink a 5mm slotdrill; this will cope with any small radius in the metal fold. The handrail sections can be silver-soldered into their final shapes and the fixings to the stanchions made as described in the above section dealing with the rear rail.

Tank fillers

In my description of the saddle tank and tender I made mention of the need to restrain

the fillers in order both to avoid their loss and accidental contact with the paintwork. During my construction, I have come up with the following device, which I think is neat and foolproof. In photo 9, a brass rod is fixed immediately underneath the filler cap, making use of the filler knob, which is already there. This rod passes through a hole in a piece of brass 1¼ x ¼in., which is drilled at its outer extremities to tally with the holes on the centre line of the filler flange. Fixing, therefore, requires no more holes to be drilled in the tank structure, merely the provision of a pair of spacers, so that the brass bar is held clear of the flange. The fixing screws are lengthened and fit into tapped holes in the brass. Near the bottom of the brass rod, a groove takes a suitable O-ring, which pulls through above the bar when the filler cap is fully lifted. It is advisable to slightly chamfer the two sides of the hole in the bar, to avoid long term damage to the O-ring. Precisely the same arrangement is fitted to the tender tank filler.

● To be continued.

Drawings, castings and laser cut components for this locomotive are available from the designers.

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Schaublin Swiss precision

Originally available in two centre heights - as the SV90 and SV102

- the Schaublin 102 is probably the best known and most widely used of the company's precision plain-turning (non-screwcutting) lathes. Of exactly the right size and rigidity necessary to produce precision parts, the lathe has become, despite a very high price, a firm favourite amongst precision engineers. Although the SV90 had disappeared from the maker's lists by 1946 the 102 is still being made today (2008) with production (including the Types 65 and 70) topping 100,000. The model descriptions used by Schaublin varied over the years but included (for all models, not just the 90 and 102) 'Toolmakers' when fitted with a headstock having a screw-operated draw-in collet attachment, a screw-feed compound slide rest and a screw-action tailstock. This model was often equipped with a beautifully made screwcutting and power feed attachment where a bracket, carrying changewheels, was bolted into the T-slot that ran down the front face of the bed. A universally joined shaft

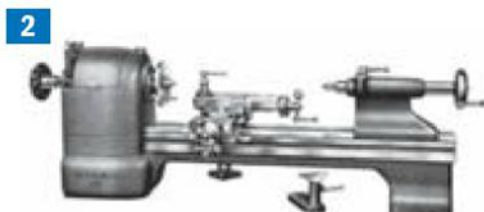
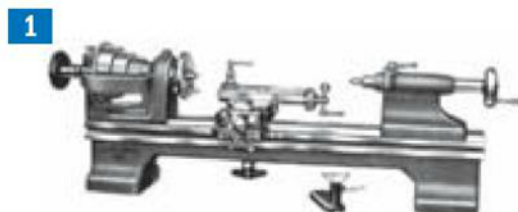
took the drive to the long-travel top slide. 'Repetition' and 'Second-operation' were interchangeable descriptions applied when a machine was assembled with quick-action lever or capstan-handle controls for movements of collet closer, cross slide, top slide and tailstock. 'Turret' was used if the lathe mounted a 6-station rotating capstan head and 'Lead-screw' when fitted with a combination of screwcutting by changewheels, a proper leadscrew and a backgeared headstock. Although these were catalogue listings, the reality was more impressive, for all models of precision plain lathe were designed so that a customer could order one or more types of bed and then mount on each, or subsequently interchange, all the different varieties of headstock, tailstock and slide rest. For this to happen it was necessary, of course, for all the sub-assemblies to be made to such a high standard of accuracy that each was absolutely interchangeable, aligned perfectly and would allow, for example, a 'toolmaker's' lathe to be instantly changed into a production machine simply by mounting the required

slides, tailstock or even a different headstock in place. This ease of conversion was achieved not by building complete machines in batches - and then dismantling them for final inspection - but by concentrating on the accurate gauging of each sub-assembly where limits of 0.001mm were the norm. Even if the factory received an order for a lathe built-up to a particular specification, the required parts were just drawn from the stores, assembled, checked to limits in excess of those proposed by Schlesinger, packed and dispatched; the company claimed that no 'fitters' were needed to scrape or otherwise modify parts. A disadvantage of this system was the need to carry in stock, at some expense, a cushion of built-up components ready for dispatch - and if you were one of the worldwide network of Schaublin agents you too were required to hold a certain number of the more common elements for instant delivery. As confirmation of this accuracy, in 2006 a used faceplate was brought over from Switzerland for a 102. When fitted it had a run-out better than 0.0001in., yet the part and lathe had been manufactured 20 years apart.

For popular versions of the 90 and 102 every year of manufacture (until recently) has seen Schaublin list beds in short ('Type 1a', 600mm) and standard ('Type 1', 900mm) lengths with feet at both ends together with a short-bed version ('Type 1b', 650mm) with a single foot and cantilever construction. As lathes bolted to cast-iron chip trays or mounted on self-contained underdrive stands became more popular, the company widened the range

Tony Griffiths describes the development of the ever popular 102 and 90 Plain Lathes from the Schaublin range.

1. Toolmakers lathe Model TO-102 lathe for overhead or rear drive.
2. Early 1950s 102 toolmakers lathe.
3. 1950s Model 102 turret lathe.
4. 1980s bench-mounted 102N lathe.





5. 102 Lathe with rear drive and overhung bed.

to include models with beds specifically adapted for these purposes with the earliest version for an underdrive model being designated bed 'Type 1c' at 900mm long. Until the 1980s, when the length was increased to 1,000mm, the standard 'Type 1' bed remained faithful to the 900mm figure - a specification that gave between-centres capacities of 300 to 425mm depending upon the particular combination of headstock and tailstock fitted.

Differences between the 90 and 102

Although the SV90 and SV102 looked very similar, there were many small differences between them. Each had an accessory range tailored to its exact requirements - though items could often be interchanged between the two and also transferred from the smaller SV65 and SV70 models. In this case, the use of raiser blocks or other adaptors was often required. Apart from their centre height, the early SV90 and SV102 headstocks were identical with an open, unbraced front and a 20mm bore spindle - hardened and ground - running in adjustable bronze bearings. At the front the spindle bearing was formed with a long, 3deg. taper and short 45deg. taper (in the manner first adopted in 1865 by Stark in the USA) with a plain parallel

bearing at the other end. The cones of the 3-step pulley were 30mm wide, with the largest carrying three rings of division holes (100, 60 and 48) in its flange and a single circle of 12 in the smallest. The bore of the largest collet that could be fitted was 14.5 millimetres. For the 102 version only, the makers offered what they referred to as a 'Reinforced' headstock; this had larger diameter bearings, wider (35mm cone pulleys) and a 25mm bore spindle that could accept W20 collets with a maximum through bore of 17.5mm as used on the VM-102 version. Later, plain-turning versions of the 102 had the ability to carry W25 collets.

Two backgeared headstocks with a reduction ratio of 1 : 5 were also available, both with a stiffer, half-height front wall: one, a standard-duty type with a 20mm bore spindle fitted both the SV90 and SV102 whilst the other, a heavy-duty version for the 102 only, had (like the 'reinforced' version) larger diameter bearings, wider (35mm cone pulleys) and the same 25mm bore spindle that could accept collets with a maximum through bore of 17.5 millimetres.

Various drive systems were available from simple, traditional bench, wall and ceiling-mounted countershafts with fast-and-loose pulleys to more complex arrangements involving foot-operated pedals for engaging countershaft clutches to give instant changes of speed. The bench countershafts - beautifully made with height-adjustable shafts - usually incorporated a socket

into which a separate overhead drive system could be plugged. This long-lived system providing a simple and reliable way of driving high-speed grinding and milling attachments held in the toolpost. In later years, an effort was made to provide countershafts that were not only neater but also allowed the belt tension to be quickly and effectively adjusted with one particularly effective example, the Type 102.95.400, using a tall flange on the end of the electric motor, to carry the drive shaft in an eccentric housing with its input and output pulleys arranged on each side of a large central bearing.

Bench-mounted, self-contained countershafts were termed 'Individual Drive' by Schaublin and the most common, the Type 102-96, carried a 3-step pulley on the motor, driving a matching 3-step on the countershaft. The initial drive ratios were normally 1:1, 2:1 and 3.5:1, and to drive the lathe spindle, the head of the countershaft could be had with either a normal 3-step cone pulley or, for heavy-duty production work, a 2-step. The unit was available with four motor options, all supplied complete with switch: 102-96 with a 1-speed 1hp 1,500rpm motor. 102-96-100 2-speed, 0.5/0.7hp 750/1,500rpm motor. 102-96-150 2-speed 0.7/1hp 750/1,500rpm motor. 102-96-200 2-speed 0.5/1.25hp 750/3,000rpm motor.

While the standard motor could tolerate a reversal rate of up to 240 per hour, for rates in excess of this (but no more than 720 per hour) a special 2-speed 0.5/1.25hp 750/3000rpm motor (No. 102.80.046) could be supplied. For a reversing rate in excess of this, a mechanical reversing unit (No. 102.80.043) had to be used and was normally mounted inside the cabinet stand.

During the 1950s and 1960s the 102 range expanded to include an almost bewildering variety of 'models' and

accessories. Even discounting special low-volume versions for dedicated production work, some 16 different 'standard' models were listed that drew from a choice of 12 different headstocks in 'open' for rear-drive and 'closed' for under-drive (combining various choices of backgear, lever and draw-tube collet closers and sliding-spindle types), five different stand drive options, five tailstocks and 11 types of slide rest. In addition, a wide range of accessories was listed including (besides the usual steadies and collets) traditional chase, changewheel or sliding-headstock screwcutting, attachments for power longitudinal and cross feed, copy turning, slotting and milling, spherical turning and grinding, an unusual headstock-mounted cut-off slide, raiser blocks, bar-feed units, an adaptor to mount 102 headstocks, tailstocks and slide rests on Schaublin milling machines - and countless small aids to production.

After the 1960s the ordinary 102 evolved through several versions including, in the 1970s, the distinctive 102N a machine with modern, angular styling of the main castings and stand. The next model, 102N-CF, was equipped with electronic variable-speed drive - thus doing away with the necessity for a heavy, complex stand. The next, the 102N-Mi-CF, was only offered for bench mounting, its variable-speed motor being fitted inside the headstock. Although the outward appearance of the lathe changed, its performance did not. A 102 of any year, in good condition, will work just as well as an example made 60 years earlier, or later.

Several special production types of 102 were also manufactured including the Model 102-80 adapted to become the 102HP and 102 TL - both hydro-pneumatically operated with the former a second-operation lathe and the latter equipped with a 6-station turret. With a suitable bar-feeder, both could be converted from intermittent to continuous-cycle production work.

Accessories

Copying the established American precision bench lathe makers, Schaublin offered a huge range of accessories designed to convert a simple lathe into a multi-use machine-tool: in addition to previously-mentioned slide rests, production equipment and collets amongst the many items listed over the years were: vertical slides with high-speed milling and grinding heads, swivelling T-slotted tables and vices together with several different designs of the required 'overhead' round-rope drive system; external and internal grinding spindles to fit in the toolpost; screwcutting attachments of the three types - simple chase and chase combined with changewheels and 'changewheel-direct-to-top-slide'; an attachment to provide power feed to the cross slide (this was combined with the screwcutting attachment); headstock raiser blocks; headstock-mounted dividing units with indexing plates; adaptors to fit headstocks and tailstocks to the tables of Schaublin milling machines; several different kinds of single and multi (rotating) micrometer stop for the carriage and both cross and top slides; T-rests of various sizes for hand work; fixed steadies with closed and open bodies and a choice of bronze-tipped or roller fingers; faceplates with T-slots, tapped holes or a combination of both together with a selection of adjustable 'finger' clamps to convert them for holding delicate parts; special 'quill' holders often used in place of the tailstock to allow high-accuracy spindles to be carried and hold collets, faceplates and other fittings (the quills could also be fitted with pulleys and driven); saw tables and the necessary between-centres cutter arbors; a cam-turning attachment; roller filing rests with either single or double rollers; machine vices; a cross-slide mounted horizontal indexing and milling attachment; an unusual horizontal 4-way toolpost; an eccentric 'chuck' (complete

with adjustable counter-weight) that accepted both collets, faceplates and a conventional 3-jaw chuck (Schaublin's term for this unit was 'Universal offset and co-ordinate head'); a centring microscope and stands with locking drawers, seats, footrests and electrical controls operated conventionally or by a knee hoop or foot pedals.

Stands, drive units and associated accessories for the older 102 and 90 models

Stands for the 90, 102 and 102-VM were produced in a number of forms, each designed to suit a lathe's particular function and equipped with a suitable drive system. The latter were often complex, expensive units, and amongst those listed were:

Stepless Variable-speed Unit (No. 102-81.200): lathes fitted with this beautifully engineered unit can be instantly recognised by an enormous handwheel, with speed-indicator drum, mounted on the stand's front face. The drive, of traditional expanding-and-contracting pulley type, was powered by a 2-speed 750/3,000rpm 0.5 and 1.25hp motor which gave, in direct drive, speeds from 270 to 3,000rpm with backgear giving a bottom speed of 55rpm. Because the motor and headstock spindle were in fixed positions, the drive unit itself was arranged to swing on a special frame; the result being that, as the pairs of pulleys opened and closed to vary the drive ratio, the tension of both belts was kept constant. Because the variable-speed belt ran over the headstock, the flat-belt pulley on the spindle was replaced by a special wide (but non-opening, of course) V type. Choosing this drive system prevented the fitting of both mechanical-reversing and speed-reducing units.

Speed-reduction Unit (No. 102-VM-81.100): combined with backgear, this 5:1 ratio step-down device gave an overall reduction of 1:25 and a range of extra-slow, high-torque speeds of: 8, 10, 14, 18, 24,

30, 34, 45, 55, 70, 90 and 120rpm. The slow-speed unit used a multi-plate clutch and, controlled by a long external lever sitting horizontally just below the belt-shifter knob, was able to change ratios with the motor running.

Combined Clutch and Brake Unit (No. 102-8): eventually to be offered, as part of the standard equipment (from the late 1950s onwards), this drive employed two cones, mounted either side of a central plate and controlled by the action of a short-stroke foot pedal, the position of which could be adjusted to suit operation from either a standing or sitting position. Releasing the pedal engaged the drive whilst a light press (2.5 to 3.0kg) disconnected it.

Mechanical-reversing Unit (No. 102-81.300): although the standard 3-phase electric motor could reliably cope with up to 240 reversals per hour (and a special heavy-duty motor, with a maximum reverse cycle of 720 per hour was available), for production processes, where reverses every few seconds were required, the makers recommended the 'Mechanical Reversing Unit' as a completely reliable solution.

Special footrest with pedal-operated reversing switch (No. 102-80.520): this was for use by a seated operator engaged in repetition work. The pedals were surrounded by a special rubber-covered footrest that could be adjusted to the angle and height that best suited the worker. In place of the pedal assembly a simple floor-mounted switch (No. 102-80.530) could be used instead.

Knee-operated reversing switch (No. 102-80-300): Designed for use with the operator standing up, this unit had an adjustable knee fork with buffers at each end of the stroke.

Special Footrest with Pedal-operated Reversing Switch (No. 102-80.520): intended for use with the operator sitting down the pedal was surrounded by a rubber-covered footrest and could be adjusted to any angle or height.

Footrest and Chair (No. 102-80.500) and No. 102-80.550 respectively). The height and angle-adjustable, rubber-covered footrest was to help with operation of the clutch or brake whilst the special chair was also adjustable for height and back-rest angle

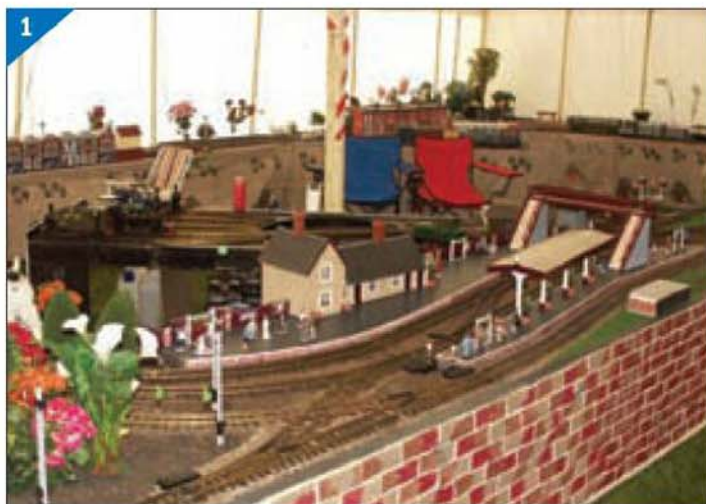
Coolant System (No. 102-80.400): this consisted of an aluminium 14-litre tank mounted in the right-hand cabinet leg, a submerged pump driven by a flange-mounted 3-phase, 3,000rpm 1hp motor with a thermal-overload switch and an articulated distribution arm. Ever keen to extract the maximum profit from its customers Schaublin even had the cheek to charge extra for the perforated drain plate (No. 102-80.700) that fitted into the left-hand end of the chip tray.

Sheet-metal Splashback (No. 102-81.400): another item that should have been included with the coolant equipment, the splashback was supplied with two simple clamps that tightened onto the back edge of the chip tray.

Light Unit (No. 102-80.800): although the light had to be powered separately (there was no socket on the machine), the light, with its switch, could be fixed anywhere on the back edge of the chip tray.

Grinding-between-Centres Drive Unit (No. 102-95.100-2-300): in addition to the main drive systems other useful stand-mounted accessories were available: an overhead-drive assembly that bolted to a machined surface on the back face of the cabinet with a switched 0.33hp 3-phase motor, a 4-step pulley to take a round drive belt, an adjustable, swivelling belt-tensioning attachment and four 'loose' pulleys that self-aligned to transmit the drive; a complete coolant unit with its 1hp 3,000rpm. motor, submerged pump and 14-litre aluminium tank mounted inside the right-hand plinth; a light unit on a flexible arm attached to the rear edge of the chip tray and a sheet-metal splash back.

ME



Merstham Show

Brian Davies reports on the show.

1. Buckinghamshire Garden Railway layout.
2. Steaming bays and turntable on the Buckinghamshire Garden railway layout.
3. Frank Paine's Meccano models.
4. Gauge 3 Society stand.
5. SMEE display.
6. Angle Rolls made by Mike Chrisp.

This year's Merstham Model Steam Show took place over the weekend of 17/18 May. This annual event is held at, and in association with, the Friends of St Nicholas School, Merstham, Surrey. If your interest is primarily garden railways then this is the show you should attend. However, there was plenty to

interest everyone, ranging from 7½in. live steam to model boats performing on the swimming pool. Having reported on the 7½in. railway last year, I looked at other aspects for this report.

Layouts

Several indoor layouts were active including the one shown in **photos 1 and 2**.

This was presented by the **Buckinghamshire Garden Railway Society**, and is a G scale recreation of the Whiteleaf Light Railway. The inner circuit runs butane powered radio-controlled live steam models, while the outer circuit had 24V electric models (T. 01442 230962).

Meccano

Meccano is familiar to many older folk, me included, and was very popular when I was growing up in the 1940s. **Photograph 3** shows a display by Frank Paine, the Chairman of the **South East London Meccano Club**. For those new to the hobby, you may be interested to know that Meccano was invented by Frank Hornby in 1901, in Liverpool. It was first called Mechanics Made Easy but soon changed its name to Meccano. Manufacture ceased in 1979. However, these products are still enjoyed today and are very popular with old and young alike.

Gauge 3 Society

Photograph 4 shows the display by the Gauge 3 Society. Originally founded in April 1990, by a small group of enthusiasts, the objective of the Society is "to encourage interest in G3, by building and running scenic G3 model railways" (W. www.gauge3.co.uk).





7. Herbert Stumm's American 1895 Fire Engine.

8. Model Power gazebo.

9. Martin's Models stand.

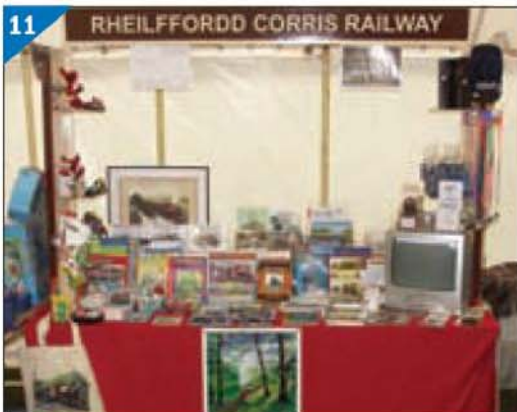
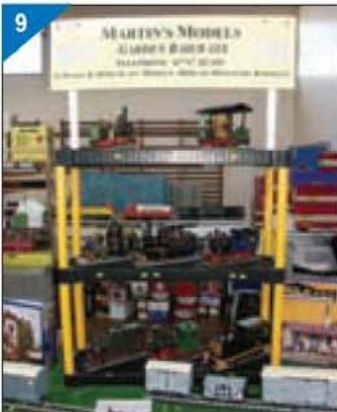
10. Tolhurst Model Engineering display.

11. Rheilffordd Corris stand.

12. Bluebell Line gazebo.

13. Glyn Valley Tramway display.

14. Welshpool & Llanfair stand.



used. The engine works well on compressed air at 0.5 bar, and at 1 bar can project water a distance of 5 to 8 metres.

You may wonder about the Dalmatian dog sitting by the side of the engine? It appears that all American fire crews had a trained dog, mostly a Dalmatian!

Trade stands

In order to give fair coverage to trade stands, I decided not to include those I mentioned last year. I have selected just three for this report:

Model Power (**photo 8**). If you require batteries and chargers for your model, Model Power have the largest selection I've seen (W. www.modelpower.co.uk).

Martin's Models and Crafts (**photo 9**). They supply of all things to do with garden railways including engines, coaches and scenic items (W. www.martinsmodels.co.uk).

TME, short for Tolhurst Model Engineering (**photo 10**). TME displayed mainly 16mm garden railway products including engines, coaches and scenic items. One featured item was a signal that comes in kit form, with no less than 12 different variations of signal including GWR and BR arms (T. 01284 728643 or E. sales@tolhurst-model-engineers.co.uk).

Railway societies

Several preservation societies were represented including: Rheilffordd Corris Railway, Bluebell Railway, Glyn Valley Tramway and the Welshpool & Llanfair Light Railway (**photos 11, 12, 13 and 14** respectively). If you would like to join them, and help preserve historical artifacts, contact them via their websites.

SMEE

As usual, **The Society of Model & Experimental Engineers** were very well represented and keen to discuss their work (**photo 5**). The SMEE exhibits included a very well made

bending roll for angle material, made by former M.E. Editor Mike Chrisp (**photo 6**).

Also on the SMEE stand was the exquisite 1:12 scale model of an American La France Steam Fire Engine circa 1895

made by Herbert Stumm (**photo 7**). This was only completed a week before the show. The model measures 260 x 150 x 270mm high and weighs 5kg. The engine was built entirely from solid - no castings were



15. Sirdar built by Richard Chesney.
 16. The Aberdeen Lifeboat under power on the swimming pool.
 17. Close-up of Jack Mileham's Aberdeen Lifeboat showing the period dress of a crewmember.
 18. The Colln Archer lifeboat under full sail.
 19. Henry Mowforth with his William foster traction engine.

Boats

Boats of one sort or another were well represented at Merstham. **Photograph 15** shows a Thames Sailing Barge built by Richard Chesney and named *Sirdar*. Sailing barges were the heavy goods vehicles of the early 18th and 19th

centuries. Despite the coming of the railways, transport was often quicker by barge (Association of Model Barge Owners, W. www.modelbarge.info).

Photograph 16 shows a model of the RNLI Lifeboat built by Jack Mileham. The Lifeboat, dated 1978, was stationed in Aberdeen and saw duty in Iceland. The attention to detail can be seen in **photo 17**. For example, the clothing worn by the figures is an accurate representation of that as worn in 1978.

On the water is a sailing ship, again built by Jack (photo 18). This is interesting because it was designed by Colin Archer as a lifeboat; a



full-size version still exists in Norway. (**Southwater Dabblers Model Boat Club**, W. www.dabblersmodelboatclub.com).

Traction engine

The only traction engine at the show is shown in **photo 19**.

This large-scale model of a William Foster engine of Lincoln is seen here with its driver Henry Mowforth. Henry is currently building a half-size traction engine - now that's what I call model engineering!

ME

Russian Master



Roger Bunce
describes the work
of Mike Chernishev.

Mike Chernishev is a remarkable man with a passion for locomotives. He lives in Belgorod, a city in western Russia. *Model Engineer* readers first became aware of Mike's work when he visited England in 1998 with his model of a Russian 2-6-2 S series steam locomotive, and again in 2000 with his model of a six-ton steam crane, for which he won a Bronze Medal at the Model Engineer Exhibition.

1. Mike relaxing in his garden.
2. L-22 in the depot.
3. Mike dwarfed by L-22.
4. L-22 nameplate.



His model engineering, however, came to a temporary halt when he decided to become custodian of a full-size Russian Lebedyanski L - series locomotive in desperate need of restoration. It is one thing working on a model locomotive - quite another restoring a 92 ton, 28m long giant!

Background

Mike first became interested in locomotives at the age of five. Since then his whole life has revolved around locomotives. He built his first models when he was aged 14 and continued to study and master the skills necessary to make models and restore old locomotives ever since. He has an extensive workshop comprising: lathes, millers, cylindrical grinders and a lot more. Some of his machines needed restoration (he had no money for new equipment), and some were acquired from the military in the period of perestroika and disarmament. He also uses his workshop to earn a living restoring machine parts and make moulds and dies.

He has a spacious garden where he keeps some of his machines, along with water turtles and other animals! He says he tries to create "a crossroads in time

where things made by man intersect with natural things."

Photograph 1 shows Mike relaxing in his garden.

In 2003 he was appointed Curator of the Old Railway Equipment Depository, and in 2005 the Belgorod Region Governor appointed him Curator of the 'Retro-machinery Museum'.

Incidentally, he also has a degree in biology - but that's another story.

Restoring Lebedyanski

Mike first removed the tender and moved the engine into the depot (**photo 2**). Then work began to remove the old paint, grease and dirt. In some places it was over 1in. thick! This was done using a mechanical scraper and propane torch. **Photograph 3** shows Mike dwarfed by the colossal locomotive. This 'cleaning process' took six months from November 2004 to May 2005. Mike then had to make and replace worn parts such as bearings and piston parts. **Photograph 4**





5. Mike with Alexander Korenok.



6. The restored locomotive in full steam.

7. Driving wheels after restoration.

8. Mike with a group of the enthusiasts in Belgorod.

9. Novoborisovka station building.

10. Tomarovka station building.

shows the nameplate - how is your Russian? I can just about manage the date - 1945. Mike had two assistants: one a railway engineer, and the other, Alexander Korenok, a student, now an electrical engineer (photo 5). The work took about four years.

Photograph 6 shows the

results of Mike's efforts - Locomotive L-22 in full steam and resplendent in black and red livery. Photograph 7 shows the 1.5m diameter driving wheels; the quality of the restoration is clearly seen. For those interested, the specification and performance of this class of locomotives is

given in www.dzherelo.com.ua/en/steam-loco-collection/L_2_10_0/ The Kolomna factory alone built 4,200 of these locomotives between 1945 and 1954.

When restoration was complete, Mike celebrated by driving the locomotive the 2,000km from Belgorod to a locomotive festival in Tambov.

Belgorod to Gotnya

More recently (June 25, 2008), Mike drove the locomotive along the old railway built by Count Sheremetiev and Duke Yusupov from Belgorod to Gotnya. Onboard were several guests from Moscow including Alexey Vulfov, head of the of the Moscow All-Russian Society of Railway Enthusiasts (far right, photo 8; I just love the red star with its hammer and sickle!) They were greeted along the way by many local people and enthusiasts.

The route is very picturesque with bridges



11



made of ornamental stone and embankments covered in feather grass. The stations reflect little of the Russian austerity imagined in the West (photos 9 and 10). Mike says that it is a great relief to realize that all these things have survived the storms of history, and all the more need that they should be preserved. **Photograph 11** shows the locomotive hauling its load of tank wagons and trucks as it neared Sumovskaya station. The L series locomotives were used mainly for hauling freight throughout Russia. **Photograph 12** shows L-22 entering the tunnel to Gotnya station - and journeys end.

Locomotive societies in Russia

There are a lot of locomotive enthusiasts in Moscow and St. Petersburg. Support comes from Russian sponsors including Russian Railways JSC (Joint Stock Company) who provide materials, parts and advice. Interestingly, the St. Petersburg Locomotive Club received a large donation from a British benefactor several years ago. Mike thinks there may be a model engineering group in the

UK, who may be interested in modelling Russian locomotives. If any of our readers have information about that, please let M.E. know, and we will pass the details on to Mike.

In Russia, as in other countries, most of the actual restoration work is done by enthusiastic amateurs. There are also L locomotive groups active in China and Cuba. Mike finds it gratifying to know that so many people are 'obsessed' with these powerful, majestic locomotives. Russia has 17 railway museums, but unfortunately none are in Belgorod. However, Belgorod is a depository for E class 0-10-0 locomotives. This was the principle freight locomotive used through Russia and about 15,000 were made. They first appeared in 1911 and remained in production, in various forms, until the 1950s. Mike would like to set up a museum to preserve them.

Models or the real thing?

Mike likes making models, but also feels "sort of responsible for keeping real locomotives for our grandchildren to see." He says his pay is modest, but the work makes him feel really

happy! Mike's only concern is for the future of his beloved locomotive, especially the high maintenance cost.

Invitation

Mike wishes to thank to his wife and children for their support, and all the workers, engineers, scholars and officials who helped restore his locomotive. Mike sends his greetings to all his friends in the UK and thanks them for their support. He also offers an invitation to visit him and his friends in Belgorod,

11. L-22 on its way to Sumovskaya station.
12. L-22 entering the tunnel at Gotnya station.

to ride his locomotive and, as Mike says, "Travel to some interesting places."

I would like to thank Mike for his enthusiasm and patience in preparing this article, and to Tatiana Ouglova (Belgorod Chamber of Commerce) for translating for us. **ME**



Longcaseitus!

Gordon Gurney struggles with an obsession.

I know - I will make a clock! Little did I realise, when I made that decision in 1985, that clocks were to become a bit of an obsession! Earlier that year I had sold my last motorcycle and decided to use part of the proceeds to buy a half decent lathe - and I was looking for a project. Why a clock? Well, they are attractive mechanisms in their own right, last for ever, perform a useful function and keep you company.

Hooked

Having looked at various possibilities, I decided on John Wilding's 8-day weight driven wall clock. Clocks don't get a lot simpler than this but, even so, I found it a challenge. I had to learn new skills and techniques and, being a lone worker, this took time. It was very different from restoring motorcycles! By 1989 it was completed, and after taking it apart several times to increase clearances, it went well. J. W. gives a design for a wall mounting shelf and

hood for his clock, but I had decided some time earlier that my efforts deserved something more elaborate.

I was now well and truly hooked and I had acquired a copy of Alan Timmins' book *Making an Eight Day Longcase Clock*. In his book he gives descriptions and plans for two different styles of case. I decided to have a go at making the simpler oak case and, with this in mind, I had been on the look out for suitable old well-seasoned timber. This came from various sources. An old desk top from work, two bed heads from someone's cellar and a twin seat from an old school desk. The last find was rescued from the local tip and would eventually become the door.

Woodwork

So there I was with a pile of wood and a set of plans. My only previous woodworking experience was a bathroom cabinet and a book rest, made at school! Like most of us, more used to working in metal, the prospect of serious woodwork is a bit unnerving. I found the best approach was to forget it was wood and treat it as any other machining exercise. I can feel all the woodworkers shudder! I bought a small router and mounted it in a piece of plywood screwed to the top of a Workmate. This was used like a spindle moulder and armed with this, a hand power saw and a small band saw, I set to. I found making the case very satisfying but one per lifetime is quite enough! Looking back, it is quite remarkable that I managed to complete the project with a full set of fingers!

United

So, in 1990, J. W.'s movement was united with A. T.'s case. I can report that both movement and case got on extremely well in spite of their different origins!



The clock took pride of place in the hall, where it remained for the next 11 years.

Diagnosis

My enthusiasm for clocks was at a bit of a low point and I diagnosed the condition as 'longcaseitus' and looked for a remedy. I had seen an example of J. W.'s 'Skeleton Clock' at an exhibition and thought it very attractive. Three years later I had made one of my own and no woodwork - other than the base! (photo 1).

Double trouble

I decided it was now time to make a start on A. T.'s striking longcase movement and for a bit of variety, I would make J. W.'s Congreve clock at the same time. 'Stupid boy!' It proved very confusing and too much for 'my little grey cells'. I had to shelve one of them and the Congreve won. The first question you get when you tell someone in clock circles that you have made a Congreve is, "did you get it to go?" (They can be very temperamental). The answer is yes, almost too well. My wife has sensitive hearing and can't stand the noise the ball makes as it traverses the tracks on the tilting tray. I will unfortunately have to part with it, or it may be the first time a clock has been cited in a divorce case! Anyone want a Congreve? (photo 2).

I carried on with the striking movement for the longcase and it was finally completed in 1999.

1. John Wilding's 'Skeleton Clock'.
2. J. W. Congreve clock.



I didn't get around to putting it in its case before we moved house from Bath to Norfolk.

Condition worsens

When eventually we got sorted I was tempted by another J. W. clock, an English regulator. What's the matter with me? It all came to a head when a woodworker friend offered to make a case for it. He made a spanking job of it and it arrived in three months. Three years later, I have just got the movement in and finally sorted (photos 3 and 4). I swear this is the very last clock, - I will resist all further temptation - honest.

This winter I finally united the A. T. longcase with A. T.'s movement. This, like most worthwhile things in life, was not straightforward. The dial



3. J. W. English regulator.

4. English regulator dial.

5. Alan Timmins' striking longcase clock.

6. Striking clock dial and hood.

7. Striking clock movement.



on the 'new' movement was $\frac{1}{2}$ in. larger in diameter. This meant that I had to remake the hood door and carry out other modifications before it would fit - I believe this is called lack of foresight - but I called it something else!

Cured at last

So, at long last the longcase is complete (photos 5, 6 and 7). It means a great deal to me as it has been there, as a project, during the entire time I have been making clocks. I am pleased that I decided to use

old wood for the case. When I look at it, I think of all the people that worked at that desk and I wonder what went on in those beds? I wonder what the children, who sat at the desk that the seat came from, went on to do with their lives? The seat now serves as the trunk door and inside it can be seen a set of old screw holes from one of the original hinges. All this, coupled with Alan Timmins' 1790 movement, has given me great satisfaction.

I would like to thank Messrs Wilding and Timmins for their excellent publications, without which, I would not have accomplished my modest achievements.

Now, I am looking for a project. I know - I will restore a motorcycle!

ME



LILLIAN

A narrow gauge locomotive for 7 $\frac{1}{4}$ in. gauge



Keith Wilson looks at techniques for indexing and some photos of unusual engines seen in Wolverhampton.

*Continued from page 44
(M.E. 4329, 4 July 2008)*

The matter of indexing presents its head on occasions. Normally the number of items is a nice round number (4, 6, 8, and 12) and presents little or no problem, however, there are times when the number of items is an awkward prime. Some of the GWR driver's brake valves were, from outside inwards, 31:24:20 and some were 24:20:16. There were also some with pear-shaped holes cast in. To index 31 holes is a bit of a bind: it is prime. So somewhere is the need for an index plate with 31, 62, 93 or 124 holes.

However, there is an easier way: use a rotary table with no loss in accuracy. They are normally of 90-tooth worm and gear drive, so it takes one complete turn of the driving handle to rotate the table four degrees. Graduations on the drive handle disk are usually in four lots of 60 minutes. That looks odd until we realize that a degree is divided into 60 minutes, in turn, a minute is divided into 60 seconds. So, without too much trouble, the table could be divided into about 43,200 parts. I write 'about' because unless you have a vernier dial, you have to guess at the halfway mark between adjacent divisions.

Whilst obviously 43,200 is not prime, neither is it an exact multiple of 31.

But, all is not lost. When, for practical purposes, low but prime numbers are required, hand indexes are certainly more accurate than we need. Bearing in mind that some pocket calculators work to 12 places of decimals, it will be seen that accurate figures are easily available. It is, of course, simple to divide 360 by the number of holes required and add this figure as often as required, but human error can creep in nastily and ruin the job.

Therefore, I worked out a Microsoft Excel program to do all the calculations ready to print out. It was only recently that the penny dropped and I realized that just one program, if long enough, would suffice for any needful number of holes. I show it here (**fig 1**) for seven holes. It is only needful to enter the number of holes required in cell 'A3' and press 'Enter'. The accuracy of the program can be seen when you see the figure of exactly 360 degrees. Incidentally, the number of holes on the regulator fitting on a GWR standard backhead is seven. An example of dividing requiring primes is shown in **photo 1**.

If anyone would like this program, then contact me and I can email it to you for the outrageous price of zero. E. keithgwrloco@blueyonder.co.uk

All that remains is to print the results, set up your job centrally on the rotary table, adjust the table so that the first hole is accurately under the drill (small centre-drill advised)



and the table index set to zero) clamp the table and drill! Note that no further calculations are required; merely rotate the table to the next position on the list each time the centre-drill is used. If you should over-shoot the mark, rotate backwards about one-half a turn and then go forward again.

More tips re: kettles

For bushes it is worth going for cast phosphor bronze or cast gunmetal which are much more machine-able metals than drawn phosphor bronze which is so difficult to machine. I would not like to learn of a tap breaking in a finished and tested boiler, but it is just possible that I might learn some new words!

A problem rears its head when a piece of material larger than your headstock bore has to be dealt with. The Myford headstock mandrel is bored to about $\frac{19}{32}$ in. Some years ago I put my mandrel in the Colchester and bored out to just clear $\frac{1}{8}$ in. diameter. I discussed this with Myford's and it was confirmed that said mandrel would not be weakened to any serious extent, but technically it is that bore for the benefit of the live centre. Since all my hefty bits were handled in the Colchester, this caused no concern, I have yet to regret the operation and the ability to handle $\frac{1}{8}$ in. dia. metal in the Myford is useful.

Having to make some big bushes from stock cast PB there are two main choices - either to saw off a suitably

Fig 1. The spreadsheet set for the prime number seven.

1. A sample of dividing completed as described. Note that holes are unevenly spaced radially, and on my original full-size one there is no set of three holes in a straight line radially.

Fig 1

	A	B	C	D	E	F	G	H
1	BASIC	POSITION		DECIMALS		DEG.		MIN.
2		0		0		0		0
3	7	51.42857143		0.4285714		51		25
4		102.8571429		0.8571429		102		51
5		154.2857143		0.2857143		154		17
6		205.7142857		0.7142857		205		42
7		257.1428571		0.1428571		257		8
8		308.5714286		0.5714286		308		34
9		360		0		360		0

short piece or to use a fixed steady as shown in **photo 2**. I use a rear toolpost (highly recommended) with the smallest manufactured parting tool - ½in. wide, obtainable from Chronos and some others. It is very economical, especially for small fittings. In photo 2, the shoulder portion of the bush is machined at this time and then the bush will be parted off. Drilling and tapping is carried out later in the usual way. The bar pictured is 40mm diameter, and the bush will be threaded ½in. BSP.

On gradients and water usage

I was intrigued to read Pete Rich's article *Mickey Mice at Newport* (M.E. 4328, 20 June 2008), his mention of the Brecon and Merthyr, and Bob Gale.

Bob took me to task many years ago in these pages due to an error I had made in writing of the GWR brake systems; I had omitted the two words 'full emergency' in my writing.

Some time later I met Bob and asked him 'had he been on the Brecon and Merthyr?' Now the main problem on that line was between Tal-y-Bont on Usk, and Torpantau. It is a seven mile gradient of 1 in 36! He had driven on that line, and was a bit puzzled as to why. When

you got to the top and through Torpantau tunnel to the station, even though you had topped up the tanks at Tal-y-Bont, said tanks were just about dry. In seven miles! He knew how it was that even if both injector water-valves were full on without putting steam on, the tanks would not have been anywhere nearly empty in the time.

However, once the steam valve is opened to an injector, a powerful suction force is created that hoicks water out of the tanks or tenders far faster than gravity could. At the time of our meeting, I had not done any serious work on injectors apart from putting two on my 5in. gauge 'King'.

If you are in the area, much of the gradient can be seen from the bottom of the grade. If my memory is correct the tunnel mouth is visible from near the bottom. This sight brings out appreciation of the gradient as nothing else can. There is a minor road all the way up to Torpantau in the same valley. For photos of Torpantau Station see W. www.alangeorge.co.uk/torpantaustation.htm

There is a narrow-gauge, the Brecon Mountain Railway, (I think it is 1ft. 11½in. gauge, usually named as 2ft. gauge) from Merthyr upwards (apparently a mere 1 in 40!)



and I was told that they hoped to run right up to the top and through to tunnel to a picnic terminus at the far end. It is quite a view.

Wolverhampton revisited

Going back to Wolverhampton for a special farewell concert given by numerous fellow singers of our group, not unnaturally we took the chance of visiting the track in Baggeridge Country Park to view the progress of the railway since we were last there.

To my delight the raised track for 3½in. and 5in. gauges is complete but not finished (like all railways everywhere!) and some very nice locomotives were operating.

A fine 4-4-2 constructed by the late Graham Fidler (**photo 3**) lent a touch of colour to the line.

An 0-6-0 of a Darlington J39 class (reminding me of my first locomotive, Mary Ann) finished in gloss black put up a nice show (**photo 4**). I understand that it was to Martin Evans' design 'Stratford'.

On the ground-level track (7½in. and 5in. gauges) we had several locomotives in steam

2. The fixed steady in use with a bush ready to be parted off.

3. A North American-style 4-4-2 built by the late Graham Fidler.

4. A Darlington J39, a fond reminder of my first locomotive.

5. A De Winton locomotive with driver Alan Rose.

and dieseling for much of the afternoon. Of particular interest was a very unusual model, a De Winton with driver Alan Rose (**photo 5**). It ran throughout the afternoon. A couple of modified Romulusses were seen. A slightly smaller Hunslet did good work, and some neat little diesel types added to the fun - as did the barbecue.

● To be continued.

WILSON'S WORDS OF WISDOM

When priests are the judges, there is no need to send to learn the verdict.

Sir Henry Rider Haggard

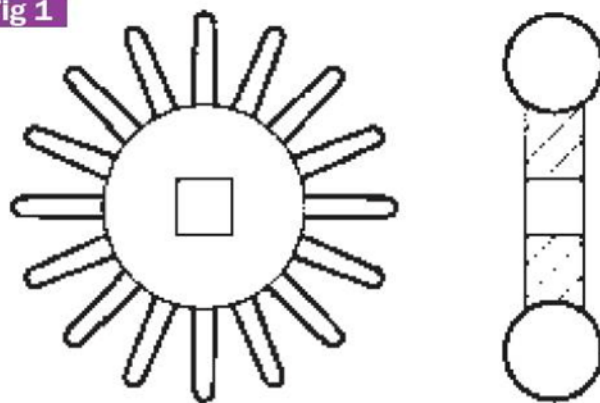
LETTERS TO A GRANDSON

M. J. H. Ellis describes some simple ways of making 'cool' handles.

Dear Adrian, in that compendium of useful advice, *The Live Steam Book*, LBSC describes the 'cool handle' for steam valves invented by the late Mr. H. G. Conybeare. It would be a pity if this good idea were forgotten about, because I believe that the book has long been out of print, and so I will tell you about it now. In my sketch (**fig 1**), the centre of the wheel is a brass disc, typically, $\frac{1}{4}$ in. dia. by $\frac{3}{32}$ in. thick, around the periphery of which a rounded groove is turned. Into this groove a toroidal spring, made from tinned steel wire, is soldered; it has to be made of ferrous, rather than cuprous metal, because of the lower heat conductivity of the former. The 'Prophet' described it as 24swg tinned music wire. In order to make it into a spring he wound it in the lathe round a $\frac{1}{16}$ in. dia. mandrel of stiff steel wire; I would suggest a bicycle spoke.

To assemble the wheel, the ends of a suitable length of the spring material are hooked together, the groove round the disc tinned with soft solder, and the ring of spring material sprung into position round it. LBSC made the point that the coil should be fairly well stretched out, as otherwise the air wouldn't be able to circulate round it freely enough to carry the heat away. Finally, a little flux is applied to the spring and the whole assembly heated until

Fig 1



'COOL' VALVE HANDLE

the solder melts. He doesn't mention it, but I think it worth pointing out that if the wheel is to fit on a square on the valve spindled, the square hole in the centre of the disc would be much easier to file out before the coil is soldered in position.

If I hadn't thought this a cute idea, I wouldn't have mentioned it, but I haven't actually ever used it myself, but made the wheel from a hard brown-coloured plastic used in electrical equipment in the form of panels, which does not soften with heat. Another thought on the subject: I don't suppose that when LBSC wrote his book in 1950 there were such things as silicone rubber rings, or he might have invented a character named Brother Slothful, to whom it would be open to use a silicone ring in place of the wire coil.

Writing in this vein has reminded me that I have never mentioned your Grandpa's own contribution in the way of valve handwheels, which I will now tell you about, in conjunction with my sketch (**fig 2**). They are best made a batch at a time, and the material required is $\frac{1}{4}$ in. dia. brass rod. Tubing could be used with advantage instead, but I do not think that it is obtainable in so small a size; and even if it were procurable, it would probably cost more than the solid rod. This size of rod will produce wheels suitable for use in 1in. scale, but of course there is no reason why you should not make them by the

same procedure to suit your own requirements.

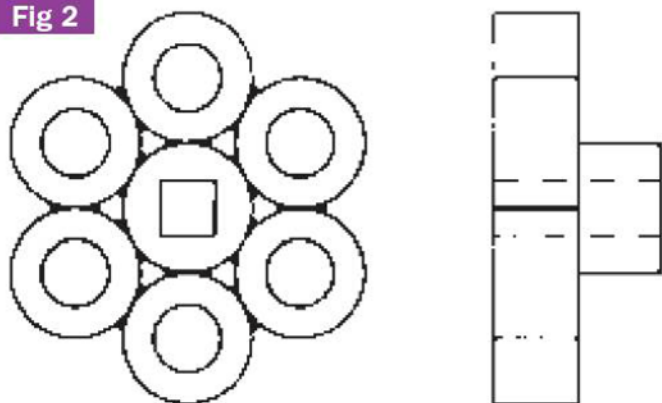
The first thing is, to cut off seven equal lengths of the rod, about $2\frac{1}{4}$ in. long, which should make sufficient wheels for one locomotive. Holding one of them in the 3-jaw, face off the end, and centre with a $\frac{1}{16}$ in. centre-drill. Now drill through as far as you can go with a $\frac{1}{16}$ in. drill, for at least half of its length. Turn the work round in the chuck, and repeat the operation from the other end, so turning the rod into a piece of tube. Do the same with five of the other pieces.

These will go to form the outer lobes of the wheels. The centres will be formed from the seventh piece, and this you should treat in the same way, apart from drilling the hole to the size which you need to open out to form a square hole to fit the valve spindles. Now you make them up into a faggot-like bundle, bound round with preferably iron wire at the extreme ends. All that remains to be done is to apply some flux, made into a paste, heat the lot up, and run silver solder sparingly into the joints.

The individual wheels can now be parted off, and the central holes filed out to fit the squares on the valve spindles. In my opinion, the resulting wheels fill the bill very well, but if anyone thought that a more spiky contour would look better, he could use hexagon brass rod in place of round.

Your affectionate Grandpa.

Fig 2



'GRANDPA'S' VALVE HANDLE



Malcolm Stride reports

Can I ask that if possible, newsletter editors make sure the full name of those mentioned in reports is provided, particularly when reporting award or trophy winners? There are many such things which I cannot report because only Christian names are given.

Southern Federation Annual Award

The committee faced a very difficult choice this year in deciding the recipient of this annual award. Two of the nominees were worthy winners in their own right and so the unanimous decision was made to share the award this year. The two winners are Joshua Hague from the **Stockholes Farm Miniature Railway** and Joe Addis from **Fareham DSME**. Both winners are very active members of their respective societies with Joshua building a class 04 Drewry battery-electric locomotive and Joe is building a battery-powered replica of the *Lion* steam locomotive. Andy Clark of Polly Model Engineering Ltd. presented the award and replica shields together with a monetary award which will, no doubt, help fund further activities. I am sure all readers will join us in expressing our heartiest congratulations to these two young model engineers.

Notices

Bristol Model Engineering & Hobbies Exhibition

Bristol SMEE will once again be hosting this really excellent exhibition on 15-17 August 2008 at the Thornbury Leisure Centre near Bristol. As usual visitors can expect a wide variety of excellent models to be on display together with a

good range of trade stands. Further details can be obtained from the website at www.bristolmodelengineers.co.uk or by calling T. 0117 967 5878.

Transport Collectors Fayre The 3rd Big Transport

Collectors Fayre is to be held on Saturday 8 November 2008 at the Winton School, London Road, Andover, Hants SP10 2PS.

The event is organised by the **Road Haulage Enthusiasts Transport Archive** and will open from 10.30am until 8.00pm. Inside attractions include models and model engineering exhibits, Hornby railways, diecast collections, railway signs, and transport photograph displays, slide shows and DVDs. Outside will be preserved buses, lorries, traction engines and cars etc, a ride on miniature steam railway, and working model traction engines etc.

There will be related sales areas and those wishing to exhibit or who seek more information should contact organiser Barry Randall on T. 01264 396891 - evenings only please.

Gilding's aero engine sale
The 10th annual **Vintage, classic and modern model aero-engine sale** is to be held at Gilding's Auctioneers, 64 Roman Way, Market Harborough, Leics. LE16 7PQ, on Saturday 15 November 2008.

The sale commences at 10.30am. Viewing: will take place on Friday 14 November (10am-4pm), or on the morning of the sale (9am-10.15am).

Gildings are looking for individual items, or collections of model aircraft and marine engines and details of the engines should be submitted to Messrs Gilding's by 10 October 2008. The company will be happy to give an opinion on the suitability of the items for the sale. Vintage kits and model aircraft books will also be acceptable. This very popular sale is always well attended by aero-engine enthusiasts and in the past has seen some exceptional engines up for sale including the fabulous Gerald Smith collection.

Further enquires should be made to: Gilding's Auctioneers, 64 Roman Way, Market Harborough, Leics. LE16 7PQ. T. 01858 410414, F. 01858 432956, W. www.gildings.co.uk E. sales@gildings.co.uk

Stockholes Farm Miniature Railway

We have been asked to publicise two events at Stockholes Farm Miniature Railway (27 Sandtoft Road, Belton, Doncaster DN19 1PH).

The first is the August Bank Holiday running on Monday 25 August and the second is the bonfire night event on 5 November from 3-8pm. Further details of both events can be obtained from Ivan Smith, T. 01427 872723.

St. Albans DMES Exhibition - advance notice

The annual exhibition of the **St. Albans DMES** will be held on Saturday/Sunday 27/28 September this year at the Francis Bacon School in St. Albans. Further details will be published in due course.

UK club news

Two recent evening meetings at **Bedford MES** had very different topics, but both were of great interest to model engineers. The first was entitled *The Alchemy of Steam*, and was given by Dick Billington; the second was a talk by Peter Titterton on photography. Dick explained why steam is such a versatile tool, especially under pressure and guided the audience through the mysteries surrounding boilers large and small. At one point Dick illustrated a point with a photograph of a wheelbarrow filled with horse manure! Peter provided a history of photography from the very earliest images right up to the digital images of the present day. His examples included a massive camera used by an American railroad to photograph its locomotives. The camera required a 20-man crew, one of whom had to clamber inside to focus the beast before a very large glass plate was exposed. Peter passed on some very

In Memoriam

It is with the deepest regret that we record the passing of the following members of model engineering societies. The sympathy of staff at *Model Engineer* is extended to the family and friends they leave behind.

Stanley Fox
Gordon Hands
John May
Tony Wells

British Columbia SME
Reading SME
British Columbia SME
Model Steam Road Vehicle Society



1. "Go away, this rock is private," the encounter between Tom Reid's steam launch and a curious water rat at Model Engineers Society (NI). (photo: Dave Heatley)

useful tips for members and illustrated the talk with examples from his own camera collection. I hope to see lots of entries for the photography competition from Bedford now! The society has now found a volunteer to set up and run the website. The first operational version is now running at www.bedfordmes.co.uk

East Somerset SMEE has completed the construction of phase 4 of the track at the Bath & West Showground. This included the 5.5m bowstring bridge and completes the half-mile main line. A new heat treatment shed has also been constructed and at the time of writing, just needs the electrics connecting. This will be used for grinding, welding and other 'hot and heavy' work.

The permanent fence along the back straight of the **Harrow & Wembley SME** track has been completed. Thanks to a massive turnout of members, the job was completed over two successive sunny Sundays. Greenery will be planted along it to make it less obtrusive. The fence was a requirement of the new lease.

Because of the nature of many model boating venues, those participating will often have encounters with wild life.

One such took place at the **Model Engineers Society (NI)** recently with Dave Heatley capturing the encounter between Tom Reid's steam launch and a curious water rat (photo 1).

Geoff Miles has volunteered for the position of Chairman of the **Model Steam Road Vehicle Society**. We wish Geoff good luck in his new position. The newsletter carries an advertisement for the position of Newsletter Editor which describes the "pay as poor, the hours what you make of it, friendship great..." Sounds ideal to me!

The annual auction at **North Norfolk MEC** was held earlier in the year and was very successful, raising a good amount for club funds. The event was described as "a humorous auction with attitude." Work has speeded up on the lean-to hut with the posts concreted in place and work being done to make it watertight. The March Bits & Pieces evening had a varied collection of models on display ranging from a 3½in. gauge *Brittania* through a Stuart Turner double oscillating engine and a small tool post to a Napier *Dagger* engine.

The first two months running days at **Plymouth Miniature Steam** have been "reasonable with fairly good attendances." The club locomotives have run well although *Hernia* has had some problems with being shy on steam (described as 'tired') on some occasions. The locomotive is due for a new

boiler in the autumn, so these problems will hopefully be cured. Due to the acquisition of a new electric locomotive, the club *Metropolitan Growler* is being sold by sealed tender. Several new locomotives are in the course of construction by members including at least three 5in. gauge LNER B1s. Member Alan Dunster has constructed a new website for the club which can be found at: www.plymouthminiaturesteam.org.uk

The new hydraulic locomotive lift at **Reading SME** is now complete and has been used for at least one public event. The new lift makes loading and unloading locomotives onto the ground level track much easier than in the past. The society is mourning the loss of founder member Gordon Hands who passed away recently. Among other things, Gordon was an accomplished organist. The society attended the Milsetones exhibition recently with a good selection of models to display. The 00 gauge section has gained another two junior members and some of the junior group are now having a go at building kits and other modelling projects at the club.

Members of **Stamford MES** had "an interesting morning" laying a field drain from the lowest part of the track. The job was accomplished with a JCB driven by Dennis Saunders to dig the trench and after the job was complete, "there will be no scar on the landscape at all." The drain will hopefully prevent the sleepers at that point from accelerated decay. The May evening talk was given by Tony Wakefield who described his experiences with a small group building a light aircraft. The aircraft will be an updated version of the French *Minicab* design.

Civil engineering work at the Stockholes Farm Miniature Railway has included completion of the new block retaining wall in Lupin Alley. The space gained will allow for a substantial depot to be built (Blackthorn Shed). Some storage rails are to be fitted

in the tunnel to provide some storage clear of any flood water which is likely to be present. Work is continuing on the locomotive fleet with progress being made in all areas. The new mineral wagon has been handed over to the operating department and was in use over Easter for the first time. The body of this wagon was made from an old metal locker which was surplus to requirements. The already folded metal proved to be exactly the right width! Peter Wood was awarded the annual Broken Spoke award for 15 years support for the society, including 10 years as a committee member.

Following a very successful exhibition, **Taunton Model Engineers** are continuing with work at the Creech track site. Progress has been made with the embankment extension to the site of the level crossing. The two curved points needed are being constructed by the Culmhead Saturday gang following preparatory design work by Andy Webb on his computer. Materials storage in the shed has also been better organised to make best use of the available space. A water supply is now available inside with a sink waiting fitting. The running season started well with a well attended opening session covered by two trains running steadily during the afternoon.

A new compressor has been installed in the storage shed at the Haigh track site of **Wigan DMES**. The air supply has been piped to the steaming bays. The April evening meeting included a presentation by Malcolm High on laser cutting of components for engineering models.

World club news

Canada

Joe Carroll recounts the tale of how he "met an old friend at the **British Columbia SME** track" recently. The old friend was a Blackstaff 2-4-2 (or *Columbia*) locomotive *Comet*. The locomotive was designed by club member the late Cliff Blackstaff as a beginner's locomotive for members of the society. This particular locomotive was built by Ron

Barrett who later sold the locomotive to its present owner Dan Parsons. Dan steams the locomotive on welsh steam coal and it is reported as running very well indeed with no smoke. Other examples of the locomotive were built by members. At the annual model contest in May, Jim Mackie

was awarded first place for his steam water pump with Jerry Barlow taking second for his Stirling water pump.

Recipe time

The following recipe for tapping fluid was in the Plymouth Miniature Steam newsletter: 1 volume - Genuine turpentine

(from an artists suppliers)
2 volumes - White Spirit
3 volumes - Olive Oil (borrowed from the kitchen!)

Shake together and use - Just try it!

The fluid is reputedly successful on even the worst materials, including copper.

Humour time

Topical humour this time from the **Model Steam Road Vehicle Society**:

"When I got home from work last night, my wife demanded that I take her somewhere expensive..."

So I took her to a petrol station!"

DIARY

AUGUST

- | | | | | | | | |
|-----|--|------|--|------|--|-------|---|
| 1 | Aylesbury (Vale of) MES. <i>Track Night.</i> Contact Andy Rapley: 01296 420750. | 3 | Nottingham SMEE. <i>Public Running.</i> Contact Pete Towle: 0115 987 9865. | 7 | Westland & Yeovil DMES. <i>Meeting.</i> Contact Gerald Martyn: 01935 434126. | 10 | Westland & Yeovil DMES. <i>Public Running.</i> Contact Gerald Martyn: 01935 434126. |
| 1 | Maidstone MES (UK). <i>Evening Run.</i> Contact Martin Parham: 01622 630298. | 3 | Oxford (City of) SME. <i>Running Day.</i> Contact Chris Kelland: 01235 770836. | 8 | Polegate & District MEC. <i>Malcolm Parker: Lines to Ramsgate.</i> Contact D. F. Pratt: 01323 645872. | 10 | York City & DSME. <i>Running Day.</i> Contact Pat Martindale: 01262 676291. |
| 1 | Romford MEC. <i>Competition Night.</i> Contact Colin Hunt: 01708 709302. | 3 | Plymouth MSLS. <i>Public Running.</i> Contact Malcom Preen: 01752 778083. | 8 | Rochdale SMEE. <i>Joe Lloyd: Beyer Peacock.</i> Contact Bob Denyer: 0161 959 1818. | 11 | Bedford MES. <i>Marine Model Miscellany.</i> Contact Ted Jolliffe: 01234 327791. |
| 2 | Cardiff MES. <i>Steam-Up & Family Day.</i> Contact Don Norman: 01656 784530. | 3 | Reading SME. <i>Public Running.</i> Contact Brian Joslyn: 01491 873393. | 9/10 | British Columbia SME. <i>Train Festival Meet.</i> Contact Sean Laurence: (604) 931 1547. | 11 | Melton Mowbray DMES. <i>Summer Evening Steam-Up.</i> Contact Phil Tansley: 0116 2673646. |
| 2/3 | Dockland & E. London MES. <i>Public Running.</i> Contact John Slocombe: 01708 222658. | 3 | Royston DMES. <i>Running Day.</i> Contact Jeff Dickinson: 01763 261670. | 9/10 | Nottingham SMEE. <i>Miniature/Model Rail Event.</i> Contact Pete Towle: 0115 987 9865. | 11 | Saffron Walden DSME. <i>Club Night & Night Running.</i> Contact Jack Setterfield: 01843 596822. |
| 2 | Ickenham DSME. <i>Public Running.</i> Contact Ian Mortimer: 01895 635596. | 3 | Saffron Walden DSME. <i>Public Running.</i> Contact Jack Setterfield: 01843 596822. | 10 | Canterbury DMES (UK). <i>Public Running.</i> Contact Mrs P. Barker: 01227 273357. | 12 | King's Lynn DSME. <i>Fun Run.</i> Contact Mike Coote: 01533 673728. |
| 2 | Maxitrak Owners Club. <i>MOC Rally at Leatherhead.</i> Contact Eric Penn 0208 979 4335. | 3-10 | Urmston DSME. <i>Open Week.</i> Contact A. L. Fussell: 0161 748 0160. | 10 | Edinburgh SME. <i>Track Running Day.</i> Contact Robert McLucke: 01506 655270. | 12 | Northampton SME. <i>Running Night.</i> Contact Pete Jarman: 01234 708501 (eve). |
| 2 | Romford MEC. <i>Trackside Afternoon.</i> Contact Colin Hunt: 01708 709302. | 4 | Peterborough SME. <i>Bits & Pieces.</i> Contact Lee Nicholls: 01406 540263. | 10 | Harlington LS. <i>Public Running.</i> Contact Peter Tarrant: 01895 851168. | 13 | Leicester SME. <i>Public Running.</i> Contact John Lowe: 01455 272047. |
| 2 | York City & DSME. <i>Summer Meeting.</i> Contact Pat Martindale: 01262 676291. | 5 | Stamford MES. <i>Running Evening.</i> Contact Derek Brown: 01780 753162. | 10 | High Wycombe MEC. <i>Public Running.</i> Contact Eric Stevens: 01494 438761. | 13 | Norwich DSME. <i>Barbecue.</i> Contact Shirley Berry: 01379 740578. |
| 3 | Bristol SMEE. <i>Public Running.</i> Contact Trevor Chambers: 0145 441 5085. | 5 | Taunton ME. <i>Barbecue & Steam-Up.</i> Contact Nick Nicholls: 01404 891238. | 10 | Leicester SME. <i>Public Running.</i> Contact John Lowe: 01455 272047. | 13 | Oxford (City of) SME. <i>Running Day.</i> Contact Chris Kelland: 01235 770836. |
| 3 | Frimley & Ascot LC. <i>Public Running.</i> Contact Bob Dowman: 01252 835042. | 6 | Bedford MES. <i>School Holiday Public Running.</i> Contact Ted Jolliffe: 01234 327791. | 10 | Leyland SME. <i>Scale Running Open Day.</i> Contact A. P. Bibby: 01254 812049. | 13 | St. Albans DMES. <i>Mike Chrisp & Dave Abbott: Going for Gold.</i> Contact Roy Verden: 01923 220590. |
| 3 | Hereford SME. <i>GL5 Association AGM.</i> Contact Nigel Linwood: 01432 880649. | 6 | Bradford MES. <i>Meeting.</i> Contact John Mills: 01943 467844. | 10 | Maidstone MES (UK). <i>Public Running.</i> Contact Martin Parham: 01622 630298. | 14 | Leyland SME. <i>Hints & Tips Night.</i> Contact A. P. Bibby: 01254 812049. |
| 3 | Leicester SME. <i>Public Running.</i> Contact John Lowe: 01455 272047. | 6 | Frimley & Ascot LC. <i>Teddy Bear Run.</i> Contact Bob Dowman: 01252 835042. | 10 | New Jersey Live Steamers, Inc. <i>Historical Society Run.</i> Contact Karl Pickles: 718 494 7263. | 14 | Sutton MEC. <i>Video Evening.</i> Contact Bob Wood: 020 8641 6258. |
| 3 | Lincoln DMES. <i>Running Day.</i> Contact Terry Peacock: 01522 681424. | 6 | Leicester SME. <i>Public Running.</i> Contact John Lowe: 01455 272047. | 10 | Norwich DSME. <i>Running Day.</i> Contact Shirley Berry: 01379 740578. | 15-17 | Bristol SMEE. <i>Bristol Model Engineering and Hobbies Exhibition at The Leisure Centre, Thornbury, Nr. Bristol, South Glos. BS35 3JB. 10am-6pm (Fri) 10am-5pm (Sat) 10am-4pm (Sun). Adult: £8, Child: £3.50, Family (2+3): £18.50. Contact 0117 967 5878.</i> |
| 3 | Maidstone MES (UK). <i>Public Running.</i> Contact Martin Parham: 01622 630298. | 6 | Oxford (City of) SME. <i>Running Day.</i> Contact Chris Kelland: 01235 770836. | 10 | Saffron Walden DSME. <i>Public Running.</i> Contact Jack Setterfield: 01843 596822. | 15/16 | Frimley & Ascot LC. <i>Open Days.</i> Contact Bob Dowman: 01252 835042. |
| 3 | Malden DSME. <i>Public Running.</i> Contact John Mottram: 01483 473786. | 7 | Leicester SME. <i>Special Run for Child Minder Groups.</i> Contact John Lowe: 01455 272047. | 10 | Sutton MEC. <i>Track Day.</i> Contact Bob Wood: 020 8641 6258. | | |
| 3 | Northampton SME. <i>Public Running.</i> Contact Pete Jarman: 01234 708501 (eve). | 7 | South Lakeland MES. <i>Meeting.</i> Contact Adrian Dixon: 01229 869915. | 10 | Taunton ME. <i>Public Running.</i> Contact Nick Nicholls: 01404 891238. | | |
| 3 | Norwich DSME. <i>Running Day.</i> Contact Shirley Berry: 01379 740578. | 7 | Sutton MEC. <i>Bits & Pieces.</i> Contact Bob Wood: 020 8641 6258. | | | | |

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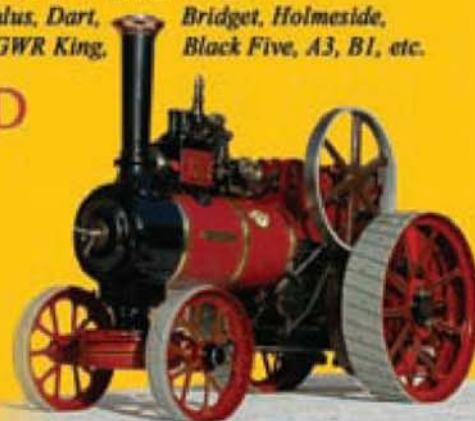
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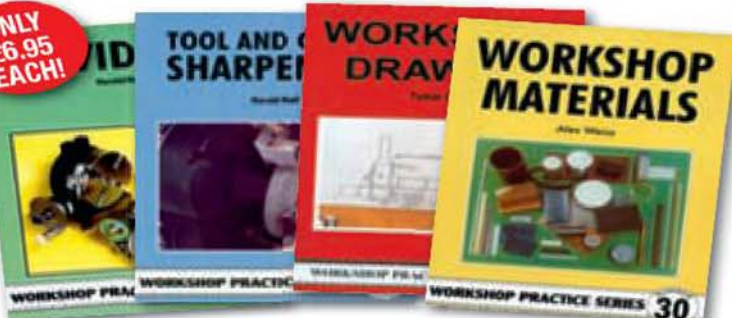
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■ Myford swivelling vertical slide with vice. £125. Startrite 10 speed bench drill, NVR and light. VGC £375. Tel: 01332 517439 Derby.

■ Quick Step milling attachment as sold by Hemingway, with collets and C-spanners. £200. Sherline 4in. rotary table, unused. £50. Tel: 02830 821247 Newry, Ireland.

■ Myford swivelling vertical slide in good condition in Myford box. £150. Tel: 01905 345274 Worcester.

■ Myford spindle nose collets, 1/4in. and 1/2in. with nose piece and closing tube in polished wood case. In good condition. £50. Tel: 02476 411660 Coventry.

■ Sherline 5410 mill with 3 axis digital readout, boring head, fly cutter, drill chuck, vice, 1/4in. and 6mm collets, 3/8in. and 10mm cutter holders and guard. £675 ono. Tel: 01793 641143 Swindon.

■ Kennedy portable hacksaw machine. Has a good 1/4HP motor but belt slips. £40 or exchange for Rotax X1 inertia starter. Tel: 01189 733288 Berkshire.

■ Bridgeport No 3 right angle head attachment fits to quill, heavy duty R8 milling arbor, 1in. dia. c/w spacers. Both as new to suit Bridgeport turret mill. £100. Colchester Bantam, 3 phase, 2 speed, 2HP, 5in. x 30in. with 3 and 4 jaw chucks and faceplate, and Colchester quick change toolpost. Lo volt lighting, coolant and some tooling. Spindle speeds 36 to 1600RPM. £650 ono. Tel: 01270 568506 Crewe.

■ Amolco milling head on base with 3/4in. x 7 3/4in. table and

Myford vice. £135. Ackworthie No 1 Morse taper model 0 tapping head with collets. £45. Tel: 020 89321093 Willesden.

■ Drill grinder (Black & Decker) with 1/4in. - 3/4in. collets. £115. Colchester 6in. x 36in. flat belt lathe. £325. Tel: 01582 529287 Luton.

Machines wanted

■ Myford or Boxford lathe in good condition well kitted out, preferably South East area. Tel: 01621 779223 Essex.

Exchange wanted

■ Warco BH600, new + cash offered in exchange for Myford Super 7. Tel: 01384 898520 Stourbridge.

Models offered

■ Narrow gauge Bagnall, 7 1/4in. gauge with riding truck and kit. Would part exchange for 5in. gauge Crompton ETC. Tel: 01664 454566 Leicestershire.

■ GWR Hall class locos in 3 1/2in. gauge, 45% built to high standard with Reeves copper boiler kit, drawings and castings. 2 off @ £325 each. 5in. gauge driving trolley. £75. Tel: 01492 547491 North Wales.

■ William in 3 1/2in. gauge by Martin Evans, laser cut frames assembled with horn blocks and axles, wheels (quartered), water pump and buffer beams, together with drawings and all castings to complete. £295. Tel: 020 83005059 Bexleyheath.

■ L.B.S.C. Dyak 2-6-0 locomotive in 2 1/2in. gauge, run on air, boiler tested, tender needs building, castings, drawings and text in 1935 Model Engineers included. £275. Tel: 01492 547491 North Wales.

Models wanted

■ Bassett Lowke 0-6-0 tank loco unmachined wheel castings. Tel: 07903 372976 Halifax.

Miscellaneous offered

■ Thornton clock wheel cutters, HSS. £25 each. Tel: 01332 517439 Derby.

■ Sleepers for 5in. and 3 1/2in. gauge track. Tel: 01403 783215 Billingshurst.

■ Lister model D stationary engine. £50. Tel: 01548 844186 South Devon.

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