



NORTHERN DISTRICTS MODEL ENGINEERING SOCIETY (PERTH) INC.

July — August 2019

# AMRA Exhibition 2019 — our best display in years

FOLLOWING considerable preparation over the past few months, the setting up of our display finally eventuated. Friday's set-up saw a keen group of members start work late morning. The table set up progressed well with little modification to our original concept drawing. Models arrived during the day and were placed accordingly, together with suitable labels. By late afternoon we were pretty well done and had all departed by around 4:30 pm.

This year's excellent display saw a huge variety of both completed models and various projects under construction displayed by members. These included several samples of different gauge locomotives and many fine examples of stationary engines, including a quality beam engine under construction.

Several horizontal and vertical boilers were also well represented. Some were in steam and were running engines on a purpose-built bench throughout the weekend. This dynamic display also held the interest of the general public and created much discussion, often for extended periods of time.

Another first this year was the inclusion of a garden railway table showing not only an array of exhibits, but hands-on construction of rolling stock with junior members of the public invited to participate. I might add that this was also well received.

On another front, traction engines located near the entrance were fired up and left running to provide a further spectacle.

A great deal of interest was shown in these and there was a distinct smell of coal combustion throughout the adjoining area and local surrounds.

The new stands which allowed for a tiered display arrangement worked very well, as



Some of the crew on the NDMES stand: Paul James, Clive Chapman, Andrew Manning and Keith de Graauw. Photo: Steve Reeves

*More photos on page 3*

the models could be arranged in order to be labelled and easily viewed. The hired barricade-style open fencing we put up around our display area also worked a treat.

The pull-down at the conclusion of the show on Sunday afternoon was a breeze — we were all packed up and gone before 5pm, which is much quicker than in past times when we had to pull down and remove the portable track!

In conclusion, I would like to thank and congratulate the members who had input into any aspect of the exhibition and especially the 25 members who helped out over the weekend, some members turning up on all three days. Running engines on steam or air and the general interfacing with the public is what this sort of exhibition is all about.

I think I could safely say a good time was had by all.

*Paul James — AMRA display coordinator*

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## President's Report for May—June 2019

TIME is flying by: AMRA has been and gone, soon it will be off to Dwellingup for the Hotham Valley Steam Fest in September and then our Annual General Meeting in October. Not to mention a few public run days and club run days in between.

I have had some fun, some disasters and quite a few successes in the workshop. As shown at AMRA there has been some progress on the RSJ cylinder block with valve chests fitted and valve stem guides fabricated. For a change of pace I have progressed my little hit-miss engine. The piston has been completed and fitted in the engine. The assembly so far turns over very smoothly — just a dozen or so more bits to make.

What a great display members put on for AMRA, showcasing the diversity of interests of society members. A great 'thank you' to Paul James for pulling it all together. See the photos and details on pages 1 and 3 of this edition.

The general meeting on Friday, June 14, was well attended and we got through quite a bit of business. It would be great if we could get a few more items for the "show and tell" section of the meeting. Ideally, it should be the main section of each meeting. We are privileged to have some members who produce magnificent models, while a lot of us produce the best we can. Do not be shy — like me, bring your work along and discuss your successes and your problems. Often there is someone who can help, if needed.

Club run day on the Sunday, June 16, following the general meeting was attended by 9 members. Phil Hartley again ran his new 5" gauge BR Class 4MT loco with great success, a beautifully finished loco and riding truck — *see photos on page 9 from the May run day*. Bob Hutt's "Royal Scot" had possession of the 7<sup>1</sup>/<sub>4</sub>" track and Ron Collins demonstrated the engine's express capabilities. Clive Jarman enjoyed a long run with his 3<sup>1</sup>/<sub>2</sub>" Hall Class. It looked really great with the long steam trail in the cold air. Clive Chapman and Andy Davies provided a sausage and bacon sizzle for lunch. It was a fun and relaxed morning.

The committee is active on several fronts, getting our training records up to date along with updated training notes and operating procedures. We now have in place job descriptions and training notes for guards, drivers and station masters and, of course, the duty officer. These documents will be available at the sign-in desk, along with a list of members who are qualified to operate in the respective roles. Thanks to David Naeser, Paul James and Phill Gibbons for this work.



### President's Report

By Andrew Manning

We have had discussions with City of Stirling council officers and our insurer with regard to getting access to the rear of our grounds via the BMX lease. There has been no progress so far but the City is optimistic we will get access, albeit limited.

David Edmunds has resigned from the committee and the role of treasurer. David has done an outstanding job as treasurer for a few years now and in doing so has set up a robust record system, not just for our finances but also for keeping track of membership. Thank you very much for your efforts David, we will miss your input and enthusiasm.

I have been filling in as treasurer, but Sue Smith will be taking on the role until October.

October — time for our Annual General Meeting and the election of members to the management committee. I ask you to start thinking now about "Who would I like to see taking the society forward" and "Am I prepared to nominate?"

The society secretary is the key position to fill. The secretary is largely responsible for managing all of the everyday activities of the society and the external interfaces with AALS, City of Stirling etc. and for recording minutes of meetings. Ideally the position requires to be filled by a member with some detailed knowledge of our activities and who has some commercial experience.

The president is the chairperson and his role is to chair meetings, coordinate roles across the committee and the society as a whole, while ensuring we meet the needs of members and the objectives of the society. The president is also the society's flag bearer but is NOT the chief executive officer. The "Rules of the Association" booklet, which you should all have either received, or be about to receive, details the roles of the president and the other members of the management committee under our Rules of Association.

The treasurer's role is a busy little job, paying all our bills, banking our income and maintaining a set of auditable accounts. This role is somewhat easier now that we use EFT for almost all payments. Cheques and petty cash are rarely used.

The current outgoing committee plans to have some sort of "guide book" to hand over to the incoming committee members in October, outlining the specific activities and records that must be attended to on a regular basis.

If you are interested in filling a position, and I urge you to think seriously about taking on some responsibility for guiding the society into the future, please ask to come along to a committee meeting and see if it is for you.

Enjoy reading the rest of Steam Lines. I'm sure it will not be so heavy reading as this! Happy making and steaming.

**Andrew Manning**



## More photos from AMRA Exhibition 2019



Another view along the NDMES stand, showing the wide variety of items on display, from Gauge 1 upwards. *Photo: Jim Clark*



Above right: Steve Reeves (seen here with Keith de Graauw) had his traction engine in steam and on display at the front entrance to the pavilion, joined by Clive Jarman (right) with his trusty Ransomes, Sims & Jefferies engine. *Photos: Steve Reeves*



Andrew Manning and Richard Turner watching some of the stationary engines ticking over, this time on compressed air. *Photo: Jim Clark*



Right: A good selection of stationary engines of various sizes. *Photo: Paul James*



Some of the model railway layouts and dioramas by AMRA members were excellent, including this well deserved prize-winning HO layout called "WieBhaven" *Photo: Jim Clark*



Left: The large beam engine currently under construction by Jim Clark. *Photo: Paul James*

# The AGM is fast approaching — your club needs you!

WHILST the last couple of years have seen some instability within committee ranks, I am sure we all agree that a stable committee is far preferable with members staying for the full term. It is very disconcerting when any elected member leaves, as this creates a void which requires filling and often increases the associated workload for others.

The Management Committee is just that — a committee of volunteers elected to manage the affairs of the society. The committee needs the full support of each and every member in it's attempts to achieve set goals, meet statutory requirements and fulfil various requests bestowed upon the committee by the general membership.

With this in mind, it seems timely to remind members that under the new Rules of Association, nominations for committee positions will be called for

starting in late August with the closing date 28 days prior to the AGM. All nominations need to be in the hands of the secretary and have attached a written statement in support of the nomination. Closing dates for nominations will be notified in due course.

When the nomination process is underway, it is incumbent on all members to consider the role they could play in developing and progressing our society.

One must remember that we are a voluntary organisation of like-minded people with many different interests that need to fit within the aims and objectives of our society. Please consider taking on a position at committee level and submit a completed nomination, or be prepared to involve yourself in our ongoing activities.

This society is only as strong as its membership participation!

**Paul James — Secretary**

## Calendar of Forthcoming Events

<b>General Meeting</b>	Sunday	14 July	11:00 am	<b>(No Friday night meeting)</b>
<b>Club Run Day</b>	Sunday	14 July	9:00 am — 2:00 pm	
<b>Public Run Day</b>	Sunday	28 July	10:00 am — 2:00 pm	
<b>General Meeting</b>	Friday	9 August	8:00 pm	
<b>Club Run Day</b>	Sunday	11 August	9:00 am — 2:00 pm	
<b>Public Run Day</b>	Sunday	25 August	10:00 am — 2:00 pm	
<b>General Meeting</b>	Friday	13 September	8:00 pm	<b>(due to HVR this Sunday)</b>
<b>Hotham Valley Steam Festival</b>	Sunday	15 September	Hotham Valley Railway, Dwellingup	(see page 5)

## Know your Society

<b>President</b>	Andrew Manning	0437 336 294	<a href="mailto:a.manning@westnet.com.au">a.manning@westnet.com.au</a>
<b>Vice President</b>			
<b>Secretary</b>	Paul James	0468 625 497	<a href="mailto:secretary@ndmes.org.au">secretary@ndmes.org.au</a>
<b>Treasurer</b>	Suzanne Smith	0410 492 083	<a href="mailto:ndmestreasurer@gmail.com">ndmestreasurer@gmail.com</a>
<b>Committee Members</b>	Ron Casotti	0407 464 747	
	Charles Coppack	0409 044 969	
	David Naeser	0433 088 703	
	Peter Smith	0407 472 770	
	Geoff Wilkinson	0424 080 979	
<b>Boiler Inspectors</b>	Ron Collins	0427 461 279	
	Phill Gibbons	9390 4390	
	Steve Reeves	9354 1395	
	Noel Outram	9525 1234	
<b>Librarian</b>	John Martin	9206 2325	
<b>Birthday Bookings</b>	Paul Costall	9572 1385	<a href="mailto:costall.paul@gmail.com">costall.paul@gmail.com</a>
<b>Driver Training</b>	Phill Gibbons	9390 4390	
<b>Safety Compliance Officer</b>	David Naeser	9276 8709	
<b>Newsletter Editor</b>	Jim Clark	0407 988 746	<a href="mailto:jimclark@hardwareandsoftware.com.au">jimclark@hardwareandsoftware.com.au</a>
<b>Website</b>			<a href="http://www.ndmes.org.au">www.ndmes.org.au</a>
<b>Society Grounds and Track Site</b>	Vasto Place (off Balcatta Road), Balcatta		
<b>Postal Address</b>	NDMES, PO Box 681, Balcatta 6914, Western Australia		



## Building a steel boiler at home

(continued from May-June issue)

NOW is the time to fit the front tube plate and firebox. All the welding on the barrel and outer firebox must, of course, be complete and ground neatly. The four long parallel lines on the barrel should still be there, so mark a cross on the front tube plate parallel with the tube holes and line up the cross with the lines on the barrel by eye.

A small tack on the bottom of the tube plate is next. If the tube plate is sloping, stop, flip the barrel upside down on the jig and weld two steel tags across the base of firebox.



Engineering Matters  
with boiler inspector  
Phill Gibbons



(see photo at left)

Drop this unit into the outer firebox on the barrel, fit and tack the front foundation ring piece. Next fit the foundation ring sides and tack them in place.

Flip the boiler around the right way up and slide a couple of tubes through the front tube plate. If they fit into the

firebox tube plate mating holes you're lucky, if not then tap the front tube plate until they slide freely. Give the front plate three more tacks. Next fit all your stays and weld everything up.

You will need a mate here to help expand the tubes. With 3mm sticking out proud in the firebox end, grab the front end of the tube tightly with pointy nose pliers and your mate can then expand the firebox end.



Use a battery drill on your expander and set it so it stops a second or so after the tube grips. Repeat for the rest of the tubes at the firebox end, then do the same on the front end.

## Hotham Valley Steam Fest

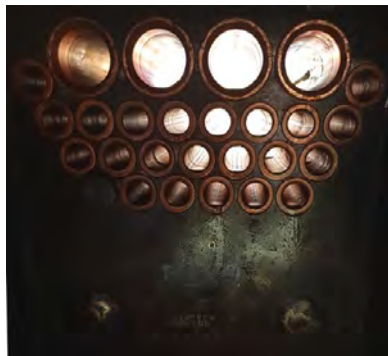
HELLO members, NDMES has once again been invited to put on a display at Hotham Valley Railway's Steam Festival in Dwellingup, on Sunday, September 15. Write the date down in your calendars now. The club is calling on all model engineers to bring along items for display on the day.

Last year we had a very successful display of a wide range of models. There were stationary boilers fired up and some model engines even ran on steam for the very first time, much to the amusement of all.

This year we hope to have three marquees filled with a variety of display items — anything related to model engineering: models under construction, on static display or fully working. As usual, the club is not paying anyone to attend the event, but there might be a free coffee for those in red club shirts!

Please contact Allen Ward on 0412 310 852 or via email at [walker1234@hotmail.com](mailto:walker1234@hotmail.com) for more details.

Bead the firebox ends over and bell-mouth the front ends, then go over the whole lot again to tighten any that may have worked loose during the beading.



Above: A simple beading tool can be made by cutting a profile similar to this one into the end of a steel bar. Hammer it around each tube end until the bead is formed.  
Left: Finished firebox end, all tubes expanded and beaded.

To be continued next issue...

Article by Phill Gibbons, photos by Steve Reeves



## A day out at Toodyay Mini Rail

WITH the weather forecast pointing to a great day, a group of NDMES members headed east to Toodyay on Sunday, May 19, to help out with the public run day at Toodyay Mini Rail, operated by the Toodyay Miniature Railway Society.

Tom Winterbourn took his Black 5 and he was joined there by Steve Briggs, Charles Coppack (a short run up the road from Gidgegannup), Steve and Mark Bowring (similarly a short run across from the Northam area) and prospective new member Paul Naughton. We were made most welcome by president Mark Greenway and secretary June Eastwood and other members.

The Toodyay track is interesting and provides plenty of activity to interest visitors, including metal images of wild and domestic Australian animals scattered around the track! But from an operating point of view, the interesting aspect is when locos return to the terminus-style station facing “wrong way” for the next run. So they are uncoupled from the carriages and roll on to the turntable where, usually, real loco driver Steve King is waiting to turn the locos around. All this in proximity to and in full view of the public.

In the meantime, another loco has backed on to the carriages and the train is ready for another ride around the 1.2km track. The arriving loco meanwhile, after being turned, travels through the station on the centre road and into a siding, ready to back down on to the next departure.

The only downside to what is a very interesting track is the position of the unloader next to the station signal box. For visiting diesel or battery locos, this is



Tom Winterbourn and his Black 5 are turned on the Toodyay turntable by TMRS member Stephen King.

Steve worked with Clive Chapman in the Dampier C power station in the mid-80s and was also a friend of Tom's from his

Pilbara days, when they were both members of the Pilbara Railways Historical Society and Steve was a fireman on the British steam loco “Pendennis Castle” when it traversed the Hamersley Iron track in the 1980s.



The public viewing area around the Toodyay turntable, which provides an excellent opportunity to see locos being turned after arrival in the station with their carriages. *Image courtesy of Toodyay Visitors' Centre.*

no problem. But for steamers, there are no steam-up facilities nearby so the loco has to be hauled by a diesel loco (or pushed!) some distance to the main loco shed, where air and an elevated service track are available.

A very interesting and enjoyable day and well worth the drive into the Avon Valley.

*Article and photos by Tom Winterbourn*



Steve Briggs sits astride the Black 5 with, from left, Charles Coppack, Paul Naughton, Tom Winterbourn, Mark Bowring and Steve Bowring.

## Cleaning your light-up fan

LIGHT-UP fans on coal fired engines become clogged with oily soot after a bit of use. Try using a domestic spray on oven cleaner, wait a short time, then hose off. Simple!

*Cautionary note: some oven cleaners contain caustic soda as the active ingredient, which reacts badly with aluminium. So if your fan contains any aluminium parts, best read the contents on the oven cleaner can before use, and perhaps choose a different brand of oven cleaner, or resort back to using the old toothbrush and kero!*

*Thanks to Lindsay Lockhart for this handy hint.*



## May public run day

THE public run day held on Sunday 26 May saw a good turn out of locos and a reasonable number of passengers. Just reasonable — perhaps due to the chill morning wind, but those who did join us were rewarded with a perfect late-autumn day and warm sunshine.

Initially Ed Brown, who was driving the club loco, was beset with train braking problems. After investigation by Peter Smith and Harry Roser, it was found that the batteries in the brake radio control unit were flat. New batteries solved the problem. The committee has resolved to have batteries replaced in all units in January and July of each year, which should prevent this in the future.

For me, the highlight of the day was driving Phill Gibbon's new Orenstein and Koppel 0-4-0+0-4-0. This was the Mallet's maiden public outing on the club track (see also the *Mallet Project* article on page 9). It was interesting and different to drive — the pressure takes a while to build up between HP and LP cylinders, but once there, the loco pulls really well.

The LP pressure is about  $\frac{1}{3}$  that of the HP cylinders, so the cylinder sizing at 50mm diameter for the HP and 75mm for the LP must be about correct, providing equal tractive effort from each. The picture (at right) shows Phill watching the gauges on the Koppel. Interestingly, there is one of these at Bennett Brook Railway undergoing restoration. Along with Phill's, it will be one of the very few in the world.

Regular driver Paul Costall was there with his Firefly and one of our regular duty officers, Keith de Graauw, drove the similar Bushfly as well.

Taking turns on Tom Winterbourn's Black Five were Tom and Stephen Briggs. Also keeping the elevated track polished was Steve Reeves with his Blowfly.

*Article and photos by David Naeser*



Peter Smith driving the club loco, perhaps as a reward for fixing the train brakes!



Phill with a good load of passengers behind his new Mallet.



Right: Keith de Graauw takes 'Bushfly' round the elevated track.

Below right: Steve Reeves with 'Blowfly' also running on the raised track.

Below: Tom Winterbourn on his Black 5.





## May meeting and club run day

SUNDAY, May 12, saw just over 20 members taking advantage of the warm, sunny autumn weather for the combined club run day and monthly general meeting.

Phil Hartley was the man of the moment, testing and commissioning his new BR Standard Class 4 2-6-4T tank engine. It ran as well as it looks, and several people had a drive of it and pronounced themselves impressed.

A couple of boilers and stationary engines were in steam: A Stuart 10V and 10H by Jim Clark, and a neat Stuart "Victoria" horizontal engine built by Richard Turner which ticked over very nicely at low speed as per the original. He was firing his boiler with a rectangular ceramic burner he recently purchased from Forest Classics in the UK. This seemed reliable and provided plenty of heat for this size boiler and engine. The burner operated from a disposable Gasmate butane cartridge, available from Bunnings in a pack of 4 for about \$5. After a couple of hours' steaming there was still some gas left in the can.

For more information on these ceramic burners, see:

<https://www.forest-classics.co.uk/ceramic-burners/>

*Article and photos by Jim Clark*



Phil Hartley looking justifiably pleased with his new 4MT loco.



Left: Richard Turner's "Victoria" engine, a Stuart model which he built many years ago, but has only recently painted. The ceramic burner mentioned in the text is the black and white rectangle next to the boiler, at lower right.



Above: Clive Jarman takes Phil Hartley's new loco for a spin. Note the very comfortable riding car with integrated water tank and tool pockets!

## Workshop items for sale

Peter Self has a number of items of workshop equipment for sale. These include:

Hand lever shears H5.6 (as new)	\$50
Bar bender UB100 (as new)	\$150
Tube bender TBRS-25 (new in box)	\$125
Sheet metal rolls SRG-50G (as new)	\$750
Section rolling machine RR10 (as new)	\$750
AC/DC 200A TIG Weldsmart	\$500
180A CIGweld Pro multi-process welder	\$500
Chain block & tackle 1 ton	\$50
Engine crane 2 ton	\$150
Eaton 7 hydraulic transmission (2 off)	\$750 ea
6.5HP Honda look-alike electric start	\$200

For further details, please contact Peter Self on 0418 207 752 or by email [daft-wullie@hotmail.com](mailto:daft-wullie@hotmail.com)

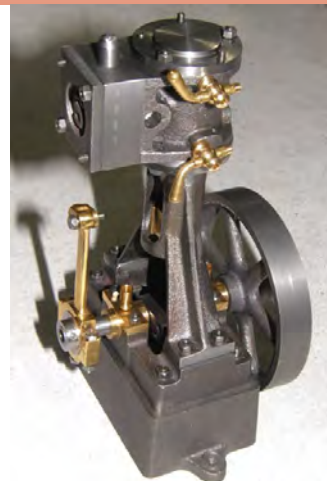
## More model engineering...

JOHN Turney is making excellent progress on machining his Stuart 10V engine, as can be seen from the photo at right.

It is surprising just how much work is involved in building any model engine to a good standard, even ones that look quite small and relatively simple!

But very satisfying when you achieve a good result.

Photo: Jim Clark





## The O&K Mallet project

*Orenstein & Koppel (O&K) was a German engineering company founded in Berlin that specialised in railway vehicles from about 1890 into the 1980s. They built a wide range of different types of steam locos, many being narrow gauge 0-4-0s which were sold around the world including to Australia, where some remain preserved. They also produced larger locos such as the Mallet that was modelled by Phill, right up to big 2-10-0 'Kreigslok' locos for the German war effort.*

*Phill Gibbons writes: "THE idea for a Mallet loco came up about 40 years ago when Sid Cleyland, a Diamond Valley Railway member, asked me to build him one as a commercial project.*

*Well, I had too many of my own projects to do so I declined, but it must have left a memory in the back of my mind, so when Tanya arrived with 'Black Betty' the die was cast.*

*I wanted it to be different — not just a Mallet but a true working compound. I had the O&K catalogue which gave me cylinder sizes, boiler dimensions, wheel centres and wheel diameter, plus a few more bits of information.*

*So with a few sketches under my belt a start was made on the frames. The beams and pivot parts were laser cut, the wheels are carved from K1045 solid, and the axles were made from an old octagonal section crowbar which was purchased for \$5. The crowbar steel is wonderful, probably the equivalent of 4140. The wheels and bearings are all press fits: the crankpins are pressed at 2 tonnes, the wheels at 6 tonnes and bearings around 1/2 tonne. It is always my intention to have my engines work for their living! The axle boxes contain ball bearings and it is sprung by two coil springs per box.*

*All the cylinder patterns were mine. I had them cast at a Fremantle foundry, so I was busy for a while — two sets of everything keeps you that way! The valve gear was a challenge to say the least. Not only are there two sets but the actuating rods must be pivoted at the same place as the frames pivot. From leaving the reverser to get to the front valve gear there are seven bearing points and two pivots, so the only accurate way to do this is with shoulder bolts and needle roller bearings, otherwise there would be lots of lost movement. The setting of the valves is critical on a compound engine, so any lost movement must be kept small.*

*The coupling and connecting rods are laser cut with gunmetal bearings. The crossheads have been described in this magazine some time ago. Now to valve setting. On the high pressure cylinders the slide valve has no lap, it is a line for line setting, either admitting steam or exhausting with no expansion. The exhaust cavity has exhaust clearance which, of course, is wasteful of steam but gives lots of power. On a compound loco this is of no consequence as the steam has more work to do in the*



Above: The new Mallet underwent its first steam tests during a private steaming at the club track in early April and boiler inspector Steve Reeves issued its boiler certificate.

front low pressure cylinders. The valves in the front are set for 60% cut-off in full gear and they have lap and lead steam with no exhaust clearance.

The two chasses are pivoted, which lets it go around very tight curves. But this leads to more work because every pipe from the rear to front chassis has to be flexible and reliable. Some must withstand full boiler pressure, then there are the brakes, drain valves and simpling pipes, not to mention the exhaust, which is the most complicated because it moves the most — on our track around 25 mm each way.

The HP cylinder exhaust runs through the middle of the chassis into an accumulator, then splits into two and into the LP steam chests. All this is flexible and heavily lagged to keep condensation at a minimum.

The boiler was constructed at Ron's workshop. Without his help the project would still be a dream. All the plate work came from a sheet metal workshop in Midland to my design. The boiler is bolted to the rear chassis with 4 shoulder bolts that allow it to expand. It is fixed hard to the front of the rear chassis and it expands towards the front and the rear on slides. It also has adjustment to increase or decrease the weight on the front chassis.

*(continued on page 10)*



## The O&K Mallet project (cont...)

*(Continued from page 9)*

The loco has steam brakes on front and rear with a handbrake on the rear. Drain valves are independently controlled from the steam turret. The LP steam chests have drain valves as do all the brake cylinders. A 12 mm ball valve is used for the regulator.

Two mechanical lubricators feed the rear cylinders, while two hydrostatic lubricators feed the front cylinders. This was a bit of overkill, but the front lubricators had to be fitted to keep it prototypical. I don't of course have to fill them but they do work.

The boiler is fed with an injector from my own workshop. It is bigger than the commercial ones on offer and so far I have found it will feed from 120 psi down to 40 psi with only a little water regulation at the lower end. On the other side we have a cross-head pump which works very well and is in keeping with O&K.

The loco was painted at Ron's with him doing the lion's share of the work. In conclusion it has been a experience which kept me thinking and on my toes. Thank you to all who helped — there are too many to name! Everyone I asked for advice was forthcoming, and it was an example of club spirit at its best.

It will from time to time participate in club passenger hauling (*see article on page 7 for example*) and you will put a smile on my face if you take it for a drive.

**Article by Phill Gibbons, photos by Steve Reeves**

Right: Phill in action at the recent Castledare Steam Fest



## Notes from the Boiler Group

THE Boiler Group were recently treated to a cornucopia of clockmaker's tools, brought along by Garth Caesar (*see photos at right*).

The watchmaker's lathe is over 100 years old, and together with the large collection of miniature collets and cutting tools that Garth has accumulated during his career, it makes a very impressive collection of precision machine tools in miniature.

Garth gave us a demo, and several other members then had a go, getting some appreciation of the watchmaker's skill! **Article and photos by Jim Clark**





## Tips for successful brass plate work (cont...)

*(Continued from May-June issue)*

LAST issue I discussed the introduction of lead-free soft solders to replace leaded solders in order to meet RoHS requirements. Since then, I did a quick check of the plumbing aisle in the local Bunnings and discovered that tin-lead solder (in both 60/40 and 50/50 grade, sold as plain sticks and also resin-cored) is still on sale. The only nod to RoHS being a small sticker warning: "Not suitable for use on potable water supplies".

So it turns out that leaded solder is readily available, at the moment anyway. The process I have used is as follows, and it relates specifically to 60/40 leaded solder. If you are using a lead-free solder you will need to do a few experiments to ensure you're using compatible fluxes and solders, as noted in the first part of the article.

Firstly, drill all the rivet holes in the outer or overlapping sheets while they are still flat. Clamp or screw each sheet to a piece of MDF board and set it up on the milling machine table, then use machine co-ordinates to drill the holes. You will need to use a centre drill to ensure the drill doesn't wander – one with a  $\frac{1}{16}$ "

point will do perfectly for  $\frac{1}{16}$ " rivet holes.

Set a depth stop so you don't over-drill and accidentally countersink the hole. Alternatively, you can first spot them all with a centre drill and come back on a second pass with the correct size drill.

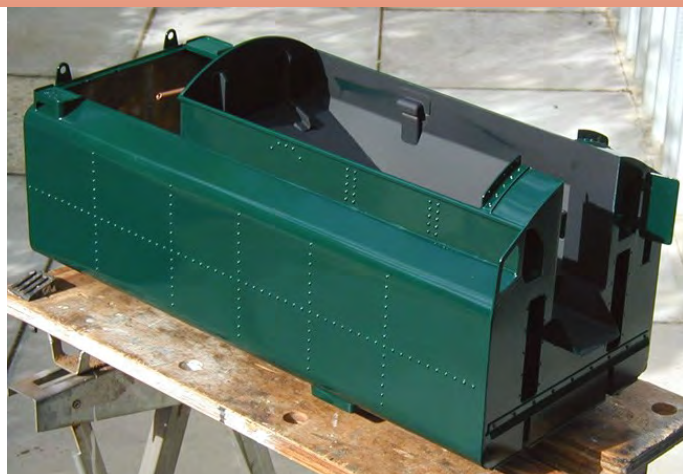


Rows of rivets that were drilled on a milling machine using co-ordinates.

Don't even think about hand-marking and centre punching — no matter how good you think you are, when you look along a line of hand drilled rivet heads there will be some out of line.

Now bend up any sheets that need to be bent. Then align the under-lapping sheets and supports and using the pre-drilled holes in the outer or overlapping sheets as a jig, drill through them into the underlying sheet. Drill two of the diagonally opposite holes first and push rivets or small screws through them to act as locating pins while you drill through the rest of the holes.

Do a trial assembly of the plates and other items that will form the completed module, using some 8BA or 10BA screws and nuts (or M2 or M2.5 if you're metric) instead of rivets to check that everything fits as it should, especially where plates meet each other or meet supports. Solder will fill small gaps, but it's not body-filler! Now is the time to go back and make any small adjustments to the fit. If you have a major problem, don't hesitate to scrap a plate and re-make it. It's quite hard to hide panel-beating or filled-in holes in brass plates!



The completed tender, painted and ready to mount on the chassis.

When you are happy with the basic assembly, strip it down and clean everything just as you would do for silver soldering — pickle it all in an acid bath, including the copper rivets you intend to use.

Originally, I used to use dilute sulphuric acid as a pickle, but once again due to health and safety concerns, it's no longer readily available. More recently, I have been using a strong solution of citric acid: about 2kg dissolved in 15 litres of water in a 20 litre drum. Citric acid is readily available from brewer's and wine maker's suppliers, such as Brewmart, or you can search for suppliers on line. A 1kg bag should be about \$10.

It is actually far easier and safer to work with (no more mysterious pinholes in my clothes!) There is a compromise however, and that is it takes quite a bit longer than sulphuric acid to do the job, say 1 or 2 hours for a basic clean, or an overnight soak for a good clean.

When all the bits are clean and dry, mark where the soldered seams will go on the plates, and which mating surfaces will need soldering. As mentioned previously, the secret to successful soft soldering is to pre-tin all the mating surfaces before final assembly, then heat gently to get the pre-tinned surfaces to flow together nicely.

Right: The tender outer shell being final assembled. Note the pre-tinned patches where plates will be fitted, and the corner angle brackets lying on the bench, which have not yet been tinned. Some baffle plates are already fitted.



*To be continued in the next issue...*

**Article and photos by Jim Clark**

# The benefits of having good procedures

**Background: The UK Seven and a Quarter Gauge Society (of which I am a member) has a web site which includes a Forum page in which members may exchange relevant written opinions on railway topics of interest — John Shugg.**

BACK in 2017, there was a report published from the Sheffield Society on it's Forum page about litigation undertaken against that society by the parents of a young girl who injured her foot whilst she was riding on an elevated-track train, some three years prior to the court action.

The Judge hearing the case heard how the Sheffield Society had verbally broadcast warnings prior to the departure of every train as well as explaining the conduct expected of passengers during their ride.

The Society had then carefully recorded the circumstances of the injury, the first aid offered and the record of interview with the parents at the time.

The Court was also shown the Driver's Training Record, the society's risk assessments, maintenance records for the rolling stock and the record showing that the incident was fully and promptly reported to the UK Health and Safety Executive (HSE).

On the evidence provided by the Sheffield Society, the Judge exonerated the club, stating there was no case to answer.

Generally, that society's adherence to HSE Code HSG216, (for miniature railways up to 10¼" gauge) had saved the club from considerable legal costs and, probably, compensatory damages.



Sheffield and District Model Engineering Society's 7¼" gauge elevated and multi-gauge track with typical straddle cars shown in revenue service.

The Sheffield Society also operates ground level track.

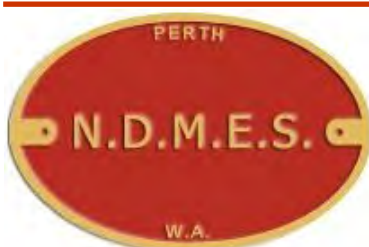
Photo: Mick Savage, reproduced with permission of S&DMES

The Forum's contributor, from SDMES, commented that he trusted other UK clubs were also following the HSG216 Guidelines. He might have suggested Australian clubs could do the same, as the principles involved are very relevant to our operations, too.

In Australia, of course, our operations are covered by the Australian Association of Live Steamers (AALS) 'Code of Practice for Operation of Miniature Railways, Road Vehicles and Plant'. For more information on the AALS operating requirements, see: [www.aals.asn.au](http://www.aals.asn.au)

**Article by John Shugg**

**Footnote: HSG216 (2002) is no longer supported by the Health and Safety Executive in the UK. The PCMRSG (Passenger Carrying Miniature Railway Safety Group) has stepped up to replace the Health and Safety Executive's involvement. For more information on the UK requirements, see: [www.pcmrsg.org](http://www.pcmrsg.org)**



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