



Boiler group's mountain retreat

WHILE most of the activity at the club recently seems to be associated with the garden railway project, there is another group quietly going about its business a fair distance away in the “mountains”.

It is the boiler-making group, which meets most Wednesdays at Ron Collins' property up there at Parkerville (near Mundaring). The days are proving most productive, particularly to one of our newer members, Keith De Graauw.

The group is also furthering the very essence of miniature steam locomotive construction – building the boiler.

Under the guidance of Ron and boiler inspector Phill Gibbons, three projects in varying stages of development are being progressively worked on.

At the most recent “workshop”, the firebox for Phill's own Orstein & Koppel 7¼” compound was bronze-brazed.

Andrew Manning's vertical boiler for his Caradoc steam tractor, the subject of a “Show and Tell” presentation at the August members' meeting, reached another stage in its development. And the boiler barrel for Keith's new Phantom 7¼” 2-6-0 was clamped ready for brazing.

The boilers for the three 7¼” Juliets being built concurrently by Phill, Rob Otway and Steve Reeves and nearing completion were also built within the boiler group.

While the important skills for making and

maintaining boilers for miniature steam locos have been maintained, that has not necessarily been the case with main line locos. So, in the UK, boiler-making apprenticeships have recently been re-introduced to maintain skills all but lost since

Seventh heaven for Mr Ed at July run



A study in steam, smoke, water – and “Mr Ed” in seventh heaven at the July run. He is pictured replenishing the water supply on Ron Collins' 0-4-2 in the station. More pictures from both the July and August public runs are on page 9.

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the demise of the steam loco and the depleting ranks of specialised boiler-makers (see also Stu Martyn's comment on page 8).

We're in good shape, but we need regeneration

A HEALTH report card on our society indicates we must be doing something right. We now have over 70 financial members (the largest number in our fraternity in WA) and a burgeoning garden railway sub-group forging ahead on a project that also promises to be a leader in its field.

We continue to regularly attract between 15 and 20 members to the Tuesday work day and many more on our public running days. Our monthly meetings also regularly attract over 30 members and the Show and Tell segment is never short of displays of our workmanship and ingenuity.

Then we have the boiler-making group which regularly meets up there in the mountains (well in Parkerville actually), with four boilers currently under construction under the tutelage of Phill Gibbons and Ron Collins, as described on page 1. This is an important element of our model engineering heritage.

Our public run days continue to provide a steady stream of income, even though the last couple of runs have been adversely affected by the weather. Our finances are in reasonable shape even though our spending has been relatively high over recent months.

A new Rules of Association draft is up for discussion at a special general meeting just prior to our September members' meeting and this should provide good guidance in the years ahead.

Usually at this time of the year we would be focusing on our AGM and the election of a new committee, but this has been put back to early in the New Year for 2017 and beyond. But it is not too early for members to think about stepping up and seeking a position on the new committee.

But with all the good news that comes with our society, we are lacking in one key element – regeneration. We need new young blood and that it is why it is such a pleasure to have vibrant young members like Mark Bowring and Meldon Bruce-Hall within our ranks.

They have both been learning much about our operations, particularly on public run days helping to fire-up the club steam loco and shunting carriages before

President's Report



by Tom Winterbourn

and after our public duties, and they need every encouragement to continue doing so.

An indication of Mark's enthusiasm was demonstrated on the second weekend in August, when Mark and dad Steve drove in from the other side of Northam for the Friday members' meeting, then again on the Saturday for the Bunnings BBQ and again on the Sunday for the club run!

And, 12-year-old Mark stood up before over 30 members at the Friday night meeting to detail the progress he had made on his 5" Tich project. This unbridled enthusiasm must be encouraged at all costs to ensure the survival of our society as we all inevitably age.

We are not alone with this dilemma, of course, with most model engineering/minature railway societies struggling to find new blood amongst those who have never seen a steam loco or traction engine in every-day use, as we older members have.



Mark, with dad Steve, cuts up onions at the Bunnings BBQ on August 13 – our future is in the hands of such new, young blood.

Calendar of Forthcoming Events

General Meeting	Friday	9 September	8:00 pm	
Club Run Day	Sunday	11 September	9:00 am — 2:00 pm	
Public Run Day	Sunday	25 September	10:00 am — 2:00 pm	
General Meeting	Friday	14 October	8:00 pm	
Club Run Day	Sunday	16 October	9:00 am — 2:00 pm	
Public Run Day	Sunday	30 October	10:00 am — 2:00 pm	
Sandgropers Weekend	Sat-Sun	12-13 November	Daily	SWMEA, Forest Park, Bunbury

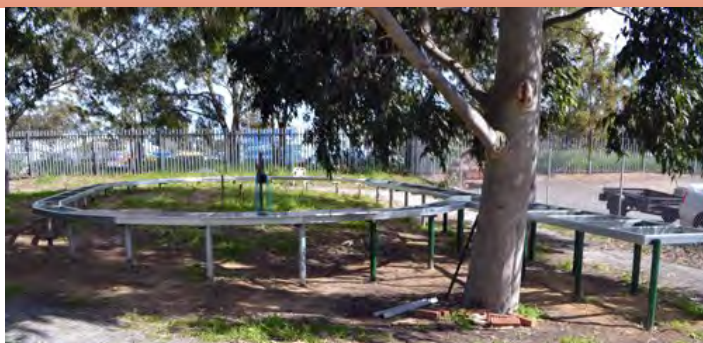
Garden railway 12 months on

It was one year ago, in September, 2015, that the “first sod” was turned to mark the start of the garden railway project.

It was Dave Robinson, using Harry Roser’s tractor, who levelled out the mound of earth, relocated from the top of the tunnel, to prepare the area for the installation of the track support poles.

It took a little while for the project to kick on from there, but the last three months has seen a flurry of activity, to the point where we have the support posts concreted in, the metal track “underlay” installed and the track base laid.

Such has been the enthusiasm of the Tuesday garden railway crew and the progress made that the “work day” has been extended by three hours until 3pm.



A garden railway in progress: Pictured on August 28, with the first four sections of decking in place. The steam-up area is on the right.



Pictured here at the first BBQ lunch on July 19 are (from left) Geoff Wilkinson, Bill Walker, Richard Turner, Steve Briggs, Charles Coppack, Laurie Morgan and John Shugg.

To enable this to happen, the inner-man had to be satisfied, and so a BBQ lunch is now provided. The first such lunch was held on July 19.

The project, originally financed by the allocation of \$3,000 by the society, is being spearheaded by the “two Johnnies” (Turney and Shugg), Charles Coppack, Laurie Morgan and Richard Turner. An additional allocation of \$4,500 by the society should see the project through to the completion of phase 1 — two full circuits, with a third line in some places.

Phase two will provide an extension with a double track through the trees near the southern boundary fence.

Already members are buying or making locos in readiness for the “Christening” of the new track well before the end of the year. The aim then is to have phases one and two ready for the 2018 AALS Bunbury convention, with NDMES hosting an “after party” on the Tuesday and Wednesday following the Easter Weekend.

‘Disinterested’ Richard now committed to GR

FOR a person who had not the slightest bit of interest in garden railways three months ago, Richard Turner has surprised himself and others in the GR construction squad.

“Who’d a thought in early May I would be involved in the GR project and building my own loco,” he said.

Richard recently completed building his kit-build Round House 0-4-0 “Billy” and demonstrated it to the Tuesday morning crew on July 2 in his own little “show and tell”. Richard had his diminutive loco steaming across the table and on blocks during morning tea, watched by the 16 members present.

After offering to help the GR team with the post hole digger, Richard became interested enough to go on-line to see what was available and liked the “Billy” kit loco offered by Argyle Locomotive Works in Victoria, particularly as he saw it as a “baby Polly”, referring to his 5” Polly kit loco “Suzanne”. He bought the kit and had the loco completed within four weeks.

“I am very happy with it as it has met all expectations and

works really well,” he said on August 2.

The loco runs for about 20 minutes on a boiler of water. It has no water pump or injector so when it runs out of water, it is simply replenished for another 20 minutes running.

Our picture shows “Billy” in steam and on blocks, watched by Andrew Manning and John Shugg.



Coupling/connecting rods a big issue

As indicated in the last issue of Steam Lines, I will deal with coupling and connecting rods in this model engineering article.

This is a big subject. My first advice is to get them laser cut from mild steel, ensuring you make all the radii on them compatible with your polishing tools.

Do not laser cut the centre holes, as the rods heat up when cutting and it will be difficult to keep the correct centres. Bore the holes by setting up toolmakers buttons.

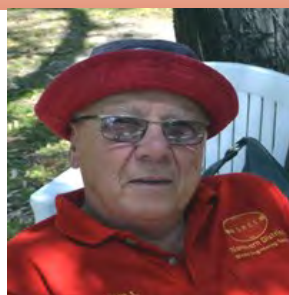
You will need to make your coupling rods before you fit your wheels, so you can get your actual centres from the job rather than drawings.

Put your frames upside-down, put your axles in the axle boxes and measure inside the axles. Then add one axle diameter. That is your actual length rather than the drawing size.

If you prefer to cut rods from solid steel, there are a lot of bright mild steel oblong sections and one must be right for you, or very near.

Now to the machining: Using a marking blue, mark the centres as close as possible. We will finish them later with the buttons. Drill them with a little clearance on say a 10mm bolt for 7¼" gauge.

The easiest way forward from here is to purchase a



Engineering Matters
with boiler inspector
Phill Gibbons.

piece of 50mm square bright mild steel bar around 100mm longer than the centre distance, scribe a centre line deeply all along two sides, mark 25mm in from each end in two spots, centre and drill clearance on bolts that fit the "T" slots in your mill. These holes will break into each other and go straight through.

Now bolt the blank on to the bar with two new holes (tapped) on the centre line. You can now bolt this to the table with your end holes, set to be parallel with the table.

Mill your shape, then turn the whole block 90 degrees and mill in any fluting in one setup.

Being bolted directly to the table of the machine will make the job much more stable.

I will explain this procedure in more detail in a Show and Tell at a future members' meeting.



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Belt sander comes with many problems!

JOHN Martin, as most of us know, is as enthusiastic about making things out of wood as he is working in the library and with signalling. The weather vane atop the steam-up shed is an example of his work.

To help him in this pastime, he built his own 12 inch disc sander and a drum sander – but there was one thing he didn't have, a belt sander which could do many things the other two couldn't.

He had not seen a narrow belt sander anywhere in WA and a web-search failed to throw up a supplier in Australia. They were available "off-the-shelf" and reasonably priced in the US and Canada, but the cost of getting one to Australia was prohibitive.

So he decided to make his own – out of wood, of course. He discovered a man in Canada who designed wooden woodworking machines, more substantial than anything else advertised and with a deeper throat, so he paid \$10 for E-plans, cutting lists, photos and instructions, which arrived within about 15 minutes after payment.

John said the build itself didn't take very long, but sourcing of materials and modifying designs to use materials he already had stretched the project out somewhat.

The two main problems didn't appear initially. The machine was designed to take 1 inch wide, 42 inch long belts, none of which were available off the shelf in Australia. They were available in the US and Canada, but again transportation costs were too high, as was the cost of having them made to measure in Australia to suit a range of grit sizes.

"With a bit of forethought, I could have modified the design of the machine to suit standard size Oz belts, but fortunately I managed to source a pack of belts, freepost from Hong Kong," he said.

"I already had a $\frac{1}{3}$ HP motor off an old bandsaw that I thought would be just right — wrong! The sander needs to turn anti-clockwise, but the motor runs other way.

"Maybe I could reverse it — wrong again. I could not access the starter winding tails which are deep inside the case."

"A friend donated an old $\frac{1}{2}$ HP double-ended motor which, on testing, worked well. I spent a whole weekend cleaning it up and mounting it on a belt tensioning platform together with a new stop/start switch. Now we're in business!"

"However, after about three or four short runs, the motor stopped, never to run again."

John said two more motors were offered, but they, too, ran clockwise and could not be reversed.

"Time to bite the bullet," he said. "There are plenty



John Martin demonstrates his new belt sander during Tuesday morning "smoko" on August 22.

of cheap motors from China, if you are prepared to buy in batches of 1000!

"I eventually found a place in Sydney selling new Chinese-made universal $\frac{1}{3}$ HP motors for \$74 plus \$40 postage, so the problem is now solved and the machine runs very smoothly.

"In hindsight I could have modified the design to construct a left-handed sander so that it worked with any clockwise running motor."

John said some guys at his Men's Shed have tried it out on their Intarsia projects and have been impressed with its ability to sand into small tight corners and there's now talk of adding a left-hand machine to the "to do" list!

John discovered the pleasures of woodturning when he was in his 'teens and he later turned to cabinet and furniture making for family and friends — and to canoes and virtually anything that could be made out of wood!

These activities were placed on the back burner when he went to work in Hong Kong, as running noisy machinery in a multi-storey flat was no longer practical. So, he bought a Unimat 3 mini lathe/mill and changed direction into model engineering.

He came to Perth in 1988 and, having a home of his own again, was able to re-establish a multi-purpose workshop. Shortly after, he joined NDMES and still continues to enjoy his involvement on a broad scale.

Dennis' milestone celebrated in style

OUR oldest and still active member, Dennis Lord, turned 95 on August 9 and the occasion wasn't allowed to pass without due recognition by the Tuesday crew.

The big day coincided with census day and while we had a few anxious moments trying to get Dennis to the club without him knowing what was going on, that was nothing compared with the dramas that befell the national census on that day, with the website crashing.

Our saviour was Dennis' granddaughter Stephanie, who delivered him to the club on time!

The day was marked by not one birthday cake, but two, with one ordered commercially and the other, an iced fruit cake, made by Lyn Shugg.

The president started the proceedings by asking Andrew Manning to say some appropriate words before Dennis cut both cakes – and he then proceeded to indulge in two fair-sized slices from each (see pic!)



Did he enjoy the cakes, or what!

He went to sea as an electrical and instrument artificer. During the Second World War he saw active service on a destroyer in the Mediterranean and was involved in several missions, including the evacuation of allied troops from Sicily. His ship later suffered a direct hit from enemy action, which disabled it as a fighting ship, but it was able to steam to San Francisco for repairs. Dennis was in San Francisco when Pearl Harbour was bombed by Japanese aircraft.

Dennis remained in the Navy after the war and later, as a civilian, he joined the Harwell Nuclear Research Establishment as a research officer. Since his early Navy days he has been a keen model engineer, initially with steam boats then progressing to steam locomotives.

Dennis and his wife Kathy migrated to Australia and he



Dennis is guest of honour, surrounded by members of the Tuesday crew.

began work as an instrument officer. Kathy died 17 years ago. Dennis has a son and daughter, four grandchildren and three great-grandchildren.

He has always been a keen NDMES member. When efficiency trials were the rage, he built a dynamometer car and more recently he established the signalling and points controls we use today. As recently as last year, Dennis installed the 12V and 24V power supplies in the 7¼" section of the steaming shed when it was upgraded with additional bays.

Dennis has been a regular and familiar face at Tuesday work days and on Saturdays and run days, travelling the relatively short distance from home on his trusty "gopher". Long may this continue.



Dennis working on the upgrade of the steaming shed in 2014.



Dennis heads home on his trusty "Gopher".

More carriages to ease congestion

WHILE discounting the July public run, which was badly affected by rain, the three previous runs have emphasised the desperate need for more carriages.

We have the locomotives, but we just cannot seem to cut down on passenger waiting time.

However, the cavalry is about to arrive in the shape of Ron Collins and Harry Roser. Ron, with more than a little help from Paul Costall, has been working on the two part-completed 2.4m aluminium carriages from Ken Austin's Kentin workshops in Malaga, and is hopeful they will be ready for use at the September run.

Harry, meanwhile, has made a second carriage based on the Collins design and had this running at the August public run — in a five-car consist behind Dave's yellow diesel.

The train comprised the two blue carriages, the club's two older red carriages and Harry's guard's van.

The "Fab team" of Ken, Andy and Steve B are again ahead of the game and have made up another triple

turnout and laid tracks into the loco shed to provide an additional two roads to accommodate the extra carriages.

Experience has proved that these longer trains take almost the same time to unload and load in the station than the previously used two-car trains, and so will considerably help in keeping passenger waiting time down to a minimum.

To this end, guards are already being trained up to full competency, complete with two-way radios, flags and whistles. In addition, all trains are running double circuits to give passengers a longer ride, easing the workload on the station staff.

A new guard-operated braking system on the carriages has made the longer trains possible.

When Ron Casotti has finalised the integrated signalling system, we will also be able to use the back straight, which will add 50 per cent to our run-day track capacity, obviating the need to run double circuits.

Don't forget to register for Sandgropers

AN important date for your diary is the second weekend in November — the traditional date for the annual Sandgropers Gathering which, this year, will be held at SWMEA in Bunbury on November 12 and 13.

Last year's event was held at NDMES, with Bunbury hosting this year. The event will return to Vasto Place next year.

Registration forms for the event were sent electronically to members in mid-August.

Sandwiches are available for lunch on both days and

there will be the usual Saturday night dinner. See the Registration Form for options, details and prices. Coffee and tea will be available at all times.

Registration for the weekend costs \$20 per person and your completed registration forms must reach SWMEA by October 24 to allow for catering arrangements.

Members wishing to run a loco or traction engine at the event must have with them a current boiler certificate. Any queries should be referred to SWMEA president Jeff Clifton on 9725 1994.

Extra line for 5" train make-up

THE Fab Team has completed a new elevated make-up line at the rear of the 5" carriage shed to make it easier to marshal trains on run days.

The last section was welded to a support post on August 16 and the line was in use at the August public run.

Various ideas on how to get 5" locos on to the traverser without backing down the main running line and holding up trains already on passenger duty are now being looked into.

One idea which seems to be gaining traction is to cut a "trap door" into the rear of the carriage shed and access the storage road on the eastern side of the shed directly from the turntable, which is equipped for 5" loco operation. Carriages on this road can be placed on the new make-up line to allow locos to move through the shed to the traverser.



Andy Davis marks up the last welding job on the new 5" storage line on August 16, watched by Ken Cooper and Bill Walker.

Excellent promotion at Bunnings BBQ

SEVENTEEN members with an age range of about 70 years helped raise funds for the garden railway project at the Bunnings Balcatta BBQ on August 14.

It was a full-on day, but all seemed to enjoy themselves in perfect weather conditions.

Paul Costall brought his showman's traction engine in from Mt Helena and it proved an immediate hit with Bunnings customers.

There were also many enquiries about our public runs and many flyers were handed out. The event raised almost \$1,500 for club funds.

As local societies and clubs can only have one Bunnings BBQ "gig" every 12 months, because of demand, we have already applied for and been granted Saturday, July 15, 2017, for our next fund-raising effort.



Paul Costall and his showman's traction engine pictured surrounded by inquisitive visitors at the Bunnings BBQ on August 13. David Edmunds also helped with the PR!

Changed your address?

WITH the start of a new calendar year, we will be updating our membership contact details.

So, if you have changed address or phone/email addresses recently, could you please let us know?

Send your updated details to treasurer Damien Outram at damienutram@yahoo.com.au

2018 convention group meets in Balcatta

THE second meeting of the NDMES/SWMEA sub-committee planning the 2018 convention at Bunbury was held at Balcatta on August 14.

The committee is made up of David Edmonds, Damien Outram and Tom Winterbourn (NDMES) and Jeff Clifton, John Matthews and Laurie Lewis (SWMEA), with Luke Fenn also travelling up from Bunbury for the meeting.

A number of issues were discussed, ranging from

meals to security arrangements, first aid, local accommodation and food.

While at our grounds, the Bunbury delegation inspected progress on our garden railway. They also showed interest in our concrete sleeper-making process, with Clive Chapman offering help in this area.

The next meeting of the sub-committee will be held on the Sunday of the Sandgropers weekend in Bunbury (November 13).

Stu puts the record straight

FORMER member Stu Martyn has his own take on the term "boiler-maker" and "silver soldering".

In an email to a few members in July, Stu made the following observations:

"I've been around a few years and have never yet met a 'Boilermaker' (a title once given to those who completed the requisite trade qualifications) who has built a steam copper boiler!

"Probably why this term for a once-recognised trade is now almost extinct is because it seems to have been

taken over by those classing themselves as 'welders'!

"I also rail against the modern term of classing 'silver soldering' as 'brazing'! Anybody who has ever done silver soldering knows that there is a major difference between brazing copper using bronze (true brazing) and silver soldering.

"To get a good joint using silver soldering is relatively easy — you just need cleanliness of the joint, enough heat and a steady hand."

Stu has since applied to renew his membership.

Five-car trains at August public run

WE have seen better days, but rain and gusty wind failed stop the trains at the July public run. And the same threatened at the August run, although the threat dissipated.

At the July run, a train had to take cover in the tunnel while other trains were held in the station until the rain stopped and most of the four birthday party groups took shelter under the patio awning and in the clubhouse, but this failed to dampen spirits.

The day was also unusual in that it was almost dominated by steam locos, with Ron's 0-4-2, Tom's Black Five and Paul Costall's 5" blowfly moving most of the passengers, with only Steve R's battery loco "Ocker", driven by Tanya, flying the non-steam flag. Financially, we didn't do too badly – certainly better than some runs in our fairly recent past.

At the August run, we had our first five car trains on both the GLT and the raised track, hauled by Dave Robinson's yellow diesel and Damien Outram's 0-4-0 "diesel" respectively. Thanks also go to John Turney and Allen Ward for taking on the roles of duty officer and compliance officer for the first time.

We had four party bookings and a number of general visitors, which made for another OK day.

Some of the locos in action at the two runs are pictured here:



Dave Robinson with our first five-car train at a public run (well actually four riding cars and a guard's van), heads down the bank towards the tunnel at the August run.



Tanya and passengers rugged up against the elements behind "Ocker".



Dylan Audrain (CMR) coast down the bank towards the tunnel driving Tom's Black 5 while the unmistakable "Daddy Longlegs" profile of Paul C driving Firefly approaches on the raised track.



Damien Outram with the first raised track five-car train runs past the tunnel embankment at the August run.



Caught on camera having a luncheon chat are Jim Crawford and John Martin.



Jean Crawford celebrated her birthday at the August run (we courteously didn't ask the number). Here she cuts the birthday cake watched by those members who were not on duty at the time.

Show & Tell miscellany

The Show & Tell segments at our monthly meetings continue to attract strong support, including a presentation by our youngest member, 12-year-old Mark Bowring, who showed at the August meeting progress he is making on refurbishing his 3½" Titch. It runs on compressed air and now needs the smokebox cleaning up. Andrew is helping Mark make the new boiler. It was an impressive presentation by the 12-year-old in front of about 30 members (below).



Also at the August meeting, Andrew Manning explained work on his vertical boiler for his Caradoc tractor (below) – but not before Ron Collins had been up to his usual mischief by labelling it “Braemar wood chip heater”!

Andrew has done an excellent job, admitting his big achievement was the reducing the flange formed over blanks. Another clever idea was to leave the tubes at various lengths to make assembly easier. He has been up to Ron's “Men's Shed” in the Hills over recent weeks, silver soldering the boiler.



Phill Gibbons showed a boiler plate and longitudinal stay seals using O rings at the July meeting.



Also at the July meeting, Damien Outram showed his 10-wheeler loco and garden railway collection.



Laurie Morgan showed his steam pinnacle modelled on the 1910 Navy workboat at the July meeting. The model has a fibreglass hull and timber superstructure. He also displayed his 1965 Vosper Thornycroft patrol boat, as used by the Malaysian Navy. It is powered by three gas turbines.

During the meeting, John Turney gave an update on the garden railway project, using a concept plan he had drawn up. As they say, it's a work in progress.



Reverse running proves popular

AN experiment in reverse running on the GLT at the August club run day proved popular – so much so that one long-standing member wants it introduced on public running days. Another described it as “good fun”.

We had the spectacle of trains running clockwise on the GLT passing trains travelling in the opposite direction on the raised track.

Following the cancellation of the July club run day, because of the threat of rain, the August event was well-patronised in excellent weather. Four members of SWMEA at Bunbury were present, primarily to attend a meeting of the 2018 AALS convention organising committee with NDMES members.

While here, they inspected our developing garden railway and showed interest in our concrete sleeper manufacture process, which chief sleeper maker Clive Chapman was happy to explain.

The 25 or so present also enjoyed a BBQ lunch on the patio. Some of those present are pictured here:



Richard Turner's Suzanne has steam to spare as it effortlessly climbs out of the tunnel with new member David Tidman in tow.



Scott Andrews climbs the bank driving his brightly coloured Heidi.



Damien Outram blows the cobwebs off his 0-4-0 battery loco.

Scotty Andrews is ready for the “off” with his 5” Rob Roy 0-6-0.



Andrew Manning tries to sort out a steaming problem with his 5” Tich.



Junior member Mark Bowring wheels out the club battery loco for a run.



Wayne Dunne has steam to spare as he coals up his 5” LNER Atlantic.

Rio de Janeiro's ancient and modern

RIO de Janeiro in Brazil recently hosted the Games of the 31st Olympiad in the modern era and events there occupied prime time on TV screens around the world.

The city, which seems to have lost its suffix “de Janeiro”, is a spectacular city and icon of the South American continent. An attraction for me when I visited Rio de Janeiro in 1975 was the Carioca Tram line that connected the city centre with the residential inner-city neighbourhood of Santa Teresa in the hills south west of the CBD.

It is one of the oldest tram lines in the world, having opened in 1877 and been electrified in 1896. It is the oldest street tramway system in Latin America and has operated almost continuously, except for a period between 2011 and 2015, when services were suspended.

The trams were often crowded and passengers clung to foot boards with a bare toe-hold. Suspension of the service came about after a major accident in 2011 when six people were killed and 50 injured. Other public street tram systems in Brazil had all closed by 1971, but this one survived. It was granted heritage status in 1988 and is now a popular tourist attraction.

Rio de Janeiro, which once had a massive tram system, now has a new light rail system. Not surprisingly, it served Olympic Games facilities.



A tram seemingly travels precariously on the 45 metre tall Carioca aqueduct with its 40-plus arches.



A well-patronised tram with children clinging to the sides.

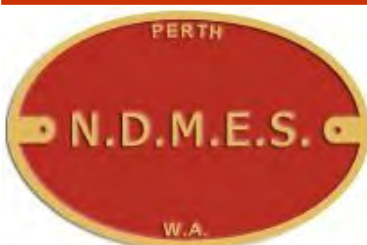


Trams 10 and 11 at the Carioca balloon loop.

New tramcars appeared when the line reopened last year. They are replicas of the old ones, but the practice of riding on the foot boards has been stopped.

The line uses the unusual track gauge of 1.1 metres (3 foot $7\frac{5}{16}$ inch) and voltage is 600 VDC. Although 6 km long (3.7 miles), services are currently restricted to a 2 km section. The route passes over the 45 metre tall Carioca aqueduct, but apart from this, it shares the roadway with other motor vehicles. The pictures show trams at various locations.

Report and pictures: Nicholas Pusenjak.



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