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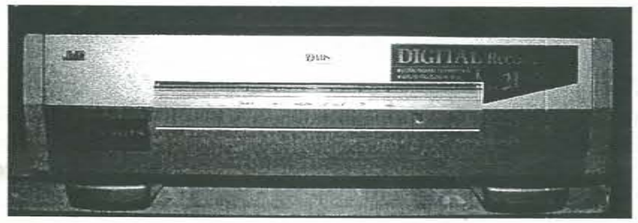

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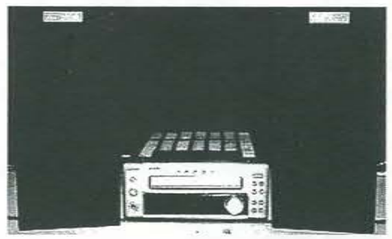

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**National Model Railroad Association Inc - *Australasian Region***

Autumn 2001 Volume 18 Number 1

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# National Model Railroad Association Sydney

Sydney Convention 2001

# 2001 Convention

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On the cover: "MODELLING WITH THE MASTERS" - Backwoods Loco Shed on RED STAG. Module by Ray Walter. Photo by Sowerby Smith.

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Peter Jensen
Conference Chair
pmj@bigpond.net.au

# Schedule of Divisional Meetings

## New South Wales

All meetings start 2:00 Saturday unless indicated differently.

| | | | | |
|---|---|---|---|---|
| **April** | **Sat 21st** | Don& Janette Davis 5 Wake Place | Kings Park. | 9671 4351 |
| **May** | **Sat 12th** | Ian Hopkins 18 Mason Street | Thirlmere | 4683 1550 |
| | | Visit to Rail Transport Museum | | |
| **June** | **9.10.11th** | Convention 2001 Holy Spirit Catholic Primary School Cox's Road, North Ryde. | | |
| **July** | **Sat 14th** | Piet & Jenny Hamersma 44 Superior Ave | Seven Hills | 9622 1849 |
| **August** | **Sat 11th** | Rod & Anne Smith 26 Peel Road | Baulkham Hills | 9624 3912 |
| **September** | **Sat 15th** | John & Toni Saxon 186 Davistown Rd, | Yattalunga | 4369 7453 |
| **October** | **Sat 13th** | Modular meeting at John Bakers 12 Rosebery Road Kellyville. | | |
| **November** | [date tba] | Zig Zag Railway | | |
| **December** | | venue & date yet to be set. | | |

Please phone host if you are going to attend meeting. It is hard to cater when 6 people phone & 64 turn up.

## Victoria

All meetings start 11:30 Sunday unless indicated differently.

| | | | | |
|---|---|---|---|---|
| **April** | **Sun 22nd** | Gary Cronin | 15 Scarlet Ash Circuit, Eltham | (03) 9439 4489 |
| **May** | **Sun 13th** | Steve Cullen | 67 Mowbray Crescent, Melton | (03) 9746 6267 |
| **June** | **Sun 17th** | Ron Wrigglesworth | 2 Terrigal Court, Bayswater | (03) 9720 8076 |
| **July** | **Sun 15th** | Laurie Green | 20 Nambour Drive, Sunbury | (03) 9744 5188 |
| **August** | **Sun 12th** | Bob Backway | 4 Tor Road, Belgrave Heights | (03) 9754 6502 |
| **September** | **16th** | Gavin Hince | 25 Dwyer Street, Clifton Hill | (03) 9489 4527 |
| **October** | **14th** | Graham Meyer | 2 Elizabeth Court, Emerald | (03) 5968 4518 |
| **November** | **11th** | John Dennis | 62 Owen Street, Mitcham | (03) 9874 1684 |
| **December** | **9th** | Grant McAdam | 194 Booran Road, Ormond | (03) 9578 8685 |

## Canberra

All meetings start at 2:00 pm Saturday unless indicated differrently.

| | | |
|---|---|---|
| **April Sat 21st** | John Gillies , | 14 Earle Street, Lyneham, 6248-8408 |
| **May Sat 12th** | Ken Macleay | 31 Shepherdson place, Isaacs, 6286-2624 |
| **June Sat 2nd** | John Prattis, | 159 Jackie Howe Crescent, MacArthur, 6291-7898 |
| **July Sat 7th** | | Host: VOLUNTEER NEEDED |
| **July Sat 28th** | | Host: VOLUNTEER NEEDED |
| **September Sat 1st** | Stephen Walker, | 5 Pasmore Close, Kaleen, 6242-8786 |
| **September Sat 22nd** | | Host: VOLUNTEER NEEDED |
| **October Sat 27th** | Stephen O'Brien , | 138 Nemarang Crescent, Waramanga, 6288-3614 |
| **November Sat 24th** | | Host: Stephen O'Brien |

## Queensland

| | |
|---|---|
| **February 10th** | Host: Glenn Stevens |
| **April 14th** | Host: required |
| **July 14th** | Host: Ken Leitch |
| **September 8th** | Host: required |
| **November 10th** | Host: required |

For details of Queensland meetings venue and host, please contact Glenn Stevens on (07) 3201-5022.




# *MainLine*

**Official Publication of the Australasian Region of the NATIONAL MODEL RAILROAD ASSOCIATION**

Registered at Australia Post
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Editor **Keith McCarron**
Copy Editor **John Saxon**

**Contributors this Issue**
John Bullen
Martin Boyask
John Saxon
Grant McAdam
Viv Brice
Ken Scales

SUBMISSIONS: MainLine welcomes articles, photographs, drawings, cartoons and other railroad modelling related material as contributions to the mutual enjoyment of the hobby by the membership. Material should have wide appeal and preferably be sent by email or post to the editor. Articles may be submitted on 3.5" computer disks in any Windows or Macintosh based word processing format. Sharp photos, either B/W or Colour are welcome. Don't own a computer? That's fine - typewritten articles are also welcome.

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Australasian Region,
National Model Railroad Association
PO Box 714,
Willoughby NSW 2068


# President's Report

## Money and Other Things

*President Geoff Hoad*

**Unless you have been hiding recently you cannot but have noticed the commentary about the economy and the Australian Dollar. Both of these unfortunately have an impact on each of us as members and modellers.**

But the Board has already anticipated the current situation. For over a year and a half we have been looking at the costs of the Association and have made some important savings with the Mainline and other areas. The consequence has been that when the Dollar dropped to US .55 cents last year the pressure was intense to increase Membership Fees. As you know this did not happen. The Board did not increase fees and chose to absorb the cost. It could only do so because of the financial savings made in the previous year.

Now, with economic pressures again the centre of attention, the same questions will be asked. Should we increase Membership Fees to offset the falling value of the Australian Dollar? But your Board of Directors does not think that is the question right now. Yes it is easy to increase fees, but fees are not our primary source of revenue. What we are doing is looking at all the income streams of the Association and all the costs of running the organisation. Then and only then can we see what our true financial situation is a plan accordingly.

The good news is that we are in a solid financial position because the Board has worked hard over time to ensure there is money in the bank for a rainy day. Many members I know question this policy and suggest we spend the money to reduce membership fees. You wouldn't spend next weeks rent money or your next mortgage payment to have a good time today, and neither will the Board accept a less than a strong financial position for this region. It is that simple!

Our task then is to put together a Financial Strategy that understands and manages the up and down nature of income and expenses, and implements plans to best handle it. You have already seen the benefits by Membership Fees not increasing and Member Benefits increasing. The challenge is to take the next step and put in place a financial plan that covers future economic challenges to maintain the financial integrity and continue the improvement of member benefits in the region.

It is time once again to re-elect a Trustee. For those of you who feel you can bring your enthusiasm and ideas to contribute to the Region, please consider standing for the position. If you want to be involved in a less formal position, you are equally welcome. Just give one of the Board a call and tell them of your interest. Let me publicly recognise and thank the efforts of each Board Member and our Trustee, David North. Most of you don't appreciate the way in which Board members and David, have willingly given up their time, and often sacrificed opportunities to earn a living, to represent you and the Region and look for ways to make this a strong, healthy and vibrant Association. Also the people who support the Board in many ways, including the wives deserve our collective appreciation. To all of you, Thank You for your contribution, your time and especially your commitment.

*Geoff Hoad*

# Sydney

## 17 February

In February, approximately 50 members, partners and friends found the journey to George and Celeste Paxon's beautiful home at Wentwoth Falls in the Blue Mountains very worthwhile.

George models in On3 and his layout is double decked, folds back on itself a number of times and travels down a large spiral to the lower level. A standard gauge line is also under development on the lower level. Approximately one-third of the scenery has been completed and it is very nicely done. The balance is proceeding at a cracking pace with representative painted backdrops in place.

George models the East Broad Top and Colorado is also represented. His contest-quality scratch-built buildings suit the era and locales and he has installed Easy DCC and Soundtraxx sound in his locomotives.

The layout occupies its own room on the top floor of the home. It is approximately twelve metres long, five metres wide and all track is hand laid. Most of the rolling stock is also scratch-built with excellent paint and weathering evident.

In the absence of the president, vice-president Allan Garbutt moved a vote-of-thanks to George and Celeste for their hospitality, included a brief commentary on the Region's finances and reminded those present of the upcoming convention.

Ken Scales, Achievement Program chairman presented George with awards for Model Railroad Author, Master Builder – Cars and Master Builder – Structures. All agreed that they well deserved from the evidence sighted that afternoon.

Ken also presented David Latham with the Model Railroad Engineer – Electrical award and Ross Smith with his Golden Spike Award.

Contest chairman Gerry Hopkins MMR invited members to regularly visit the Region's web site for the latest convention news where registration forms were available for downloading. Membership officer Toni Saxon announced that seven new members had joined in the previous month and that the non-rail clinic program would again be craft-based, inviting those interested in being a presenter to contact her.

The afternoon concluded with a delicious afternoon tea. The weather was great and we all enjoyed a very pleasant run back home.

## 10 March

Approximately 60 members and friends found the trip to South Penrith to visit Colin and Jan Brettle well worth the drive. Although the weather was generally fine, the rains came yet again in the late afternoon but Colin had fortuitously organised additional outside shelter to keep us dry during the formalities.

Colin's main-line layout is in a large garage, featuring big horsepower diesels and long, long trains. About 80% is sceniced with an operating signaling system. Colin also had an operating O scale trolley in action above the layout plus an On30 train circulating even further up the wall!

However, HO modern standard gauge is obviously Colin's main interest and the large crowd has an enjoyable afternoon watching the trains. It was so popular that many had difficulty even getting in the door!

President Geoff opened the formalities early due to the threatening skies, welcoming the attendees and thanking Colin and Jan for hosting the meeting. He went on to report on the Region's financial status and said that the Board would shortly be holding a special meeting to consider the long-term impact of the depreciating dollar on the finances.

Geoff reminded the meeting that the convention was almost upon us and invited everybody to visit Ruth Garbutt's stand where she would be happy to take reservations. He said that all forms for the Convention were available on the Regions web site, and that Gerry Hopkins was keeping the site up to date with the latest information.

Trustee David North reported on the latest meeting he had attended in the US. David also reported that Headquarters were keen to dispose of the balance of the special issue freight cars still held and invited those interested to contact him for details.

David went on to make a short speech and present Volunteer of the Year awards from the U.S. to John and Toni Saxon in recognition of their continuing work for the Region.

Vice president Allan Garbutt reported that the Board had appointed him to be the communication link between the members and the ***MainLine*** team and commented that, in his opinion, our magazine was one of the two best regional magazines in the NMRA, the British Region's newsletter being the other. He went on to say that editor Keith McCarron had commented that although there were some first class layouts in the region, that not all owners might feel confident to do a story to accompany an illustrated article for the magazine.

Therefore, Keith had suggested that anyone interested in seeing their layout exposed to the membership might contact he or Allan with a view to photographs being taken and an accompanying description written.

Shirley MacMicking reminded members that name badges were still available through her on 02 9958 5988.

Allan corrected the date shown in the last ***MainLine*** for the next Sydney meeting at Don Davis's Kings Park home to 21 April. John Baker then thanked Colin and Jan for their hospitality and presented Colin with the usual commemorative plaque as a memento.

**What is your Email address?**

We recently sent a broadcast email message to those members who have supplied their email addresses when joining or renewing. If you have an email address, did not receive a test message from **jsaxon@tac.com.au** and would like to be included in our database for circulation of news and meeting date changes, etc. would you please send a message to me. Thanks, Toni Saxon, Membership Officer.



# Melbourne

by Grant McAdam

## November 2000

On an overcast November day 16 members made the trek out to Sunbury for our monthly meeting at Laurie Green's. The rain stayed away throughout the day but the recent wet weather had made Laurie's driveway a little harder to negotiate than normal. It was one of our usual lunch time meetings where the members bring along their own meat and drink and have a barbecue for lunch. Considering the distances many of the members' travel to get to a meeting, it makes it more worthwhile to make it days outing than just an afternoon gathering.

Laurie's layout room has undergone some significant changes since our last visit. This room has been where he has built his recent exhibition layouts. The remains of the permanent home layout had gone and in its place Laurie has set up Old Ophir and the Enterprise Gold Mining Co. which are both O scale switching layouts, the former in On3 and the later in On2.5. I am not sure whether Laurie now plans to have running sessions or whether his prolific rate of building layouts is going to be reduced for a while. Anyway it was great opportunity for the members to see the layouts up close.

The topic of discussion for the afternoon was scenery work. It usually falls to the host to give a short presentation but Laurie did not have the opportunity to prepare anything. Fortunately Mario Rapinett had brought along some dioramas and was able to explain the techniques that he had used. It was decided that next year the formal part of the afternoon would be changed. No longer will members be asked to give a short presentation/demonstration, instead anyone who brings along an item for display will be given about five minutes to describe some facet of the item in question. This will reduced the load on the meeting host and it was trialed at this meeting and worked extremely well.

During the short formal section of the meeting the dates and locations for the meetings next year were discussed and people freely volunteered their homes to host them (see elsewhere in this issue for the next meeting). Grant McAdam took the opportunity to complete the last remaining detail from the Convention held earlier in the year of presenting the certificates to those that won or placed in the modelling competition.

There was an interesting array of display items this month. Steve Cullen brought along a selection of photos of the Orbella model railway and some O scale detail parts from the Langley range. The O scale theme was continued by Gavin Hince who had some figures that he had painted with artist's oils, which he found far easier to blend on the figures. He also had a small blacksmiths shed and a curved crossing destined for his new home layout. Two small dioramas came from Grant McAdam one was

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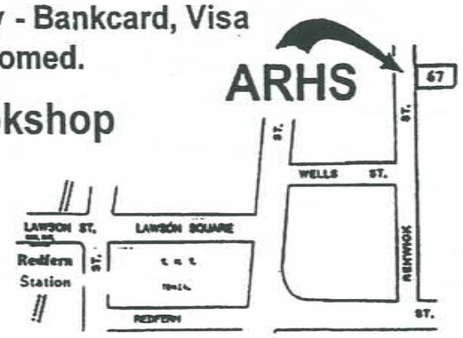


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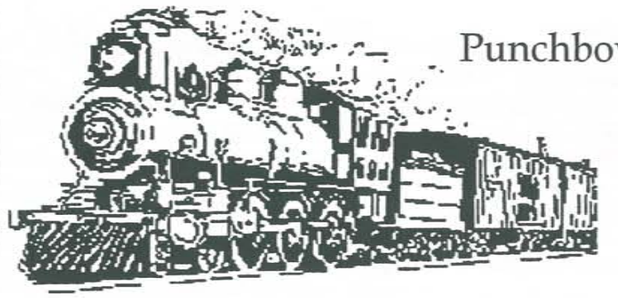

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# Queensland

by Glenn Stevens

The first meeting for Division 1 in 2001 was hosted by Glenn Stevens, and he was finally able to "show-off" his new train space, and the projected plan for his Marysville Sub-Division of the B&O.

Ten members attended an enjoyable afternoon, with apologies being received from Nick Negerevich, Graeme Young, and Craig Woodhead. A warm welcome was extended to Tony Reidpath who attended for the first time. Tony has been a member for a couple of years, however with his work taking him 'bush' all the time, he is rarely home on meeting days. Tony models generic US in HO, with a leaning towards tank cars (JAKE OIL is his own private road name). He bought along some of his models for 'show-and-tell', and for anyone who has not seen it, his Tichy wrecking crane is exquisite.

Garth Fraser bought along some photographs of his O Scale layout showing all the refurbished scenery behind his engine terminal. It is refurbished mainly because he had a severe attack of white ants in that area, and his logic was that if he had to get into that area to repair the wall, he might as well make the repaired area blend into his layout.

Glenn passed around a copy of the Convention handbook from Pittsburgh in 1990. There are clinic notes from 43 clinics and the quality of the clinic notes is of an equally high standard, with topics ranging from planning, through loco's and cars to structures and operations. It is recommended to all. Discussion followed on the other sets of clinic notes that are available from International. It is highly recommended that you all think about this as a source of modelling information. Look at your recent mailings for more information.

**Division 1 NMRA Business**

There was general discussion concerning both the meeting schedule and the programme for the year. It was agreed that as the two Beginners Clinics were very well received, that with the concurrence of the clinic presenters, the clinics would be presented again in 2001. In addition, because the Division members missed out on Graeme Davis' scenery clinic, a scenery clinic for members was high on the agenda for this year.

**Division 1 Personal News**

Following an enthusiastic report by Denis Lane and Glenn about their trip on the Mary Valley Rattler in late January, it was decided that we would organise a fan trip using the MVHR Rail car set. It can be hired any day for $660 all up cost, the only stipulation being that the train had to be back in Gympie by midnight. Glenn and Graeme Emery were tasked with getting together and organising a date for the trip. Informal enquiries since to various groups to which members belong has indicated that we will have no trouble getting 66 seats sold.

**2001 Meetings**

The discussion on the meeting schedule arose following recognition that April 14 is Easter Saturday, and that we still needed hosts for some meetings. There has been some slight amendments to the following schedule than what was published late last year, so don't forget to change your diary. The start time for all meetings is 1:30.

21 April – Graham Emery
14 July – Ken Leitch
1 September – Denis Lane
10 November – Graham Emery
8 December – Christmas Lunch

# Canberra

*by Viv Brice*

**January**

The first meeting of the New Year, some would say of the new millennium, was held at Viv Brice's home on 20th January. This was basically a get it all re-started meeting. We did agree however, that the rest of the meeting s for this year would have a pre-announced 'theme'.

**February**

This meeting was hosted by John Bullen and the theme was 'Railroad Oddities'. There is no doubt that over the years, railways and railroads throughout the world have given us some real eye-openers. There was the steam engine with a pantograph which used electric power to heat the water during a prolonged coal shortage in WWII, a couple of Belgian steam locos that defied the Whyte classification system, a steam monorail from Ireland, an early electric loco that was retired for being too powerful and many others. I suspect we will return to this theme later in the year.

**March**

The theme for this meeting was very simple – a swap meet. The meeting was held at Peter Weller-Lewis home and as usual at this venue, was a very congenial meeting. The range of goods to be sold/swapped was broad and most of us went away with some new (or pre-loved) goodies.

## I receive too many renewal reminders?

Members often contact me to advise that they have received a reminder from the US, followed by a second notice if they do not quickly renew to the US direct, asking whether they should respond and questioning where is their local membership reminder.

David North has been working with the US for some time to transfer responsibility for all membership renewals, including those who are members of the US only to Australia. Unfortunately, due to staff changes at headquarters, this has not yet been able to be implemented.

With over 20,000 members, administration of the US member database is a monumental task and with 300 members, we are only a small but important section. The procedure at HQ is that the first reminder is automatically first class mailed approximately 2 months before the scheduled expiry date and the second, if there is no response, one month later.

Our practice here is to mail the local reminder approximately 2/3 weeks before the expiry date as we have found earlier reminders tend to be put aside and forgotten.

Therefore, when you receive reminders directly from the US we recommend that you ignore them and await our reminder, which will shortly follow. Paying here of course provides local members with substantial cost savings at the present and allows local and US renewal with one easy transaction.

Please call me on 0243 697 453 or email me at <jsaxon@tac.com.au> if you require any further action.

Toni Saxon, Membership Officer.

# ACHIEVEMENT PROGRAM

## MASTER BUILDER – SCENERY

*By Ken Scales MMR*
*Achievement Program Chair*

One of the most satisfying AP categories to qualify for if you already have a medium size large layout is Master Builder- Scenery. To qualify for this certificate you must:

Construct a completed section of a model railroad of at least sixty square feet in O scale, or forty-five square feet in S scale, or thirty-two square feet in HO scale, or eighteen square feet in N scale or other scales in proportional relationship to HO scale. This completed section must contain the necessary scenic elements of terrain, structures, background, lighting, and realism/conformity all combined to achieve a realistic effect using applicable NMRA standards. The intent of this category is the prototypical rendering of the scenic elements from the ground up.

The layout should contain the ground and all natural features such as rocks, water, trees, hills and depressions, as well as manmade features such as the railroad roadbed, cuts, fills, drainage ditches, embankments, streets and roads.

Structures should be correct from the standpoint of prototypical suitability, placement and appearance as scenic elements. Structures include bridges, trestles, culverts, buildings and all other types of structures (towers, power lines, signs, fences, etc.), track and right-of-way appurtenances (such as turnout controls, signaling structures, crossing gates and shanties etc.), turntables and other service structures. The items described above are a few examples and additional features are encouraged.

The layout must have a background created by treatment of wall, backdrop or ceiling to realistically depict depth and distance, horizon and sky.

The layout must have effective lighting. This may include effects from three aspects: railroad cars and signals, etc.; buildings, streets and roads, etc.; overall lighting effects - day and/or night. An entirely daylight scene is acceptable.

Most importantly the layout must look believable and conform to real practice. General overall impression must be that the scene is a believable, miniature representation of prototype railroading.

You must prepare a set of photographs and a written description clearly describing the intended setting of the model railroad and the scenic details including towns or cities in the area being judged.

Lastly you must earn a Merit Award of at least 87.5 points on the section of layout being judged. However as long as the completed area of the scenery on a layout is large enough to satisfy the rules above a partially finished layout can earn this award.

As I said above scenery is probably one of the most satisfying categories in which you can earn a reward. Setting a goal of earning an award for scenery is also a great incentive to improve the overall appearance of a layout. It gives you a standard to aim for and a reason to finish it.



# LOCAL CD-ROM NOW AVAILABLE FROM OUR LIBRARY

Sydney member Steve Chapman has put together and donated a Data CD to the library, which contains a great deal of information and local photographs. It is available now through librarian David Latham.

It is a standard PC Format Data CD-ROM, but Steve does not know if it will also be accessible with a Macintosh. He stresses that a current and reliable virus checker be applied to the CD-ROM when first used, as he cannot guarantee that it is virus-free.

It contains many, many photographs taken by Gerry Hopkins MMR and Trevor James and several downloaded by Steve. There is also a freeware picture viewer and shareware viewer and it has a handy function that lists file descriptions alongside the file names.

The CD-ROM is organised into different sub-directories like Diesels, Steam, Crashes and Steve's pet love, On30 as follows:

| Directories | Information |
|---|---|
| [A-GH] | Gerry Hopkins pictures |
| [A-SC] | Steve's pictures, also plenty of sub-directories |
| [A-TJ] | Trevor James pictures |
| [Apps-Viewers] | Different shareware and freeware programs |
| [Finescale] | Two different finescale magazines |
| [Rail-Sim GM] | Rail Simulator program (German version) |
| [Rail-Sim OZ] | Rail Simulator program (Australian version) |
| [RR Programs] | Different Railway programs for evaluation. |

Note that Steve downloaded some of the information and photographs and warns that they therefore could be copyrighted and should be used with caution without the author's approval.

He asks that if you have any Data for a second CD to contact him and he will assist you to assemble it into a second CD. He would also like a member to do a write-up on the CD for later publication in MainLine, so please keep that in mind when you borrow it from the Library.


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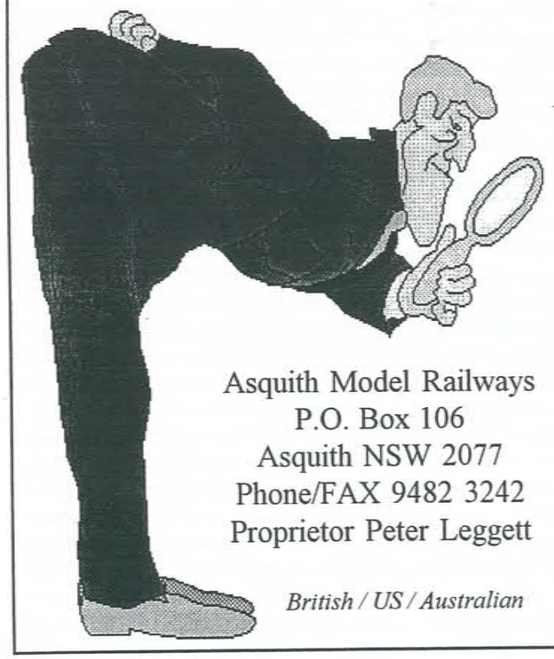

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# DCC
## Digital Command Control

*by*
*David Jupp*

# Please Explain?

No, that's not me, but that's the way I felt a couple of years ago.

"DCC" – much more than just another one of those darned acronyms to remember. For those not familiar with the technology, I thought I would write an article on the subject because never before have I felt so enthusiastic about something and its application to my chosen hobby.

I am continually amazed by those in the retail business of our hobby who are ignorant of the subject, or simply choose not to know what DCC is and the benefits to the model railroad hobbyist. The latest technological addition to our hobby, or is it? Perhaps you will be surprised to know that it all started back in the early 80's when Hornby produced an electronic control system called ZERO ONE. It was clever, ahead of its time and probably started the ball rolling which would gain momentum as the microprocessor (the big computer silicon chip in your PC) became cheaper, smaller and more powerful. The biggest problem as I remember was that the Zero One decoders were quite bulky and would not have fitted the locomotives of today, for example, from Kato, Life Like, Atlas, Spectrum and the latest examples from Austrains for all those hooked on Australian railway modeling.

What could Zero One do? Well, it could control up to 16 locomotives all doing different things, provided they had the mandatory decoder fitted. Simultaneously! It could also control up to 99 accessories such as turnout motors and 4 operators could do their own thing also simultaneously. Well, as was inevitable, other manufacturers eventually started to produce digital command control systems. It took a while though and assistance from the silicon chip manufacturers in the form of miniature surface mount technology and low power dissipation pulse width modulation.

Don't ever think your model railroad control system is going to become obsolete overnight if you don't go the DCC way, although I can tell you that once you try it, I would be extremely surprised if you do not want it. "Try it, you'll buy it!" That's a phrase you'll easily fall for. Generally sold only through agents, there are about 5 or 6 systems available, all exhibiting good, bad and indifferent features. The popular manufacturers, Lenz, Digitrax, Wangrow System One, North Coast Engineering, Easy DCC, (originally offered as a project kit in a magazine) Soundtraxx, Model Rectifier Corporation (MRC) and now Atlas, all comply with the NMRA recommended practices in some form or another, meaning receiving equipment (decoders) will work with controlling equipment from other manufacturers.

The NMRA set up a working party to recommend standards for manufacturers to follow and thus "DCC" was born. Standards were completed in 1993 and recommended practices published in 1995. An NMRA conformance logo is supplied to the manufacturer if compliance with the standards is adhered to. Prior to these standards, proprietary systems existed and as one would expect, each manufacturer offered what he termed the best system. Even with these NMRA standards however, it is still not possible to share hand controllers from different manufacturers on the same layout (excepting Wangrow System One and North Coast Engineering which are effectively badge engineered) because manufacturers use different control bus arrangements and protocols between the hand controllers (cab) and the main controllers. (Command Station)

The NMRA standards apply specifically to the signals on the track, to which the decoder responds. Hand controllers communicate directly with the main controller and do so in their own language on the command control "cab bus." The main "control bus," the data highway, connects the main controller and its information to the decoders via the track. This NMRA standard is good for the end user because it allows for consistency in decoders. Some manufacturers make quite cost effective decoders with minimal features and some provide all the bells and whistles with price tags to match.

Competition is good for any hobby and being able to mix and match helps the low budget purchaser. We all want cheaper prices. Decoders come with as few as 1 additional function or as many as 6. These additional functions are to connect to lamps etc. The latest manufacturer to provide decoders is Train Control Systems (TCS) who currently have 2 up market decoders with more to come. Included are special lighting effects on 2 functions at extremely competitive prices.

Additionally, in the NMRA standards there is room for manufacturers to be "creative" in the motor control output of the decoder and a variation known as "Back EMF" (Electro-magnetic force) has been born. This simply makes use of the voltage generated from the motor between applied pulses from the controller. This "feedback" signal is used to electronically maintain constant speeds no matter what the load on the locomotive and to give finer motor control. A heavily laden train therefore will maintain its speed as set on the flat and up the incline too.

Let's just take a quick look at what it's all about. These are the components: a standard AC transformer, cab/s, (hand controllers) command station, (controller) booster/s and decoders. A cab talks with the command station consisting of the microprocessor generating the control data and a current booster amplifies a constant level square wave voltage signal with embedded data to the track. This constant level voltage helps to overcome to a certain degree problems with dirty track and poor locomotive pickup. Don't get me wrong. It doesn't solve this problem but helps to overcome it although the format of the signal on the track (known as Bi Polar) also minimizes dirt buildup. (Oxide which forms on Nickel Silver track is conductive, dirt is not. In comparison, oxide formed on brass track in non- conductive)

This high frequency bipolar switched voltage on the track contains digital information enabling the command station to seek out any locomotive fitted with a decoder and make it perform. Forwards, backwards, turn head lights on, off, cab lights on or off, ditch lights on or off, dim headlights, and using specialist decoders from Soundtraxx, very realistic diesel or steam engine sounds can emanate from miniature loudspeakers located in the locomotive or its tender.

How about this? A stationary diesel with engines idling, the horn sounding, the noise of dynamic braking or a steam engine with an occasional steam safety valve blowing off, the air pumps running, whistles or the sound of coal being shoveled into the fire box and even the metallic bang of the firebox door opening and closing? The clank of couplers connecting? Interesting and realistic quality, digitally stored sound!

Back to running trains. Multiple cabs can be connected to the cab bus up to the design limitation of the chosen system. Therefore multiple operators can control the system. The number of locomotives that can be run at one time in theory would be 9999 using long addressing but power supply current limits obviously apply. This can be overcome by using additional boosters to feed separate blocks.

You can set that heavy freight at a slow speed crawl running forward, select another locomotive and drive that one and other operators can do their own thing too. A locomotive and another and another, on the same track! Running in any direction. Ridiculous? No, reality!

Someone else could be controlling a switcher in a yard and all this multiple operator control information is received by all locomotives and "decoded" for each locomotive to respond as and only as commanded. Slow speed operation is enhanced with full voltage pulsed power. You can even unplug your control cab, move to another location and the trains keep rolling as previously instructed. Plug your cab in at another location and take command again.

Wireless adapters (using radio frequencies in the 900 Megahertz range, not line of sight infra red beams) are also becoming available which eliminate the necessity to plug the cab to another location or to drag a long curly cord. But what if the operator becomes confused and sees two trains heading for each other? No problem. Hit the panic stop button and all comes to a halt. Whew! Pity it isn't that easy on the prototype. Perhaps it will be one day as I am advised that in New Zealand, some shunting is carried out by wireless remote control. The "engineer" drives his locomotive from a hand controller whilst walking beside the locomotive.

Admittedly, it is a good idea to have a dispatcher when multiple operators are let loose. All of the advanced "conventional" 12 volt controller features like realistic acceleration and deceleration (momentum) are pre-programmed into the decoder but can be re-programmed by the owner using either software and a personal computer or through the advanced cabs. These variables are stored within the decoders in non-volatile locations which are known as Configuration Variables. (CVs) It is possible to store either 14, 28 or 128 separate speed steps and you can setup a boost voltage to get that sluggish locomotive moving before dropping the volts to keep it going.

One thing that may seem obvious now is that the wiring to a layout with DCC all of a sudden becomes very simple. Simple generally means greater reliability too. The same voltage feed goes to all track although experience will show that it is still advisable to be able to isolate blocks or sectionalize the feeds to find that darned inevitable short circuit. This usually only happens when friends bring their rolling stock to run causing embarrassment and wasted time. There are available, electronic block controllers with current limiting and "cut outs" to shut down the offending block before the whole operation stops, should a "dead" short occur. The short is then limited to that block and the rest of the layout keeps operating.

If the layout is not split into blocks, then there must be considerable current available on the track in order to allow many locomotives to be run simultaneously. A derailment resulting in a short circuit could cause some serious welding and damage to occur with all that current available. Remember however that track does have resistance and this is significant in

*Continued on Page...14/.*

# A POSTSCRIPT

# TRAMS

## TROLLEYS AND TRACTION

*by John Bullen*

The tip-off came from a friend with inside knowledge. "Watch out for the next issue of Main Line, it's got a great article on trams which'll really interest you!" Main Line duly arrived, and yes, my friend was right! I dived past the impressive Pacific Electric interurban car on the front cover, and into the article itself. Eagerly reading it, I was impressed. Yes, this is good stuff! I had read about half the first page when it began to seem vaguely familiar. I must have read this before somewhere. Who wrote it? Cripes! I did!! And someone else has added Philip Moss's excellent USA photos. Having written it a couple of years or so ago, I'd forgotten clean about it! And I hadn't previously seen the beaut photos.

I re-read it with renewed interest. Hey, hang on! Now we really do have a problem! The author of this article has got a few things wrong, so I'd better write to put him straight, since he obviously hadn't done enough research when he wrote it. I guess the editor of Main Line will probably publish the corrections, because it's not every day you get an author attacking his own work in print!

Of course there are a few typographical errors, apparently due to electronic scanning of printed text into digital form. "Trams" appears as "trains" in several places, and "modern" appears as "modem", but these and other errors should all be obvious to Main Line readers with plenty of background knowledge, and hardly warrant mention.

More important are errors of fact made by the author, who luckily has learnt a bit more since he wrote the article back in his youth. Or, that's his excuse, anyway.

Big Error No 1: "The only PCC car in Australia..." Wrong! There are TWO PCC cars in Australia. One is the San Franciso PCC car in operating condition in the Sydney Tram Museum. The other is Melbourne tram no 980, Melbourne's only tram in its PCC class. This tram was a PCC tram from USA, operating in Melbourne from 1949 to 1971, but it didn't look like a conventional PCC car because it had a locally built body. It has been preserved and is at the Tramway Museum Society of Victoria at Bylands, near Kilmore. Hopefully it will eventually be restored to operating condition.

Big Error No 2: "...World War Two curtailed an even wider adoption of the PCC cars, especially outside North America." Wrong! North America was indeed the home of the PCC tram, where about 5000 cars were built and operated. But mention should also have been made of the 20 000 or so that later ran in Eastern Europe.

Big Error No 3: "The passenger car [of a cable tram] was the trailer or dummy." Wrong! The word "dummy" applied to the "grip" car at the front, not the passenger trailer behind. Incidentally, those of us familiar with coupled electric trams and their simple reversal of direction at a terminus can easily overlook the much less simple technique of reversing a steam tram or a cable tram. For obvious reasons, the driving car always had to be at the front in the direction of travel, and drivers developed much skill in switching the cars over on the move and in minimum time, as they approached the terminus.

Big Error No 4: "*Auckland had one* Grand Union junction *in the city centre.*" Wrong! Auckland had two, both in Queen Street; one at the Customs St intersection and the other at Wellesley Street. It may seem surprising that the far bigger tram networks of Australia had only one Grand Union junction (still remaining at Caulfield) in the entire country, but the simple truth was that no tramway authority ever built such complicated junctions unless they absolutely had to. Bearing that in mind, it is surprising that Auckland had two. The need for a Grand Union junction at Customs Street is very obvious, but very little use was made of some of the turning tracks in the Grand Union junction at Wellesley Street.

OK that is enough self-criticism. If you cannot spot any more blunders, then I reckon the rest is pretty right. But wait! There is more. In the couple of years or so since I wrote the article, the situation with Sydney's new trams has changed quite dramatically. Here is the latest.

The line from the old Central Station tramway colonnade above Eddy Avenue to Darling Harbour and on to Wentworth Park has now been extended to Lilyfield, and the tram fleet has been expanded accordingly. At the end of the track at Lilyfield is a big sign reading "To Be Continued!"

Prior to the opening of the Lilyfield extension, the tramway was carrying three million passengers a year, with an annual growth rate of 13%. The Lilyfield extension has added an extra million passengers, and the line should be carrying 4.5 million passengers by the end of 2001. Patronage of the system appears to be running about 30% higher than expectations. The planning of the next extension to Leichhardt Town Hall is now under way.

Meanwhile, an initial city extension to Park Street is now under consideration as a first step in linking Central Station and Circular Quay by tram once again. A few years ago, as an election promise, the Carr Government put on hold plans to extend the tram link to Circular Quay via Pitt and Castlereagh Streets, when bowing to pressure from members of The Government Bus Union, who did not want competition, despite a favourable feasibility study. However, when opening the tramline to Lilyfield in 2000, the Premier, apparently forgetting his old election promise, which was by then sliding further into the past, extolled the virtues of light rail as Sydney's transport of the future. He painted a very rosy picture that would appear to pave the way for trams to return to Circular Quay. (Time will tell.Ed) JB


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Nickel Silver code 100 and even more significant in code 70. Voltage drop in the track can be many volts therefore it is recommended that feeders of a heavy gauge wire are used with connection to the track as often as every 6 feet.

How then does a locomotive react to a command? Just as in a personal computer (PC) when you need to send to or receive information from a specific device such as the floppy drive, hard drive or CDROM, each locomotive is given a unique address which is stored in the decoder. Think of a DCC railway as a typical office computer network and the link between the PC workstations, (decoders) and the server (command station) is the network cable. (Track) The data contained within the square wave signal on the track seeks out the decoder address at speeds up to 200 times a second and thus the locomotive with that address and only that locomotive responds to the given command.

The command could be anything, reduce speed by one notch, switch the headlight off or sound the horn. All other locomotives get the same command but ignore it and continue to do what they were last instructed to do. The data is sent in "packets" and consists of a special "unique" synchronizing code (to tell the decoders this is the start of a transmitted command) which is unable to be replicated during normal operating, an address, to search out the locomotive or accessory, then the command for that address (data) followed by error checking information for the decoders to decide whether a valid command has been given or not. Because all decoders respond independently, a locomotive can be stationary in a siding with its headlight on whilst another passes on the main line going the same way or the other way. Pretty neat and much more prototypical. Isn't this what we are trying to achieve?

Now the obvious disadvantage is that all locomotives have to be fitted with decoders and although this is relatively easy, some may be reluctant to remove the loco body and start doing surgery. Personally I have trouble even working out how to get the body off some of my locomotives. There are however, people round who will do this for you at reasonable rates. Some manufacturers (Life Like, Kato, Atlas, Bachmann) are now even making DCC ready locomotives. They make it easy for us by providing a simple plug-in update. Simply remove the dummy plug, replace it with your plug in decoder and you're on the way to realistic operation. Atlas have recently released their first HO locomotive, the GP38 with built in decoders with more on the way.

So what if I have an old locomotive without a socket to accept the decoder? It really is quite simple. The simplest of decoders would have just 4 wires. Two go to the track and two go to the motor. In some locomotives one side of the motor is connected permanently to the chassis (like a car uses the body for carriage of the negative side of the 12 volts) With DCC, it is imperative that the motor be isolated from the chassis. This is usually a fairly simple job. Usually, but not always. Isolation of the motor from the chassis as with Athearn product is as simple as placing a piece of electrical insulating tape between the motor and the chassis and adding a wire from the decoder to the lower brush contact. Additional decoder functions together with a common wire support among other things headlight operation or perhaps a smoke generator. NCE are also making custom built decoders to fit locomotives where installation would otherwise be difficult or impossible due to space restrictions.

OK, so we somehow have installed a decoder and I suspect that before too long as in some "N" scale product, more decoders will be factory fitted as is the case with a few HO Rivarossi Big Boys and now the Atlas GP38. There are a few things to do first however as all new decoders come with a default address. Put all these "new" locomotives on the track and they will all respond to the same command. How do you rectify this? Different manufacturers do it differently but as an example, the locomotive to be programmed is placed on an isolated section of "programming track". There is an additional output from the booster to connect to the selected programming track to do this, current limited in the case of System One to avoid damage to the decoder should there be an installation fault. Using a special program mode in the controller, the "new locomotive" is instructed that it should now only respond to commands sent to its new number. This new number chosen by the operator, is now permanently resides in the decoder and stays even if the locomotive is boxed and brought out six months later. (That's what is called non volatile memory.) The number chosen is usually the cab number (road number) although this may not be possible. It's up to the operator.

There are two forms of addressing, those containing 2 digits (short address) and those containing 4 digits. (long address) Those containing 2 digits can only be given numbers from 01 to 127 and those with 4 digits, 0001 to 9999. Whilst a 4 digit system can obviously address many more locomotives, there is another more important advantage. Most locomotives have up to 4 digits in their road numbers. (excepting some Australian Locomotives, which would have 5 numbers eg 421, 422 classes) It's much easier to look at the locomotive, for example that Union Pacific Big Boy 4004 and command it using that full number rather than just the number 04 because the likelihood of another locomotive say 804 is high. Instant conflict! I guess you could call the big boy 40 and the diesel 4 but there could be another 40 or 4 in your locomotive lineup.

There is a way round this however. Some systems have available an operation called Locomotive Aliasing. Using this feature, it is possible to select a 4 digit number and it automatically becomes assigned to an unused 2 digit decoder address. What then if you forget the address number you've given to a locomotive? No problem. With some systems, and again I speak of System One, the controller can interrogate the decoder and display the address and other variable parameters to you



It should be understood that not all manufacturers support long addresses although most have indicated that they will in the future. Should you wish to run your "decoder equipped locomotive" on a non-DCC layout, a feature in the decoder will allow this to happen. This feature can be turned on or off electronically and is usually defaulted to "ON" from the manufacturer. Whilst the decoder equipped locomotive will work perfectly well on a "pure DC" voltage layout, it may act unpredictably in a pulsed DC situation, especially at slow speeds. The new decoders from Atlas including those installed in the GP-38 loco are capable however of flawless DC operation. This is selected by moving a jumper on the decoder. You can then operate your decoder-equipped locomotive on a non DCC layout.

Stationary decoders are also available with their own unique addresses and multiple outputs either with relay contacts or open collector transistors that will switch turnouts, control signaling equipment, turntables or whatever you desire. There are even specialist decoders to operate the Circuitron Tortoise turnout motors. Manufacturer ROCO also make a DCC breakdown crane, also a dock crane with 7 functions and is about to release a modern container crane. Functions include cab rotate left or right, boom up or down and hook up or down and an ancillary output to operate an electromagnetic pickup or bucket. There is even available controlled loco uncoupling from the decoder. Block detection equipment and receiver circuits are also available to allow active feedback, helpful when PC operation is added.

OK, so what else can I do with DCC? Well I can drive a locomotive and couple it to another and make an addressable consist. (Consist? What's that? Multiple powered locomotives coupled together and operating as one, double heading is another term) Doesn't matter which way the locomotives are facing either, just select consist on the hand controller, the lead locomotive address, the required direction, and then the addresses and direction of the other loco/s to slave to it. Control the lead locomotive and the others in the consist follow faithfully. So! You can do that with standard control systems. Ah yes, but you can't uncouple them and then separate and control them individually, driving them away from the consist all "hands off"! That is really neat stuff.

Still not impressed? What else then? Oh yes, constant brightness headlights, loco moving or not. Even those Spectrum carriage interior lights stay illuminated from the constant voltage on the tracks without a decoder fitted. Special effects lighting is available in some of the up market decoders which simulate, rotating beacons, mars lights, gyro-lights, rule 17 dimming, strobe lights and alternately flashing ditch lights.

Remember the two-rail dilemma and the short circuit when you loop a piece of track back to itself as in a "Y" or return loop? You end up with a short circuit so you have to isolate the track, stop the train, reverse the voltage and start again. Well, with DCC you'll still get the short circuit and you'll still need to isolate a section of track, but with a special booster feed to that isolated section of track, you don't even need to stop the train. The short circuit is automatically detected and the polarity is instantly reversed. As the polarity of the square wave signal on the track does not affect the locomotive direction, it keeps moving the same way without stopping. Another neat feature.

You can even run a non decoder equipped locomotive on the same track along with DCC locomotives. System One requires a few cheap owner supplied and installed additional components to do this. It works, but the locomotives buzz when stationary. In time you could do damage to the motor because of the AC component. (That's the bipolar signal) I don't recommend this feature at all, but technically you can do it.

Some control systems have standard serial computer ports (RS232) either as standard features or that can be added. Using this feature, a personal computer can be connected to the port and with software becoming more readily available (eg Railroad and Co, Kam Industries, Wangrow Loco Commander and EasyRamp 2) a whole new world of automation from a PC is possible with even more user friendly programming of the decoders. So what I hear you say. I enjoy running my trains, I don't want a computer to take away that fun. OK, so use the computer to operate the continuous run train whilst you shunt manually and keep out of its way. That is really fun.

With all this technology, don't think to yourself, "I am techno-illiterate therefore DCC is beyond me," because the opportunities that DCC offers makes it worthwhile studying the technology. There are quite a number of NMRA Australian members who own different systems. Advice therefore is just around the corner. Just remember that as with the PC, it's not the cost of the computer that will get you, it's the cost of the software. With DCC it's the multiple decoders that add up in the end, but you will find it worthwhile I have no doubt, as I have. I admit, I am a technology freak but I think I can safely make the following statement. If you try DCC you will be hooked! I am, I have a system and I currently don't even have a layout!

How ridiculous! So far I have had an incredible amount of pleasure from it, studying the features and putting those features to work on my un-sceniced test track. I chose the Wangrow System One simply because I thought it was the best for me as it came standard with all the features I wanted, like advanced controllers, built in auto reversing, PC connection port and extensive excellent documentation. It is really user friendly with an advanced feature cab standard, has good local and warranty support. A number of different cabs from simple to advanced with intelligent features are available. A couple of my friends have that system which helped me with my decision although I did exhaustively investigate most of the systems available. I can assure you, DCC is really "cool" stuff! Now I must get

*Continued from Page 15./...*

moving and add to that test section of flexitrack I have used for years and build a layout. I think the world of DCC is about to take off!

It is fact that the American and European modelers are the ones that have converted to DCC in mass with the British and Australians, reluctant. Join the move to DCC however and I can promise, you will experience reality in model railroading. If you want to know more, I recommend the book *"DIGITAL COMMAND CONTROL THE COMPREHENSIVE GUIDE TO DCC"* by three editors Stan Ames, Rutger Friberg, and Ed Loizeaux available from good hobby supplies and also the DIGITRAX *"BIG BOOK OF DCC"*. You'll find them very interesting and full of informative diagrams, pictures and explanations. They'll describe the many features I haven't even mentioned. The NMRA standards have allowed room for expansion in the DCC protocols and I am sure there will continue to be development over the coming years.

I trust you have found this interesting, or at the very least, I have tempted you to read more about DCC. It is not a passing phase. It is definitely here to stay. Even the most famous of model train manufacturers, Joshua Lionel Cowen's American "Lionel" has gone "digital." Now you can truly drive the locomotive.

*David Jupp*

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| John Walker | Townsville QLD | HO | AT&SF/UP |
| Geoff Chatwin | Yass NSW | N | Not stated |
| Michael Lane | Penshurst NSW | HO | US/Australian |
| Douglas Cook | Shortland NSW | N | AT&SF |
| David Rayson | North Plympton SA | HO | Australian |
| Stuart Mitchell | Sebastopol VIC | On30, HO, O traction | |
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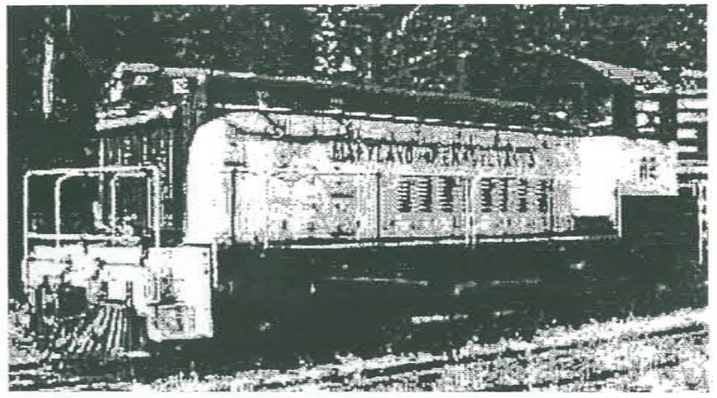
(or is that 1000mmto the metre)

# Why not Rent-a-Loco or a Whole Train?



**The Golden Gate Railroad Museum** of San Francisco (where else?) has a Locomotive and Car Rentals Program that will allow you to fulfil your dream of being a real life engineer, even if for just an hour.

The following is an extract from the Mueum advertisement. Even so, it makes interesting reading (dreaming?).

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Rent-a-Train, Parties, Events
Coach or other car for rides - $50/hr
Lounge car for event 2 hr minimum - $75/hr* Plus car attendant/docent - $25*

All rentals and group visits are by appointment. Locomotive and car rental depend on mechanical availability of equipment. The GGRM reserves the right to substitute locomotives as needed. For further information or to make a reservation, call 0011-1-415- 822-8728 or email us at info@ggrm.org. *$US of course.

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**O Scale All Nation Royal Blue 4-6-0 Locomotive:**
Originally 2-rail pick-up but converted to 3-rail many years ago. Easily returned to 2-rail. Cousin Hal wants at least $A200 for it. Initial enquiries to John Saxon 0243 697 453 or email <jsaxon@tac.com.au>

**HO Brass:** Kiwi member John Bates has 3 surplus brass engines for sale, a Western Maryland H-9 2-8-0 for $NZ600, a Pennsy K4 4-6-2 for $NZ800 and an Alco Models DL-721 road switcher (SP/NYC) for $NZ250. Contact him at 15 Main Road Ohaupo NZ, (0011) 647 823 6555 or <john.kaybates@actrix.gen.nz>

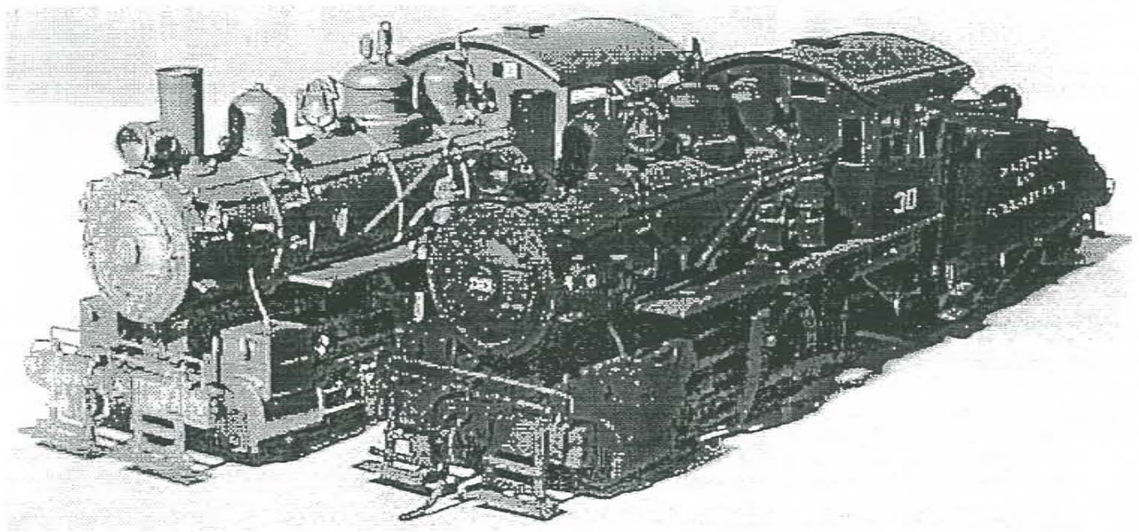
FINAL FEATURE

# Brass Locos

## Getting Them to Run

*By Martin Boyask*

Final part of Martin Boyask's brass adventures.



*A pair of M&PA 0-6-0 HO Brass Locos - one ready for fine tuning; the other one complete* - Photo by Keith McCarron

## Part 6. The Superstructure - the Body Beautiful

In part 5 we had completed our mechanism rebuild, with all its components painted. The bodyshell has no moving parts as such, unless you count the occasional fall plate behind the cab. It can however interfere with the running of the loco rather than help it.

Our main jobs on the boiler/cab unit would be repairs, weight considerations, painting and possibly adding lighting [I'm not getting in to sound here as I feel it forms a separate subject]. Other aspects include making sure the superstructure does not interfere with the moving parts of the mechanism and checking that it rides level on the chassis.

Obviously, because of the handling involved, painting should come last. Firstly make sure all attached details, and larger joints, are sound, re-soldering where necessary. If you have a small detail that you really feel you cannot solder, clean it and its attachment area up thoroughly and secure with a good ACC cement, not epoxy. The latter usually seems to form unsightly blobs. If you intend to bake your paint, do not glue anything loose in place till afterwards.

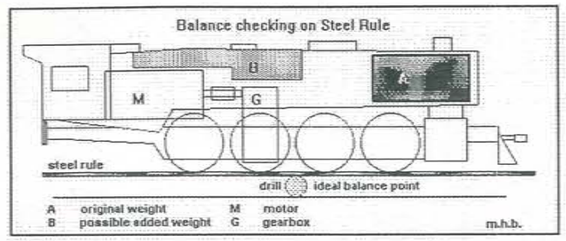
Install any weights provided and fit the shell onto the mechanism. Do not assume the weights provided are correct. See sketch for hint on replacing smokebox weight.

With the loco assembled, check it for ride attitude on level track. Corrections usually are minor, and involve small adjustments around the holes for the mounting screws. However before doing anything like that, if the loco rides nose down or nose up, see if the chassis is doing the same thing. If so, it is the weight distribution that is wrong. Old large loco's, especially, sometimes came with a huge lump of smokebox lead, which pulled the front down. Also remember that if you have re-motored from a large old Pittman to a can, you may have greatly altered the balance.

If the chassis is level but the body is at an angle, suspect the position of the cab fixing screws, or occasionally the set of the smokebox on the cylinder saddle. If this is a long way out, and the cylinder block itself appears to ride high on the frames, you can sometimes improve matters by filing the cutouts at the location of the cylinders, or even the underside of the cylinder saddle. This is very rare though. More usually an elongation of the cab screw holes in the necessary direction will allow the rear end to be adjusted a little instead. In extreme cases the plate into which the rear screws go might not be in the original position due to bad



soldering or just distortion. This also applies if the loco looks tilted to one side when viewed from the smokebox door backwards. More than one brass loco has dropped on the floor at some time in its life!




If you are not sure about the weight, take it out of the boiler so only the relatively light brass shell is in place on the mechanism. Retest for level ride, and work from there. While weight is important for traction, you usually get better operation with less lead evenly distributed than with a massive smokebox lump. To test distribution, I prefer to remove the loco trucks again [replacing the pivot screws in the keeper plate]. Then check the loco by placing it on a see-saw. I use a thick steel rule balancing across a 1/4" drill.

The loco should obviously balance at about the centre of the coupled wheelbase. Added weight should be inside the boiler sides, above the gearbox, and if necessary in the firebox where space allows. I have removed smokebox weight quite often and found improved performance.

You only need enough weight to allow the loco to undertake reasonable chores, considering its type, and the fact that it is a model! The most important rule of thumb is that a loco should never be able to stall a train. If it cannot shift it, the drivers should slip. When slipping, it should not register a current draw above the capacity of the motor. With a can motor, this is usually around ¼ to 1/3 amp at most. Open motors might go up to 0.75 amps or more.

A well-sprung, well-balanced loco should be able to do all you require, so long as that expectation is realistic, and your grades and curves are too.

At this stage check your pilot coupler ride height and adjust to the Kadee gauge as necessary.

If you want a simple lighting set-up [i.e. a 12 volt miniature bulb in the headlamp] you probably need to drill a small hole in the back of the headlamp casing, and the nearest point of the smokebox door, or the smokebox rim ahead of the stack. Articulated and C&O type pilot-mounted headlamp wires can go down through the pilot deck and along into the mechanism.

One wire can be made very short and soldered to the nearest convenient spot in the boiler shell or mechanism, or to a solder tag placed under the head of a hidden screw, e.g. one holding down the valve gear hanger frame. The long wire needs to run to the motor hot brush [the one fed from the drawbar.]

For constant lighting set-ups you need a little more boiler space for the electronic module, and wire it according to the instructions. Where space is limited you can put

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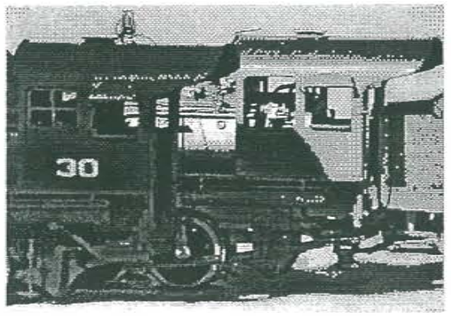

it in the tender, but this will require a wire to cross to the boiler, possibly with a one-pin micro connector. A good place for small lighting units is inside the cab roof.

With the boiler and trucks back in place, check for possible interference between boiler details such as injectors, and the trucks. Again we suffer from unrealistic amounts of truck swing, and might have to take a little licence with the position of piping. Check any booster engines cast into trailing trucks. These have been known to be set too low and can need bending up or a little filing to clear the rails reliably.

When all is to your liking, remove the boiler and spray in your chosen medium, ensuring a thorough degreasing has been applied first. Hot detergent works fine, followed by a good rinse and prolonged drying. I don't bother to remove sound clear coatings or "brass" paint finishes. These form as good a primer as most. I generally use satin black car aerosol as the initial light coat, and then continue with airbrushed satin Floquil or Scalecoat. According to the end result wanted, the final coats might be softened to a very dark charcoal by adding a touch of grey to the mix. Final finish at this stage is always gloss for decalling. I bake the paints lightly, and then the engine goes through for decals, white lining, glazing, lenses and all the rest. I'll not detail this - it is a separate subject and everyone has his or her preferred methods.

We now have a fully finished engine to a reasonable standard - not necessarily museum quality, but a good hard-working and reliable member of the roster.

All that remains is to apply similar tests and standards to its tender. Obviously much simpler, but attention here will be rewarded. The points to look at are trucks, coupler, drawbar pin, possibly solder joint repairs and ride height/level. As with the loco, before doing anything, try to assess the tender 'as is'. For example, many an apparently erratic loco has been found to run perfectly with the tender from another model. This, Sherlock, might tell us the fault could well be in the original tender! Elementary, dear Watson!

The usual problem is conduction of current. Tenders conventionally pick up current from all left-hand wheels, pass it to the truck frames, and thence to the tender bolsters. The floor passes it to the drawbar pin [except in some sound/lighting equipped locos where the pin is insulated from the floor.]

Short circuits are possible, between the tender body and the cab metal work. This usually happens on sharp curves, and can be improved by using a longer drawbar [or different hole in the same drawbar] or by using wider curves! The "cab roof to front of coal/oil bunker" is a common short.

Rarely, an insulated wheel might be found to touch the underside metal work, or even the inside surface of the truck frame. A suitable fibre washer on the axle end, or revising the truck assembly can cure the latter. Sometimes all that is needed is to bend the truck bolster back to correct shape.

If the loco has a metal fall plate, make sure its edges cannot touch the tender front face, and that its underside is insulated with tape or a plastic film.

All but the earliest tender trucks have sprung kingpins. The springs are not always ideal, and better tracking occasionally can be obtained by softening or shortening one or both springs. If the tender ride height is not level, a thin metal spacer shim or washer between the low-end bolster and its truck will correct this.

Check for solder security around handrails, cut bars, back-up lights and footsteps. Also ladders are often poorly attached. As with the loco, re-fix anything doubtful before proceeding.

Coupler height should be checked after any alteration in ride height. It is easy to shim down an over-high coupler but one riding low is trickier, unless the whole tender is low, and is going to be shimmed up. If not, the offset type of knuckle is very useful, especially the plastic shanked variety of Kadee etc.

When checking trucks, look for the axles to be parallel to each other and square on to the frames. Look at the truck endwise to ensure all axles are parallel that way too. Adjustments are usually just small bends here and there in the truck frame but a few times I've had to alter the position of a journal hole. [Fill in with solder and re-drill.]

Equalised trucks have one or both side frames pivoted on a screw fitted inside the bolster. Sometimes one side is insulated but this is a bit unnecessary if the wheelsets are okay. Make sure the pivoting frame is free to do so but not sloppy. A stiffly moving side frame is worse than a rigid one as it can stick in a bad position. Decent track does not really need this equalising in HO, nor does it need tender truck bearings to be sprung as a few are. But overall the wheels must sit squarely on the rails and there must be enough freedom of movement to follow minor track irregularities.

After painting, make sure there is no paint at any place that needs to conduct current. This includes the axle ends and journals, tyre treads, truck bolsters [upper and lower surface around kingpins], tender bolsters and drawbar pin. I use a little switch contact cleaning spray [Super Servisol #10] on every bare surface. This excellent conduction enhancer lasts a very long time. I use it on all tyres, railheads and even commutators.

The loco should now be ready for final finishing, and then a long working life on the layout....oh, darn, dropped it again!

Note: *Servisol #40 is the same as WD-40, so it ought not to go onto tires and motors. Servisol #10 is a conduction enhancer and is really excellent.*



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