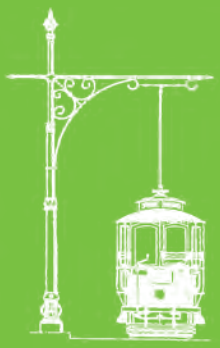
TROLLEY WIRE

No. 342
AUGUST 2015



Print Post Approved 100004350

$9.90*

ISSN 0155-1264

In this issue

- Steam Tram Operations in Sydney 1898
- Corrugated Tram Rails
- Sprague-General Electric PC Control

TROLLEY WIRE

AUSTRALIA'S TRAMWAY MUSEUM MAGAZINE

AUGUST 2015

No. 342 Vol. 56 No. 3 - ISSN 0155-1264

CONTENTS

Published by the South Pacific Electric Railway Co-operative Society Limited,
PO Box 103, Sutherland, NSW 1499
Phone: (02) 9542 3646 Fax: (02) 9545 3390

Editor .....Bob Merchant

*Cover price $9.90 (incl. GST)
Subscription rates (for four issues per year) to expire in December.

Australia $A36.00
New Zealand/Asia $A45.00
Elsewhere..... $A50.00

All correspondence in relation to *TROLLEY WIRE* and other publishing and sales matters should be forwarded to PO Box 103, Sutherland, NSW 1499.

Printed by Printgraphics, Mount Waverley
Tel: (03) 9562 9600 Fax: (03) 9562 6700

The Sydney Tramway Museum has an advertisement on the rear of a Warrigal Charters of Wollongong vehicle. The advertising is aimed at the Wollongong / Illawarra district and has received very favourable comment from museum visitors who have seen it. A truck driver, who followed the coach into Canberra, did not know of the museum's existence until he saw the advertising. He emailed the museum that his family thoroughly enjoyed their subsequent visit to the museum and will be back!

Courtesy Transit Graphics Pty Ltd

Front Cover:

Hayden Holmes guides Perth Electric Tramway Society's Melbourne W2 441 between the paperbarks at the Bennett Brook Culvert after leaving Mussel Pool in Whiteman Park on 6 April. Michael Stukley

STEAM TRAM OPERATIONS IN SYDNEY IN 1898

By Duncan MacAuslan

The Sunday Times was published in Sydney from 15 November 1885 and ceased after 2389 editions on 1 June 1930. The National Library of Australia's *Trove* holds the issues numbered 442 onwards. On Sundays 22 and 29 August and 12 September, 1897 the paper ran a three part series *The Tramways* written as a *Sunday Times SPECIAL*.

The articles were:

I. The unsuitability of the Bent-street terminus. How the Traffic is Managed. The Arranging of the Time Tables— The Telephone System, &c. (etc.)
II. What it costs to run them - facts and figures, How the Tickets are Dealt With— The Lost Property Office— Amusing incidents, &c.
III. Randwick workshops and running sheds. A Gigantic Establishment. The inconvenience of its position. How the tramways are repaired. The Wages of the Employees; &c.

As with most journalism of the late nineteenth century the articles were rather verbose and patronising as can be seen from the opening paragraph of the first article:

> 'How many tram travellers ever consider for one moment the gigantic system upon which the tramways are run? Very few, indeed. The average person simply pays his fare, perhaps passes an uncomplimentary remark concerning the condition of the car, and if it be night-time, and he feels disposed to have a read, might supplement it by referring to the inadequate and unsuitable lighting.'

Two other secondary sources are referred to, both in the ARHS *Bulletin.*

1. R.F. Wylie, C.C. Singleton and A.V. Green wrote a long series of articles *Steam Trams of Sydney* starting in issue 71 in September 1943 and running, including a detailed fleet list, until May 1945.
2. C.C. Singleton's series of articles on *Sydney's Steam Tramways* in 1898 in issues 285, 286 and 287, July, August and September 1961.

Neither of these included citations and obviously used some personal records. However by their own admission they relied in part on the authors' recollections.

Bridge Street Yard

By 1898 it was accepted that the steam tram system was out of date and running at capacity. The latter was caused by all lines converging on Elizabeth Street and terminating in the seven tracks of Bridge Street yard. On the site of the former Treasury Paddock, the yard was opened on the same morning that tram services were extended to Glebe, 1 August 1882. Until then, trams had reversed at Hunter Street. The articles refer to the terminus as Bent Street as passengers could only join the trams there. From 1 November 1889 the starting point of the route was moved from the platform at Bridge Street to a new ticket office and waiting rooms at Phillip Street on the south side of Bent Street. Bridge Street remained as the arrival terminus. This overcame the need to move trams out of the yard into Phillip Street before reversing them into the departure platform. With the opening of the Bridge Street yard, all down trams could go direct from the yard to Bent Street.

Trams from the suburbs carried passengers to Bridge Street where, the leading conductor applied the handbrake to hold the cars while the fireman uncoupled the motor, which was then run into the yard to take water. After servicing, it either stood in a vacant siding or reversed to the down line. Two water tanks stood on the western side of the yard, each being equipped with a quick-filling device. The incoming motor would run alongside, the chain would be pulled and the water poured into the motor's saddle tank. In the meantime, the cars had been gravitated into a siding, the falling grade giving them sufficient momentum to reach any part of the yard. The motor then closed on the cars, sometimes took on a basket or two of coke, and was ready to depart within two to five minutes after arrival. Sometimes a car was attached or detached.

The rapid growth of the tramways meant that Bridge Street yard was also becoming a bottleneck. Overnight storage of cars was also a problem that was solved by leaving cars at some termini. Singleton noted that the last three trams at night stowed their six cars in the up dead end whilst the motors returned light to their sheds. As the last two fouled the crossover, the first motor from the shed in the mornings had to cross over

Bridge Street yard was the northern terminus of the steam tramway. The steam motors took on water from two tanks seen here between the two motors on the left. STM Archives

to the up line at Short Street and approach the depot on the wrong line. Because the last cars arriving at Bridge Street depot could not be cleaned, they were shunted out to cleaning sheds at Woollahra and Moore Park and replaced by clean cars from those sheds.

Timetables

Prior to John Kneeshaw's appointment in November 1895 as Superintendent of Tramways, timetables had been prepared without time-displacement diagrams. As a result of his railway experience, Kneeshaw introduced the diagrams that enabled more efficiency in scheduling. Gradient diagrams were also prepared to calculate speeds and together these enabled improvements to the Bondi and Waverley timetables in April 1896, with improvements to Glebe and other services occurring later. Each day, 1240 trams were handled at Bridge Street. There were 60 passenger diagrams with runs 12 to 41 shared across the Crown Street, St Peters, Dulwich Hill, Balmain and Leichhardt lines. One of the consequences of this was that crews who had been dedicated to one line had to learn new routes, often from their passengers.

By 1897 there were 1410 two, three or four-car trams shunted daily in a space with seven tracks that held only around 100 cars. On average a tram had to be shunted every 90 seconds and during the peak periods around 120 trams were despatched hourly, this being the limit of the terminus's handling capacity. Any problem meant trams were queued back to Liverpool Street.

C.C. Singleton listed the weekday evening departures from Bent Street on 1 July 1898 as:

Time pm		Destination
5	00	Enmore
	00	Leichhardt
	02	Bondi Junction
	03	Railway
	05	Coogee (extension connection)
	06	Enmore
	07	Bondi Junction
	08	Railway
	08	Balmain
	09	Leichhardt
	10	Glebe Point
	11	Crown Street
	12	Waverley (Through Tram)
	14	Railway
	15	Leichhardt
	17	Bondi Beach
	18	Dulwich Hill (Through Tram)
	20	Coogee
	21	Glebe Point
	22	Waverley
	23	Crown Street
	23	Marrickville
	25	Railway
	25	Leichhardt (Abbotsford Connection)
	28	Balmain
	28	King Street, North Botany
	30	Bondi Junction
	31	Enmore
	33	Railway
	33	Glebe Point
	35	Crown Street
	35	Leichhardt
	37	Enmore
	42	Waverley (Through Tram)

Time pm		Destination
	42	St Peters
	42	Railway
	44	Glebe Point
	45	Leichhardt
	47	Crown Street
	48	Dulwich Hill (through tram)
	48	Balmain
	49	Bondi Junction
	49	Bay Street, North Botany
	52	Railway
	53	Marrickville
	55	Waverley (through tram)
	55	Leichhardt
	57	Glebe Point
	59	Crown Street
6	00	Bondi Junction
	01	Enmore
	03	Railway
	05	Bondi Beach
	05	Coogee (extension connection)
	06	Leichhardt
	06	Botany
	08	Balmain
	09	St Peters

Two solutions were proposed. The first was to secure some of the grounds of Government House. However this was rejected because it would still leave the bottleneck in Elizabeth Street. The second was to use another street for the western lines. This was announced in March 1898 when George Street was nominated for conversion to electric trams. To assist operations the staff were given a daily timetable showing the arrival and departure times of every car during the day.

As far as possible, trams ran to a memory timetable every 10, 15 or 20 minutes. This was complicated by the single lines from Five Dock to Abbotsford; Forest Lodge to Balmain; Enmore to Dulwich Hill; and on the Crown Street and Waverley lines. The timetable had to ensure that the trams were at the crossing loops at their scheduled times. If this failed to occur, services would be very disrupted. On the Balmain line the placement of passing loops limited the service to every 20 minutes. The four motors hauling water tanks also had to be fitted into the timetable to so as not to interfere with the passenger traffic.

A dedicated telephone network connected to the head office in Phillip Street existed along each line with phones being located at all termini and other locations such as junctions. Using the diagrams and telephone network, supervisors would know the location of every car was at a given time. If a tram was delayed by 10 minutes, the timetable could be rearranged temporarily and normal services reinstated within an hour. Facilities provided for crews included lavatories at each shed or yard and at most termini. Where crews signed on, there were locker rooms and a meal room. At Bridge Street yard a boiler existed from which 400 to 500 cups of tea were brewed daily.

Tickets and lost property

In the financial year to 30 June 1897, 72,343,812 fares were collected. At a penny a fare, this amounted to nearly 200,000 coins a day to count and bank. Tickets were printed by the Government Printing Office, which was then situated at the corner of Bent and Philip Streets. The tickets were sealed in packets to prevent tampering. After being delivered to tramway offices, the tickets were distributed to conductors in packets valued at £1 and £4 each. Each conductor was allowed a cash advance of £5 and supplied with two registers: one counting cash; the other for pre-paid tickets. Prepaid tickets could be purchased at shops and stalls in strips of six-penny blues or eight 3/4d reds, the latter valid for trips to or from the Railway. The registers' bells had different sounds so passengers could hear that their fare had been properly recorded; the tickets were then cancelled by being torn in half and placed in the conductor's bag. The conductors could not open their registers and on return to the tramway office they were read by trusted staff and the result entered in a ledger. The conductor then handed in the torn tickets and cash he had collected. The tickets were boxed and weighed to check if the 'return' closely matched the weight expected by calculation of ticket weight by register count. The tickets then were placed in a sack and sent to Bridge Street yard where they were burned each morning in a furnace built especially for the purpose.

All items found in trams were supposed to be handed to the conductor who then handed the item in at Bridge Street where it was transferred to dedicated staff at the head office. Each item was registered and stored until an enquiry was received. To prevent abuse, enquirers had to describe the item, the tram service on which it was left, and the approximate time when it was lost. On being claimed, a small fee was charged to defray the handling expense. If an item was not claimed within a few days it was sent to a storeroom, where it remained for six months, after which it was sold and the proceeds placed in a special fund. Should the loser of any item that had been sold appear subsequently, he or she would receive the money resulting from its sale.

A three farthing (3/4d) red prepaid ticket.

Randwick Workshops

The principal workshops and running sheds were established at Randwick in 1882 and covered an area of about nine acres.

The Sunday Times clearly felt this was a serious operational detriment 'entailing a deal of unnecessary expense' requiring each tram an extra eight miles (12.8km) empty running with the additional cost of employees' overtime estimated at £5000 a year. The paper supported use of the Domain and suggested that 'were the tramways run by private enterprise instead of the Government, no doubt some such scheme would be adopted' despite the last serious acquisition attempt by private enterprise having been by the Sydney Tramway and Omnibus Company in 1890.

It was suggested by the newspaper that Sydney was the only city in the world where there was not a proper system of storing cars. The practice of leaving them at the termini in 'all sorts of weather' would be unnecessary if there had been adequate undercover depot space. It was estimated that one third could be added to a car's estimated life of 15 to 17 years by the provision of better storage facilities. At least one original 1879 built car was reported in service. Green's tables in the *Bulletin* indicate that 36 A class cars were still on the register in 1898, albeit without their upper decks, and were disposed of in 1900.

There were 117 steam motors in NSW of which 60 were required for regular services in Sydney. Twenty-eight motors were allocated to Pitt Street; 38 to Randwick; and 1 to Botany; thus allowing 7 spares. Two more were allocated to Enfield; 13 to Newcastle; and 3 to Kogarah and Morpeth. The remaining 42 were apparently either stored or under repair at Randwick.

There were also 198 cars of which 42 were stored at Randwick; 2 at Botany and 2 at Enfield. The rest were stored in the open at the half mile long Waverley sidings; Bridge Street yard; Newtown Bridge siding; the 'long siding' at Moore Park; the Bondi Aquarium siding; and at various termini, with six being stored at Leichhardt and two at Botany.

The tram motors ran about 30,000 miles before they were given an overhaul, which took about six months. Overhauls for all the colony's tramways took place in five main buildings at Randwick. The No. 1 building, which was 300 feet by 40 feet, was subdivided into machine and fitting shops with 'a liberal equipment of the best machine tools and other facilities for the efficient and expeditious performance of the work'. Adjoining this was another building 300 feet by 50 feet, with three roads and engine-pits throughout. This was used as a running shed stabling 25 engines at night, and for jobbing repairs to engines by day.

The carriage and wagon-repairing shop covered a similar area to the No. 1 building. This was where repair and renewal of the cars and trucks was performed as well as repairs to the woodwork of the motors. The fourth building housed the blacksmith and boiler shops. The former contained 14 fires, 7 on each side; the boiler

Steam motor 96 is outbound to Bondi in Elizabeth Street, now Philip Street, at Bent Street.
Kerry & Co.

shop had 4 fires, punching and shearing machines, plate rolls, etc. In the paint shop there were 2 pits of 46 feet each accommodating 14 cars. In addition to these buildings there were the pattern-makers' shop, a tinsmiths' shop, and the brass foundry, the latter being a small brick building where all brass, copper and lead castings required in the workshops are made.

Between 12 and 20 motors and 9 cars were regularly undergoing general overhaul and other light repairs. At Newcastle, there were only facilities for minor repairs. When a car was beyond repair it was burned, the iron and other fittings were then collected and either reused or sold. As well as maintaining motors and cars the workshops also made and repaired components for the permanent way. Staff often worked overtime to complete their duties.

Night staff at the running sheds cleaned and made running repairs to the motors in service. These sheds had electric light and the engine pits were fitted with portable electric lamps. The motors had their fires banked at night, a sufficient number being blown down nightly to ensure every boiler being washed out with hot water once a week.

The Sunday Times reported that the motors built in the United States gave the most satisfaction being 'more pliable than those of English manufacture, which are too rigid and soon collapse in consequence of the heavy work involved'; there were only three English motors.

Randwick employed 267 staff and the Commissioners claimed that their wages were higher than those paid by private firms but they benefited by having the work performed in a more satisfactory manner. The difference, they claimed, 'can be set off against the profits which a private contractor would require, and, therefore, in the end no loss is suffered'. This is an interesting argument from the viewpoint of privatisation.

The table shows the breakdown of staff in each of the shops and their weekly pay rate in shillings (s) and pence (d).

Shop	Occupation	No. of Employees	Max Rate S d	Min Rate S d
Day staff				
Fitters' Shop	Fitters	37	18 0	8 0
	Apprentices	7	5 0	0 10
	Labourers	9	7 0	6 6
		53		
Turners' Shop				
	Turners	18	11 8	9 4
	Apprentices	2	5 0	3 0
	Machinists	12	10 2	8 4
	Labourers	4	8 0	7 0
	Stationary engine Driver	1	8 0	
		37		
Boiler Shop				
	Boilermakers	7	10 8	9 4
	Apprentices	2	3 0	1 3
	Labourers	8	7 0	7 0
	Shop boys	3	2 6	1 9
	Machinist	1	7 0	
	Stationary engine Driver	1	8 0	
		22		
Blacksmith Shop				
	Blacksmiths	11	12 4	10 0
	Strikers	18	7 6	7 0
	Apprentices	2	3 0	1 3
		26		
Paint Shop				
	Painters	10	12 0	8 0
	Apprentices	5	5 0	2 0
	Painters' assistants	6	7 6	7 0
	Shop boys	11	5 0	2 0
		32		

Shop	Occupation	No. of Employees	Max Rate S d	Min Rate S d
Car Shop				
	Car builders	14	11 0	8 8
	Carpenters	4	9 8	9 0
	Machinist	1	10 0	
	Apprentices	3	3 0	2 0
	Car lifters	4	8 6	
	Car fitters	2	10 2	9 4
	Labourers	6	7 0	6 6
	Stationary engine Driver	1	7 6	
	Shop boy	1	5 0	
		36		
Pattern Shop				
	Pattern maker	1	11 0	
Brass Foundry				
	Brass moulders	2	11 0	10 0
Plumbers' Shop				
	Plumbers	5	11 8	9 6
	Gas fitter	1	9 6	
	Labourers	2	7 0	6 6
		8		
Tinsmith's Shop				
	Tinsmiths	5	11 8	9 6
	Apprentice	1	1 8	
	Labourers	2	7 0	6 6
		8		
General Hands				
	Steam crane driver	1	8 0	
	Storeman	1	8 0	
	Labourers	10	8 0	6 0
	Watchman	1	7 0	
	Shop boys	2	3 0	
		15		
Night Staff Randwick Shed				
	Fitters	4	13 0	10 2
	Labourers	3	8 0	7 0
		7		
Pitt Street Shed				
	Fitters	4	13 0	10 2
	Turners	1	11 2	
	Labourers	5	7 6	7 0
	Shop boy	1	4 0	
		11		
Bridge Street Staff				
	Car Examiner	1	12 6	
	Carpenter	1	10 0	
	Fitter	1	11 2	
	Car lifters	4	8 6	7 6
	Car oilers	2	7 0	5 0
		9		
Grand Total		**267**		

Steam motor 103 at Botany terminus.
V.C. Solomons collection

The annual cost of wages and material at Randwick amounted to between £55,000 and £60,000.

The expenditure was dealt with using a system of shop orders that recorded the precise cost of repairs to each 'head of service' without an expensive clerical force. Standing shop orders existed for the regular work, and special shop orders were issued for all other work. Costs were recorded in a journal, the heading showing the order number with particulars of the work performed, one page being used for the labour incurred in each shop, and the other for materials and the total. The journal was indexed, so that any order could be readily found. The system was considered to be excellent, and at the same time, inexpensive.

More information on Sydney's steam trams

The Sunday Times articles provide a useful insight into the operation of Sydney's steam trams a century ago. More information on Sydney's steam trams is provided in articles contained in the Australian Railway Historical Society *Bulletin*, which cover aspects including revenue and costs; signalling; employment practices; and the production of timetables and handbills. David Keenan's series of books on Sydney's trams describe steam operations on those sections of line later converted to electric traction. David Burke's book *Juggernaut!* is another source of information. *The Tramways of New South Wales* by Ian MacCowan gives brief information, including coverage of the various isolated lines. Details of the steam tram rollingstock are given in the *New South Wales Tramcar Handbook 1861-1961, Part Two.*

Steam motor 102 waits for departure time at Woollahra. The bearded conductor has the registers for cash and prepaid tickets to be recorded.
R.I. Merchant collection

Originally published in the *NSW Railway and Tramway Budget*, 1 January 1915.

CORRUGATED TRAM RAILS AND THE WOODS GILBERT PLANING MACHINE

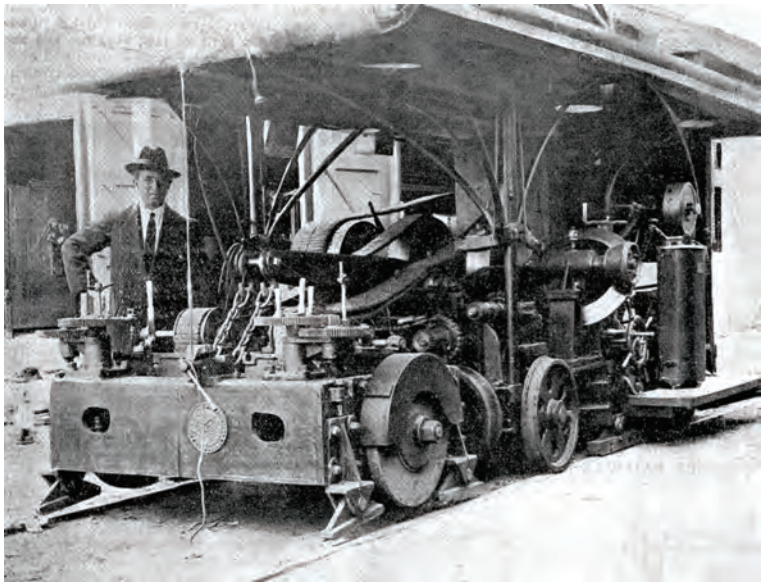
Introduction

The advent of tramways has been responsible for the opening up of immense avenues for the best engineering and managing brains of the community. Like her more important sister, the railway, both have to carry the very undignified title of "common carriers." In spite of this, both demand and get the keenest and ablest brains to meet and overcome the many difficulties that has opposed the introduction of the various systems of street tramways similar to that so successfully operated in this our city. Its present success was not obtained in a day or a year, but persistent and able guidance has placed us, if not in the premier position of the tramways of the world, so close to that position, both for carrying capacity and revenue, together with safe operation, and meeting the convenience of the travelling public, that it would be difficult for any unprejudiced judge to place them in any other than in the very first flight.

Difficulties on tramways are not all known at once. Like Topsy, they grow, or continually develop, needing continuous watchfulness to detect and overcome them. One of the latest troubles is that known to the fancy as the corrugated rail face. The term explains itself—the rail, instead of retaining its original smooth surface, develops an uneven, wavy surface, or corrugation.

In its earlier stages a low rumbling sound is produced as the trams pass over; later the noise is sufficient to destroy all conversation between tram passengers, and is no doubt incidentally responsible for the many mistakes in issuing tickets of the wrong denomination. In addition the noise and bumping destroys to a large extent the pleasure of a tram ride. The increase in the weight of rolling stock and rails only seemed to accentuate the trouble, which soon became very real, agitating the management of the many tram systems. Accredited delegates met and discussed from their various points of view its cause with doubtful effect, all getting seriously to work to devise a cure.

First, the large triangular file, fitted up with handles similar to a carpenter's jack plane, were provided for the men to scrub away and try to rub out what the thousands of passing wheels were constantly developing. This method was soon abandoned.



This photo accompanied the original article and was described as a late one. It shows a front view of the Woods Gilbert rail planer.

Departmental Rail-Grinding Car

In the next place one of the cars was fitted with a carborundum shoe, like a track brake. This could be operated to drop on to the surface of the rail, and be kept there whilst the car was travelling. This is a local departmental device, and has been in operation for some years, and has done more than good service.

Woods Gilbert

This brings us to the subject of this article, the Woods Gilbert Rail-planer. This company was quick to see the need of something to cope with this growing evil. An oil-power machine was evolved that could travel on the rail at a speed of about 12 miles per hour, so constructed that it could be side-tracked at right angles to the road at short notice, thus allowing a car to pass, and easily and quickly regaining its position on the rails. The whole operation occupying some five minutes.

This machine was soon improved upon, was fitted with electric power, and is now doing satisfactory work grinding all night to counteract the all-day grind of the tram wheels. A detailed description of this machine would be difficult on paper, and probably uninteresting to the general reader. A general description is as follows:—

Main Trolley

One main trolley carries all operating gear and the electric motor.

Grinding Trolley

One grinding trolley carries two 24in. wheels, and is connected to the main trolley by universal drawbar couplings.

Travelling

When travelling the machine runs on four steel wheels connected to the main trolley by powerful springs, to allow for fast travelling of from 12 to 15 miles per hour.

Feed

The feed when grinding is reversible, and is operated by the means of friction and worm-gearing, feeding at the rate of 12ft. per minute.

Weight

The weight of this machine complete is 9½ tons.

Capacity

Its working capacity is about 500ft. of rail face.

Power

A 50-h.p. D.C. shunt motor operates the machine, with current obtained from the overhead wire.

Transverse Wheels

This machine is also fitted with transverse wheels and lifting gear, to enable it to side-track at right angles

A side view of the Woods Gilbert rail planer at Randwick Workshops. V.C. Solomons

to the rails, to allow cars to pass over the same road that it is operating on, the whole operation occupying about five minutes, i.e., to take the grinding machine off the rails and replace it again in working position.

Grinding Trolley

The grinding trolley is lowered on to the track by means of a Canton lever, and runs on four sets of multiple rollers, with separate vertical feed to each spindle.

The whole machine is of substantial construction, and is arranged for quick operation when lifting and side-tracking by power. It can also be lifted and side-tracked by hand. It is necessary that the machine should be heavy, as it operates simultaneously on both the rails of single track. Also that it be rigid to prevent the grinding wheels from clattering, especially on rails that are loose on their road-bed.

This improved machine has been operating on the Sydney tram tracks for about five months, during which time it has treated about 9000 lineal feet of rails at the joints, together with about 28,000 lineal feet of corrugated rail face.

The operating staff consists of the mechanical engineer in charge and two assistants.

All working parts can be operated from the ground.

The running machinery is sufficiently powerful to negotiate any of our steep grades with ease. At the same time is fast enough to run between trams without fear of blocking them should it be necessary to do so.

This work was done by the Company for the Tramway Department at a contract price for each lineal feet of rail, or rail joint done.

The Department has now purchased this machine, and it is now working under our own rules and regulations, and handled by our own staff.

When working at night the machine has a weird appearance, surrounded as it is with flying sparks when the alundum·wheels are in contact with the rail faces.

A rear view of the Woods Gilbert rail planer at Randwick Workshops. B.G. Tooker

From *The Sydney Morning Herald*, Thursday 25 October 1888 page 4:

THE NORTH SHORE TRAMWAYS BILL

Mr. Day presented a petition from Messrs. Clement Alban Benbow and Leslie Johnston, asking leave to proceed in the present session with a bill to authorise the construction of a tramway from the northern terminus of the North Shore cable tramway to the Spit at Middle Harbour, together with branch lines therefrom. The petition was received, and the bill was introduced and passed through all its stages.

From *The Sydney Morning Herald* Tuesday 13 January 1891, page 5:

YESTERDAY for the first time the Railway Commissioners opened departmental tenders in public. The following offers for the works and supplies named were received :- ... and for the manufacture of two dummies and four tram cars for the North Shore cable tramway, two tenders, lowest Mr. B. Carne, £1225.

Originally published in the *Electric Railway Journal* in 1924

BRISBANE SYSTEM TO BE REHABILITATED

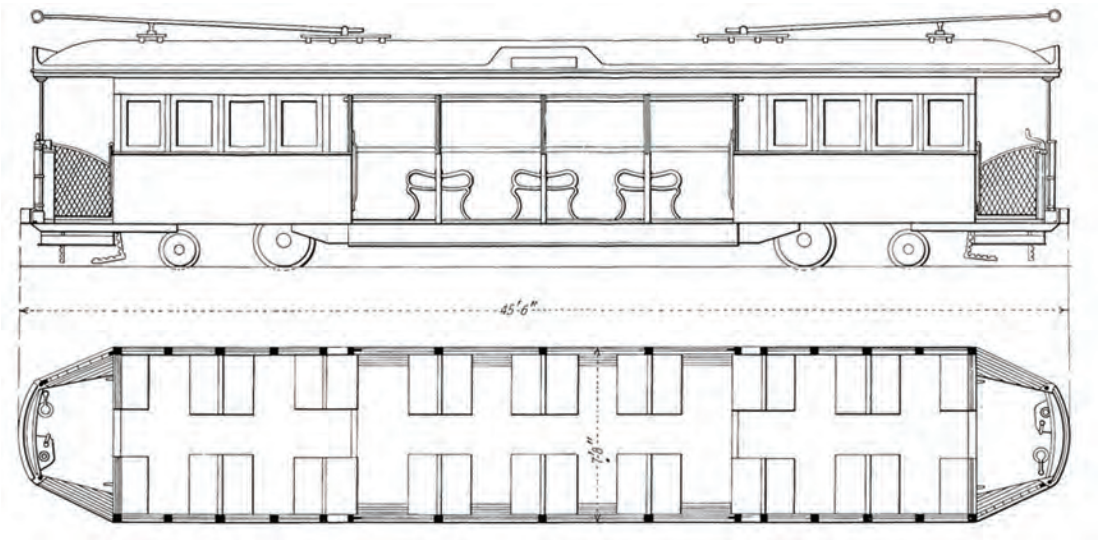
The Privy Council in London has decided that the state of Queensland is to pay the Brisbane Tramways £1,500,000 for its property which has been taken over by the government, and is now being administered by a board. This board consists of two members appointed by the government and six representing various councils. The tramways property was formally taken over on January 1, 1923, but the compensation to be paid for it has only recently been determined. The case first came up before the Full Court of Queensland, which on March 28, 1923, directed that the compensation should be paid on the basis of the physical valuation as of January 1, 1923, with allowances to the company to cover the unexpired statutory rights in the case of certain extensions, also that the Land Court of Queensland should be the tribunal to fix the amount. Against this judgment the company appealed to the Privy Council with the result mentioned. The company asked for £1,738,257.

The tramway system in Brisbane consists of 70.54 miles of track and 182 cars. During 1923 the car mileage was 5,211,971; the number of passengers carried was 74,721,594, and the revenue received was £636,258. There are 1,386 employees.

While the definite plan for rehabilitation naturally has had to be delayed until there was a decision as to the amount to be paid for the property, the new owners have practically decided to rebuild the office building, carhouses and repair shops, and add considerable new equipment. The replacement of fifty old cars will be the first step.

The design of car shown in the accompanying elevation and plan is the one being considered. As will be seen, it is a combination open and closed car, with the closed compartments at the ends. The seats follow the back to back plan which has proved to be so popular in Australia.

This car will have a total of 64 seats or a greater seating capacity than any of the present cars, six exits on each side instead of two as at present, better protection against the weather, steps which will be 8 in, lower than on the existing cars, and the conductor will have free access to all passengers through the centre aisle without using the running board.



Plan and Elevation of Car Proposed for Brisbane, Queensland.

ACCIDENTS ON THE SYDNEY TRAMWAY SYSTEM IN 1948

By Ian Saxon

In preparing a possible future article about the various tramway accidents on the Sydney system, Sydney Tramway Museum archivist, Vic Solomons gave me a copy of a report prepared by the Commissioner of Road Transport and Tramways. In those days the Tramways Department was responsible for investigating all tramway accidents.

The procedure and investigation of tram accidents was that immediately after a collision between trams in traffic, it was the practice to relieve the driver from duty and arrange for an examination and test of the cars involved. Preliminary investigations were followed by a Departmental inquiry in accordance with the provisions of Section 63 of the Transport Act, 1930. During the examination and test of the rolling stock, and at the inquiry and any subsequent proceedings before the Appeal Board, the employee against whom disciplinary action has been taken, was entitled to Union representation.

Because of press coverage regarding the number of tram accidents in late 1948, a report was prepared on 8 December 1948 by Mr C Neale, Commissioner of Road Transport and Tramways, for the Minister of Transport. It was reported that seven rear end collisions occurred in the last week of November and the first week of December 1948 and details the reason and the disciplinary action taken. However it does not report any estimated cost of repairs which might have also been interesting.

In the same report, it was reported that in the period 1 July to 31 October 1948, there were 39 collisions between trams in traffic. In 36 of the 39 collisions, the driver was to blame and punishment was imposed. In two of the remaining three accidents, the condition of the track was the cause and in only one instance was it found that the trams concerned, a coupled set of P type tram cars, were defective due to an air leak in the braking system.

Details of the seven accidents which occurred between 25 November and 6 December 1948 are as follows:

Date	*Trams*	*Location*	*Brief Description*
25/11/1948 (Thursday) 09.50am	1798, 1821	Boomerang St., City	1798 collided with 1821 which was stationary at a stop which was not normally in use at that time of day. Driver of 1798 demoted to conductor.
25/11/1948 (Thursday) 10.12am	59s, 1977	William Street, City	59s collided with 1977 which was stationary. 59s was proceeding to the accident above. Driver of 59s was demoted.
27/11/1948 (Saturday) 09.27am	836+1195, 1401+1431	Botany Terminus	Coupled set of "O" cars 836+1195 collided with coupled set of O cars 1401+1431 which was standing at the staff stopping place. Wet weather conditions were the primary cause. Driver of 836 was severely reprimanded and lost 2 days' pay.
03/12/1948 (Friday) 12.45pm	1592, 1436+1402	Anzac Parade near Abbotsford St., Kensington	During a storm accompanied by lightening and heavy rain, 1592 collided with the stationary set of O cars. 1592 was hit by lightning, severely damaging electrical equipment which then damaged the air piping with consequent loss of braking power. No disciplinary action taken.

Date	Trams	Location	Brief Description
05/12/1948 (Sunday) 07.22pm	1509, 1905	Young Street, Circular Quay	When travelling down the grade in Young Street, 1509 collided with 1905. No fault was found with the equipment or condition of 1509. Driver was demoted.
06/12/1948 (Monday) 03.06pm	1148, 1114	Elizabeth Street, City	1114 had to brake suddenly to avoid an accident with a motor car and as a result 1148, which was following, collided with 1114. Driver was demoted.
06/12/1948 (Monday) 04.00pm	1954, 1738	Kings Cross	1738 was stationary at the Kings Cross stopping place when 1954 collided with it. Driver was taken to hospital and the Inspector reported "He was not under the influence of intoxicating liquor but there was a smell of alcohol in his breath". Investigation incomplete at time of report.

C class breakdown car 59s about to be driven to Randwick workshops after its collision with 1977 on 25 November 1948. John Burgess

From *The Sydney Morning Herald*
Monday 7 July 1879, page 7:

CITY IMPROVEMENTS
The steam tramway is progressing rather slowly, on account principally of the wretched weather, and in part owing to the unusual labour required to form a good foundation in Elizabeth-street near the Haymarket. It is, however, being substantially constructed, for the space between the rails, and a little way outside them, is well pitch-paved, and care is being taken to have the foundations reliable. The gradient up to Liverpool-street is very steep -1 in 19. About half the line has been constructed, and Mr. Payton, the officer in charge, says that the whole will be finished in two months' time.

From the *Berrima District Press*:
19 November 1898:

THE ELECTRIC TRAM.
The electric tram from Circular Quay to Darling Harbour is now close upon completed, and will no doubt be a great convenience when opened. I have not heard yet what the charge is to be from Circular Quay to the Redfern Railway Station, but if the Railway Commissioners are wise they will make it the single penny. The penny section busses in London and other cities have been an enormous success, and to my mind there is now traffic enough between the Harbour and the Railway station to justify it.

Originally published in *The Victorian Railways Magazine* for June 1930

RAILWAYMEN AS TRAMWAYMEN

By S.C. Weetman

A few hundred yards back from the seafront just beyond St. Kilda, where the shores of Port Phillip Bay jut out to form the popular Point Ormond, there is located a small, comparatively isolated fraternity of railwaymen, who are really not railwaymen.

Here, at Elwood, is situated the unassuming headquarters of the railways electric tramway system linking St. Kilda and Brighton Beach stations, the system which bears the official title of "St .Kilda-Brighton Electric Street Railway."

Although the services on this route link up with the railway at St. Kilda and Brighton Beach the existence of the trams as a railway institution is perhaps little realised. The nature of the work carried out by the men on the trams, too, is so different from the generally accepted idea of railway working that the tramway employees seem almost a class apart.

The Elwood depot is located about midway along the 5½ mile line and comprises, in addition to the tramway office and locker rooms for the motormen and conductors, sheds for sheltering cars out of service, a workshop, and a power station. Power for the trams, which prior to the electrification of the suburban railway system was generated by a local power plant, is now supplied from the Newport power house to an automatic substation which is supervised from the Jolimont substation by a system of remote control.

The transportation staff at Elwood totals approximately 75 men, of whom 26 are motormen and about 40 conductors. This staff is directed by Tramway Inspector James Griffiths, who has been connected with the trams for the past 18 years. In turn, he is responsible to the Metropolitan Superintendent for the operation of the system in much the same way as a stationmaster is responsible for his station.

Sixteen bogie cars arid seven single truck cars, with seating capacities of 56 and 36 passengers per car respectively, are used in the service. The maximum number of cars in normal running at any one time is 17.

This enables a frequent service to be provided as the running time for the through journey is 27 minutes. The route is subdivided into four sections and some of the cars are terminated at these intermediate points as the traffic warrants.

The speed limit for the route is 25 miles per hour with suitable reductions, of course, where curves are encountered. The timetable, however, is based on approximately 11 miles per hour including stops. A daily mileage of 1,680 is run, the total mileage run for the year amounting to 560,000. The gauge of the track is 5 ft. 3 in.

The conductors are men who, in the main, were previously porters. By accepting service on the trams, promotion to the position of motorman is open to

VR 35 departs St Kilda railway station and is about to cross the MMTB tram lines in Fitzroy Street bound for Elwood.
Public Record Office Victoria

VR 28 in St Kilda Street outside Elwood Depot.
Public Record Office Victoria

these men who, at the same time, are still eligible for promotion to the grades of operating porter, assistant stationmaster and other railway positions in the same way as though they had confined themselves to station work.

The conductors sell combined rail and tram tickets in addition to those for purely tram travel. This means that nine sectional checks and 20 different railway tickets are carried. All tickets sold on the trams are for first class travel. The revenue handled amounts to from £5,000 to £6,000 each month, which includes a considerable amount of railway revenue. During the last financial year, no fewer than 5,380,698 passengers used the trams on this track, paying £56,513 in fares.

Behind the Scenes

While the words "tramway work" suggest to the man-in-the-street only the occupations of motormen and conductors, there are also the correlated activities directed by the Rolling Stock branch, which is responsible for the upkeep of the cars, and by the Way and Works branch, which attends to the permanent way.

Skilled labourers, electric fitters, electric mechanics, car builders, painters, mechanical fitters, pitmen and electric welders co-operate in effectively maintaining the cars. Each car is cleaned daily, is disinfected with formalin once a week, and is thoroughly washed once every ten days. Which means that complaints of dirty cars are non-existent.

Each car also passes through the workshop once in 48 hours for minor inspection, adjustment of brakes, and similar attention. Again, after every 2,000 miles of running, a general inspection is made, and the cars are lubricated and thoroughly examined to forestall the developing of any possible defects. Practically all the repair and overhaul work necessary is carried out at Elwood, but jobs such as the retyring of wheels and other heavy work is handled by the Newport and Jolimont workshops, where similar railway work is performed.

The permanent way, which in this case is the roadway, has to be maintained in excellent condition, and a gang of men are continuously engaged on work along the tram route. Extra men are employed when drainage work and similar extensive operations become necessary. The Department, incidentally, is responsible for the maintenance not only of the portion of the roadway between the outside rails, but for an additional 18 inches on the outer sides.

The first section of the route, as far as Park-street, Middle Brighton, was completed at the beginning of May, 1906, the remaining portion to Brighton Beach being ready for service just prior to Christmas the same year. In those days, the service was provided over a single line.

Prior to the duplication of the line the trams were worked under the staff and ticket system of safeworking. At the same period, trailer cars were in service which were withdrawn when double line working was instituted in 1913.

Another interesting item in the history of the line is the fact that a few years after the line was opened, a disastrous fire destroyed the car shelter sheds and cars. In consequence, trams were rushed across from Sydney to carry on the special service until new vehicles could be provided. The present trams, with the exception of the electrical gear, have all been constructed at the Newport workshops.

Cars 40 and 37 at rest inside the depot at Elwood.
Public Record Office Victoria

VR 53 outside the tram depot in St Kilda Street, Elwood.
Public Record Office Victoria

Notice – Tram service ceases 28 February 1959.


ST. KILDA—ELWOOD
Tramway Service
will cease after the last trip, Saturday, Feb. 28

Commencing from Sunday, March 1, a private bus service will operate between St. Kilda station and Park Street, Brighton, over the old tramway route.

Combined rail and bus tickets to sectional points on the bus route are available at Flinders and Spencer St. stations. Adult single rail tickets St. Kilda-Melb. issued on buses.

Another section of tram track, this time of 4 ft. 8½ in. gauge, was opened between Sandringham and Black Rock during March, 1919, and was extended to Beaumaris seven years later. The route extends for 4½ miles and, last year, carried 1,606,685 passengers for a revenue of £16,987.

This system, which is supervised b the stationmaster at Sandringham functions in much the same way as the St. Kilda-Brighton system. Rail and tram tickets are not issued, however as the combined fares are the same as the sum of the separate fares.

In all, there are 9.9 miles of route, 17.18 miles of running track and 1.4 miles of sidings connected with the Victorian Railways tramway service and the comparative immunity from complaints of any kind testifies to the efficiency of the service provided.

Originally published in the *General Electric Review*, Vol. 28 No. 10 dated October 1915.

SPRAGUE-GENERAL ELECTRIC PC CONTROL
(THE ELECTRO-PNEUMATIC SYSTEM)

By C. J. Axtell
Railway Equipment Engineering Department, General Electric Company

A detailed description of the mechanical construction and pneumatic operation of this new type of car and train control forms the body of the following article. This system of control combines elements which give extreme simplicity in operation and compactness in design which particularly adapts it to the many varying conditions of wheel diameter and minimum space requirements. – Editor, *General Electric Review.*

Probably few, if any, branches of electrical engineering have developed more rapidly during the past few years than the electric railway. This is particularly true in the large cities where the demands for rapid transit facilities are constantly ahead of the facilities provided. Not only a greater carrying capacity of cars and trains is required, but also an increased schedule speed is demanded. These increases tax the equipment; not only to care for the additional load imposed by the car service, but, also to operate upon a system on which the power station and distributing lines have grown to tremendous proportions: Such demands necessitate control equipments on cars to handle the increased capacity, to be capable of opening heavy overloads and even short-circuits under the above conditions and to provide for a reliability that has never before been obtained, while at the same time the cost of maintenance must be kept at a minimum. Due to the present day tendencies in car design to lower the car floor, to use small wheels, etc., the space available underneath a car for control equipments has been growing smaller instead of larger.

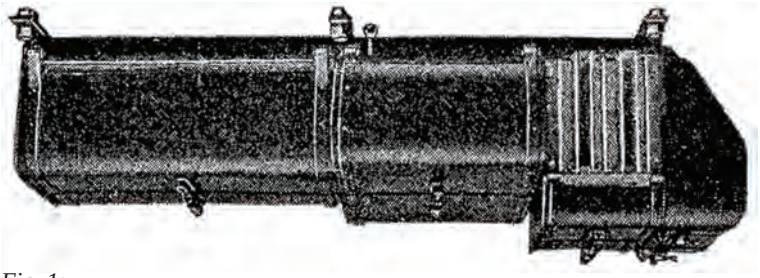
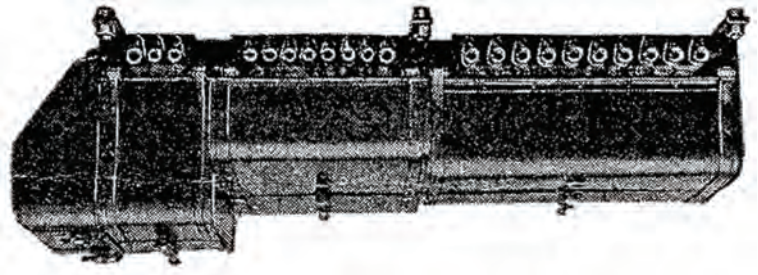


Fig. 1:
Type PC Motor Controller. Front view with covers.

Fig. 2:
Type PC Motor Controller. Rear view with covers.



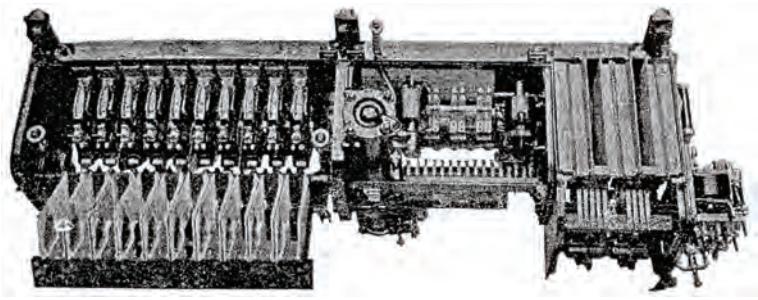


Fig 3:
Type PC Controller. Front view with arc-chute unit swung down.

It is to meet these conditions that a new type of control, known as the Sprague-General Electric Type PC Control, has been developed and recently placed upon the market. This system of control embodies all the essential characteristics for the simple and satisfactory operation of electric railway cars either singly or in train. The complete control of the car movement is possible from any car in the train, the equipments operating on the well-known multiple-unit principle, viz., all main or motor controllers on the train operate synchronously, their movement being governed by the master controller. The control equipment for a car consists essentially of a main or motor controller, a master controller, and motor resistor, together with such auxiliary apparatus as is common to all car equipments.

The principal piece of apparatus is the main or motor controller. Exterior views of a typical controller are shown in Figs. 1 and 2, and the front and rear views with covers removed are shown in Figs. 3 and 4. The particular controller shown in these illustrations is suitable for operating two 220 h.p, 600-volt, tap-field motors. One hundred and twenty-four of these controllers will shortly be in use for operating trains on the lines of the Interborough Rapid Transit Company, New York.

The controller contains in one box the line breaker, the overload relay, the contactor elements for making the various motor and resistor connections, the reverser, and the operating mechanisms. The line breaker elements, of which there are two in the equipment illustrated, are electro-pneumatically operated contactors provided with extremely powerful magnetic blowouts. The power for operating these line breakers is. obtained from the compressed air supply of the air-brake system. Air admitted through a small. magnet valve to a cylinder located underneath the operating mechanism, forces up an air piston and closes the main contacts of the line breaker element against a powerful spring. These line breaker elements function to open the motor circuits under all normal conditions as well as under overload conditions: This possesses the advantage of rupturing all arcs in that part of the equipment particularly designed for such service; which part was formerly used as a circuit-breaker, opening only under over-load or short-circuit conditions. Extensive investigation and development has recently been made to produce the most efficient magnetic blowout, the results of which have been incorporated in this new control both in the line breaker and in the contactor units. The current carrying parts of these line breakers are similar to those used on the contactors of the Sprague-General Electric type "M" control and consist essentially of a main contact, series coil with magnetic blowout, and are chute. Fig. 5 shows a partially disassembled view of one of these breakers. The construction of the element in a unit form and the assembly of it on a moulded compound base makes the removal or replacement of any element very simple, for it is only required to detach the two cable terminals and loosen the two nuts holding the unit in position. The operating levers are so designed that the contact tips when closing and opening are

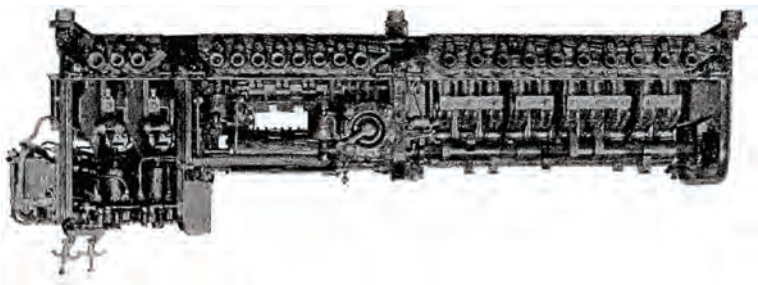


Fig. 4:
Type PC Controller. Rear view with covers removed

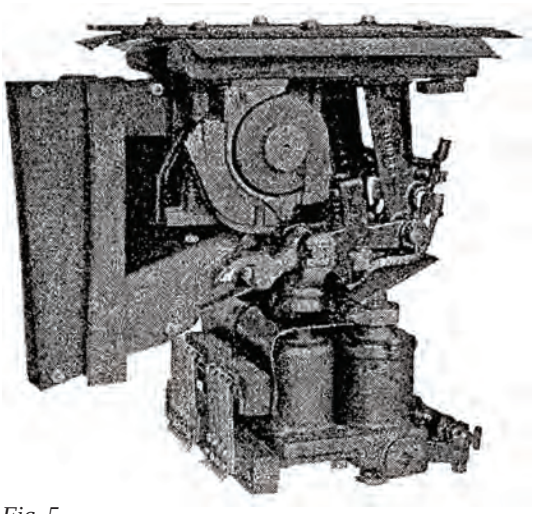


Fig. 5.
Line Breaker, with One Arc Chute Removed, for PC Motor Controller.

given a "wipe" or rolling motion which prevents them from "freezing" or welding together.

Included as a part of the main controller is an overload relay consisting of a series coil through which passes the line current taken by the car, an armature that operates contacts in the control circuits of that equipment, and a mechanical latch having an electrical reset. This latch is arranged to hold the relay in an open position, in case it is tripped by an overload current, until the reset coil is energised by a small switch in the motorman's compartment. The armature of the relay is held in the normal position, that is, with the contacts closed, by means of a tension spring, which spring also affords a means of calibrating and setting the relay to trip at any desired overload current value, depending upon the equipment and service conditions.

The reverser used on this type of controller is, like the line breakers and main contactor units, operated electro-pneumatically. The form of reverser is that of the well-known cylinder type such as has been used for many years on the standard "K" type of platform controller. On account of the severe service and increased capacity of motors, which this controller is designed to handle, the parts of the reverser must be very large and rugged which is made possible by locating them under the car body. The operating mechanism of the reverser consists of two air cylinders with a magnet valve directly attached to each cylinder. The pistons of the air cylinders are connected to an arm on the shaft of the reverse cylinder that carries the contact segments. The energising of one of the reverser magnet valves admits air to its cylinder and rocks the reverse cylinder to the opposite or reverse position. Control fingers, as well as the main current fingers, are also placed upon the reverse cylinder, the function of which is to commutate the control circuits as the reverser is thrown. The control circuit energising the reverse magnet valve passes through an interlock on the control cylinder of the cam shaft, which connection is made only on the "off" position of the main controller, thus positively preventing the throwing of the reverser until power is cut off from the motor circuit. After one of the magnet valves of the reverser is energised and the reverse cylinder thrown over to the reverse position, the control fingers on this cylinder transfer this control circuit from the magnet valve of the reverser to that of the line breaker. This transfer of control circuits gives the safety feature of insuring that the reverser is thrown to its final position before the line breaker magnets can be energised and any current applied to the motors. It also cuts off the air from the reverser air cylinder, as the air pressure is required only for throwing and not for maintaining the reverser in position.

The fourth and principal part of the main controller consists of the cam operated contactors or magnetic blowout switches which function in the proper sequence to make the series and parallel connections of the motors and to cut out the resistance sections used to accelerate the car. These contactors are constructed very similarly to, but smaller in size than, the line breaker elements for they are not required to have as great an arc rupturing capacity as the line breaker. They are, however, of sufficient capacity to open the motor circuit, even under abnormal conditions, if for any reason the line breaker should fail to do so. One of the contactor units without arc chute is shown in Fig. 6.

The arc chute for the entire group of contactor elements is made up as a unit, that is, the individual arc chutes are rigidly fastened together and are hinged on the lower side; the construction being similar to that of the platform type of controller. By simply loosening two spring thumb nuts, the entire arc chute can be lowered as shown in Fig. 3, thereby affording free access for inspection or repair of the moving parts of the contactor unit. In any method of connecting up the motors and resistors of the control equipment certain of the contactors, due to their location in the circuit, operate under more severe conditions than others, which causes a greater burning of the tips and arc chutes. In the arc chute of such contactors there is introduced a small auxiliary arc chute to take this burning This arc chute is reversible and is readily renewable, it being easily detached in a few seconds without tools and without disturbing any other part of the contactor.

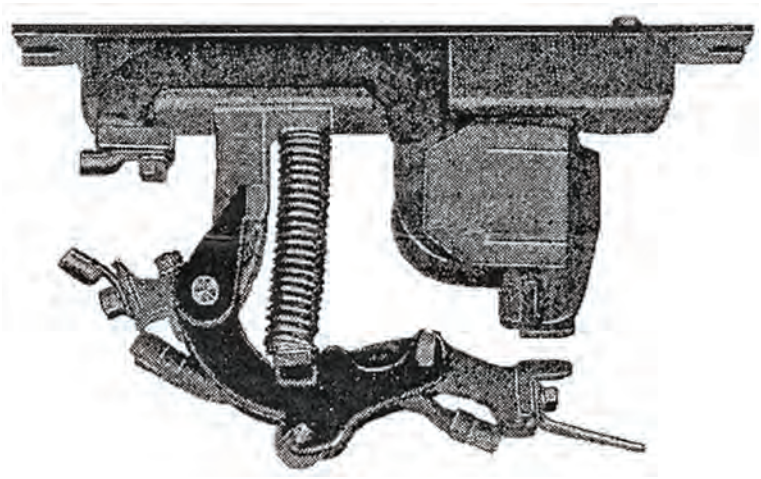


Fig. 6:
Contactor Unit for PC Motor Controller.

The movement, of these contactor units is effected by means of cams mounted upon a rotating shaft which is located underneath the contactors and which bears upon the rollers of the contact levers. The construction is illustrated in Fig. 4. This shaft is rotated by a pinion and rack, the rack being actuated by the piston of two air cylinders. The air pressure against the piston of the "on" cylinder tends to rotate the cam shaft to give full parallel connections of the motors, while the air admitted to the "off" cylinder produces a rotation in the opposite direction. To each air cylinder is attached a magnet valve which governs the admission of air to that cylinder. The magnet valve attached to the "off" cylinder is so arranged that when the valve is in the normal or unenergised position the "off" cylinder is charged with air from the supply reservoir, and when this valve is energised the cylinder is connected to the atmosphere. The magnet valve governing the "on" cylinder has the reversed function, that is, when in the normal or de-energised position it connects cylinder to atmosphere while in the energised position it admits air to the cylinder. It will thus be seen that when neither of these magnet valves are energised the air pressure will be against the piston of the "off" cylinder only, which will turn the cam shaft to the "off" position. In order to advance the cam shaft through the successive steps of the control, it is necessary to first energise the "on" magnet and to admit air to the "on" cylinder. This equalises the pressure in both cylinders and the advancement of the cam shaft is then obtained by reducing the air pressure in the "off" cylinder. As this reduction is governed by the magnet valve, it follow that the entire control of this cam shaft from the first series to the last parallel position of the motors is obtained by the energising or deenergising of a single valve.

On the cam shaft is also mounted a control cylinder with the segments and fingers necessary to make the required control connections for each step, and to insure the proper functioning of the line breaker elements, the reverser, and the cam operated contactors. No interlocks are used on the contactor units themselves, as in the case of other multiple unit controls; this control cylinder takes the place of such interlocks and thus gives not only a much less complicated control connection but a greatly reduced number of parts. Fig. 7 shows the control and motor circuit connections for an equipment suitable for four, 130 h.p., 600-volt motors. This controller gives five series and four parallel steps and is operated by nine control wires in the train line. The connections shown are for a hand control but, by the addition of a series relay in one of the motor circuits and one finger on the control cylinder of the main controller, the equipment can be made automatic with current limit. This series relay opens up the control circuit of the "off" magnet thus preventing the "notching up" of the motor controller when the motor current is above a predetermined value.

The master controller is provided with a "slip ring" attachment which closes the trolley circuit to the control when the master controller is moved from the "off" to the first position. This contact remains closed with any forward movement of the master controller handle, but it immediately opens if the handle is turned backward and it cannot be closed again without returning the handle to the "off" position and, again advancing.

Line breaker element No. 1 is so interlocked that it can close only when the cam locked is in the "off" position, and the cam controller cannot advance from the "off" position to the first position until this element No. 1 is closed. Therefore, the control has been made, as far as possible, proof against abuse, improper, or unsafe operation.

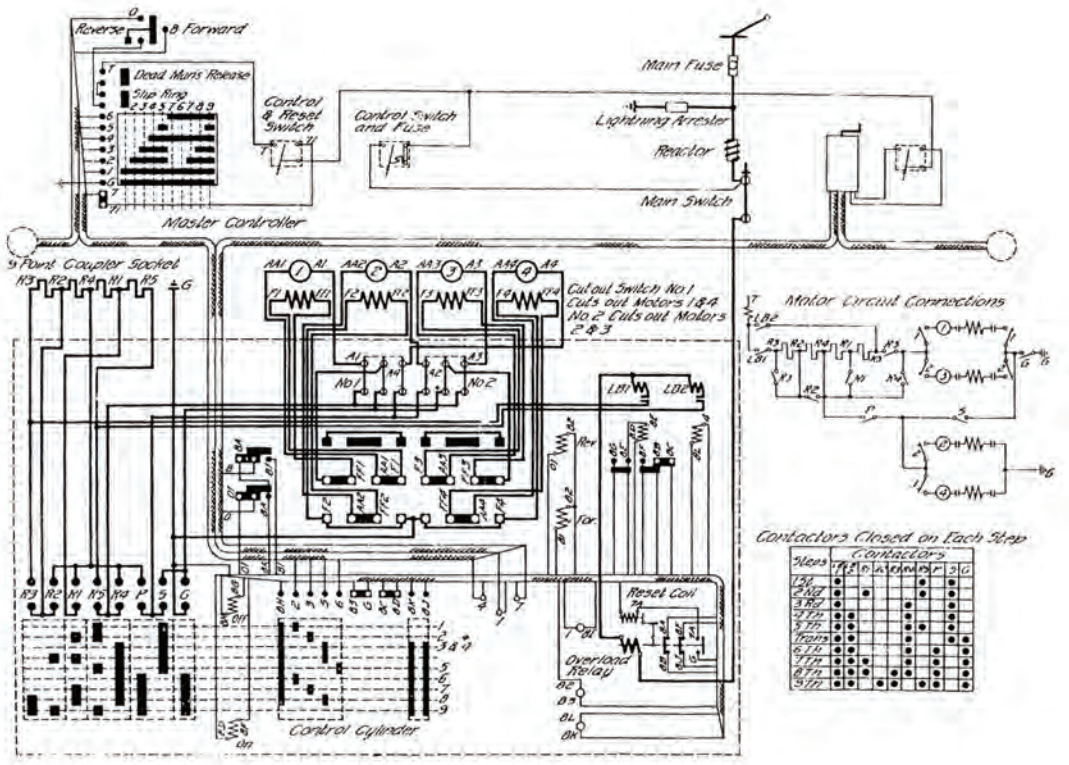


Fig.7:
Connections of Sprague-General Electric Multiple Unit Type PC Control for Four 130 h.p., 600-volt Motors.

The control current required to operate the magnet valves is approximately 0.3 amperes per car on a 600-volt circuit. Only a part of the energy represented by the above current is used in operating the magnet valves; consequently, the control is particularly adapted for use where the control current is to be taken from a small battery on the ear.

A prominent feature of this control is that the sequence of operation of these contractors is positive as they are closed by the cam and opened by a stiff spring. This feature effectively eliminates the trouble found in using individually operated contactors, viz., that due to the time lag of opening and closing which varies with the electrical connections, voltage, air pressure, etc. This controller has also the advantage of insuring that, regardless of the rapidity with which the motorman advances the master controller handle, the main controller must advance through all the successive steps exactly the same as does a drum controller, which not only protects the motors from abnormal rushes of current but also avoids improper circuits in the controller itself.

This type of control contains, therefore; in one piece of apparatus what was formerly located in three separate boxes, that is, the circuit breaker, the contactors, and the reverser. As will be seen from Fig. 2, all the conduit inlets are at the back, the cables going into the box and directly to the terminals thus eliminating much of the interior wiring that was necessary on former types of equipments: The cable inlets are located on a hard wood strip to insulate the box from the conduit, as it is recommended that the controller be insulated from the grounded framework of the car. Due to the combination of these pieces of apparatus in a single box, this new type of control equipment is considerably lighter in weight than other types of multiple-unit control of equal capacity, and occupies much less space under the car.

This control system is applied to either two or four-motor equipments for 600-volt or higher voltage systems, and for motors of any capacity. It is also applicable where tap-field motors are used. When used on a line of higher potential than 600 volts, a dynamotor is not required as the small amount of energy necessary for operating the control magnets can be obtained by the use of a control resistor.

HERE AND THERE
AUSTRALIAN AND OVERSEAS NEWS

Sydney Variotrams

Transport for New South Wales has called for tenders for the purchase its fleet of Variotram light rail vehicles, retired with the introduction of new Urbos 3 cars.

The seven Variotrams, numbered 2101 to 2107, were built at Dandenong and introduced in 1997 with the opening of the first stage of the Sydney light rail system. Six of the original fleet continued to operate until the coming of the new cars, which began at the end of 2013 with deliveries completed in May 2015. (Car 2106 was scrapped following a derailment in October 2013.) With current stabling constraints, there was a need to retire the fleet of Variotrams and they have been removed to storage at Penrith.

The Variotrams have an overall length of 29m and a width of 2.65m. The capacity of each tram is 217 passengers, including 74 seated. The vehicles have a low-floor access level of 290mm above the rail. They can achieve a maximum acceleration of 1.2 m/s^2, a top speed of 80 km/h and are capable of travelling up a maximum gradient of 6 per cent. The articulated design allows for a wide body vehicle without over-swing on curves, and their air conditioning equipment was designed specifically for the Sydney climate.

Gold Coast light rail

Gold Coasters have voted with their feet and made more than six million trips on the light rail system during its first year. The $1.2 billion tram system marked twelve months on 20 July since it first took passengers, and patronage figures have greatly exceeded the expectations of GoldLinQ and political leaders. The trams have travelled more than one million kilometres and driven a 25 per cent increase in public transport patronage on the coast in their first year of operation.

Figures show 6.18 million trips were made on the 13km system across 365 days, or around 18,200 trips each day. This was far beyond the 5.70 million expected before opening, with the Queensland Government now tipping close to 7 million in the next year. These figures do not include the 80,000 people who used the trams on their free trial day when the system was launched. That figure was also above the forecast of 50-70,000 travellers.

The success of the first year has added to the pressure for an agreement to be reached for the construction of the system's second stage that would link the trams to the Gold Coast railway. A survey undertaken on the Gold Coast found more than 82 per cent of respondents support this plan.

Sydney: Light Rail for Green Square

For the first time, the NSW Government says a light rail line is needed to accommodate the massive growth in apartments in the area around Green Square in Sydney's inner south.

Transport Minister Andrew Constance says more mass transport will be required to prevent the area becoming a congestion choke zone. Mr Constance's comments represent a departure from the Government's recent opposition to a light rail line to Green Square, and also that of the previous Labor government.

While the City of Sydney Council has long championed a tram line through the area, it has found little government support for the scheme. But the precinct, which extends from Waterloo and east Alexandria in the north to the northerly parts of Rosebery in the south, is rapidly becoming the most densely populated area in Australia, a situation Mr Constance says needs to be addressed.

"I'm very keen on seeing light rail go to Green Square," Mr Constance said. "The main reason being we've got no mass transit system for what is an area of Sydney that is putting 50 new apartments up every week – it's extraordinary," he said. "So light rail I think will feature very heavily through there."Lord Mayor Clover Moore said she "really welcomed" Mr Constance's comments and looked forward to working with Transport for NSW to make the project happen. "The population of the area is already booming and there are nearly 10,000 apartments due for completion over the next four years," Cr Moore said. "Green Square West has a heavy rail station, but the concentration of development is in the north and east parts of Green Square, an area that is a 20-minute walk from the station. Residents rely on overcrowded buses which will not accommodate future demand."

Warringah Council's former Rozelle car R 1753 has been cleaned of rubbish and broken glass ready for restoration work to begin. Howard Clark

Narrabeen tram waiting shed

Warringah Council has announced details of a $2 million upgrade proposal for the historic Narrabeen tram waiting shed. Subject to development approval, a tram display and cafe would become part of the Tramshed Arts and Community Centre.

One of the features of the plan would be a heritage tram display on the Pittwater Road side. The council has tram R 1753 from the Sydney Tramway Museum, which was formerly at Rozelle; a community team has been refurbishing the vehicle. Tram services in the area ceased in 1939. A privately run cafe is planned to operate next to the tram display.

150 years of Berlin trams

On 22 June 1865 the first German horse tram line was opened. It ran from Charlottenburg to Berlin's Brandenburg Gate.

On Sunday, 28 June 2015 a commemorative tram parade was run from the Lichtenberg tram depot to Alexanderplatz and back. Eleven tram sets operated in the parade in Siegfriedstraße near the tram depot exit.

An open top horse tram was on display in the depot hall. The Gotha and Tatra T6A2/B6A2 bogie cars used in the parade had not been in service for many years and had received an inspection by the BVG for this event.

A horse car of the Große Berliner Pferd Eisenbahn (Great Berlin Horse Railway) on display in Lichtenberg depot for the centenary. Christof Henseler

BALLARAT
BALLARAT TRAMWAY MUSEUM
PO Box 632, Ballarat, Victoria 3353 www.btm.org.au

From Dave Macartney and Warren Doubleday

Restoration work

Work continues on the restoration of former Melbourne Restaurant Tram No. 939. The interior is being altered to conform to current day requirements and a new cab front from No. 908 has been fitted to replace the original, which was in poor condition. The paintwork is largely complete, with the panel work in a strong blue colour. Clinton Pearce of the Western Springs Tramway in Auckland has been assisting us in finishing the No. 2 end cab as well as completing other refurbishment work on the tram. Other activities around the depot have seen the repainting of tram No. 18 continue, repairs started to the truck at UGL Ballarat, preparation of tram W6 998 to go to Perth and commencement of the preparation of a landscape plan around the depot.

On 3 June W2 No. 504 arrived at Bungaree for storage. Between 1978 and 1982 sixteen W2s were painted all over by a number of Melbourne based artists under the Transporting Art program. No. 504 was the last W2 painted under the program to remain in government ownership, and it had been in storage at Preston since 1987. With the current rebuilding of Preston Workshops into a running shed, covered shelter for 504 had to be found elsewhere. The Museum is storing the tram on behalf of the Victorian Government, which continues to own it. Just prior to the withdrawal of the W2 class, an auction was held on 7 December 1986 for disposal of fifteen of the sixteen trams.

Tramway operations

On the traffic front, a Tram Showcase event took place on 24 May, with all available Ballarat SEC trams making at least one appearance in Wendouree Parade during the course of the day. This was very successful, particularly with photographers, who could record the entire former SEC fleet in a single day. Many all-day tickets were sold with 300 passenger journeys being recorded and 242 people visiting the display in the depot.

Following their success last year, two 'Biggest Morning Teas' were held on 28 and 30 May. While the numbers were not large, this charity event generates some revenue and a lot of goodwill.

No. 33 waits at the pedestrian crossing near Depot Junction, during a night charter on 24 May. Roger Gosney

Ballarat in winter can get cold, sometimes, perhaps even snow! For this winter, the BTM has introduced a cosy tram where rugs are supplied to passengers to rug up if needed. Conductor Roger Gosney issues tickets in the saloon of No. 27.

Peter Waugh

Another new enterprise this winter is the 'Cosy Tram'. With the temperature in Ballarat in July rarely making double figures, the service tram each day runs out well equipped with an assortment of rugs and crochet work sourced from many a church fete to keep the passengers warm and, we trust, happy. The link to the *What is a Cosy Tram?* on our webpage has been very popular.

A visit by the 5th Mount Pleasant Scout Group on 12 May saw No. 33 operate at night in Wendouree Parade. This was a first for some of our crews who had never had the opportunity to drive a tram at night and found out just how dark it is out there in the Gardens.

Other projects

Funding for the commencement of the reconstruction of part of Wendouree Parade was received from the City of Ballarat early this year. The first step was the purchase of rail, sleepers, weld kits and dog screws. These have been received and are now in storage. Planning to carry

Once again 'Wayne Swan' is told he can't ride without a ticket by driver Roger Gosney.

Peter Waugh.

Trams 28 and 38 pass each other at Gardens Loop during the BTM's Tram Showcase day on 24 June, in a lovely autumn setting in Wendouree Parade.
Simon Perrin

Looking like a ghost tram emerging from the mists of time – 939 has its bogies and underside steam cleaned on 17 June. Peter Waugh

out the work has commenced. When the installation of equipment on poles along the tram line started recently, we found out that the Victorian Government is installing Wi-Fi hotspots in the Gardens area. We understand that there will be some nine aerials installed alongside the tramline. Access to these will be free for visitors to the Gardens.

Outside the depot, alongside the fish hatchery fence, the Council has installed two tramway waiting shelters built to the Ballarat design. A number of these were installed at bus stops after the system closed, built in the tramway style, but were subsequently replaced in turn by the current bus shelters, which offer better protection from the elements.

The extension to the Archive Room, located above the mess room and substation, was built during May and June. Painting and fitting out is now under way. This will enable the existing room to be given over solely to storage, while the new room will be used as a work space and for meetings. A suitably sized long thin table is being sought!

Commemorating the First World War

A temporary exhibition to remember the Ballarat trammies who fought in the First World War was provided in the Museum's display area. The 40 trammies included those who worked for the Electric Supply Company of Victoria, the operator of Ballarat and Bendigo trams before, during or after the war. We found out a lot more about the lives of those who were involved than we knew previously. Display items came from the Museum's collection, the RSL, and from private collections. The exhibition will run to 20 December 2015, the anniversary of the withdrawal from Gallipoli.

Promoting the Museum on the Internet

In order to improve awareness of the Museum and provide another mechanism for promotion, the Museum commenced a Facebook page in 2013. This year has seen a concerted push to get our 'likes' up and provide an almost daily post about our activities, historical photos or just a witty or novel caption to a photo. Some recent news on the page has been about the visit on 3 July of the TV program *Selling Houses Australia* and the photo competition *Ballarat Through My Eyes* that feature our trams. You don't have to be a Facebook user to access our Facebook page; it is linked from the front or home page of our website – www.btm.org.au

Late last year the Museum commenced a free digital monthly publication known as *Ballarat Tramway eNews*. Anyone can subscribe by clicking on the link on the front page of our website. It gives an update on what is happening and forthcoming events.

BENDIGO

BENDIGO TRAMWAYS

1 Tramways Avenue, Bendigo, Victoria 3550 www.bendigotramways.com

From Bendigo Tramways

Our ANZAC tram

As reported in the May issue of *Trolley Wire*, work on Bendigo's ANZAC tram, a modified maximum traction car that was once an MMTB E class, was completed on 22 April. The tram was repainted in its original PMTT colour scheme and has been renumbered back to No. 45. Fittingly, the tram was recommissioned on Anzac Day.

Despite a somewhat rocky start to its new service life, No. 45 has been used daily on our prime run: the 10:00am departure from the Central Deborah Gold Mine. Operating with a different commentary from the rest of the Bendigo fleet, the ANZAC tram provides a glimpse into the lives of people involved in the First World War. Describing sights that may have been seen when riding the trams in 1914, the commentary on No. 45 is filled with stories, personal letters and interviews with the men and women who selflessly gave of themselves during a very difficult time in our nation's past.

W8 class upgrades

Upgrading of SW6 957 to a W8 class was completed recently, with the tram being returned to Melbourne for use on the City Circle route. No. 957 is the second tram to be rebuilt to the W8 class specification at Bendigo on behalf of the Victorian Government and Yarra Trams (and the third W8 class – the first, No. 946 was

Tramways Manager Jos Duivenvorden, speaking about No. 45 at its launch. Bendigo Tramways

An interior view of car No. 45 showing the new longitudinal seating. Howard Clark

Our Workshop team standing in front of 957 at her launch.
Bendigo Tramways

rebuilt at Preston). The tram was formally farewelled from Bendigo by Jacinta Allan, Minister for Public Transport and Member for Bendigo East, on 20 May. Our hard-working staff appreciated the Minister's visit to our workshop and the opportunity to present their exemplary restoration work.

Work on the next tram to be upgraded to the W8 class, W7 1010, is proceeding smoothly with the project now in its third phase. The tram now has a new fibreglass roof, and crack testing was completed some weeks ago. Our workshop staff are currently working on the ends and cab frames.

Sydney tram projects

Work is also proceeding on two Sydney trams: R1 2050 has been moved into the paintshop where work will continue; and R1 1995 has arrived at our Hargreaves Street depot, having first been stripped down to its framework at the gasworks. Refurbishment of car 1995 is being done under contract for the Mirvac Group, which plans to develop a new shopping centre at the former Rozelle tram depot in Sydney. The company proposes to display No. 1995 inside the building, with visitors to the shopping centre being welcome to hop aboard.

Tram operations and infrastructure

With the winter school holidays having come and gone, we are pleased to report that our half-hourly service carried over 2000 passengers during the two weeks, with nearly 300 stopping at the depot for the half-hour depot and workshop tour. Both figures are up on last year – a good result.

Birney car No. 302 is bursting with an explosion of colours and patterns after being 'yarn bombed' again by a local group of 'needling ninjas'. A post about this on our Facebook page received an unprecedented response, with a resulting increase of more than 4000% in Engagement and Post Reach from our page.

Car 957 commences her trip from Bendigo to Melbourne.
Bendigo Tramways

Andrea and Michael keeping warm beside yarn bombed 302 at the Central Deborah terminus. Bendigo Tramways

Running and maintaining a tramway involves a lot of work, not just in the running of the trams themselves but also in the maintenance of infrastructure. Recently we completed some capital works where we re-laid the Tysons Reef curve, between Weeroona Avenue and Bridge Street. Taking three weeks to complete, we were unable to run trams past Lake Weeroona. During this time passengers were invited on a 10-minute introductory tour that briefly covered the history of Bendigo's Tramways and provided with a short description of the full depot and workshop tour.

Driver John inside tram 302 which displays the results of being yarn bombed by a local group. Bendigo Tramways

The Lego model of Bendigo Tramways southern terminus at the Central Deborah mine, complete with tram.
Bendigo Tramways

In the past month the Bendigo Tramways and Central Deborah Gold Mine were pleased to discover that we were memorialised in, of all mediums, LEGO! Local citizen Michael Peebles was assisted by his son to recreate the Central Deborah Gold Mine, as viewed from the surface, along with the southern terminus of the Tramways. This amazing model features a moving miner's cage and a moving tram closely resembling a B class. This model was quite a hit at both the Queenscliffe Bricks exhibition and Bendigo's Inside the Bricks exhibition where models made from thousands of Lego bricks were displayed.

BYLANDS

TRAMWAY MUSEUM SOCIETY OF VICTORIA

38 Piccadilly Crescent, Keysborough, Victoria 3173 www.tramwaymuseum.org.au

From Running Journal

Society administration

At the Special General Meeting held on 21 March 2015, a number of members offered their services to the Society for consideration for elevation to board positions. At the subsequent meeting of the remaining board members held at Bylands on 12 April, the nominees were officially elected to the various positions available. The makeup of the current board is now:

Chairman	Anthony Sell
Deputy Chairman	Andrew Hall
General Manager	Geoffrey Dean
Board Members	Noel Adams
	John Perritt
	Graham Jordan
	Paul Constantinidis
	William Fedor
	Stephen Johannessen

At the following Board meeting in early May 2015, several appointments were made. These included Graham Jordan being re-appointed as Secretary and Treasurer after a six-year absence. Other appointments saw Paul Constantinidis and John Walker appointed as Membership Officer and Operations Manager respectively.

Our new signage at the Union Lane entrance to the museum. William Fedor

Readers are asked to note that the Society's official postal address is now 38 Piccadilly Crescent, Keysborough 3173.

Museum activities

Works have commenced around the site, undertaken by a small but dedicated band of members. The main thrust has been to clear and tidy unsightly areas that are either in or visible from the public's domain, and to present a more pleasing landscape for visitors.

One of the priorities of the new board is to place W3 667 under cover. Because we are presently unable to shunt the running sheds to make room, we need to move the car by crane and/or truck to another location such as the pit shed or Exhibition shed. The damp conditions that arrived early in autumn and continuing into the start of winter have made ground conditions too soft for heavy vehicles. It will be necessary to wait until later in the year when the ground dries out before this move can be made.

We are working with the Men's Shed to rework the existing lease arrangements and protect the Society's interests, including a return of the kiosk entrance hall to the northern end of the Bristol building.

New signage has been erected at the front gate. It proclaims our new trading name 'Tramway Heritage Centre' and website address. Our website, at www.tramway.org.au has been redesigned and updated.

Accreditation

Work continues towards the Society's accreditation with Transport Safety Victoria. Following the recent change of management of the Society, a meeting has been held with senior TSV management to explain the Society's current positions both administratively and at Bylands.

TSV has been supplied with copies of our previous (pre-June 2009) accreditation documentation and they are presently reviewing its alignment with current regulations.

Kilmore cable car shed in Hudson Park in April 2015. John Walker

FERNY GROVE
BRISBANE TRAMWAY MUSEUM SOCIETY
PO Box 94, Ferny Hills, Queensland 4055 www.brisbanetramwaymuseum.org

From Peter Hyde

All photos by Peter Hyde

Although painting of the interior of Dreadnought 136 is almost completed, the laborious task of removing many layers of paint from the seats in preparation for re-varnishing continues. The long white panels are the advertising boards about to be placed above the windows.

With the removal of each panel more rust has been discovered in Trolleybus 34. Part of the scaffolding for access to the roof is visible in this view of the front of the vehicle.

John Hudson is hard at work on the traction motor leads underneath FM400. The bogie kingpin has been wrapped in light cloth as a warning against bumping into it.

For the first time in more than 40 years one of the former tramway welding trucks is exposed to sunlight during a cleaning and clearing project in the store building.

One of the problems in operating a museum spread over ten buildings on a sloping site is convenient access. A short paved pathway has been completed between the machine shop and the general maintenance building, and a stairway is under construction from the machine shop to the levels of the tram depots.

HADDON
MELBOURNE TRAMCAR PRESERVATION ASSOCIATION
324 Sago Hill Road, Haddon, Victoria 3351 www.mtpa.com.au

From Anthony Smith

Restoration of W5 792

Work is continuing on the stripping of the body in preparation for overhaul. All the interior trim and wall linings have been removed, which has confirmed our initial assessment that all the saloon pillars will need replacing due to rot. It is fortunate that we have these items on hand as they were obtained many years ago as part of a large batch of timber components being disposed of by the tramways.

The drop-centre quarters and bulkheads have had all the cover strips and sheet metal panelling removed. This has revealed that while the timber framing of the bulkheads are sound, the same cannot be said of the quarter panel frames. Unfortunately the rot and damage in all four quarters has rendered them beyond restoration. Again, we are lucky that we have a number of these items on hand so they can be replaced without major cost.

The remains of both cabin windshields as well as the controllers, piping and other fittings have been removed from 792. Work will shortly commence on the dismantling of the vent roof section. This has been found necessary because of rot and structural damage to a number of vent roof support ribs. While we will be able to reuse most of the roof boards it is going to be a slow process to remove the numerous screws without damaging the boards. When the vent section of the roof is removed, repairs will be undertaken on the front fascia panels that have been covered by fibreglass on both sides of the roof sections.

Perway and overhead work

During June major repair works were undertaken to No. 3 road within the carbarn due to track movement. This involved cutting of bitumen floor surface, followed by excavation works. When the floor was opened up it was discovered that the movement was caused by the contamination of the track base with mud. Accordingly, the old sleepers were removed and the roadbed was excavated to remove the old filling, which was replaced by blue metal and then compacted. New, treated pine sleepers were then inserted, fastened to gauge then backfilled and packed. In addition, a number of tie rods were fitted. With the need to complete this work on the same day and make the track serviceable, it was a very busy time for our two workers.

Work has commenced stage one of the project to replace the span wire support networks over both the north-west and south-west curves. In June a start was made on the fabricating the replacement spans for the north-west curve. So far a number of pole collars and pull off spans have been fitted, and the support

Kym Smith fitting new pull off spans to the poles at the commencement of the north-west curve. Anthony Smith

Excavating the track on No. 3 road is underway for sleeper replacement. Jacqui Smith

network has been prepared for the changeover that will occur shortly.

Additional storage

With the need to house items removed from W5 792 together with other timber components, we have decided to acquire an additional storage container. During May, foundation holes were dug and concrete poured in readiness for its arrival. The container arrived in early June and work immediately commenced on its fit-out. During this period we acquired a quantity of second-hand pallet racking that has since been modified for use as shelving. We have also fabricated a number of special purpose brackets.

View showing trial fitting of a line breaker in the test cabinet. Jacqui Smith

Frank Schroders compacts the new road base metal on No. 3 road. Anthony Smith

Anthony Smith tops up the compressor oil on VR 41 during servicing. Jacqui Smith

William Adams prepares the English Electric controller on 792 for removal. Anthony Smith

William Adams and Daniel Edwards remove the cover strips and drop centre panel on 792. Jacqui Smith

The advertising weather strip being removed from the saloon panel of 792. Jacqui Smith

to store long timber sections such as roof boards, drip rails, and cable ducts. Work is currently under way on sorting and staking items into this area.

Test room equipment

Work is finally underway to complete the electrical test bench to enable this facility to test and calibrate tram line breakers. In early May a special mounting frame was designed and fabricated. This frame has been fitted into the test cabinet and a line breaker trial mounted to enable the various test leads to be measured and made.

Tram servicing

In recent months our members have been kept busy servicing L 103, VR 41, and W2 407. Particular attention was given to the K35 controllers on 41 and 407, and the line breaker on 103.

LAUNCESTON

LAUNCESTON TRAMWAY MUSEUM SOCIETY

PO Box 889, Launceston, Tasmania 7250 www.ltms.org.au

From Robert Quinn

Our "*Trevor the Tram*" was assembled in the museum's display hall to provide a source of enjoyment for children, thereby giving Mum and Dad or grandparents some museum time while viewing our displays. The youngsters soon become involved and seem contented.

Recently, "*Trevor*" received his face. This work of art was carved by Rob Van Galen of Launceston. Close up, the detail is truly amazing! Youngsters spot this as soon as they enter the Museum Display Hall.

LOFTUS

SOUTH PACIFIC ELECTRIC RAILWAY CO-OP SOCIETY

PO Box 103, Sutherland, NSW 1499 www.sydneytramwaymuseum.com.au

From *SPER News*

New arrivals

On 27 May **Berlin 3007** and **Milan 1692** were moved from Hawthorn Depot to Bendigo, where they were stored temporarily pending onwards transfer to Loftus.

The temporary unloading ramp was set up on the eastern track north of the trailing crossover on 13 June. Berlin 3007 arrived from Bendigo about 2.45pm on 23 June

Berlin 3007 is carefully watched as it is pulled gently off the trailer onto the unloading ramp.
Martin Pinches

and was unloaded using the ramp the following morning. The pantograph had been removed for transport so it was towed by sister car 5133 (formerly 3008) and placed on the traverser to await the arrival of 1692.

Milan 1692 arrived at Loftus on 25 July, and was similarly unloaded using the ramp. It rolled onto the rails just after midday. The coupling on overhead line car 99u turned out to be readily compatible with the Milan car, which it towed and then propelled up to the top shed.

A shunt preparatory to the arrival of these cars saw them placed under cover, and the Berlin trailer and Munich 2666 moved outside again.

The arrival of Milan 1692 at Loftus occurred almost 19 years after contact was first made with ATM, the operator of Milan's trams, about the possible acquisition of a tram, and almost 14 years after the car arrived in Australia. Although there have been many lengthy restoration efforts, this must be a record for the time taken for an operable tram to reach a museum. The story of 1692 and its preservation was reported in *Trolley Wire* in May 2002.

Other tramcar news

Melbourne Y1 611 is now in service after several months of work to rectify cross connection problems with the air operated doors and to modify and improve some of the control systems on the car. The brakes are now compliant with Sydney's left-handed operation. It was the last job undertaken by Mick Duncan at Loftus as he has moved to Victoria. A visit in June saw William and Fay McCabe involved in changing a number of the

Berlin 3007 is propelled to the depot yard by sister car 5133 on 23 June. Martin Pinches

Milan 1692 being towed from the unloading ramp into the museum grounds by overhead line car 99u on 25 July.
Dale Budd

The museum mounted a small display with video outside No. 3 platform at Sydney terminal station for the Transport Heritage Expo over the Queen's Birthday weekend, 6-8 June. Here, Peter Kahn keeps an eye on things during a quiet moment. Robert Merchant

CSO workers lay a brick surface to the ramp into the YMCA building on 18 April.
Danny Adamopoulos

incorrect interior light shades in the car with the correct shades.

Ballarat 37's wiring has been completed, and the roof hardware is being fitted after some modifications to the anchoring arrangements. The bogies only need a steam clean before reassembly. It is hoped that this car will be operational towards the end of the year.

In the workshop **Melbourne cable grip car 322** is receiving the finishing touches to its bodywork. Work has continued on preparing **Sydney C 37** for painting.

Leusink Engineering has modified three Adelaide Tomlinson couplers to match a sample Sydney coupler, and they were returned in April. The six-inch difference in the distance from the coupler face to the pivot point between the Adelaide and Sydney couplers required modifications to be made so that the Adelaide couplers can be used on P 1729 and PR1 1573.

Rubber-tyred news

The Matador recovery vehicle is again fully operational following an extensive overhaul. The project started out as an engine change but many other things were found to require attention and were rectified.

The Broomwade air compressor, which now has had extensive work including a new roof and side panels, has moved off site to be shot blasted and painted with two-pack. This will return it to its original manufacturer's corporate green colour.

A new fence – thanks to Sydney Trains

Sydney Trains arranged for a contractor, Northern Fencing Specialists Ltd, to replace the old chain link fence along our common boundary with a new 2.4m-high powder-coated tubular fence similar to that around the TAFE College. We express our grateful thanks to Sydney Trains for replacing this fence which, we hope, will increase site security.

A night photo from our Photographers' evening. Craig Parkinson brings the beautifully restored AEC double decker 2619 through the depot yard gate to pose for more photographs.
Greg Davis

Photographers' afternoon

Our first Photographers' Event was held on 25 July and the results were impressive.

The on-line response was phenomenal. There were over 6000 views of our Facebook page, and over 1200 engagements (comments/likes/shares etc.) - a huge publicity win for the Museum. Images also appeared on other Facebook pages, enhancing the publicity.

Financially, the day was also successful. We were open for just four hours but took around a good full day's takings.

Five static photo 'sets' were created, and three tram runs were made for further photographic opportunities. The sets included Edwardian Sydney, a 1920s 'Silver Service' picnic, a 1950s Sydney peak hour, a 1960s Brisbane and a 1990s 'The Met' Melbourne (with Y1 611 substituting for Z2 111 which was unavailable). One trip, using 1497 and 1979, went to the Royal National Park for photographs in the afternoon, while 1979 went north to Army Hill during dusk and early night.

Visitor feedback was entirely positive, and many are asking for a summer time repeat either later this year or early in 2016.

This was a team effort and thanks are expressed to everyone involved, from the maintenance and restoration teams to the traffic staff as well as those who provided motor vehicles, an essential part of the 'sets'.

The tramway museum goes to the buses

The Museum was recently able to obtain some invaluable advertising space on the rear of a charter bus in the Warrigal Coaches fleet in the Illawarra region. The advertisement, which takes up the entire rear window of the bus, features images of trams and information together with a map of the Museum's location.

Extremely favourable terms were negotiated for this advertising with considerable savings on the normal cost. The advertising has already proved its worth with a number of verbal and written confirmations from visitors that they have noticed it.

The artwork prepared by Transit Graphics for applying to the bus rear window.
Courtesy Transit Graphics

Extensive work was being carried out on Army Hill on 20 June to ease the grade, and to install conduits for a negative cable. Martin Pinches

The Illawarra is an important but sometimes forgotten market for the Museum as we are located beside both the main road and rail arteries between Sydney and Wollongong.

Many thanks to Adam Hayhurst for his initiative in making this advertising possible, to Transit Graphics for preparing the artwork and to Warrigal Coaches for making a coach available.

Track and associated work

The long welded lengths of 53kg rail that were laid out between Army Crossing and TAFE Crossing on the western side of the track have been dragged down to TAFE Crossing with overhead line car 99u and were moved to the eastern (Rawson Avenue) side of the track with No. 3 forklift and CSO workers with crow bars. This was done to allow Small's Poles access for their post hole boring/pole erection machine between the two crossings.

Replacement of more life-expired timber sleepers has been carried and a track drain has been prepared for future use at Army Crossing.

On 9 June the 12-metre lengths of 80lb rail on Army Hill were dragged up into the northern terminus area where they have been welded into eight 120-foot lengths for re-use on the hill. The welder needs a 415 volt power supply which is available in the terminal area but not down the hill.

We have had problems at Army Crossing since the Sutherland line opened in 1988 with water flowing over the track during and after heavy rain. This was due to the pipes under our track and under the driveway to the Army Depot being inadequate in size.

With the track on the hill removed the opportunity was taken to excavate beside the existing pipe under our track and to insert two additional 300mm diameter pipes. This will move the problem downstream to the Army driveway where the Council has plans to lay an additional pipe to increase capacity.

On 20 June the roadbed on Army Hill was excavated to regrade the slope and to remove the hump halfway down. A trench for conduits for a future negative feeder was also excavated, and further work on the hill was scheduled to follow. Materials have been purchased to make sufficient tie bars for the track on the hill.

The last panel of the temporary track previously laid outside the new south shed has been removed to allow vehicular access.

Overhead work

New treated poles have replaced five termite-infested poles and wires have already been transferred to some of them.

Two new cross spans were installed on the sharp curve near No. 2 substation in preparation for the new pull-offs. Due to the issuance of a Safety Notice, we cannot carry out any overhead work that involves the overhead line car or the tower wagon. Most of the work carried out is preparation activity in the workshop.

ST KILDA

AUSTRALIAN ELECTRIC TRANSPORT MUSEUM (SA) INC
PO Box 213, Salisbury, South Australia 5108 www.trammuseumadelaide.com.au

From Colin Seymour and Kym Smith

New depot and workshop progress

The timber components for the troughing for Road 6 have been constructed, with work now progressing on the steel fittings to hang the troughing. It is expected that installation will occur by August. We need to secure further donations to assist with progressing the maintenance pit for Road 6 and the completion of the flooring for the shed. Accordingly, donations towards these projects would be most welcome.

Track and overhead

More track and overhead days will be scheduled during the cooler months to try to ensure that we maintain the line in good operating condition.

Recently four members changed out eight sleepers along the tree reserve, using second-hand timbers obtained from the Department of Planning, Transport and Infrastructure.

Work has also progressed on preparing a replacement poles for Pole 18 and several others requiring replacement along the lakeside track and for planned works at the Playground.

Bib & Bub set

Work has progressed on trams 14 and 15 with panelling completed, lighting being installed and Brill Winner saloon seating being fitted to tram 14. The set looks fantastic, and ran a couple of trips for members on the AGM night. The project is a credit to all those who have worked on the restoration and who have supported it through donations.

Annual General Meeting

The Museum's Annual General Meeting was held on 30 May 2015 with the following members elected to positions on the Executive Committee:

President	Kym Smith
Vice President	Chris Andrews
Secretary	Mark Jordan
Treasurer	Julie Lench

Car 15 (front) and car 14 on the lakeside track on 30 May. The pole on car 15 has been raised for the return journey to the Museum. Arnold Krueger

Bib and Bub cars 14 and 15 in the yard after the Annual General Meeting on 30 May. Arnold Krueger

Restaurant tram H 378 in the Museum yard for a dinner charter by the Historic Military Vehicles Association on 27 June. Melbourne W7 1013 is in the background. Kym Smith

Site and Safety Manager	Jack Pennack
Trustee	Maureen Parker

In addition to Bib & Bub cars 14 and 15 running several trips for members on the night, films from the late Jim Burke and Ron Jenkins were shown by Ron Jenkins and Kym Smith.

New Operational Rules and Standards

New Operational Rules and Standards have been produced as part of the Museum's Safety Management System. The new rules replace the Conductor's, Motorman's and Despatcher's Rules that existed in previous iterations of the SMS with this single document, and reflect the current operational practices at the Museum.

Restaurant tram charter

The Historic Military Vehicles Association visited the Museum on 27 June for a dinner charter on restaurant tram H 378. They cooked the three-course meal 'army-style' on the camp trailer adjacent to 378.

Interior view of restaurant tram H 378 in preparation for a three-course meal 'army-style' on 27 June. Kym Smith

WHITEMAN PARK

PERTH ELECTRIC TRAMWAY SOCIETY (INC)
PO Box 257, Mount Lawley, Western Australia 6929 www.pets.org.au

From Michael Stukely

Traffic operations and service cars

Tram services resumed on 28 March following a major interruption caused by lightning damage to the overhead in the Village Mall on 4 February. Full replacement of several damaged insulator sets was carried out here, with thorough electrical testing then being completed.

Easter, as usual, was a very busy time in the Park as a result of fine weather and there were two trams in service on each of the four days. W2 329, W2 441 and Fremantle 29 were used. Special thanks go to our Sydney-based members Hayden Holmes and Scott Curnow who travelled to Perth especially to assist with our Easter tram services, with local members Shane Parsons, Trevor Dennhardt and new conductor, Rebecca Edwards. Services then ran on seven days per week throughout the April school holidays, with a very good overall result.

W2 329 was the main service car in April and May, with 441 and FMT 29 also running on a few occasions.

New carbarn project

In late May, Park staff burnt three large heaps of well-dried vegetation on the site, clearing the way for further progress on the shed development. Final site pegging has been completed. Bryan Adcock has measured the site levels and four truck-loads of clean fill were received from other Whiteman Park works fortuitously now in progress, and dropped at the west end of the new carbarn site on 17 June. Seven stored lengths of grooved rail were re-stacked by John Azzaro (with the crane), Bryan Adcock, Nick Tsiaglis and Lindsay Richardson to enable clear access to the work site. Final quotes and approvals for construction will now be obtained.

General

Three steel traction poles were installed by contractors in late June on the gradient north of the Triangle between the cattle grid and the main Village road crossing. They replace the last remaining timber poles

Easter Saturday tram crews pose with W2 441 and Fremantle 29 at the Loop on 4 April: Rebecca Edwards (left), Hayden Holmes, Scott Curnow, Shane Parsons.
Photo courtesy Shane Parsons

After terminating at Mussel Pool, W2 329 passes the logging whim displayed at the original Mussel Pool tram stop, near Bennett Brook.

Michael Stukely

on this section, which are in poor condition due to the unrelenting attack by termites and fungal wood rot.

The overhead wire connection between the pit road in the Noel Blackmore Tram Service Centre and the carbarn fan was installed in May with a parallel section alongside the Road 4 overhead, rather than a direct frog connection, due to the relatively infrequent use of the pit road by trams.

John Hallett has been steadily working on the internal refurbishment of Adelaide H 371, including retouching the painted signage, with assistance from Bill Allnutt. Work on this car is now largely complete.

Two hundred new steel sleepers of the Mark II type have been ordered. These will be used to replace the remaining timber sleepers on curves where check-rails are fitted. The Mark I sleepers, of which we have a good stock, are not compatible with fitting check-rail at the required spacing.

On 18 April, a team of seven members replaced two timber sleepers at the Stockmans Triangle North points, and upgraded and lifted two worn rail joints on Camel Curve at the far end of the paved Village Mall.

Our cherry-picker was permanently attached to the tray of the Mercedes-Benz tray-top truck in May, with the hydraulic connections now to be installed to make this important new works vehicle fully functional. Fraser Douglas has made good progress in repainting the truck's cab.

On Wednesday 6 May, a formal on-site inspection of PETS was carried out by staff of the Rail Safety Regulator. A detailed report of the inspection was provided by the Regulator and no corrective actions were required, which is a very good result.

The new PETS site entry sign, painted by Fraser Douglas, after it was attached to the newly-erected steel frame on 11 March.

Lindsay Richardson

W2 441 waits on the loop as 329 runs through from Village to Mussel Pool.

Michael Stukely

Milan 1692 pauses at Marulan, NSW on its delivery run from Bendigo to the Sydney Tramway Museum at Loftus on 24 July 2015.
Australian Train Movers

Ballarat trams 38 and 40 during the Tram Showcase Day on 24 May meet at the rebuilt Depot Junction which now allows a bogie tram to stand clear of the running line after crossing Wendouree Parade.
Warren Doubleday