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SOUTH AUSTRALIAN STATE TRANSPORT AUTHORITY HERITAGE POLICY

At the conclusion of the successful Street Passenger Transport Centenary Celebrations held in Adelaide in June 1978, the Australian Electric Transport Museum suggested that the Authority might give consideration to setting up a Transport Historical Review Committee to examine changes taking place following the creation of the Authority from the Municipal Tramways Trust and the suburban operations of the South Australian Railways. A Heritage Policy drawn up on behalf of the Committee was subsequently submitted to the Authority and has been formally adopted. The policy includes the creation of a Transport Heritage Review Committee which is responsible for the implementation of the policy. So far as is known, this represents the first formal adoption of such a policy by any Australasian transport organisation and represents a significant step forward in the transport conservation field. The policy statement is set out below:

1. The State Transport Authority, established under the State Transport Authority Act, 1974, has as its principal functions the management and operation of tramway and motor omnibus services within South Australia and under certain conditions the operation of motor omnibuses beyond South Australia and the management and operation of railway services within metropolitan Adelaide. In assuming these roles, the Authority is mindful of having taken over the responsibilities of (a) the Municipal Tramways Trust which was itself established under the Municipal Tramways Trust Act, 1906, to assume control of the Adelaide horse tramway system which had been built under the Adelaide and Suburban Tramway Act, 1876 and subsequent Acts; and (b) the metropolitan operations of the South Australian Railways whose operations derive from a series of Acts commencing with the City and Port Adelaide Railway Act, 1851. The Authority became at its formation the successor to bodies having a transport heritage stretching back over 120 years. In consequence, the Authority recognises a responsibility to help preserve historical documents, records, artifacts and vehicles representative of its operations and those of its predecessors.

2. In so doing, the Authority is mindful of its principal functions and acknowledges that under current circumstances, it cannot assume

sole physical and financial responsibility for the preservation and where appropriate, operation of historical transport relics from within its own resources. Rather, its role is seen as catalytic in initiating procedures that will ensure the achievement of responsible transport heritage preservation within South Australia. Where possible, it should contribute significantly towards that achievement.

3. The Authority recognises the prior establishment of the Australian Electric Transport Museum (SA) Inc. whose objectives include the preservation and operation of artifacts and equipment from the former Municipal Tramways Trust; the Mile End Railway Museum Inc., whose objectives include the preservation of artifacts and equipment from the former South Australian Railways; and the Australian Railway Historical Society (South Australian Division) Inc., whose objectives include the operation of rolling stock from the former South Australian Railways.

4. The Authority recognises the desirability of adopting a South Australian Transport Heritage Policy which promotes co-operation and co-ordination of effort among recognised historical bodies, both government and non government sponsored. The Authority encourages these bodies to achieve maximum standards of

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DELIVERING THE POWER TO THE MOTORS

A BRIEF ACCOUNT OF POWER COLLECTION ON AUSTRALIAN TRAMWAYS

By K. McCarthy

This year marks the centenary of the Berlin Industrial Exhibition where the firm of Siemens and Halske operated a successful electric railway. The centenary of this event, together with the recent pantograph trials in Melbourne along the outer end of the West Preston line, perhaps makes this an opportune time to present a brief treatment of methods of tramway power transmission and collection which have been employed in Australia.

The mystery of delivering the power to the motors of the new electric tramway systems at the turn of the century is perhaps best summed up in the Punch cartoon of that era. The old lady alighting from one of the new London double deck cars is asking the conductor: "Is it dangerous if I put my foot on the rails". To this question the conductor is replying: "No Mum. Not unless you was to put the other one on the overhead wire". . . .

The "Ballarat Courier" recorded on 21 August 1905 that when a native of nearby Bungaree saw the new Ballarat electric trams for the first time he was heard to remark, "I have seen trams pulled by wires

(cables) and horses, but this is the first time I have seen one pulled by a fishing line". . . .

Between the 1830's and the 1860's such inventors as Davenport, Farmer and Page in U.S.A. conducted successful trials with experimental light railway cars powered by electric motors.(1) In Great Britain, Robert Davidson of Aberdeen constructed a battery powered rail vehicle in 1837 which is reputed to have hauled a six ton coach on the Edinburgh and Glasgow Railway. The successful combination of reliable traction motors and dynamo produced current had to await the above mentioned Berlin Industrial Exhibition held at Moabit between 31 May and 30 September 1879. The firm of Siemens and Halske operated their small locomotive and cars on a 300 metre long, 600mm gauge electric line, collecting current at 140 volts from a third rail, for the amusement of visitors.(2)

During 1881 this German firm opened a public electric tramway at Lichterfelde near Berlin. The two tramcars received their 180 volt current from

FRONT COVER: *The Official Train for the Eastern Suburbs Railway opening returns across the Rushcutters Bay viaduct. 23.6.79.*

ABOVE: *One tram, one track, one wire; the three basic elements of an electric tramway are portrayed in this photo of Brisbane drop centre 293 in O'Keefe Street.*



The celebrated 'Punch' cartoon of circa 1908.

the two insulated running rails. In 1889 the cars received twin bow collectors which collected power from newly erected overhead wires. This enabled the supply to be increased to a potential of 500 volts after 1890.(3) The inventor of the sliding bow collector was W. Reichel, an engineer at Siemens and Halske and he designed the twin bows used at Lichterfelde in 1889.(4)

Another exhibition tramway displayed by Siemens in 1881 at the Paris Industrial Exhibition used double deck cars taking power from two slotted pipes attached one above the other on lineside poles about 13ft above the ground. Two collector shoes sliding in the pipe slots were attached to the car by cables and these trailed behind as the vehicle progressed along the tracks.(5)

In U.S.A. the pioneer installations by Leo Daft during the mid 1880's used an inside third rail in "off the street" locations. His street system, opened in Los Angeles in 1887 employed the "troller" system where a small four wheel trolley sat on top of twin overhead wires spaced about 9 inches apart. This trailed along, above and behind the tramcar to which it was attached by thin power cables. Siemens second Berlin line, from West End to Spandauer Bock used 300 volt power supplied by a similar "troller" system but it seems that this was replaced by the Paris type slotted tubes soon after it opened in 1882.(6)

Charles van Depoele, a Belgian cabinet maker whose business success in U.S.A. enabled him to transfer his energies to the arc lighting industry, installed a conduit current collection system for his demonstration electric tramway at the Toronto Industrial Exhibition held in Canada during 1884. In the following year he altered this collection mode to a system which employed overhead wire and a crude form of under running trolley pole. So the collection method which was to gain equal popularity in the tramway industry with the sliding bow and pantograph devices emerged.(7)

Frank Sprague, a graduate of the United States Naval Academy in 1878, installed the first modern complete system of electric tramways in Richmond Virginia in 1887 covering 13 miles of track with a fleet of 40 cars.(8) Under his guidance his colleagues established an efficient power house with three units of a total of 375 hp capacity, designed suitable traction motors, devised a method of mounting these motors in a "wheelbarrow" suspension system on separate tracks which enabled the gears to be in constant mesh, and perfected the under running trolley pole system of collection. Sprague produced a successful combination which resulted in the rapid electric tramway expansion which occurred at the turn of the century.

Edward Bentley and Walter Knight, a patent examiner and an electrical inventor electrified 2 miles of the 23½ mile East Cleveland RR Coy. in Ohio during 1884 using a primitive plough and conduit system between the rails. During 1888 Bentley and Knight installed a 4½ mile electric undertaking for the Observatory Hill Passenger Railway in Allegheny Pa. Three miles of this tramway was served by double overhead wires, located one above the other, on kerb side poles like phone wires, from which the tram collected current by trailing two shuttles at the end of cables. The remaining 1½ miles of the route was fitted with the plough and conduit system located between the tracks.(9)

At nearby Pittsburgh, Leo Daft fitted out the steeply graded Pittsburgh-Knoxville and St. Clair Street Railway. On the steeply graded 1 in 9 sections the electric tram locomotives collected power from twin overhead wires through a troller as here a rack was needed between the running rails, but on the level street sections the plough and conduit system was in use.(10)

The conduit method was adopted in Paris, London, New York and Washington where overhead wires were forbidden in the city centres. This persisted for the entire tramway operation period in those areas. Budapest in Hungary and Berlin employed the side conduit, located under the groove of one running rail, from 1887 to 1925 and from 1896 to 1907 respectively.(11) The surface stud contact system also had its followers when local opinion prevented overhead wire erection. In Britain, Hastings, Mexborough, Torquay, Lincoln and Wolverhampton at one time used the system, but Paris seems to be the only undertaking which retained the system for any appreciable time.

In some locations, where overhead wires were permitted, the telegraph, telephone, gas and water authorities some times prevented the tramway from using the tracks as an earth return through bonded rails. Cincinnati U.S.A. and Havana Cuba, used double, (positive and negative) wires for the entire

life of the tramway system. Many Japanese undertakings also employed this method, but most had converted to the single wire-earth return system by the World War II period.

Australian Pioneer Lines

All Australian electric tramway undertakings have been served by the overhead wire system. The first car on the pioneer Box Hill to Doncaster tramway, at the eastern outskirts of Melbourne, entered service in 1889 fitted with a single conventional trolley pole. This car had been installed on a temporary standard gauge electric tramway in the grounds of the Exhibition Building in Melbourne during the Centennial Exhibition from August 1888 to March 1889.⁽¹²⁾ This Thomson (sic) Houston Exhibit earned a first prize, an Order of Merit and a Special Mention when judged. The "Exhibits Catalogue" reported that this Thomson Houston Electric Coy. tramcar was constantly running in the exhibition grounds and was the first thing of this kind that the untravelling Victorians had seen. The smoothness and noiselessness with which it operated were warmly commended. It is contemplated, stated the catalogue, to introduce the electric tram in Ballarat and other cities, but the cable system works so admirably in Melbourne that there seems little chance of it being displaced.

This form of traction installed by the Thomson Houston Company, dated from 1883 and claimed to be the most successful in the world at that stage.

Photos of the first tramcar at Box Hill are too indistinct to show whether the trolley wheel

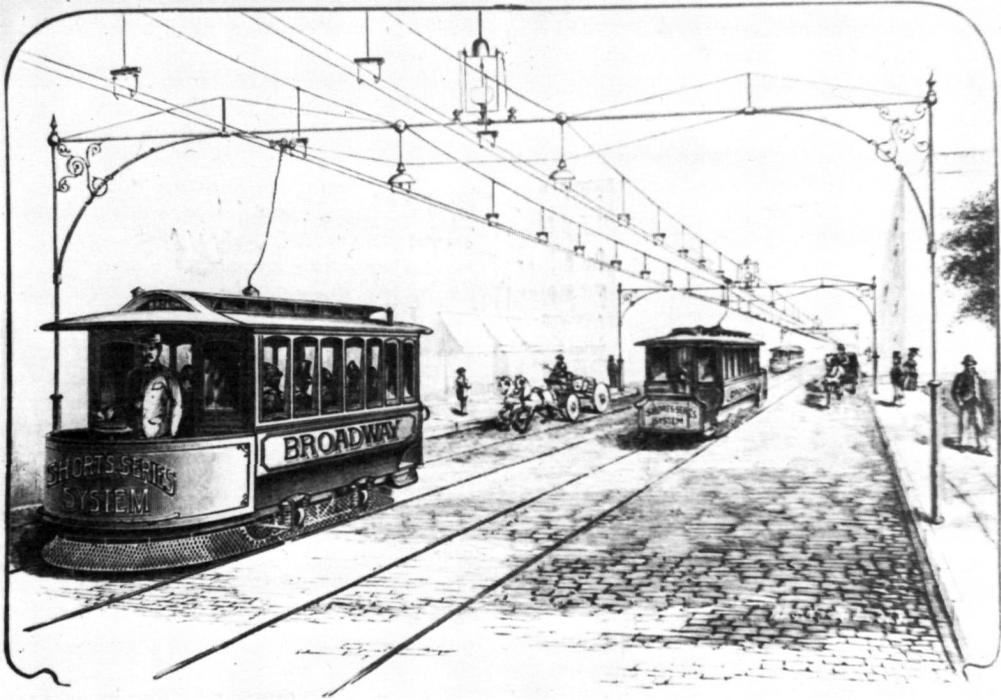
operated on a fixed axis or could swivel, but the photos of the later saloon car clearly show the fixed axis wheel in use.

The three tramcars on the experimental tramway opened by Thomson Houston between Randwick and Waverley during 1890 on the NSWGT route carried single trolley poles. The Waverley photos cut off the trolley head but the "Sydney Morning Herald" for November 6th 1890, however, reported that the pairs of span poles were 120ft apart and had span wire stretched between. This in turn carried the copper conductor, suitably insulated, over the centre of the tramway. This could indicate that the trolley wheels on these three vehicles were fitted to a fixed harp or yoke on the end of the poles.

In 1893 the three Waverley tramcars were transferred to North Sydney to work the Military Rd. extension beyond the cable tram terminus near Ridge Street. This single track route was constructed alongside the road and a report by Electrical Engineer J. Brearly⁽¹³⁾ indicates that it was initially designed for steam traction. In order to use the Waverley experimental material at North Sydney, the overhead was dismantled and re-erected and the tramcars transferred to the north side of the Harbour. The firm of H. Kingsbury was the successful contractor for the removal of the overhead equipment from Waverley and the rigging at Military Road North Sydney. This contractor was also responsible for easing the abrupt track curves, the work costing £200 for the main line wire along Military Road and £92-17-11d for erecting wires along Miller Street from Falcon



Siemen's electric railway display at the Berlin Exhibition during the northern summer of 1879. - Siemen's Archives



Early tramcars receiving power from overhead trollers.
- Street Railway Journal

Street to the Ridge Street car shed. Reports of the day suggests that a third track was constructed for the electric trams, between the last two named locations, located parallel with the existing double track cable tramway.(14)

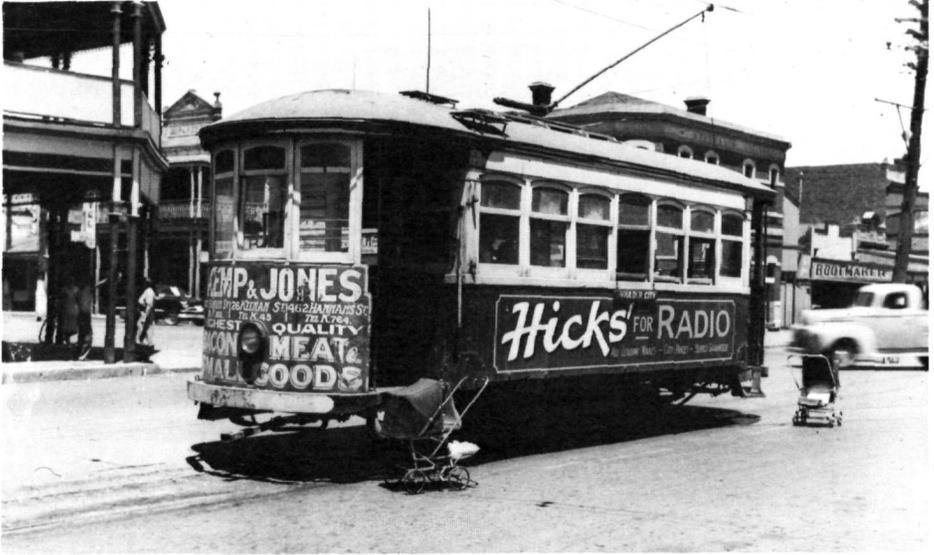
In his 1899 report, Mr. J. Brearly stated that the North Sydney tramway was possibly the first in Australia to use side bracket suspension. The later Mosman extension, along Avenue Road and the outer end of The Spit route were also fitted with short side brackets carrying the twin positive overhead wires.

When transferred to North Sydney the three saloon tramcars were fitted with wooden (not bamboo) poles and the trolley base was relocated from the roof centre to the side of the car at the roof edge. This new position could be reached, without too much effort, by the inquisitive, so the wooden boom insulated all but the trolley wheel, a covered cable being clamped along the pole. At North Sydney the fixed axis trolley wheel was replaced by a swivel type and Mr. J. Brearly remarked that it swivelled on ball bearings. At some locations the trolley wire was offset as much as 9ft from the track, but this required a reduction in the speed of the tramcar, but up to a 5ft deviation from the track, the car could travel at speeds up to 30 miles per hour.

It appears that the "easing of abrupt track curves" along Military Rd. caused the single track to deviate in places from the north side to the southern kerb of that thoroughfare, thus on some sections of the route the tramway was in the kerb and the wire near the centre of the road, supported by cross span wires. Generally, however, the track location enabled the single offset trolley wire to be held over the kerb by a primitive curved swan neck bracket, projecting above short 12 feet high wooden poles.

An unidentified clipping of 1908(15) recalled the trials and tribulations of electric operation along Military Road in 1893. It stated that the poles were at the side of the road and the overhead was at the kerbstone. When the trams arrived at passing loops the conductor would pull down the pole and keep it down until the tram had proceeded through the loop when the wheel could be "plopped" onto the wire again. This action had to be carried out as there were no overhead wires at the loop and the poles were easily broken.

Photos reveal that the offset overhead wire was later erected on tramway extensions at North Sydney to Milson's Point, Willoughby, Gore Hill, and possibly Neutral Bay.



ABOVE: An unobtrusive but vital part of the above Kalgroolie scene is the trolley pole and overhead wire. - J. Sullivan

The extensions of the original Military Road electric tramway to Mosman in 1897 and Willoughby during 1898 caused the electric generating plant adjacent to the cable winding house at Ridge Street to reach a maximum capacity of three 100 KW multi polar and a single 60 KW bi-polar generator to power the 12 electric tramcars. In addition a battery of 220 chloride storage cells with a 340 ampere hours capacity for a 6 hour discharge and a Parker motor-booster of 5 KW capacity were provided.(15a)

The other North Sydney extensions, as well as the conversion of the Ridge Street to Milson's Point cable tramway, awaited the completion of the submarine cables under the harbour from the southside central Ultimo Power Station. By September 1899 this work was well advanced, and although experiments had been conducted during March 1899 to see if the salt water of the Harbour could be used for the return circuit, when electric trials were conducted along the North Sydney cable tramway in January 1900, a pair of cables supplied the energy from Ultimo providing a complete metallic circuit. The report dealing with the return current experiments of March 1899 commented "if found feasible some interesting results in the way of electrolysis may be looked for" if the salt water return circuit is used.(15b)

To supply high voltage power to the railway sub stations along the semi-isolated service between Hornsby and Milson's Point, as well as for tramway extensions, the Railway Department completed a tunnel under the Harbour in 1924. Construction of this 1,760ft bore commenced in 1913 when the expected cost was estimated at £11,135, but this soared to £140,295 by the time it was completed 11

years later.

Tunnel construction commenced at the Balmain end but was soon abandoned when residents complained of the noise. The working face was then transferred from Long Nose Point to Greenwich Point where construction noise would not be so disturbing in the then sparsely populated location. By May 1915 the tunnel had progressed 1,250 feet under the water when a huge fissure three feet wide was encountered in the sand stone floor of the harbour.

Water and silt cascaded into the tunnel and for 15 months the engineers tried to fill the fault by pouring tons of cement into the harbour from a specially built platform but this proved ineffective. The last 15ft of the tunnel was sealed by a concrete plug and a 50ft dive constructed to avoid the fault. A smaller fissure caused water to flow into the new branch but a clay and cement patch succeeded in sealing this fault.

Just before the bore broke into the Balmain heading in 1924 another crack let water into the workings at a rate of 24,000 gallons per minute but this was well within the capacity of the pumps. The tunnel, 8ft square in section, was fitted with a narrow gauge railway to aid maintenance and the laying of high voltage cables. Soon after completion one of the fissure patches failed and the tunnel rapidly filled with water, but as the tunnel is an average depth of 80ft below the harbour floor and the cables continued to function correctly no attempt was taken to rectify the fault. As late as the



The standard Sydney cast iron overhead hangers are evident in this view of R 1 1992 turning into Devonshire Street from Elizabeth Street.
- K. McCarthy

last report sighted in 1960, the tunnel was still filled with water and the cables continued to perform their intended duties.(15c)

During June 1902 the first of three General Electric 1,500 KW 6,600 volt 3 phase 25 cycle alternators were commissioned at Ultimo power house to serve sub stations located at distant portions of the expanding electric tramways. The high tension cables were extended to the North Sydney tramway by way of a submarine cable. This was armored with two layers of No. 11 S.W.G. steel wire covered with impregnated jute. Each phase of the standard high tension feeder cable comprised of 19 No. 16 BWG wires stranded together and insulated with 7/32in. paper, the entire three conductor cable being covered first with 3/16in. paper, then with lead and impregnated jute. (p.614 "Street Railway Journal" Vol. XX No. 6 December 1902).

The North Sydney sub station supplied by this high voltage AC line was located adjacent to Ridge Street depot and commissioned in 1902.

Even after the conversion of the Ridge Street to Milson's Point cable line to electric traction on February 11th 1900, the side system of overhead wire persisted at North Sydney. A fleet of "D" type single truck California combination electric cars were used to replace the cable tramway. On two occasions during January 1900(16) six of the new electric trams, hauling cable trailers, appeared in force on the cable route after the last cable tram for the night had entered the sheds. The new trams

operated the proposed peak period frequency in the dead of night, so that the plant could be tested under load conditions. These tramcars were fitted with dual trolley poles, one located in the conventional centre roof position and the other at the side of the body above the centre saloon window. The North Sydney system was not converted to the centre trolley pole configuration until November 1901.

The swivel trolley heads were replaced by fixed axis wheels during 1899. A photo of a "C" saloon motor car on the newly opened Mosman line in April 1898, however, shows that the swivel head was still in use at that stage.

By the time the Rose Bay electric extension tramway, beyond the Ocean St. terminus of the King St. cable line, was opened in October 1898 the NSW Government Tramways Dept. had adopted the centre trolley pole, with fixed axis trolley wheel head as the standard. By 1900, when the initial conversions of the Sydney steam tramways to electric operation were well in hand, some difficulty was being experienced with trolley pole dewirements on curves and at junction frogs. As an emergency measure some of the frogs were removed from junctions, the conductor being required to swing the pole onto a parallel wire. Eventually the problems were overcome by more scientific positioning of the overhead junction in relation to the tracks, while more curve pull off wires were fitted together with special bridge clips just beyond the overhead frogs.

With the increased traffic generated by the popularity of the new Sydney electric trams some difficulty was experienced in finding suitable methods of track bonding for the return circuit. Patent methods of that period, such as squeezing bonds against the rails under fishplates, lost efficiency in time due to oxidation and corrosion. During January 1902(17) serious consideration was given to converting the Sydney tramways to the double overhead wire system. More efficient bonding methods, fortunately removed the need for such a drastic change.

Bow Collectors in Hobart

Electric tramcars were introduced to Hobart, Tasmania, on September 21st 1893, the day after regular electric service opened to the public at North Sydney. The Hobart tramways had been ready for operation for some months prior to this,(18) but the opening was prevented until the telephone system could be converted from earth return to a fully metallic circuit. Siemens Bros. of London were the contractors for this pioneer Tasmanian enterprise and it is not surprising that the bow collection form was adopted. The first 20 double deck tramcars were fitted with two primitive bows each, spanning the complete car width. This

enabled substantial side posts to be extended right through to the flimsy top deck canopy giving the bows a much stronger support than would have been obtained if a bow base had been located on the centre of the roof.

Until the Hobart Municipal Council took over the tramways in June 1913 from the Hobart Electric Tramway Company, all cars, with the exception of two, carried twin bow collectors. Tramcar 21, the first single decker, appeared in traffic during 1903 fitted with a single, full length bow mounted on the roof, while 2nd 14 also worked with a single bow, this being a single decker car possibly rebuilt from double deck car 1st 14.

Double decker No. 22 appeared in 1903 provided with two bows of a narrower width than the original cars and until 1913, all new tramcars appeared with these more modern twin collectors. The single deck cars of this period, carried these short bows on roof towers enabling the bow bases to be mounted at the same height as the roof line of the double decker vehicles. The Council built trams, from 1914 onwards, carried only a single bow, the older cars remaining in service were eventually fitted with these newer collectors, the single deck tram receiving long bows which enabled the springing mechanism to be fitted to the roof.

The bow method of collection was retained in Hobart until the closure of the tramways in 1960. From October 1935, however, trolley buses shared the street with the trams and where these intersected, special work had to be erected to enable the bus trolley poles to cross the wires for the sliding tramway collectors. At City depot the trolley buses shared the store area with tramcars and shared common positive wires. The negative bus wires located between the tramway positive wires had to be held in deep inverted "U" shape ears out of reach from the wide sliding pans of the tramway bows.

Other Early Electric Tramways.

The Brisbane tramways first electric line opened in 1897 while the first Perth electric cars appeared in September 1899. Both private undertakings were influenced by American tramway technology so the trolley pole, with fixed axis wheel was adopted as the collection method. When Thomas Saywell converted his private steam tramway to electric operation in August 1900, he adopted the twin overhead wire system. This tramway connected Rockdale Station with the bayside resort of Lady Robinson's Beach, south of Sydney. Saywell constructed his power house behind the Brighton Hotel on the beach front(19) and this supplied current for



Hobart tramcar, original no. 1, in Macquarie Street at the turn of the Century. The original twin bow collectors are shown in this view.

-R.Allen collection



Single deck car 25 in Elizabeth Street Hobart circa 1908. The early design bow collectors used on the Hobart single deck cars and the bent span poles designed to avoid the roadside telephone wires are clearly illustrated in this photo.
K.Magor Collection

domestic use as well as traction purposes. The tramway consisted of six cars with General Electric motors operating on a "metallic circuit" and the conversion was supervised by Mr Noel of the Melbourne Electric Light Company. The "Australian Mining Standard and Financial Review" for 23rd August 1900 stated that this recently completed tramway and lighting plant at the rear of the hotel was carried out by the new three wire process.

On September 28th 1899 the same magazine had given an account of this three wire system. The system enabled two 250 volt generators, the voltage used in the domestic power supply, to be connected in series to supply a potential of 500 volts to work the tramway. The link between the two generators in this system was earthed to the tracks to provide a neutral link, while the two extreme leads, one from each generator, fed into the twin overhead wire.

Thus one wire carried the potential of +250 volts and the other -250 volts, to produce a potential difference of 500 volts across the system. The neutral link kept the supply system balanced about the zero potential.

K. Hedges in his work "American Electric Street Railway" of 1894, provided a description of this power supply system and stated that there was a saving of 50% in feeder wires when compared with the single wire system using an earthed track return. Without the neutral earthed link to balance the supply around zero potential, the voltage in the wires could build up a large potential relative to zero, yet still retain a potential difference of 500 volts between the two trolley wires. This difficulty was experienced with early trolley bus systems when the negative wire was not earthed.

The twin wire system was used at Rockdale until 1914 when the NSWGT, on taking over the

undertaking, converted the tramway to the conventional single overhead wire-track return principle. The old second wire was retained, however, as a positive feeder and this remained in place along the tramway until the closure in 1949.

Two other locations in Sydney come to mind where a second trolley wire was strung along parallel to the working wire as a feeder. The "up" track in George Street Sydney, between Goulburn Street and Bathurst Street required a parallel feeder trolley wire while the same hill location in parallel Castlereagh Street was similarly treated.

The first three trolley buses introduced in Perth W.A. during 1933 were fitted with the usual twin trolley poles, but instead of being mounted, side by side in tandem, one trolley base was situated above the other sharing the same single axis pivot. This enabled the buses to be turned back without the use of a loop wire. The buses could make a quarter 90° turn in a street while the poles were on the "down" wires, then complete the "U" turn with the poles then swung onto the "up" wires. If this manoeuvre was attempted with tandem mounted poles, the risk of a short circuit existed if the bases came into contact with faulty insulation. Thomas Saywell avoided this difficulty by never turning the trolley poles. His trams trailed their poles in the conventional manner on the up hill trip to Rockdale, but worked towards the beach with them in the dangerous leading position.

Leonora W.A.

The one car electric system between Leonora and Gwalia in Western Australia functioned between 1908 and 1915. Steam trams worked on the 1½ mile line from 1903 while between 1915 and c.1921 a converted motor lorry worked the line after the power house was destroyed by fire.(20) This small undertaking also adopted the double overhead system which was also possibly based on the "three wire" principle, as power was also supplied for domestic consumption.

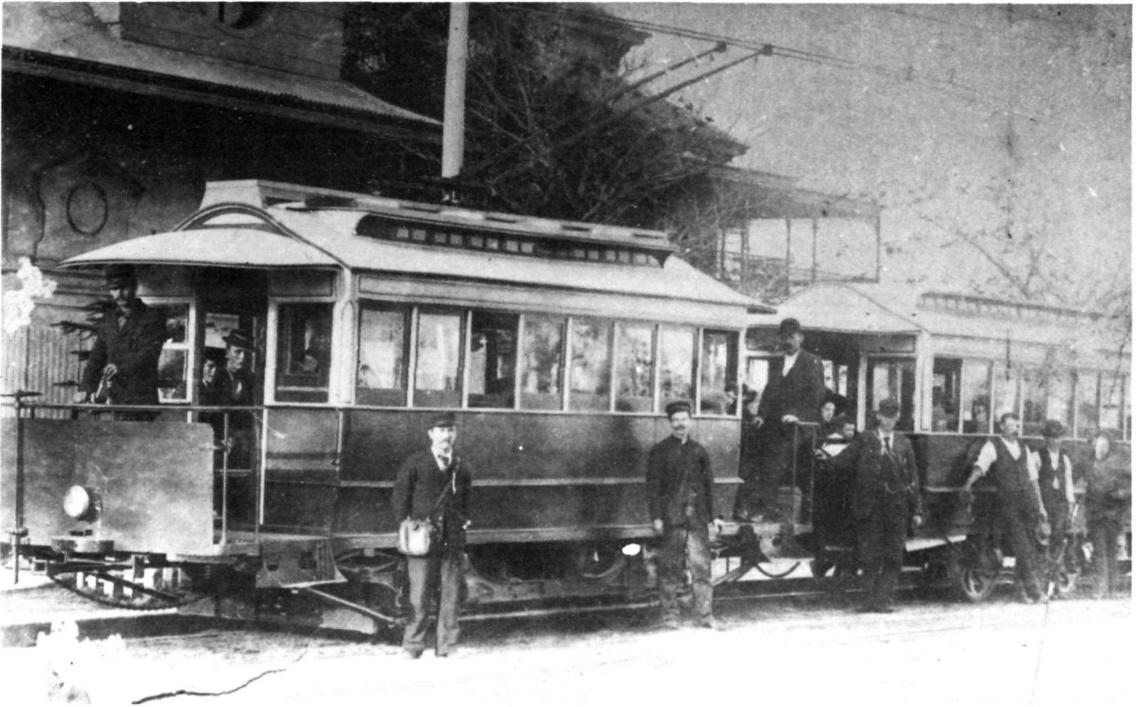
The results of a report, compiled by Mr. C. Bircher of Kalgoorlie, based on the performance of the Leonora plant were released in April 1909(21). The electric tramway was opened on 5 October 1908 and the contractor handed the plant over to Mr. Johns, the engineer for the Leonora tramway and power supply system in November, 1908. The 43hp gas engine working the 35 KW dynamo was not adequate to enable the single tramcar to operate at full speed. On Saturday nights the machinery was so overtaxed due to overcrowding on the tramcar that the street lights had to be turned off to ease the load. Mr. Bircher recommended that a larger gas producer plant and a 54hp engine be installed to drive another 35 KW dynamo, to be purchased for £1,500.

The single generating plant at Leonora cost 5.3d per electrical unit but with more favourable conditions the traction portion would just pay its way but the lighting business should prove profitable. As



Overhead wire brackets suitable for bow collector operation on the corner of Adelaide and George Streets Brisbane circa 1939. These brackets were fitted along the length of the Rainworth tramway for possible bow collector trials.

- K.McCarthy Collection



The saloon car and trailer at Lady Robinson's Beach (Brighton-le-Sands) terminus. This photo shows the twin overhead wires used on this private tramway between 100 and 1914. - K.Magor Collection

a result of a canvass conducted with householders in Leonora and Gwalia during 1909, enough seemed to be willing to install electric lights to enable the expanded plant to make a further profit of £30 per month to yield a total profit of £130 per month.

The Leonora tramcar received twin trolley buses, located side by side, with the springs and pole on the same side from the pivot point. There was little change of a short circuit occurring when these poles were turned at the terminus.

Swivel Head Trolley Pole Systems.

Bendigo, Ballarat and Launceston opened electric tramway operation with swivel head trolley poles, but only Launceston persevered with this collection method.

During 1900 the Electric Supply Coy. of Victoria Ltd. was established in England with the British Insulated Wire Coy. being the major shareholder.(22) This company gained the electricity supply franchise for Ballarat and Bendigo and also purchased the Ballarat horse tramways and the Bendigo steam tramways. The new company introduced electric trams to Bendigo in April 1903 and Ballarat in August 1905.(23) Both systems employed the trolley pole method of collection with the British type swivel trolley head.

Early photos reveal that Bendigo had single overhead wire centrally located over the double city tracks, but on some single track suburban sections twin positive wires were suspended 2ft apart offset parallel to, but away from the open top decks of the former Ballarat horse cars used as trailers at Bendigo, as the overhead supported by cross span wires, rather than side brackets, tended to sag in some locations.

Early photos of Ballarat reveal that double positive wires were situated over each single track, even along the double tracks in Sturt Street. This must have been done to cut down on the amount of feeder wire necessary to supply the power from the generating station located near View Point on Lake Wendouree.

These twin wires were mounted about 9 inches apart and greatly complicated the junction arrangements, especially at the intersection of Lydiard and Sturt Streets. The inner wires in Sturt Street were usually used by the cars. At the eastern end of Sturt Street, where the double track became single to traverse the very narrow Bridge Street section, the inner Sturt Street wires continued as twins over the single Bridge Street track. The two outer Sturt Street wires also continued along Bridge Street, giving four trolley wires along that location, but these outer wires were held by the span wires by

conventional ears, located, however, close to the kerbs. Bridge Street then, carried a single tram track but four trolley wires!

Photographic evidence suggests that the swivel heads in Ballarat and Bendigo were replaced by fixed axle trolley wheels by 1912, but the twin Sturt Street and the quadruple Bridge Street trolley wires remained in place until the 1920's.

The Municipal authorities adopted the swivel trolley head in Launceston when the tramways opened in 1911 and continued with its use until the closure in 1952. In Launceston, the trolley wire was usually located close to the track centre, but an early photo of Charles Street(24) shows this single line section within the city centre served by side bracket suspension with the trolley wire well away from the tracks. Although the overhead junction frogs had to be manually set as well as the facing track points, this collection mode removed the need for wiring crossovers on the double tracks. The trolley pole of the reversing tram was placed on the opposite wire before the tram negotiated the cross over between the "up" and "down" tracks.

Unusual Overhead Fittings.

Between 1919 and 1922 the Melbourne and Metropolitan Tramways Board gained control of the cable and horse workings of the Melbourne Tramway and Omnibus Coy. (Melbourne Tramways Board since 1916) and the Northcote Council, as well as the various electric tramways in the suburbs worked by municipal and private authorities. The two feeder tramways serving St. Kilda and Sandringham stations, however, remained under Victorian Railway control. Prior to the amalgamation, wherever the independent undertakings crossed, power leakage was protected by heavily insulated overhead frogs. The last of these remained until the closure of the St. Kilda (Railway) Tramway in 1959, as that tramway crossed the M&MTB routes at three locations.

With the progressive electrification of the Melbourne suburban railways from 1919, various electric railway/tramway crossings had to be erected with special fittings to not only allow the sliding railway pantograph collectors to intersect the wheel type trolley wires used on the tramways, but to also control the voltage difference. Elaborate overhead section insulators enabled 1,500 volts or 600 volts to be switched into the overhead in the crossing area depending on which vehicles had the right of way, but there have been instances where the trams have entered the crossing when 1,500 volts was still switched on in error, resulting in the tramcars having to spend lengthy periods in the workshops for repairs to their wiring.

Although several of these level crossings have now been replaced in the Melbourne suburban area

by bridges, four such intersections still exist. In Sydney the hilly terrain lent itself to grade separation, so level crossings at busy locations were usually avoided, or have been replaced by bridges immediately traffic density posed problems. At the three locations at which the Sydney tramways crossed the Government Railway system, no overhead wire problems existed as the trams crossed steam worked freight lines. Physical railway/tramway connections existed adjacent to electric railways in Sydney at West Ryde, St Leonards Botany Rd. Siding (near Railway Square), at Wolli Creek Arncliffe, Rockdale and Ashfield, while the 5'3" gauge St. Kilda tramway connected with the railway system in Melbourne. At all these locations the terminal strain poles of the tramway siding were situated well clear of the railway overhead leaving a non electrified "no man's land" in between.

The main Sydney tramway crossed swing bridges at Gladesville and Glebe Island while the Port Adelaide tramway (and later trolley bus route) crossed the Jervis swing bridge. Overhead wire continuity was made possible by special overhead wire pans which guided the trolley wheels over the swing gaps when the bridge was closed against shipping. The tramway ferry which connected the isolated Manly tramway with the North Sydney lines between 1912 and 1939 had a single length of overhead wire rigged between span poles located at each corner of the vessel. When moored to receive a tram, a ship to shore cable supplied the punt with 600 volt power to its overhead. Due to tidal variations, however, the punt wires were not aligned with the shore wires, the conductor had to swing the pole from one wire to the other as the tram coasted onto the vessel.

Two other strange alignments existed on the Sydney electric tramways. White Bay Power House siding could only be reached by way of a turn table revolving through 90°, while a traverser table was used by electric trams at the Manly cargo pier. No records of the overhead wiring pattern at these two locations have yet been discovered.

High Voltages and Catenary Overhead

As far as is known, all Australian tramways operated at 500 to 600 volts, although the pioneer Box Hill to Doncaster line in Victoria was originally designed to work at 400 volts. Experiments were conducted in Sydney with a 1,200 volt supply. During 1915, "O" cars 1277, 1278 and 1279 were fitted with dual 600/1200 volt equipment for high voltage trials on the Ryde to Ryde Station feeder tramway. This higher voltage was intended for planned lengthy extensions beyond Narrabeen on the isolated Manly tramway. The higher voltage was planned to cut down on feeder wires and sub stations in this then sparsely settled area. To cater

for this, catenary overhead had already been fitted beyond Brookvale, but World War I shortages and the emergence of the motor bus as a dependable mode for lightly settled areas caused the Church Point and Newport extensions to be forgotten. These three tramcars retained their dual equipment until 1940.

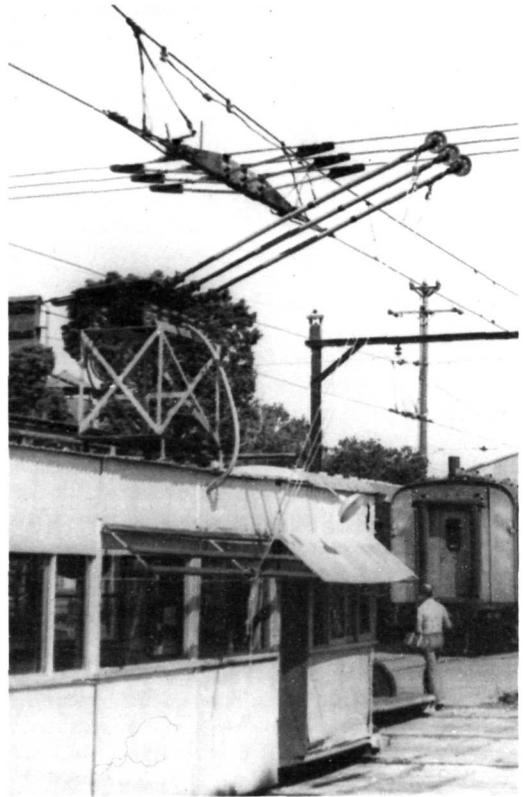
Several other sections of the Sydney tramways received catenary suspension. The Ryde to Ryde Station line, the Summer Hill Station feeder from Hurlstone Park, the swing span on Glebe Island Bridge, the Sydney Harbour Bridge tramway and the wire across the suspension span of the Suspension Bridge at North Sydney.

In Adelaide, the Glenelg tramway opened in 1929 with catenary overhead along the reserved track section with ears and fittings suitable for both trolley pole and sliding collectors. During 1935 bow collector and pantograph trials were conducted on the catenary sections to Glenelg but the results were not encouraging enough to cause a change from trolley pole collectors.(25) The catenary overhead was replaced by standard trolley wire/span wire construction in 1953 with standard ears and clips replacing the upright "U" brackets which had been installed in 1929 for both forms of collection.

Trials of Alternative Collection Methods.

A photo taken at the corner of Adelaide and George Streets, Brisbane c.1939 reveals trolley wire fittings on the down and up curves into George Street (west) suitable for sliding collectors, but the trolley wheel type clips were retained on the overhead leading into George Street (east). This could indicate that bow collector trials were contemplated on the Rainworth line in Brisbane on the eve of World War II.

The Sydney tramways conducted a flirtation with trolley shoe collection in place of the conventional wheel. During March 1920 a Miller trolley shoe was fitted to N 723 by the end of that month. This device had been tried earlier on O 1044 on the Enfield system and after the Rockdale experiments the shoe returned to Enfield on car O 1047. The trials concluded in 1923. The Portland and Lewiston interurban line in U.S.A. first fitted the Miller shoe in 1916 and found it so successful it soon replaced trolley wheels on high speed services in U.S.A. The manufacturer claimed that this graphite insert shoe required less pressure and reduced arcing and dewirements when compared with the more familiar trolley wheels. A threefold increase in wire life was also claimed for this device. Except for the Kogarah trolley bus network, the NSW Tramways Department retained trolley wheel collection on its rail services while the King's Cross



An example of trolley wheel overhead intersecting sliding pantograph contact wire at Elcar Workshops, Chullora N.S.W. This is the no. 1 traverser, 415v 50 hertz 3 phase AC. The railway contact wire is 1500v DC. The no. 2 traverser is still powered from a 600v DC supply which is collected from a two wire, trolleybus style overhead. It does not cross the 1500v line. 24. 3. 79. - K. McCarthy

trolley bus line also used wheels during its brief life.(26)

Span Poles.

Australia's limited forest areas produce the world's finest hardwoods. In fact, until World War II, the Karri and Jarrah forests of the southwestern areas of Western Australia supplied some of the sleeper needs of the British Railway Companies. It is therefore not surprising that the majority of span poles employed on Australian tramways were of the hardwood variety. Steel poles were mainly limited to the inner city areas and main thoroughfares.

South Australia, however, is poorly endowed with hardwood species, and in a report dated 1911, the Municipal Tramways Trust revealed that tubular steel poles were used on the initial electri-

fication programme of the Adelaide horse tramways with the exception of the outer end of the Henley Beach line.(27) From personal observation one recalls that the outer ends of the St. Peters line and the Springfield route used some wooden poles by the 1950's while the terminus of the Colonel Light Gardens run, as well as the portion of that line adjacent to the Glenelg tramway at Goodwood also employed wood span poles. Later Adelaide tramway expansion made use of the composite concrete and steel "Stobie" poles.

"A mixed lot of undressed poles comprising iron bark, turpentine, grey and blue gum were erected on the Waverley to Randwick electric tramway in 1890" and afterwards used on the Military Road line. Most are still sound at heart though in nearly all cases dry rot has attacked the sapwood. They are about to be replaced by dressed iron bark poles which should last 15 to 20 years". This was revealed by J. Brearly in his paper read to the Electric Association of N.S.W. in June 1899.(28) The decision to soon replace the old overhead fittings and poles along Military Rd. had been reached by the N.S.W.G.T. in February 1899.(29)

Steel poles were erected along the Circular Quay to Pyrmont electrification in Sydney during 1898-99. Centre poles with ornamental brackets appeared along George Street and Harris Street between the Quay and Ultimo Depot Junction while ornamental side span poles were used beyond, to Pyrmont terminus.

Steel poles extruded in the Mannesmann process, where oblique rollers twist the hot billet of steel over a shaped spear to produce a hollow tapered tube, stepped in stages, were found to be not stiff enough and these were used in suburban streets. The main centre poles used in George Street were manufactured by Morris Tasker of U.S.A. delivered in Sydney ex sailing ship at £3 per ton. The metal in these poles was $\frac{1}{4}$ " thick, fitted with cast iron collars and finials. These cast iron fittings amounted to 15% of the actual pole cost(30) The standards in Sydney in 1899 allowed pole spacing to be at intervals of 120ft to 132ft. This spacing could also be used on curves down to 2 chains radius.

All the state capitals used some steel poles on their main thoroughfares. As mentioned earlier, the Hobart undertaking was confronted with difficulties with the Telegraph section of the Post Office Department and installed thin steel poles at the kerb, bent into an elongated "S" shape to avoid the phone wires. Many of these were strengthened with truss rods.

When Elizabeth Street was widened in the vicinity of Hyde Park in Sydney during 1909 the park side steel poles were replaced with wooden ones. As late as the 1940's the remains of what was

possibly the original paint scheme of these poles could still be observed. These poles were painted dark blue for approximately the lower 8 feet and grey above a separating black band. This was an unusual treatment as wooden poles are generally not painted.

The centre poles along George and Harris Streets in Sydney were removed during 1908 to enable the loading gauge clearances to be expanded to take the new O cars. The only other thoroughfare in Sydney using centre bracket construction was Flinders Street Darlinghurst. These were removed c.1916 when that street was widened. Bases of the original 1899 George Street steel poles can still be seen around Sydney. The Water, Sewerage and Drainage Board used these as bases of kerb side sewer main vents in the inner and eastern suburban areas.

Of the provincial undertakings only Newcastle, and possibly Kalgoorlie and Leonora used wooden poles in entirety. The cable tramway route at North Sydney received steel poles in 1899 while photos of Launceston show some steel poles in the main streets of the city area. Metal poles were also in evidence on the large arch bridge on the Trevallyn route. Limited evidence exists of their use in Perth, but the inner sections of the Fremantle tramways made liberal use of steel poles.

The Electric Supply Coy. of Victoria made lavish use of ornamental steel poles in the main streets of Eaglehawk and Bendigo. The tasteful electric lamp brackets used in lieu of the finials on the centre poles in Bendigo and Eaglehawk were replaced by the ungainly fluorescent lamp extensions in c.1961. When that same company followed with the Ballarat electrification, finance must have been less plentiful as wooden poles with clamped on steel brackets were employed along the broad gardens of Sturt Street and around Lake Wendouree. Metal poles were in evidence along narrow Bridge Street while isolated examples could be later seen at Drummond Street Junction and at View Point.

The Melbourne Electric Supply Coy. Ltd. installed elaborate centre bracket steel poles in Geelong when the electric tramways opened in 1912. These poles were erected along the business sections of Malop, Moorabool and Ryrie Streets, while centre bracket poles along some suburban sections, as well as along Ryrie St. East, were of the Ballarat design of wooden poles with scrolled metal brackets attached. Geelong city and surrounding areas experienced steady expansion throughout this century and the increase in road traffic caused the Moorabool St. centre poles to be replaced with cross span wires between the Wharf and Ryrie Street in c.1939 while those south of Ryrie Street were not removed until c.1949.

The use of ornamental metal centre pole brackets was prolific during the formation of the Adelaide

system. King William Street and King William Road, Adelaide contained a forest of these poles, while they continued into Connell Street, North Adelaide. North Terrace and Grenfell Street had a similar display, while Hutt Street and the Eastern Parklands sections and the business section of Norwood also come to mind. During the decade 1916-1926 the poles in King William Road were removed and other sections were similarly treated, but Connell Street, North Adelaide, King William Street between Victoria Square and North Terrace, North Terrace west of King William Street, Eastern Parklands, Hutt Street and the outer reserved track section of the Colonel Light Gardens line still retained the centre bracket suspension method until the closures of the 1950's.

The only florid example which remained in Sydney until the closure in 1961 was that spanning three tracks in Eddy Avenue. Two centre brackets from King William Street were preserved by the St. Kilda Museum Tramway in South Australia and these now stand at Mangrove loop on the museum line.

To see these grand pieces of Edwardian street furniture one must now visit Pall Mall in Bendigo, and the Melbourne tramway system. The M&MTB have retained centre bracket suspension in Victoria Parade, Fitzroy Street, St. Kilda and Dandenong Road. The striking display in William Street Melbourne was replaced by cross span wire during 1972 following the removal of similar fittings in Peel Street during 1970, but during 1977 a modern centre bracket standard was erected in Preston Workshops Yard in Melbourne for operation trials and if successful this could mark the return of centre bracket suspension to new extensions of that tramway system.

In most instances during the twilight days of the Australian tramway systems the ornamental steel poles were painted in drab schemes and plastered with bills. During 1948, however, the kerb side metal poles along Harris Street, Sydney were repainted in a handsome scheme of light green lower portion with silver-grey above a black band. The full beauty of the anthemion leafed bases and the echinus gadrooning on the collars were revealed after years of neglect.

Further Trials and Alterations in Melbourne.

The Melbourne tramways conducted two series of trials with bow collection. The two birney cars introduced on the Power Street shuttle service between the Richmond cable tram terminus and the Hawthorn electric tramway(31) in June 1924 had their trolley poles removed and replaced by bow collectors a few weeks later. This experiment lasted until 1927. Between 1931 and 1938 three of the ten former North Melbourne Electric Tramway and

Lighting Coy. "U" type four wheel end loading saloon cars received bow collectors. These vehicles worked under trial conditions on the short Holden Street shuttle between Lygon Street (East Coburg) and St. George's Road (Preston) tramways.

The then isolated Footscray routes in Melbourne were the location of trolley shoe trials from July 1930. This coincided with the general introduction of one man operation on that system. The wire was regularly lubricated and the Tramways Board persevered with the trolley shoes until July 1940 when wheels were re-introduced. Mr. T. Strickland, the then Chief Engineer of the M&MTB revealed the following costs in his paper read at the March 1934 Australian and New Zealand Tramways Conference when he compared the costs of the Holden Street and Footscray experiments with wheel collection:-

Trolley wheels -	
Footscray system	7d per 1,000 miles
Trolley shoes -	
Footscray	7d per 1,000 miles
Fischer bow plates	
- Holden Street	23d per 1,000 miles
Trolley wheels	
-main Melbourne lines	12d per 1,000 miles

With the long awaited completion of the Bourke Street tramway in Melbourne from Spencer Street to Northcote and on to East Preston on June 26th 1955, carbon insert trolley shoes appeared in service. Their use spread to the second Bourke Street route along Nicholson Street to East Brunswick on April 8th 1956 when this new line opened for traffic.

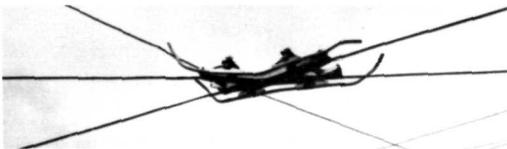
The other Melbourne lines continued to use trolley wheels until 1961 when from September 9th, cars in various depots in turn were fitted with shoes. The main reason for the conversion was to cut down on noise levels caused by "drumming" transmitted to the car roof by the trolley wheels, but the M&MTB also expected a saving of £7000 per year on trolley wire and wheel maintenance. The conversion of the main Melbourne depots to shoe collection was completed on 21 December 1961, Footscray lines being the only group not treated. The three local Footscray routes were replaced by buses on 10 March 1962.

The latest development in tramway collection is now under trial in Melbourne. Towards the close of 1976 the Tramways Board received an ETK pantograph and a Stremmens pantograph from overseas and an Airmate unit of local manufacture for trial operation. By February 1977 the trolley pole had been removed from one end of "W2" test car No. 546 and the roof prepared to receive the Stremmens single arm pantograph. During March 1977 work continued on attaching adaptors to point

frogs and section insulators as well as fitting new brackets to trolley wire clips on curves to deflect the cross span wires out of reach of the collection pans along the outer end of the West Preston line. After evaluation trials on that tram route, beyond the workshops at Preston, the Stremmens pantograph was replaced by the ETK unit during August and since then further trials have continued.

In addition to fitting side diverting skates on the overhead point frogs to depress the pantograph pans under this special work, a conventional right angle trolley wheel crossing frog was installed on the down track in Gilbert Road at Kendall Street during the trial period.

The results of these trials are awaited with interest, but if Melbourne changes from trolley pole to pantograph collectors, trolley poles with wheels are expected to continue in use on the Adelaide to Glenelg tramway while the current cars are in service. The tourist lines at Ballarat and Bendigo and the museum operations in Brisbane, Sydney and Adelaide will naturally persist with the trolley pole as a memorial to this simple but effective invention which solved the important problem of current collection which presented a stumbling block to the successful progress of electric tramway development in the 1880's.



The compromise overhead frog suitable for both trolley pole and pantograph operation at the corner of St. Georges Road and Miller Street Preston, Melbourne. 4.9.77.
- K. McCarthy

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28. See note 13.
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TROLLEY WIRE

JUNE, 1979

Run 52 S54 & S55 C3004 D4083 D4082 C3003
C3002 T4102 T4101 C3001
Run 53 S57 & S56 C3008 D4073 D4072 C3007
C3006 D4084 D4080 C3005
Run 54 T50 & T49 C3013 D4090 D4091 C3014
& S60 C3015 D4079 D4089 C3016

(In order from down - Bondi Junction - end)
It should be noted that all sets except S55 were

comprised of two car sets although, except for T49 & T50, they were numbered as four car sets. The two trains which operated from Mortdale were taken to Punchbowl on the Friday and washed.

To say that the opening was a success would be an understatement. The crowds far exceeded all expectations and gave the new



ABOVE: Opening day of the ESR and an eight car train bound for Bondi Junction runs onto the Woolloomooloo viaduct after leaving the city tunnel at the Art Gallery (Domain).
BELOW: A two car train stands at platform 24 at Central. Although finished in ESR style the low level at Central (and also Redfern) is more akin in layout to city railway stations.





New electric locomotive 8501 being towed from the manufacturers works by 4851 on 17 May 1979. Although not identical it shares the same general ungainly end styling and unimaginative paint scheme of the 442 and 80 class diesel electrics.

installations a thorough testing. The trains performed well and demonstrated an ability to reduce the running time although this was far outweighed by lengthy station stops. The unsuitability of double deck stock for a rapid transit type service was obvious. Escalators were packed and sometimes failed; automatic barriers quickly failed as souvenir tickets were jammed into them (Passengers were encouraged to familiarise themselves with the new magnet-

ically encoded ticket system by using these barriers); ticket machines ran out of change or jammed when all buttons were pushed at once, but nevertheless must have yielded considerable revenue for a free day. Red coated guides were on hand to help sort things out on the concourses and at the barriers and traffic staff (mainly higher grades) were on the platforms which are normally unstaffed at the new stations

CONTINUED ON PAGE 26

CITY SECTION

News of the Melbourne and Metropolitan Tramways Board

During the April run up to the 5 May Victorian State election, all political parties aired their transport plans to the voting public. The Liberal Party won the election with their majority reduced to the barest possible. Their promises included 100 new trams (the Z3 class), 130 new buses with an option for a further 70 (contract for MAN chassis with Ansair bodies), 150 more shelters on MMTB routes and 500 on private bus routes, 36 air conditioned cars for country rail services, 300 new stainless steel suburban cars (improved 'silver' type), more parking spaces at suburban stations and an increased rate of installation of protection at level crossings.

ROLLING STOCK

Sub classifications have now officially been allocated to the Z class trams:

Z	1 to 80 except 5
ZC	5 (chopper control)
Z1	81 to 100 (improved suspension)
Z2	101 to 115 (body alterations)
Z3	116 on (second contract)

The body of Z3 class tramcar 117 was received from Commonwealth Engineering on 24 April 1979 and is being fitted out at Preston Workshops. It is understood that 116 is still undergoing extensive testing and was noted at East Preston terminus with Z2 101 in the evening peak. Both cars were running special. Z2 112 has been noted mobile on the north side of Preston Workshops.

Crews at East Preston Depot are still re-

fusing to run cars from 101 upwards due to the deletion of lifeguard trays and trip gates. North Fitzroy crews have operated 101 to 103 and Camberwell crews have agreed to operate such cars. Late in May it was reported that four more Z car runs would commence operating on the Wattle Park route from Monday 4 June with full operation of the route tentative from Sunday 5 August. It is understood that Z2 cars will be run in at North Fitzroy Depot and then sent to Camberwell Depot for use on the Wattle Park and East Burwood routes.

Z2 105 entered service from North Fitzroy on 31 May and 109 on 1 June. The group from 104 to 109 did not enter service in sequence but all had done so by mid June.

The four original SW2 cars are receiving overhauls and being modernised. 478 and 436 should re-enter service in June or July, with 426 and 432 to be then taken in hand. Work includes lined ceilings and re-upholstered seats (including the drop centres).

PRAHRAN CELEBRATIONS

The City of Prahran commemorated their centenary over the weekend of 26/27 May 1979 by holding a carnival in Chapel Street, between just north of Commercial Road to the railway line south of Toorak Road. The Chairman of the MMTB, Mr. D. Snell, agreed to remove the two tram services from the area concerned and supply connecting buses and to place Ministry of the Arts decorated trams 234, 243, 525 and 567 on static display. On the Saturday, trams from Batman Avenue and North Richmond were operated by Kew Depot and ran to the Toorak Road crossover, but disembarked passengers south of the river onto connecting buses. This service turned left into Toorak Road, right into Williams Road, right into Commercial Road and left into Chapel Street, handing passengers over to the trams at the Windsor station crossover. Glenhuntly Depot operated the service from here to St. Kilda Beach, while no service ran to 'Prahran' (at Brighton Road). On Sunday, buses ran all day, using the detour. The normal Sunday bus service from Batman Avenue to East Malvern operated as usual, while another service ran from North Richmond to St. Kilda Beach. It had been reported that tourist tram V214 would be present, but this did not take place. It might have been just as well because minor damage was suffered by the four W2 trams on display.

TRACKWORK

The M&MTB Civil Engineering Branch has performed quite a few smaller jobs in recent weeks while still keeping a major track relay in progress somewhere on the system.

The down track in Power Street Hawthorn,

from Burwood Road to near Riversdale Road was completed and brought into use on Tuesday 15 May and the next big job commenced the following Monday in Park Street South Melbourne. This was between St. Kilda Road and Kingsway with the southern track being started first. During March the section of Brighton Road St. Kilda between Milton and Dickens Streets was relaid. The junction and curves into Chapel Street were renewed and concreted and a new crossover laid a short distance south, replacing the old crossover further south. This scheme is in conjunction with a series of traffic islands planned to rationalise motor traffic in this area. In St. Kilda Road, the junction into Park Street was mostly relaid in March, while the crossover north of Commercial Road was taken out of use by removal of the crossing frog on the up track.

Late in April, the crossover in Toorak Road, east of Chapel Street, South Yarra was removed as part of the relaying of the section from Chapel Street eastwards. The first stage is to River Street and track lights are in the overhead at Stanhope Court. The double track right angle crossing at the main city intersection of Swanston and Bourke Streets was renewed over the weekend of 26/27 May with work starting on the Friday night.

Work on the main inner suburban intersection of Hoddle Street with Victoria Parade/Victoria Street Richmond moved a step closer to completion over the weekend of 12/13 May when tracks were installed to the new alignment. The old, sharp, reverse curve was replaced by easy curves at each end with a straight between. The new work leaves the old alignment just west of the railway bridge in Victoria Street and joins the reserved track alignment in Victoria Parade at the eastern end of the crossover. The old tracks were only removed at the points of divergence with the remainder being buried under filling for a new, higher, road surface.

The single track in Brunswick Road East, North Fitzroy is being removed between Lygon and Nicholson Streets as part of road works. A short length of straight track is being left at Lygon Street as a lay over and is being protected from east bound road traffic by a concrete kerb which forms part of a divided road for some distance east of Lygon Street. This work started in May.

Track lights were strung in Doncaster Road North Balwyn, from the East Kew shopping centre to about the site of the old loop, near the terminus, in May.

Planning for the East Preston line extension is going ahead with work due to start during the 1979-80 financial year.

CORRECTION: The first item on page 18 of the February issue should read - New Z class trams 101 to 103 . . .

ADELAIDE TRANSPORT NEWS

With 6 of its 26 H cars out of traffic for long periods and several others unavailable for short spells due to roof damage following a spate of dewirements at speed, the STA has on several occasions recently been hard pressed to muster sufficient cars to maintain all services on the Glenelg line.

Three cars have been stopped for many months for mechanical reasons. Car 353 is without motors, while 356 and 379 require new axle bearings. In an unprecedented circumstance three cars found their way into the paint shop (track 8) at City Depot and all were being repainted in different colours for different purposes. Car 377, which is already advanced in the refurbishment programme, has been selected to become the gold Jubilee tram and should ultimately see operation for a number of years in that guise after completion. The majority of gold components (side panels, end panels, doors, windowframes) are being spray painted at Hackney prior to fitting to the car. Yellow tinted fibreglass rather than the conventional red tinted panels form the basis for the refurbishment. Minor trim will be black. Car 351 (previously 359, originally 351) is being refinished to the condition in which it appeared when it opened the Glenelg line in 1929. Whilst generally similar to the current tuscan red and cream scheme, there are several significant variations, the most obvious of which will be the all-tuscan ends. (The current scheme has end window surrounds painted cream.)

The third car in the paint shop—last to enter and first to emerge, is 380. Unwilling to allow the MMTB to have a monopoly of the use of trams for art expression, the STA repainted

the silver roof of this rather faded car and handed the remainder of the job over to Miss Greer Honeywill, curriculum materials officer of the Education Technology Centre. With the aid of students from a number of Adelaide high schools, Miss Honeywill was able to prime and fill the more obvious surface blemishes, brush paint the car in grey undercoat and then have it repainted by art students. The Glenelg end of the car is dominantly lime green, while the City end is royal blue, latticed in white. The northern side is covered with a montage depicting life in the city, while the southern side has a series of country scenes. Much of the art work was done while the car was parked in Victoria Square as part of the 'Come Out 79' Children's festival during May. Despite much scepticism among the tramway fraternity during the initial stages of the project, it is now generally agreed that the end result has been surprisingly effective, especially when it is realised that all the artists were of high school age.

The double track on the rebuilt Goodwood flyover on the Glenelg line was brought into use in April 1979.

The three door Leyland Worldmaster buses, built in the mid 1950s to replace the trams and whose reliability has been found much better than more recent purchases, were all nominally withdrawn from traffic in November 1978. (They were previously withdrawn in 1972.) They seem to manage to find their way back onto the roads in various ways. Six of the seven Bee-line buses (801-804, 806, 807) remain in heavy daily traffic. 909, which became the tuscan red picnic bus (270) in 1973 and took various mus-

High school students finishing murals on H 380 in Victoria Square. 14.5.79. - Ian Hammond



eum members to St. Kilda in 1974 for the opening of the tramway, found its way back into traffic in 1976 and is still in use on one of the Adelaide Hills routes. When the small number of charter buses kept at Hackney started to weaken recently, it was given extra strength by adding 905, 927 and 946 from retirement. Finally, 939 is being converted to become the flagship of the STA fleet as a promotions bus, specially painted green and white, for use by Marketing Manager John Drennan. The rear window is being replaced with double outward opening doors so that a fibre glass mock up of the front of a new Volvo bus can be carried inside.

The first two body shells of the new suburban trains for Adelaide were noted in the yard of Commonwealth Engineering at Clyde N.S.W. during May. Constructed of stainless steel with curved sides they owe something in basic

design to the Metroliners operated by Amtrak between New York and Washington. Whilst the original proposal for these cars envisaged push pull working using 12 wheel diesel electric power cars the order now in hand is for 12 diesel hydraulic power cars and 18 driving trailers. The power cars (20 class) will be of 1030 HP provided by two M.A.N. underfloor engines. A motor alternator set mounted above floor will supply power for lighting and air conditioning. Both types of vehicle share a common length of 81ft 4½ inches. Each has a raised drivers cab at one end. The power cars, which also have a compartment for the guard and parcel space, seat 76 and the driving trailers (21 class) 106. The cars will be fitted out and completed at the Com-Eng Aresco plant at Dry Creek. To facilitate this, a rail connection has recently been laid into the plant.

STATE TRANSPORT AUTHORITY HERITAGE POLICY CONTINUED

scholarship, preservation, display and operation as a means of promoting community recognition of the role of public transport in South Australian society.

5. The Authority shall, subject to any prior commitments before the adoption of this policy seek to retain ownership on behalf of the State of representative artifacts or vehicles set aside for preservation but shall have the right to make available such artifacts or vehicles to other organisations under mutually agreed terms and conditions.

6. The Authority, as a means of implementing its Heritage Policy, has established a Transport Heritage Review Committee whose composition shall be at the discretion of the General Manager. The initial composition of the Committee shall be Mr. C.R. Stewein, STA Chief Engineer (Chairman), Mr. J. Drennan, Marketing Superintendent, Mr. R. Sexton, Publications Officer, and Mr. J.G. Miller, Workshops Supervisor.

7. The functions of the Transport Heritage Review Committee shall be to:

(a) Monitor surplus documents, records, artifacts, facilities, equipment and rollingstock to evaluate and advise on their potential historical worth, taking into account their significance in technical and operating terms to the routine

functions of the Authority and make recommendations to the General Manager regarding items worthy of preservation.

(b) Recommend procedures for the routine retention of classes of documents having historical significance.

(c) Maintain a register of items approved for preservation and supervise their security.

(d) Develop facilities for the study of preserved historical documents by bonafide historians and students and recommend on the availability of access to these facilities.

(e) Ensure that documents surplus to the Authority's requirements are notified to the State Archivist in conformity with the Libraries and Institutes Act, 1939 and arrange disposal of those not required by Archives.

(f) Evaluate and recommend on external proposals for preservation of historical transport items.

(g) Oversight the management of any items loaned to recognised museums by the Authority.

(h) Assist recognised government and non government historical organisations achieve objectives which are in keeping with the Heritage Policy of the State Transport Authority.

(i) Recommend ways in which the Authority can maximise the value to the community of any documents, records, artifacts, facilities, equipment and rollingstock which it has set aside for preservation.

FOOTNOTE: Mr. Ron Stewein, who was appointed Chief Engineer of the South Australian State Transport Authority in 1975, is well known as the author of a number of railway texts published by the ARHS. Mr. John Drennan was responsible for organising the Transport Centenary Celebrations in 1978 and is managing the Glenelg Tramway Golden Jubilee Celebrations to be held in December 1979. Mr. Robin Sexton is editor of the STA house magazine 'Among Ourselves' which was founded by the MTT in 1946. Mr. Joe Miller, who commenced his career as an electrical fitter at Hackney tram depot, has assisted several Australian and New Zealand museums to find hard to get equipment in recent years.

★ *Museum Notes and News*

C.O.T.M.A.

News from the Council of Tramway Museums of Australasia

This report deals with further work by COTMA in arranging help for member societies.

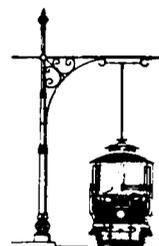
Advice was received from the MMTB that they had a quantity of GE K35JJ controllers available for disposal to any COTMA member society which was interested. Fortunately, a periodical memorandum was due to be released to members and this item was naturally included. Replies were received from AETM (requesting 8), MOTAT (8), TMSV (4), WATM (2). The

Board approved these requests and the four groups are arranging payment and collection.

With the steady commissioning of further Z series tramcars, W2 cars are being withdrawn and it seems certain that further items of equipment will be offered by the MMTB to COTMA member societies and our organisation will thus continue to serve its purpose of co-ordinating its members requirements and relieving the Board's officers of much work.

LOFTUS . . .

South Pacific Electric Railway



And Still They Come

OP 1089 which has been stored at Ingleburn since 1974 arrived at Loftus on Thursday 31 May 1979 and was squeezed into the already overcrowded yard. Although mobile, as are all the Society's tramcars, being mounted on bogies from a ballast motor (Sydney No. 6) which have a long wheelbase and are thus unable to swivel very much within the confines of the deep frame it is confined to the straight section of the East Branch in front of the sub station. It has displaced O957 from just inside the gate and although also only a shell, having received a protective coat of green paint whilst at Ingleburn it presents a somewhat more presentable appearance to arriving visitors.

Only one of the Society's tramcars is now off site - C29, which on display in the Old Spaghetti Factory in Sydney.

D scrubber 134s returned to Loftus after 12 weeks working on the ESR on Friday 15 June 1979. It was loaded at Dowling Street Woolloomooloo just outside the McElhone Street portal to the Kings Cross tunnel. The four wheel flat truck was returned at the same time, riding on its usual place on the gooseneck of the low loader. When the cable from the motor alternator set was disconnected the feed from the rectifier was also removed and the trolley pole was reconnected so that upon being placed once more on the track at Loftus it was driven away (with the flat truck in tow) under its own power. It was positioned with the resistance grids compartment at the north end, the same way as upon its previous return in December but reversed to its original orientation at Loftus.

Trolley Bus Progress

When the Society obtained Kogarah double deck trolley bus 19 in 1978 only the barest remains existed with one staircase, all seats and fittings, electrical equipment and wheels and axles and most of the interior and exterior sheeting gone. Brian Muston obtained a front axle assembly from an AEC half cab chassis and fitted this to the vehicle. Using borrowed wheels this allowed the bus to be towed to Loftus.

A number of top decks still existed in a variety of uses and one of these, mounted on a truck chassis and used as a mobile kitchen by a caterer, was purchased. This was moved recently, fortunately not to Loftus, and after reconditioning will be used to replace the top deck on 19.

The search for suitable seats and their subsequent location in Victoria and transport to Loftus was related in *TW* for April 1979.

The major obstacle to further progress was the lack of the rear bogie. The most promising lead was to a scrap yard in Wales where some Cardiff BUTs remained. However a lead indicated that a scrap yard in Perth had one. Mal McAulay visited the west in April for a live steam convention and upon calling at the scrap

yard found the near complete bogie assembly and chassis of a Perth Leyland single decker which had been used as a trailer for some years after withdrawal. Quick measurements did not quite tally with those of 19 which is an AEC. The bogie and part of the chassis was purchased, the latter in case it was necessary to modify the chassis of 19 to take the Leyland bogie.

These parts were expeditiously despatched to the east. A trial fitting has shown that only minor adjustments will be required to match the AEC chassis and the Leyland bogie, and the chassis part brought from Perth will not be required.

New Equipment

Following on the purchase of a radial arm drill as reported in the last issue of *TW*, a much larger investment has been made in a new high pressure water/wet sand cleaning machine. This unit has many applications and will be used for cleaning rust and paint off vehicles, buildings and equipment and for degreasing motors, compressors and bogies. Its initial use will speed up restoration on F 393 and R1 1979 and enable protective work to be undertaken sooner on O 957 and R1 1971.



The rear bogie assembly with two pieces of chassis on top of it, in the yard at Loftus before being fitted under TB 19.

- V. Solomons

CANNINGTON . . .



Western Australia Transport Museum

Another vehicle has been added to the fleet and urgent moves have been made to obtain a further one.

The new addition is a normal control Thornycroft bus. It is thought to be an A1 long model and dates from about 1927. Chassis number is 18718. This vehicle has long resided in the open on a property near Northam and the wooden body frames started to crumble when moved (on a low loader) and restoration will involve complete reconstruction.

Thirtysix Perth and Fremantle tram bodies have been used in a caravan park at Mandurah for about the last twentyfive years. The lease has expired and has not been renewed by the

local council, the owners of the site. The proprietor started to burn the trams in early May but said any could be taken away before their turn came. The Museum expressed interest in some but could not arrange removal in time. At the time of going to press it appears that a FMT four wheeler will be obtained. Other groups and people have expressed interest in taking five other cars; one, Perth 34, has gone to the Halls Head Cottage Museum. Cars identified as burnt are: FMT 2, 4, 11, 12, 20, 21, 24, 25 and the remainder of the FMT four wheelers from 1 to 19 except two, the one for WATM and one other which most likely will also be burnt.

THE SYDNEY SCENE

CONTINUED FROM PAGE 20

Sunday was the same, only perhaps more so as the service had to be supplemented and painted rolling stock appeared on the line. A two year old girl was seriously injured when her foot was caught in an escalator at Martin Place.

The real test came on Monday when thousands of commuters had to learn a new daily routine with the change from bus to train at Bondi Junction or Edgecliff. The new ticketing arrangements and through fares caused problems for passengers and bus crews (all one man or woman in the area) alike. The daytime service was operated by four car double deck sets with a five minute frequency. The trains stopped at the down ends of both the up and down platforms which caused some congestion on the escalators, especially at Bondi Junction. The problem was overcome here by moving the up trains to the up end of their platform and running one pair of escalators down and the other pair up. An estimated 100,000 people used the line on Monday.

So, after a hundred years wait it was open. The service is quick, 11 minutes from Central to Bondi Junction, and frequent; in the off peak it is comfortable. However, the noise level is still very high and no relief is provided against the draught caused by the trains. The opening has been a success, we can now only wait and see if this continues.

New Electric Locomotive Delivered

The first of 10 new 85 class 2700 Kw (3600 hp) electric locomotives being built by Commonwealth Engineering was delivered on Thursday 17 May 1979. It was hauled to the Chullora Workshops area by 4851 for weighing and sanding. Later in the day it returned to Clyde and was check weighed at the Waggon Works. After examination and some trial runs (light) it subsequently returned to Com Eng. It was formally handed over to the PTC at a ceremony at the plant on Wednesday 30 May.

Speed trials were undertaken on the western line between Seven Hills and Penrith on 12 and 13 June and brake and load tests on 19 and 20 June. On these last two days it was coupled to two 46 class locos. A trial run with a coal train between Glenlee and Rozelle took place on Monday 25 June and this was followed on Wednesday 27 June by a run with a 576 ton train from Enfield to Lithgow. Forming part of the load were the Dynamometer Car and 4628, which was manned and ran with a pantograph up in case assistance was needed. This did not prove necessary. The load for a single 46 class loco, which is of similar power but marginally lighter, on the ruling Blue Mountain grade from Valley Heights to Katoomba is 400 tons.

Initial reports indicate that the class is likely to be very successful and although intended basically for heavy coal haulage, 8501 has been unofficially reported as exceeding 100 mph.

BYLANDS . . .



Tramway Museum Society of Victoria

We are pleased to report another rolling stock acquisition for Bylands — but it will not be rolling very far! Some months ago we enquired from Vicrail about purchasing a van for use as a kiosk at Bylands to enable the present small building to be vacated and thus made available for its original intended use — the substation. We were lucky to find that the railways were withdrawing a bogie guards van, the first one to be withdrawn and sold. After a long wait while the administrative wheels slowly turned, 21C eventually arrived at the museum on Tuesday 1 May 1979 and was placed a little west of the mainline and to the south of the tramstop and platform. The exterior is being washed down to remove the grime and ready it for repainting, while most of the interior (shelves, desk and toilet) have been removed to increase available space. The southern end will become the public entrance lobby and kiosk while the northern portion will be used as

a public waiting area. 21C will thus become a very useful adjunct to the Bylands Museum.

During the reconditioning of X1 467, it was found that one drip rail was in bad condition. Two lengths were purchased from Preston Workshops and the necessary angled joints cut ready for installation. Some rusted metal fascia has also been found and will be given suitable treatment.

Mention is made of our standing invitation to readers of *Trolley Wire* to visit our Museum, situated four miles south of Kilmore on the Northern Highway and open every Sunday between 11 am and 5 pm. If you do not have a car please write to the Society at our post office box giving details of your proposed visit and we will try to arrange transport to Bylands. It would be appreciated if at least two or three weeks notice could be given to give time for arrangements to be finalised.



Cameramen from the ARHS Victorian Division film group at work at Bylands. 24.2.79.

ST KILDA . . .



Australian Electric Transport Museum

Annual General Meeting

The Annual General Meeting of the AETM was held at Hackney on Friday 20 April 1979. The following Executive Committee was elected:

<i>President</i>	John C. Radcliffe
<i>Secretary</i>	Ron White
<i>Treasurer</i>	John D. Hoffman
<i>General Manager</i>	Mark Skinner
<i>Committeemen</i>	John R. Pennack L. Max Fenner Robert G. Magnussen

The only change to the committee from the previous year was the appointment of Ron White as Secretary in place of Christopher Steele who had previously advised that he would be unable to accept nomination for any position in the 1979-80 year. The retirement of Mr. Steele marked the end of a period of office-holding extending back to the very inception of the Museum in 1958. Mr. Steele had held a variety of positions throughout that period apart from the years 1967-72 when he was overseas. He remains one of the Museum's trustees.

Major items approved on the Budget for 1979-80 at the Annual Meeting included purchase of a lathe, a second stores shed, substantially upgraded fire extinguisher provisions commencement of the toilet block and a significant contribution towards the reconstruction of car 42 as a toastrack car.

The Annual Meeting also approved a motion to offer to the State Transport Authority on loan the differential, tail shaft and rear axle half shaft from Green Goddess trolleybus 216 for use in a project to make Garford motorbus 208 operational. The equipment was removed and taken to Hackney by STA staff several weeks later.

192 Commissioned

The South Australian Minister of Community Development, Mr. John Bannon, formally commissioned D type tramcar 192 into traffic at St. Kilda in a short ceremony on Sunday 6 May 1979. He subsequently drove the car with a

crush load on a return run to St. Kilda Beach. After making a detailed inspection of the Museum and its facilities, he rode as a passenger to the Beach on car 381 which he drove on the return run. He was accompanied by his family during the visit and was assisted by the Mayor of Salisbury, Mr. R. White.

S. A. Museum Enquiry Visit

Mr. Robert Edwards, who is enquiring into operations of the S.A. Museum and its relations with other museum activities on behalf of the South Australian Government, visited the AETM on Tuesday 1 May 1979.

Property Improvements

Lining of the members lounge was continued in May. An attractive timber feature wall has now been completed on the northern side of the lounge. The Inspectors cabin was repainted in May. The opportunity was taken to vary the previous colour scheme of all over rich brown which had faded in the summer sun. The new scheme is golden cream with architectural features picked out in rich brown. This closely matches the style used on the signal box and waiting seat. The change brings a greater cohesiveness to the various items of street furniture surrounding the depot fan.

The Executive Committee recently was given the opportunity to purchase from a member a small prefabricated garden shed 9 x 12 ft. This shed, which is already on site, is to be erected away from the main Museum buildings to serve as an inflammable liquids store.

Weed spraying of the main line has again been carried out following autumn germinating rains. This is done using works car 354 which has a petrol driven gear pump and boom spray mounted on the eastern end bumper.

Subscribers will find enclosed with their copy of this issue of *TW* the leaflet issued by the STA for the Adelaide Centenary Celebrations. If you missed this last year make apoint of coming to the Glenelg Jubilee in December.

ALBION PARK . . .



Illawarra Light Railway Museum Society

Open Days

The regular open days held on the second Sunday of each month have proved popular. Between 500 to 600 rides continue to be the daily patronage. On the May open day children and friends associated with the Illawarra Crippled Children's Association were invited to the Museum and the Society was able to donate \$100 to that charity as well as entertain the children to train rides. In addition to this amount the adjacent South Coast Model Engineers and the Wollongong Silver Band, which performed on the afternoon, made similar donations towards the children's welfare.

Locomotives

Readers are familiar with the problems faced by the Society over the last eight months concerning the boiler certificate for the 2 ft

gauge Hudswell Clarke loco *Cairns*. A provisional certificate was issued in time for the February Open Day which enabled it to steam at 120 lbs/sq inch pressure. A regular boiler ticket has now been granted at 160 lbs/sq inch.

Regular operation now means that considerable time has to be spent in motive power, rolling stock and track maintenance, but it is hoped that work will continue soon on the restoration of *Tully 6*, the 0-6-2T Perry steam loco and the 0-4-0ST Hawthorne loco *Burra*.

Restoration progress on Lima Shay No. 2 has been limited over the last month to the preparation of timber stakes for boiler lagging and the rebuilding of the cab steps.

2 ft gauge Hudswell Clarke loco 'Cairns' steams along Old Croom Road Albion Park during the March open day at the ILRMS museum. - P.Neave



TROLLEY WIRE *Stationary Engines*

By early May all the retained stationary steam engines donated by Wollongong Gas Co. when their plant converted to natural gas at the close of 1977, had been restored, mounted and connected to the vertical boiler in the engine area. At the same time the roof over these exhibits was completed and these units present an interesting working display on open days.

Track Extensions

The track location into the 'Yallah' station area has now been pegged out and on 28 April the culvert for the waterway crossing adjacent to Old Croom Road was constructed in concrete.

During early June the track gang was concentrating on repacking the existing track bed with pneumatic tampers, but when that task is completed work will then push ahead on the afore mentioned extension.

Around The Museum

During May a concentrated effort was made on sorting and stacking rails, stores and exhibit items. Some of the former Corrimal rail was disposed of due to web corrosion and lengths suitable for reuse have been stacked on a lineside rail table. The purchase of a

JUNE, 1979

ride-on mower has simplified the mowing tasks while equipment donations have enabled the barbecue areas to be further developed and more swing sets to be provided for children.

Earlier this year large wheel and axle box sets were received from Mackay. Mr. Len Heaton, Chief Cane Inspector at Marion Mill, obtained these items for the museum some time ago, but he was able to keep them stored until transport could be arranged. Mr. Heaton arranged free transport to Mackay Harbour from where they were shipped free of charge to Sydney by Australian National Line. Finally Mr. Brian Carruthers of Robinson's Transport delivered them free of charge to Albion Park over the last lap of the long journey. The ILRMS is grateful to those people who brought this project to a successful conclusion.

ILLAWARRA LIGHT RAILWAY MUSEUM SOCIETY Albion Park N.S.W.

Museum open on the second Sunday of each month between 11 am and 5 pm.

Correspondence: The Honorary Secretary,
Box 1036, P.O. Wollongong
N.S.W. 2500

FERNY GROVE . . .

Brisbane Tramway Museum Society



This report from Ferny Grove once again lists some considerable achievements, but it must be said at the outset that most of the work was achieved through the good offices of 10% of the membership. The activation of an operating museum tramway is a task requiring labour as well as capital and as most regular work party attendees can attest, previous skill is not a prerequisite!

On the depot scene, we were delighted to have donated to us a generous load of concrete on number one depot fan. The finishing layer is currently half completed, employing a more labourious technique.

Up at the substation, a fence has appeared around the transformer, busbars have appeared through the wall and the 11 Kv has disappeared underground. The last two jobs are now underway—the reconditioning of the transformers, initially one, and the installation of the

mercury bulbs. 600 V DC may be available when this article appears.

Our last off site work party for hopefully some time was held recently at the old Bulimba powerhouse, from where we acquired a complete set of rectifier cabinets and control gear, including the mercury bulbs. This was achieved by 5 people in one and a half days, using a truck generously provided by Avis.

Also, TAA are to be thanked for flying the society President to and from Melbourne in May where he met with MMTB representatives regarding driver training and the possible acquisition of Melbourne cars in the future.

The ARHS held its annual field day at the Redbank Museum in May. The society's exhibits were conveyed there in another of our exhibits, Leyland Worldmaster bus 241. The usual success was enjoyed by all.

AUSTRALIAN ELECTRIC TRANSPORT MUSEUM (SA) INC. St. Kilda, South Australia.

Trams — Trolley Buses — Electric Locomotive

Trams operate Sundays & Public Holidays 1 — 5 pm. (Except Christmas Day and Good Friday)

Groups may arrange inspections on Saturdays by appointment. No public transport available. Interstate visitors please contact AETM if transport required.

In emergency phone (08) 297 4447.

Correspondence: The Secretary, AETM (SA) INC.,
Box 2012 G.P.O., Adelaide,
S.A. 5001.**BALLARAT TOURIST TRAMWAY**

Ballarat Botanic Gardens, Wendouree Parade, Ballarat, Victoria (Ballarat Tramway Preservation Society Limited).

Tram Rides, Static display of trams, photos;
Sales Department etc.

Operates Saturdays, Sundays and Public Holidays (Christmas Day excepted) and most days during Victorian School holidays and the Ballarat Begonia Festival 11 am — 5 pm.

Telephone: Tram depot (053) 34 1580,
Bungaree House (053) 34 0296Correspondence: The Secretary, B.T.P.S.
Box 632, P.O., Ballarat.
Victoria. 3350.**WESTERN AUSTRALIAN TRANSPORT MUSEUM (INC).**

Tramway Museum and Bus Operation, Castledare Boys Home, Watts Road, Wilson. W.A.

London RTL Double deck bus rides 1st Sunday in month 1.00 pm to 5.00 pm.

Correspondence: The Secretary,
Box 33, P.O. Maylands,
W.A. 6060.**VICTORIA'S TRAMWAY MUSEUM** Union Lane, Bylands, Victoria. (Tramway Museum Society of Victoria Limited.)

Horse tram rides, museum site, trams, photos and other items on display, Sunday 11.00 am to 5.00 pm.

Correspondence: The Secretary, TMSV,
Box 4916 Mail Exchange,
Melbourne, Victoria. 3001.**STEAM TRAM & RAILWAY PRESERVATION (CO-OP) SOCIETY LIMITED** Parramatta Park Steam Tramway, Parramatta N.S.W.

Steam Trams are operated on the 3rd Sunday of every month, from 1.30 to 4.30 pm.

The Society possesses 1 steam tram motor, 2 steam locomotives and 5 various trailer cars.

The surrounding parklands are suitable for picnics, barbeques, etc. and contain historical buildings.

Public transport is available. Rail to Westmead station then walk across parklands to the depot.

Correspondence: (SAE would be Appreciated)
The Secretary, S.T. & R.P.S.
Box 108 P.O., Kogarah.
N.S.W. 2217**SYDNEY TRAMWAY MUSEUM** Princes Highway, Loftus N.S.W. (South Pacific Electric Railway Co-op. Society Limited).

Electric trams from N.S.W., Queensland and Victoria.

Tram rides Sundays and Public Holidays (Except Christmas Day and Good Friday) 10.30 am — 5.00 pm.

5 minutes walk south from Loftus Railway Station.

Correspondence: The Secretary, SPER,
Box 103 G.P.O., Sydney.
N.S.W. 2001.**TASMANIAN TRANSPORT MUSEUM SOCIETY,** Glenorchy, Tasmania.

Comprehensive transport museum under construction

Correspondence: The Secretary, T.T.M.S.,
Box 867J, G.P.O.,
Hobart, Tas. 7001.

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South Australia's Minister of Community Development, Mr. John Bannon, talks with AETM member Jim Burke after having despatched his passengers off to St. Kilda on the next tram, following the inaugural commissioning run in car 192 on 6 May 1979. - Ian Hammond