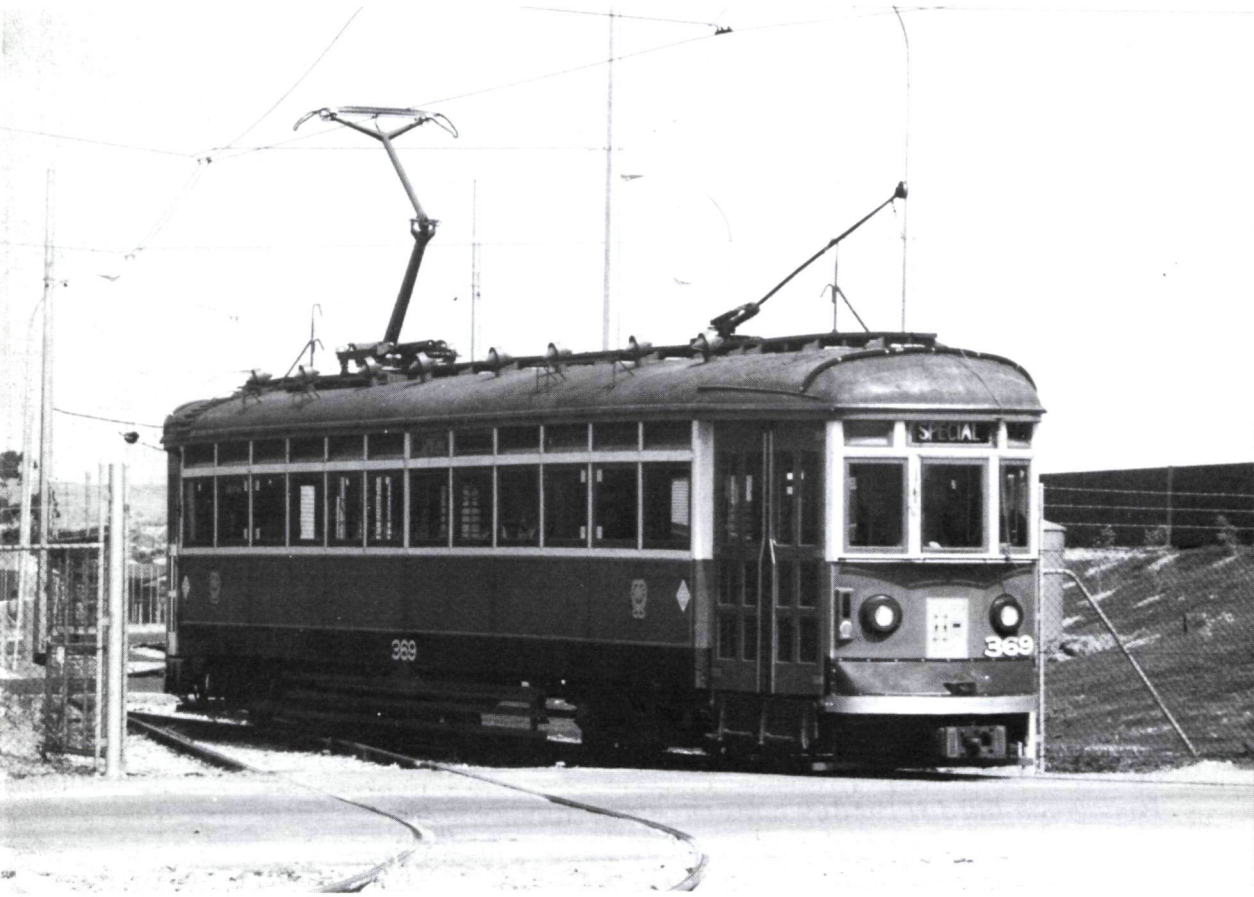
TROLLEY WIRE

$2.20

JOURNAL OF . . .
AUSTRALIAN TRAMWAY MUSEUMS

October 1986

ISSUE No 226



1932 PAPER ON LATEST TRAMCAR TYPES

Registered by Australia Post — Publication No NBH0804

TROLLEY WIRE

ISSN 0155-1264

OCTOBER 1986
Vol 27, No 5
ISSUE No 226

* *Recommended Price*

CONTENTS

Published by the South Pacific Electric Railway Co-operative Society Limited, Box 103 P.O. Sutherland, N.S.W. 2232.

The opinions expressed in this publication are those of the authors and not necessarily those of the publishers or the participating societies.

Typeset and printed by Meulen Graphics, 70 Jellicoe Street, Lidcombe 2141, phone 648-1444.

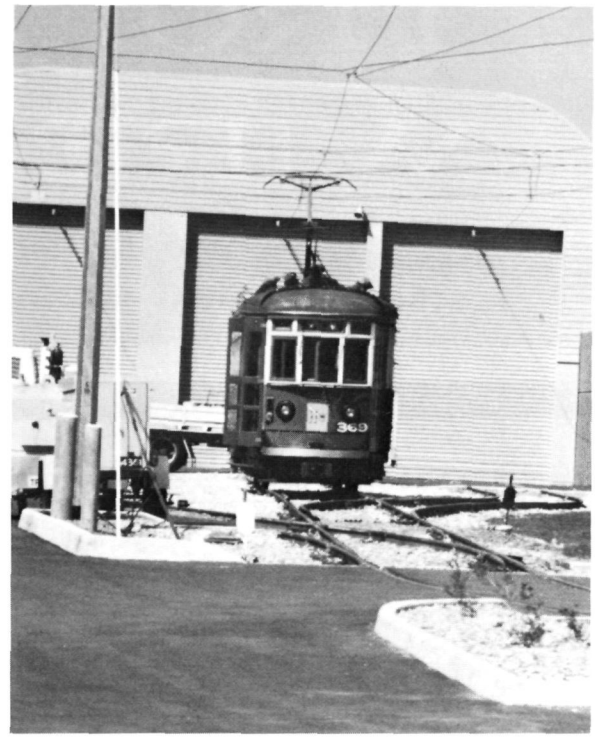
Subscription Rates (for six issues per year) to expire in December:

AUSTRALIA $12.50
OVERSEAS $14.50

All correspondence in relation to *"Trolley Wire"* and other publishing and sales matters should be forwarded to:

BOX 103 P.O. SUTHERLAND 2232

EDITOR ..... Bob Merchant
CO-ORDINATOR ..... Bob Cowing
SUBSCRIPTIONS ..... Norm Chinn
DISTRIBUTION ..... Mal McAulay
Peter Hallen, Laurie Gordon



The shape of things to come. Pantograph-fitted H369 stands outside the new depot at Glengowrie during its test running in September 1986. The new depot overhead wiring is designed for use by pantograph-fitted cars only. The move from the old City Depot in Angas Street is expected to take place over the weekend 18/19 October 1986.

BOB MERCHANT

FRONT COVER:

Pantograph-fitted H car 369 turns out of the entrance to the new Glengowrie tram depot bound for Glenelg during one of its test runs during September 1986.

R.-I. MERCHANT

BACK COVER:

The interior of Sydney R class car 1739 showing the leather upholstered tip-over seating in the end saloons, the wooden seating in the dropcentre and the balanced drop windows. Varnished woodwork and a white painted ceiling complete the decor.

OFFICIAL PHOTO

LATEST TYPES OF TRAMCARS IN MELBOURNE, ADELAIDE AND BRISBANE

by F. N. Maclean

It is perhaps appropriate, following the Council of Tramway Museums of Australasia Conference in Adelaide during September, 1986, to look back at a similar conference held 54 years ago. The following paper was prepared by Mr. F. N. Maclean, AMIE (Aust), Chief Designing Engineer of the Department of Transport, New South Wales, and read to the Australian and New Zealand Tramways Third Conference held in Adelaide on 12 to 16 September, 1932. Mr. Maclean's findings were taken into account in the development of the Sydney R class tramcar, the first of which was received in September, 1933.*

Introduction

These notes have been compiled as a result of enquiries and observations which were made in Melbourne, Adelaide and Brisbane during May 1932, with the object of obtaining general information on the above subject, and also to assist in forming an opinion concerning the question as to whether the new type of tramcar which it is proposed to design and construct, when funds permit, to replace old tramcars in Sydney, should be of the "Drop-Centre" type, used in the above cities, or the "Corridor" type used mainly in America.

Number of Latest Cars in Service

In making the comparisons between the tramways in the Australian cities in question, it is necessary to keep in view the fact that the Melbourne Tramway is in the course of conversion to the electric system from the old cable tramway system, and that the plant generally, therefore, is newer.

The number of cars of the latest type in each city as compared with the total electric passenger cars is as follows:

	Total Cars in Service	*Latest Cars in Service*	*Percentage of Total*
Sydney	1490	419 (P, OP and LP types)	28%
Melbourne	556	443 (W, X and Y types)	80%
Adelaide	312	114 (F and H types)	36%
Brisbane	294	95 (Drop-centre type)	32%

The outlines of the latest standard tramcars for the main services in the above cities are shown on the accompanying drawings.

Size of Cars

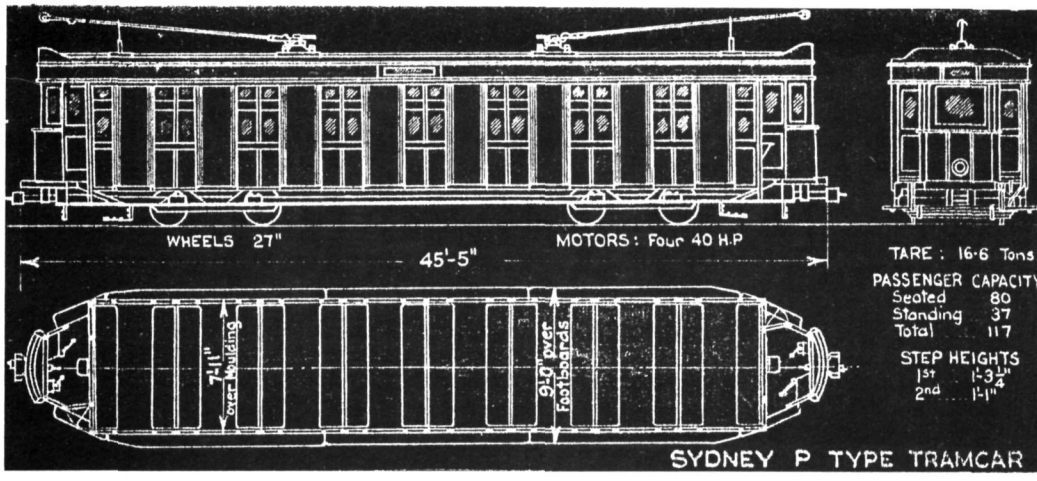
As compared with Sydney, the clearance limitations of track centres and track survatures permit somewhat larger cars to be used in Melbourne and Adelaide, whereas in Brisbane the cars have to be smaller, e.g., the width is restricted by legislation to 7ft 8in. The largest possible single-deck car is favoured for the main services in all of these cities.

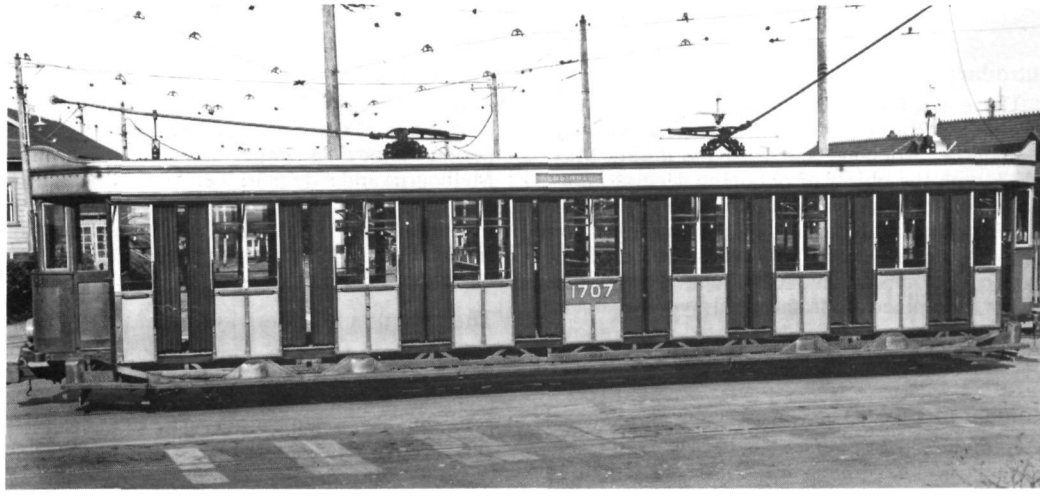
The Location of Doorways

Two main types of corridor cars are used in America, viz: the single-end type for running in one direction like a bus, and the double-end type for running in both directions. The single-end type is used extensively and necessitates doorways on one side only, usually, one at the front end and another at the centre; both being wide enough for two people abreast. These are good locations for doors, as they are reasonably close to the passenger zone in the car. With the double-end car, however, it is necessary to provide wide doors on both sides, usually at the ends, which are not good locations owing to their comparative remoteness from the passenger zone in the car.

If doors were provided at the centre as well as the ends on both sides with double-end cars, and the usual large floor areas were provided adjacent

* From August 1930 Tramways Department was separated from Railway control to become the Metropolitan Transport Trust and the Newcastle Transport Trust. In April 1932 the name was altered to Department of Transport becoming the Department of Road Transport and Tramways in February 1933. The Transport Trust initiated design work on the proposed R class tram.





Sydney P class 1707 outside Dowling Street Depot. The P class were the newest in Sydney, the last being delivered in 1929, three years before this paper was presented to the Conference.
OFFICIAL PHOTO

to the doors, the sacrifice of seating would be considerable, and it is for this reason that the side doors on double-end cars are generally confined to the ends.

The location of the doors on the drop-centre type of car, as used in Melbourne, Adelaide and Brisbane, is better. In Melbourne and Adelaide entrances are provided at the drop-centre only, but there appears to be a necessity for end doors also, as the passengers are disinclined to fill the end saloons. This is overcome on the Brisbane car, to a great extent, by the door at the driver's end, as far as the front saloon is concerned, and by the fact that the rear saloon, together with some of the rear open seats, are for smokers, thus encouraging the use of this saloon. Apart from this latter feature, however, the use of the open compartment for smokers is obviously the better arrangement.

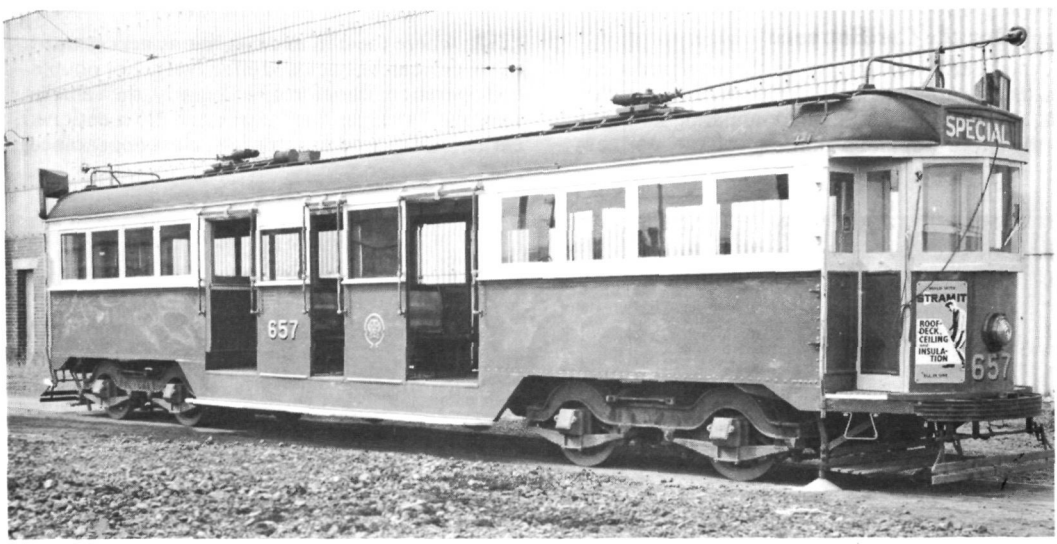
It should be added that the opinion is held in Melbourne that doors at the drop-centre are used to such great extent, as compared with an additional end door, that the latter is at least regarded as of doubtful value. It is true that a better chance of obtaining a suitable seat is offered to passengers who avail themselves of doorways at the centre of a drop-centre car constructed with end doors also, not only on account of the greater number of entrances at the centre, but also due to the fact that the smoking portion is usually at the drop-centre. Nevertheless, the impression has been formed, after viewing and discussing the operation of the cars in all three cities, that narrow end doors, as in Brisbane, are desirable in addition

to the main doors at the drop-centre, as a means towards filling the saloons and generally equalising the distribution of passenger traffic through the doorways. These end doors involve no material loss of seating capacity with a car like that in Brisbane. The benefit of this would be obtained more fully than it has been in Melbourne, where comparatively few cars were fitted with end doors as well as those at the centre, if a larger proportion of cars with end doors were in service, as in Brisbane. The question as to whether a rear end door should be provided would depend, as indicated above, on whether it could be placed under proper observation and control.

In the earlier 'W' cars in Melbourne, the three entrances were each 2 ft 7 in wide, but it was found that wider entrances were desirable to facilitate quick loading, and the centre portion of the car was therefore rearranged by placing the seats back to back and making the two entrances close to the saloon 3 ft 6 in wide and that in the centre 1 ft 11 in wide.

Step Heights

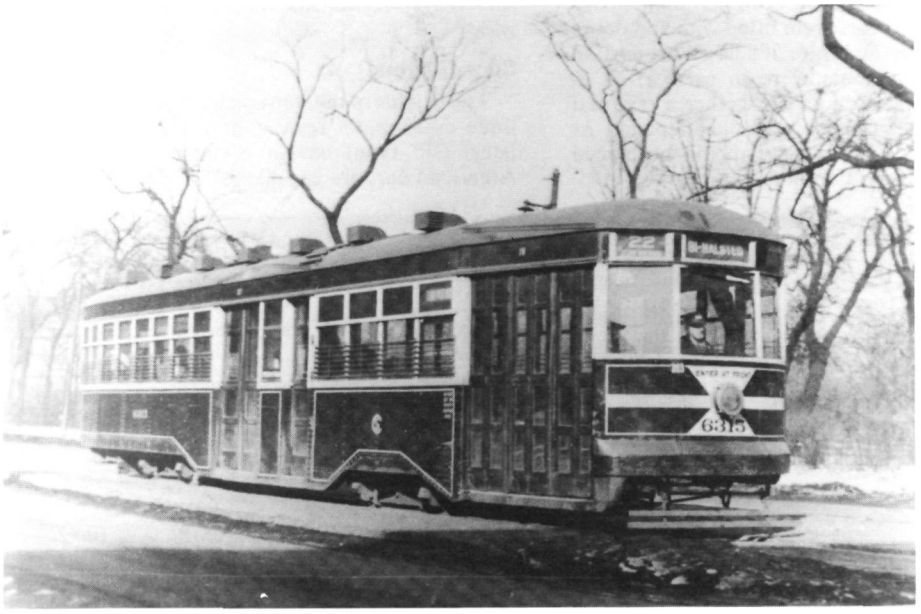
The heights of the steps on the latest trams in the three cities under review, as compared with the latest ('P' type) car in Sydney and a typical American car, are as follows:



Melbourne W3 class car 657 was one of three cars which had the original truck-mounted brake cylinders removed in 1949 and replaced by a normal pattern cylinder under the car. The trucks were fitted with 33 in wheels in an attempt to achieve quieter running. The W3 cars were the first drop-centre cars in Melbourne to have all steel frames.

MMTB OFFICIAL PHOTO

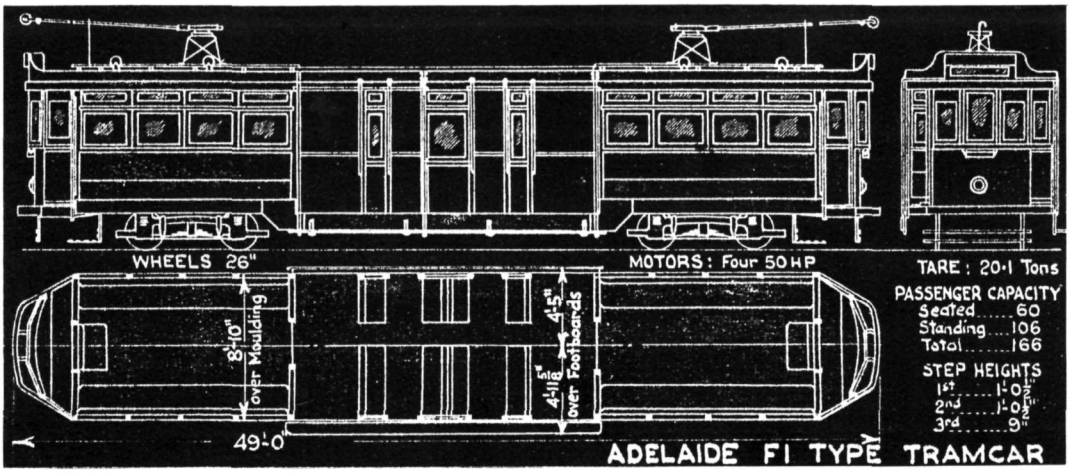
	Sydney	*Melbourne*		*Adelaide*	*Brisbane*	*Chicago*
Wheel diameter	*27¼"*	*33"*	*26½"*	*26"*	*31"*	*26"*
1st step	1'3¼"	1'3¼"	1'1⅝"	1'0½"	1'1"	1'3"
2nd step	1'1"	1'1¼"	1'0⅞"	1'0½"	1'0"	1'1"
3rd step	—	9"	5"	9"	7¾"	4" ramp

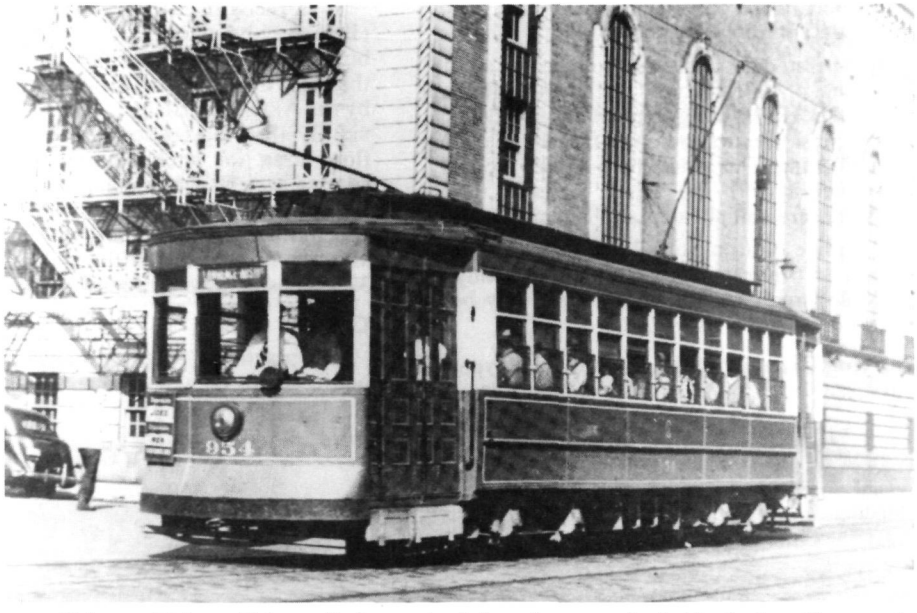


Chicago's latest cars were 100 Peter Witts delivered in 1929. They were 49ft long and seated 60 passengers. This 1944 view of car 6315 was taken on route 22.

Enclosing the Car Entrance

American tramcars are of the enclosed type, i.e., there is no open or semi-open portion, which is due, undoubtedly, to the predominating influence of the more populous portions of the northern USA, where the climatic conditions necessitate a car which can be enclosed effectively. For double-end operation, therefore, particularly, the vehicles have the "straight-line" characteristic mentioned earlier, which tend towards high class appearance,



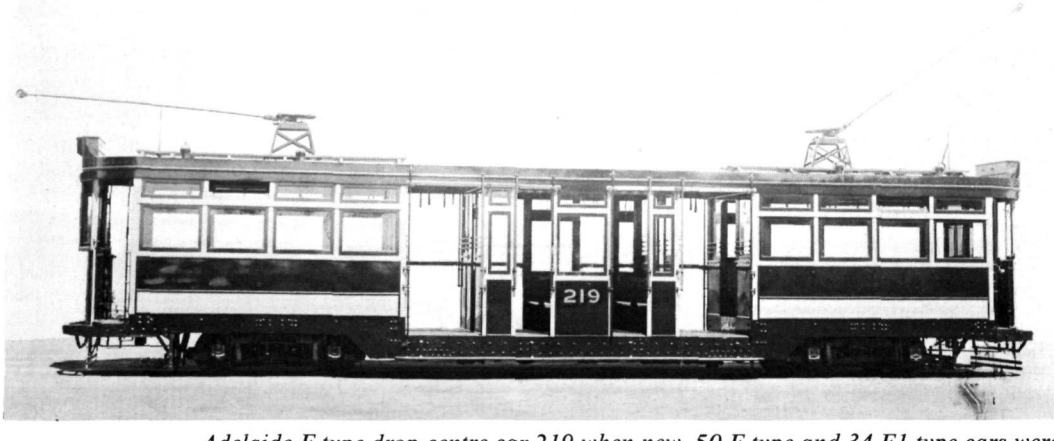


Chicago 954 could be called a typical American car in basic design. Drop ends enclosed by folding doors and a long centre saloon give the 'straight-line' characteristic mentioned by Mr. Maclean. 954 is one of three groups of similar cars numbering 1000 units. An additional 2400 cars following the same basic design were also in operation in the "Windy City".

and simple girder construction of the body for carrying the loads. Air-operated folding doors are usually provided at the entrance of these cars.

A disadvantage of the drop-centre car is that no really high class method has been developed for enclosing the entrances. In all three cities under review, spring-roller canvas blinds are used, but, although accepted as satisfactory by the majority of those interviewed, being not so wide as those used on the 'O' cars in Sydney, they are not free from objections which resulted in this type of blind being abandoned in favour of the concertina blind on later Sydney cars.

No flexible wire cords are used in Melbourne and Adelaide, and the blinds are of ordinary striped blind material instead of the heavy brown duck used in Brisbane and Sydney.



Adelaide F type drop-centre car 219 when new. 50 F type and 34 F1 type cars were built between 1921 and 1929. MTT OFFICIAL PHOTO

In Adelaide the conductors operate the blinds; public are not allowed to do so.

Air-operated doors are used on the 'X' and 'Y' ('one man' or 'safety') types of cars in Melbourne and on the 'H' (Glenelg) type of car in Adelaide, but are considered to slow down the rate of loading and unloading. This would be reduced, probably, if not tied-in with the safety features, which, moreover, are complicated and expensive.

The price of a pair of folding doors and door gear per 4 ft 6 in entrance, manufactured locally for the Melbourne cars, the door engine only being imported, was quoted as £68.

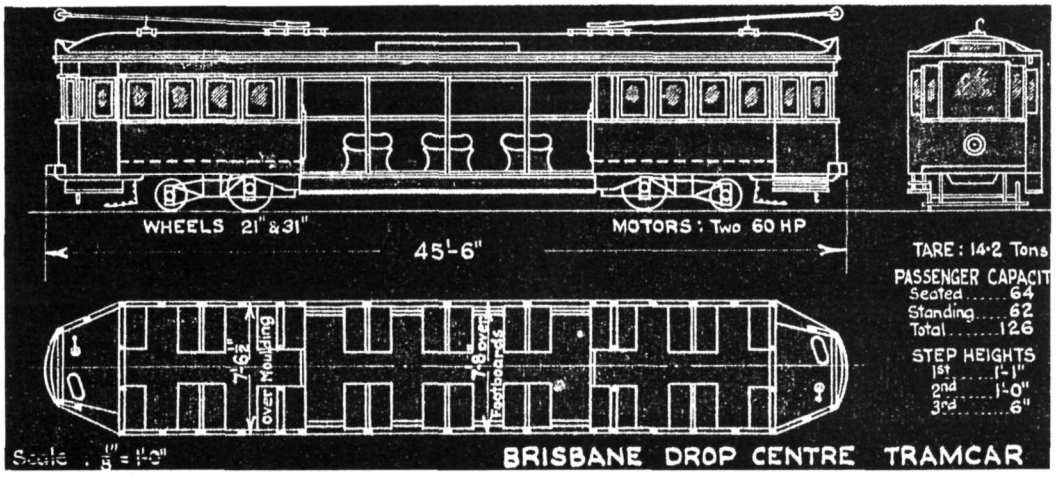
Carrying Capacity of the Latest Main Types of Cars

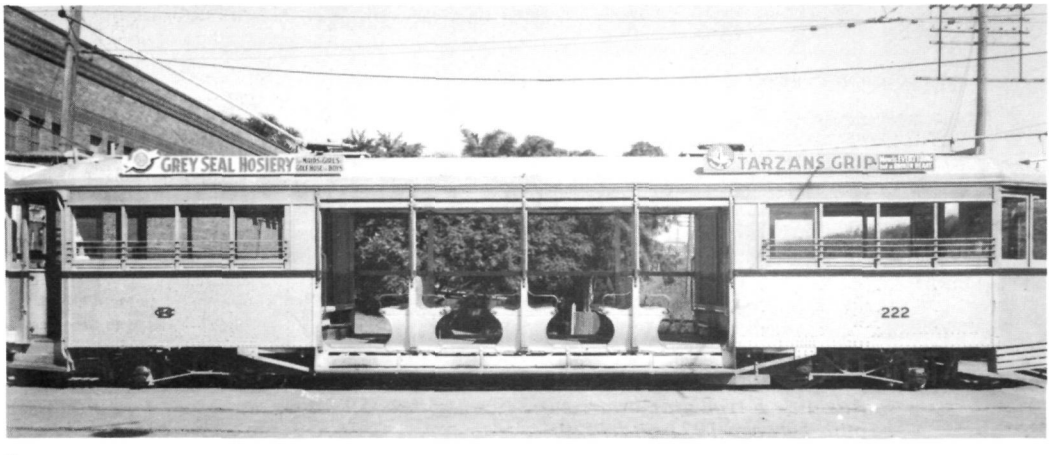
It is recognised that larger standing capacities may be claimed than those given above, but, to place the figures on a comparable basis, the areas have been calculated as recommended by the American Electric Railway Association, viz: By allowing 1.4 square feet of the available floor area for each standee after deducting seating area based on a depth of 2 feet from the top of the seat-back and a width of 17 inches, except for transverse seats, where a person may sit over the seat end of the aisle, in which case 32 inches is allowed for two passengers.

Coupled Cars

The practice of coupling tramcars is not carried out in any of the cities except Sydney.

	Sydney (P type)	*Melbourne (W3 type)*	*Adelaide (F1 type)*	*Brisbane (Drop-centre)*
Seated	80	52	60	64
Standing	37	97	106	62
Total	117	149	166	126





The "Drop-Centre" Feature

In Melbourne, Adelaide and Brisbane, a Drop-Centre type of car has been adopted, having an enclosed compartment or saloon over each bogie, and a semi-open or open compartment at the centre or mid-length portion of the car with a lower floor level in which entrances to the car are incorporated. In Brisbane an entrance is provided also at the leading end behind the driver, although the same name is used. The present-day use of this drop-centre type of car is peculiar to Australia and New Zealand.

In America, it is now not usual to drop the floor near doorways at either the centre or ends of the cars. The large platforms or floor spaces, which are provided near the doors to facilitate loading, and the main floor are on the one level throughout, excepting, sometimes,, for a small amount of ramping near the doorways. These cars in effect comprising a long single compartment without partitions. This absence of steps inside the car facilitates passenger movement, and also tends towards simpler straight-line construction and, consequently, better appearance generally. It does not permit such low steps from the road level, however, as with the centre or ends of the car dropped. A disadvantage of the drop-centre feature is that a conductor, when at the lower level at the centre of the car, is likely to have difficulty in viewing passengers boarding or leaving at a side door towards the rear of the car. The use of a rear door was abandoned in Brisbane soon after the latest cars were placed in service for this reason. The objection does not apply to a door at the leading end, since the driver is able to view and control passengers at these entrances.

Obstruction of Entrances

This habit is marked at the main drop-centre entrances in Melbourne and Adelaide, where the passengers lean against the partitions at the main entrances and consequently retard loading and unloading, resulting in the capacity of the entrances being reduced thereby from two passengers abreast to a single file of people entering with more or less difficulty. In Melbourne, not withstanding the provision of permanent metal notices, additional paper notices are posted in these entrances as follows·

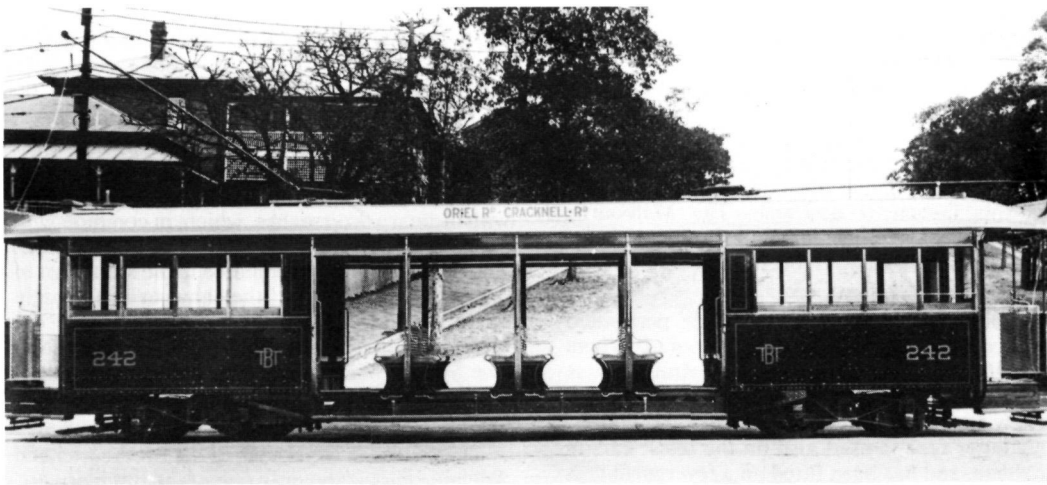
PASSENGERS
MUST NOT OBSTRUCT
CAR ENTRANCES

This condition does not exist on the Brisbane cars, as there is nothing for the passengers to lean against, but the entrances on the Brisbane cars appear to be much too narrow.

Off-Side Barriers

These are used in all three cities on the drop-centre cars. In Melbourne and Brisbane passengers sometimes ignore them by bending under them to board or leave the car.

Observations indicate, if one hook (located centrally along the bar) only is used to secure the



Brisbane drop-centre car 242 in original condition with open driver's platforms and wire mesh gates on the off-side. The driver's positions were later enclosed and the entrance to the driver's right was closed off. BCC OFFICIAL PHOTO

LEFT:

Brisbane drop-centre car 222 outside the Milton Workshops. The car is painted with aluminium paint relieved with light and dark blue lines. The off-side barrier is in the lowered position on the far side of the car. BCC OFFICIAL PHOTO

wooden bars in the raised position, that provision should be made, including metal wearing strips on the wood, to maintain them in a horizontal position, otherwise they cant, with consequent unsightliness.

Fare Collection in Cars

The work of conductors in collecting fares in the aisles and platforms appeared to be free from serious objection during crush loading, which, however, probably owing to the prevailing depression, was not heavy when inspected at peak hour in any of the three cities.

Seats

The prevailing opinion obtained in conversation with Tramway officials in the three cities visited appeared to be that there is no justification on tramway services of average length to provided upholstered seats, but it was generally agreed that the tramways would be forced to adopt these if again faced with unregulated bus competition, which, however is considered unlikely. It was considered also that these seats would have to be reversible, to meet possible competition of this nature, since none of the tramways in question is constructed for single-end operation.

There appears to be a general agreement that passengers should be enabled to face the direction of travel, but, in the present absence of competition, there is a disinclination to accept the reduction of seating capacity which this entails, as compared with back-to-back seats, viz., a 10% reduction approximately.

The predominating use of longitudinal seats involves a further reduction of approximately 7% in seating capacity, but increases the total carrying capacity of the cars by providing large standing space, and is giving satisfaction in Melbourne and Adelaide, but nobody appeared to be convinced that this feature is desirable. The Melbourne authorities have considered several cross-seat schemes for their saloons, but have not altered any cars.

In both Melbourne and Adelaide perforated plywood seat-covering material is favoured. Where the seats are more exposed on the central portions of the Melbourne cars, wooden battens are used closely spaced in alternate dark and light timbers. This latter type is used also on the latest cars in Brisbane, and has been fitted on a few recent cars in Sydney.

Rattan covering is also used in Melbourne and Adelaide. Experience with these, particularly on long seats in Adelaide, shows that the usual crimped sheet-steel backing should be provided, otherwise the contour of the seat becomes wavy, with subsequent fracture of the rattan due to local subsidence of the seat-padding.

On some of the 'Y' type (one-man) cars in Melbourne, and on the 'H' type (Glenelg Interurban) cars in Adelaide, reversible upholstered seats, covered in brown leather, are used and found satisfactory.

One of the cars in Brisbane has also been fitted with locally-made upholstered reversible seats, but are not favoured by the Transit committee of the Brisbane City Council, although the Tramway officers favour them. Moquette covering is also being tried in both Melbourne and Adelaide, and is found satisfactory; but leather is preferred.

The costs of seats of the different types available, per seated passenger, vary approximately from £2 for a back-to-back wooden slat seat to £10 for a reversible seat upholstered in leather.

Floors

The 'W' cars in Melbourne are covered on the saloon floors with 'Ormonoid' roofing felt, and in the central open portion by wooden slats, the reasons given for this latter being to obviate passengers standing in small pools of water, which, it was suggested, would be the case if these floors were covered with the material used in the saloons.

The 'F' cars in Adelaide are covered with wooden slats; the 'H' (Glenelg) cars with rubber.

Rubber is used also on some of the cars in Brisbane, but roofing felt is preferred. No objection is found there to pools of water in the open compartments. Slats have been found on the Brisbane drop-centre car to make sweeping difficult, due largely to the mixed arrangement of the slats transversely and longitudinally.

Windows

The Melbourne and Adelaide cars are equipped with ordinary drop sashes, which, in common with many observed elsewhere, are difficult to operate. The reason for this is indicated in the statement of one of the foremen that "they have to be a bit tight to stop them from rattling". In Brisbane they are loosely fitted, and it was stated they do not rattle. The Sydney balanced window is a superior piece of equipment; it is now used in Brisbane, where drivers' sashes are provided.

The central drivers' sash of the Melbourne and Adelaide cars is the only one of the three drivers' protection sashes which opens. This is effected by sliding the sash sideways in a curved race behind the right-hand side sash. While this is a simple arrangement, it does not permit the use of a wide central sash, which is customary in Sydney. The Sydney balanced sash is a better piece of apparatus, but it does not appear necessary to have two side drivers' sashes moveable.

Sloping drivers' sashes are fitted on the 'Y' cars in Melbourne, and, by choosing a suitable angle of slope, have been found to eliminate reflective glare from the interior lighting of the car, although provision is made for a screening curtain behind the driver. The fact that water runs off these sloping surfaces more slowly than it does off vertical windows has been used as an argument by the staff in representations for installing screen wipers. These sloping sashes were arranged, at first, to tilt like an automotive windscreen, but objections were found to this owing to wind effects; the driver's position being too close, and the sashes were altered to drop in the usual way. The sloping central sash is joined to a vertical side sash by a peculiarly shaped intermediate sloping sash, and the effect is not pleasing.

Window Louvres

It has been found necessary in Melbourne to provide some protection from the sun with long longitudinal saloon seats, but not with cross saloon seats. Light wooden drop louvre shutters are favoured. These are used in Brisbane with cross seats.

Ventilation

Melbourne saloons are ventilated by means of a longitudinal slot formed by a shallow 'lantern' effect in the roof, and by hinged or tilting glass louvre sashes above the main window sashes. In addition, it has been found necessary to leave out a small portion of panelling in the top of the bulkheads.

In Adelaide, more dependence for ventilating the saloons is placed upon leaving the glass louvre sashes permanently open above the main sashes. In addition, 'torpedo' roof ventilators are provided.

In Brisbane, no provision is made for ventilation beyond doors and windows. The smoking saloon was stated to be unsatisfactory in this respect if the windows were closed in bad weather.

Opinion was expressed in Melbourne that the corridor car suggested in preliminary outline for Sydney, comprising, in effect, one long saloon, might prove to be hot.

Saloon Doors

In the three cities visited a coned roller is provided for preventing sliding saloon doors from rattling, but it appears doubtful whether this feature is completely effective.

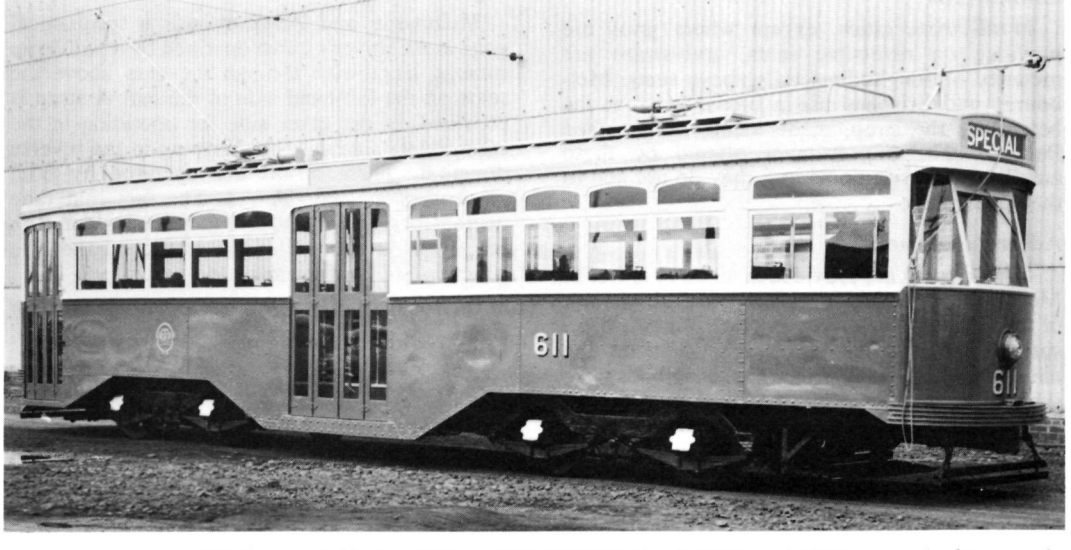
Ceilings

The ceilings of the cars in Melbourne and Adelaide are not lined, i.e., the roof boards and car-lines are exposed. These are varnished in the natural colours of the timber. Preference was expressed for this, as it has been found difficult to keep white ceilings clean.

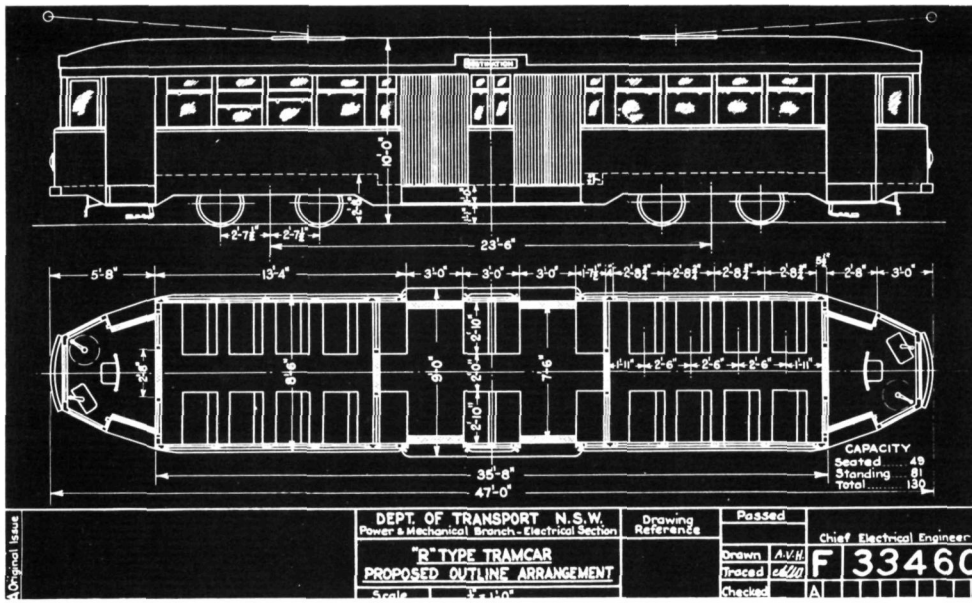
White-lined ceilings are favoured in Brisbane and Sydney.

Lighting

The lighting does not appear as good in any of



Melbourne's Y class 469 and Y1 610-613 (built 1927 and 1930 respectively) were the only trams in Australia to follow the Peter Witt design. The sloping front sash had been fitted with screen wipers when this photo was taken of Y1 611 at Preston Workshops. MMTB OFFICIAL PHOTO



This proposed outline arrangement of the R class tramcar is stamped "Advance Proof, Subject to Revision, 10th October 1932". SPER COLLECTION

the three cities as in Sydney, particularly in Melbourne and Adelaide, due to poor reflecting qualities of the ceilings.

The headlights also do not appear to be so bright in any of the cities as in Sydney.

Grab Straps

In all three cities, except where grips are provided on reversible seats, grab-straps are mounted on longitudinal rails above seats. Melbourne and Brisbane use a brown 'grip' at the bottom of the strap, made locally of moulded Bakelite. The improvement offered by these handles is of hygienic nature; they do not add to the appearance.

Advertising Racks

Curved racks are provided in all three cities. In Melbourne, dependence is placed on the curvature of the cards to keep them in place. In Adelaide, spring-steel retaining strips are added at the abutment of adjoining cards. These methods were superseded some years ago in Sydney by the use of retaining strips secured at the abutment of adjoining cards by two substantial screws. In Brisbane, these strips are also provided, but do not apear to be now used. The cards are tacked or screwed to the racks, due, possibly, to the cards being of non-uniform length. The Tramways in Brisbane prepare the whole of the cards for the advertisers in a special small section of their workshop, which is claimed to possess advantages.

In all three cities the impression was obtained that more advertising rack business is secured than in Sydney, notwithstanding that there are better facilities for securing the cards resulting in better appearance.

Signal to Driver

Melbourne and Adelaide use a mechanical gong in the driver's cabin operated by a pull-strap running lengthwise through the cars above the seats on the left-hand side of the car. A strap is provided on the other side for operating in the other driver's cabin when running in the reverse direction. These straps are operated by both passengers and conductors. The fact that they operate on the left-hand side only is considered an advantage in controlling the traffic on the side which is used for entrance and exit.

In Brisbane, the straps are operated on both sides.

Rear View Mirrors

These are used extensively in Melbourne.

Destination Signs

The signs in the three cities, generally, do not appear to be so satisfactory as those in Sydney. Route numbers are used on some cars in Melbourne, but do not appear to be well understood or quoted freely. The location of the route number, however, towards the side of the roof and facing obliquely forward is of advantage to passengers

waiting on safety zones close to the tracks, as the signs can be seen at a distance when cars are following one another in congested order at peak hours.

Car Colours

The cars in Melbourne and Adelaide present a more pleasing appearance than those in Sydney owing to the brighter colours used to paint them, and also due to the fact that the painting is carried out oftener (Adelaide 1½ years; Melbourne 2 to 2½ years).

The metal panels on a number of cars in Brisbane are being finished with aluminium paint and some coloured lines, with pleasing results and at low cost.

Cleanliness

The outsides of the cars in Melbourne and Adelaide are washed, and they appear cleaner than in Sydney where dry cleaning is adopted mainly. In Brisbane the cars are hand-washed.

Oil on Roofs

There is no dripping of oil on the roofs of the Melbourne, Adelaide and Brisbane cars from trolley wheels, noticeable in Sydney, and the appearnce of the former cars is consequently better. Graphite and grease are used as lubricants.

Speed

The free-running speeds in the three cities appeared to be about the same as in Sydney, viz., about 28 miles per hour.

The average schedule speeds, as compared with Sydney, were given as follows:

Sydney	12.17 excl. of layovers at termini
Melbourne	11.31 excl. of layovers at termini
Adelaide	10.47 excl. of layovers at termini
Brisbane	9.88 inclusive of layovers at termini

The rates of acceleration and deceleration in Melbourne and Adelaide were quoted at 3 feet per second (approximately 2 miles per hour per second).

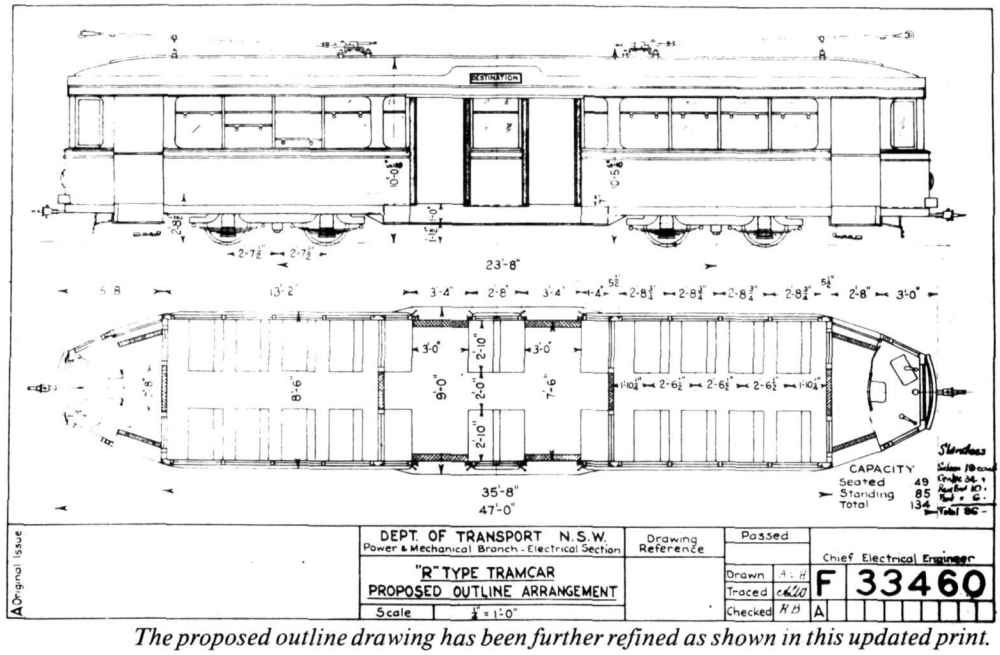
The 'H' type car, which is rather of the inter-urban type, maintains a schedule between Adelaide and Glenelg of 17.66 miles per hour, excluding a layover of 5 minutes at each terminus. The free-running speed is quoted at 40 miles per hour. The route length is 6 miles 50 chains, including ½-mile of city street running at each end, with the remainder right-of-way.

The running times are 23 minutes up and 27 minutes down.

Riding Qualities

The Melbourne cars are noteworthy for their good riding qualities. There is some side swing due, presumably, to short swing links on the bolsters, but the spring deflections provided are much greater than is usual on tramways, and approximate to automotive practice.

The following figures show the relative deflections:



The proposed outline drawing has been further refined as shown in this updated print.

SPER COLLECTION

Total Deflection	*Sydney*	*Melbourne*	*Adelaide*	*Brisbane*
Tare to crush	0.9 in.	3.75 in.	1.87 in.	0.625 in.
Crush to closed	0.62 in.	0.625 in.	1.88 in.	0.58 in.

Long semi-elliptic springs have been used in combination with helical springs with the object of obtaining smooth running of these cars.

Weight of Cars

The weights of the latest tramcars in the three cities visited, as compared with Sydney, are as follows:

Sydney (' type)	16.6 tons
Melbourne (W3 type)	15.7 tons
Adelaide (F1 type)	20.1 tons
Brisbane (Drop-centre)	14.2 tons

The low weight of the Brisbane car is attributable, partly, to the following reasons, viz.:

(a) Air brakes are not used;
(b) The central portion of the car is of open construction instead of semi-open;
(c) Maximum traction trucks, with two-motor equipment having a total rating of 120 hp, are provided instead of equal wheel bogies, with motors having a total rating of 160 hp, as on the cars of the other cities quoted above;
(d) In common with the Melbourne cars, direct control is used instead of multiple unit equipment;
(e) In common with the other cars, except Sydney, no draw gear is provided.

The ten 'W3' cars in Melbourne show a saving in weight of a little over 1 ton as compared with the 380 'W2' cars (16.75 tons) of earlier design. This has been achieved as the result of special attention to the matter of saving weight, some of the principal savings being affected by the use of a steel body instead of a wooden superstructure on a steel underframe, the wider use of aluminium alloy castings, and the savings in weight due to some of the special features of brakes gear mentioned later.

With reference to the matter of weight reduction, the Melbourne and Adelaide Tramways have used sample Birney Safety Cars, 28 ft long, seating 33 passengers, and weighing about 8.5 tons. Notwithstanding their very light construction, the service from these cars has been satisfactory over a period of about 9 years.

Steel Construction

On the 'W3' cas in Melbourne steel construction has been used to a greater extent than on previous cars. A noteworthy feature is that welding has been used to secure the sheet-steel panels to the body side framework. These welds are of the intermittent fillet type made by covered electrodes. No distortion was noticeable on the panels. The appearance is consequently better than the usual riveting method.

The use which has been made elsewhere on the body and bogie construction on the latest Melbourne cars, although extensive, appears to have been governed by the fact that it has been adopted, mainly, where there was some objection or difficulty in riveting. In the Sydney 'P' type car construction, as in practically all steelwork fabricated at Randwick Workshops, welding is used throughout.

Noise Elimination

The Melbourne cars appear to be much less noisy than those in Sydney, due, in a degree, to the high percentage of new permanent way, new rolling stock, and the wider streets. There have been special investigations towards the reduction of noise on the cars, however, and some of the measures which have been adopted are: Axle box hornstays have been eliminated on the latest ('W') cars. On the earlier 'W2' cars, where hornstays are used, the clearances are kept to a minimum by renewable liners, which, in addition, are made of ferodo to reduce noise. Motor axle bearing clearances are maintained closely, to a maximum of 1/16 in when condemned, to minimise motor gearing noises. To obviate rattling, clearances of pins in brake gear are maintained at a minimum by renewable hardened brushes, and, in addition, they are grease lubricated. Lateral movement of the pins and washers is restricted by the use of springs and, to further reduce noise, fibre washers are used instead of steel washers.

Opinion, and the general tendency in Melbourne, particularly favoured maintenance of trucks and undergear to a higher standard to ensure quiet running.

Wheel Diameter

Both Mr Strickland and Sir William Goodman* are of the opinion that the use of small wheels has increased rail corrugation and noise. On their latest cars, the Melbourne Tramways have reverted to 33 in wheels instead of 26½ in.

Experience in Sydney does not appear to support this view, but the matter necessitates consideration for any future design.

Special Drives

The Melbourne Tramways have had one or two

* Mr. T. P. Strickland, Chief Engineer, Melbourne & Metropolitan Tramways Board and Sir William Goodman, Chief Engineer and General Manager, Municipal Tramways Trust, Adelaide.

trial sets of three drives in service for periods varying up to about six years, viz.:

(a) Worm drive through cardan shaft and universal couplings;
(b) Worm drive through Metropolitan Vickers quill couplings;
(c) Spur drive through an adaptation of the M.V. quill.

Difficulty has been experienced in adapting these drives to bogie trucks, owing to the restricted space, and they are mounted on four-wheel cars. These are considered no quiter in service than ordinary cars.

From the rolling stock point of view, these special drives are considered disadvantageous owing to the larger number of parts, the more accurate fitting involved, and the consequent higher cost.

Maximum Traction Trucks

Trouble is experienced in Brisbane due to slippage of wheels when the cars are heavily loaded, caused by the percentage of load on the driving wheels being less under these conditions than when the car is empty.

Brakes

Departures from conventional tramway braking practice have been made in the braking of the 'W3' car by the adoption of:

(a) Clasp brakes on the wheels;
(b) Two air cylinders mounted on each bogie;
(c) The hand brakes are not connected through the car, i.e., each hand brake operates on one truck only.

These features should be considered for any future care in Sydney. Clasp brakes were considered for the 'P' car, but the restrictions of space imposed by the footboards prevented them being adopted.

The variable load brake apparatus has been tried in Melbourne, but it is considered that its complication is not justified.

Brake Shoes

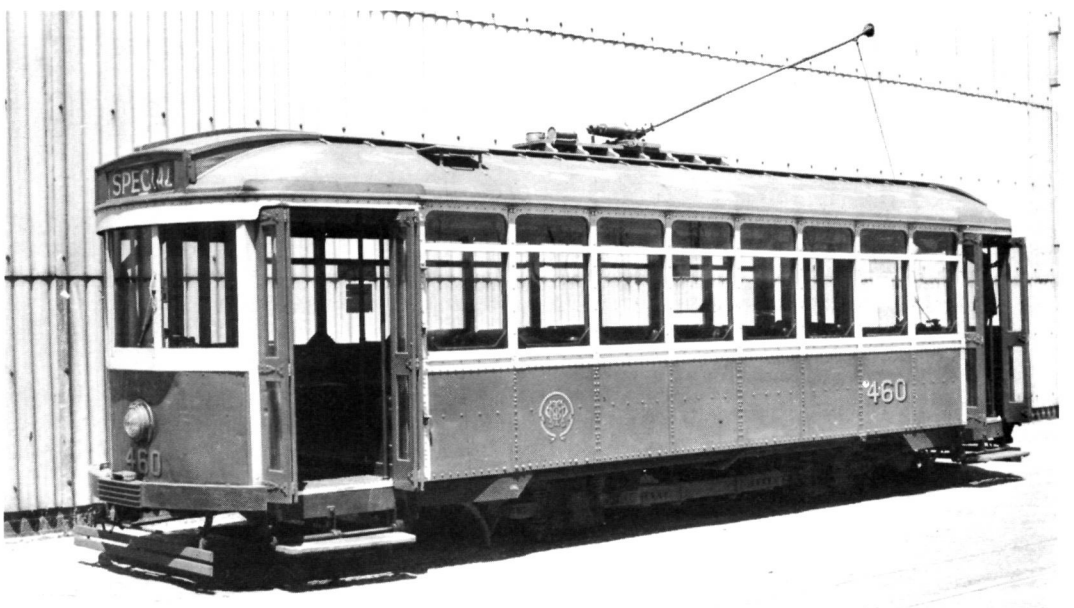
The Master Car Builders type of shoe and saddle are used in Melbourne and Adelaide. This type possesses the advantage that there is no right and left-hand features in the shoes used in Sydney.

In Brisbane this type is also used in addition to the Sydney type, and it is preferred to the latter because it is considered that it permits less chatter.

One of the unexpected advantages claimed in Melbourne for the Clasp brake is that the brake-shoe consumption is halved by its use.

Brake Shoe Suspension

Half-ball hangers with renewable liners are



Melbourne's X1 class cars 459 and 460 were test cars for the worm drives. It was mentioned at the 1934 Conference that the drives were unsatisfactory due to the high maintenance costs involved. MMTB OFFICIAL PHOTO

used in Melbourne and Adelaide. The half-ball hanger is favoured in Brisbane also, because it provides means for taking up slackness which causes shoe chatter. Enquiry on many tramways shows that the extent to which half-ball hangers have been tried and adopted, or conversely tried and discarded, is about equal. They were discarded in Sydney many years ago after varying opinion had been formed, both favourable and otherwise, by the workshop and car-shed staffs. Melbourne are now proposing to substitute a coned surface instead of the half-ball surface, in the hope that this simpler shape will be as satisfactory as the half-ball feature.

Sand Gear

Sand outlets on the pneumatic sand gear in Melbourne point downwards vertically on to the rail, by means of rubber hose outlets, instead of obliquely, as in Sydney, by means of metal outlet pipes, towards the contact point of the wheel on the rail, where they are more subject to wheel wash.

Centre Bearings

Centre bearings are provided with means for being oiled regularly on the 'W3' cars in Melbourne. Brass liners are used. In Adelaide, a spherical seated centre bearing is being installed as a means of counter-acting heavy wear which has taken place on the brass liners, resulting, presumably, from rolling of the car.

Flats on Wheels

In Melbourne, the flats are removed expeditiously in the car-sheds by a special grinding machine installed in one of the pits, which is brought into operation after raising the end of the car by jacks and sliding a section of the pit rails sideways clear of the wheels. In Sydney, the flats are removed by turning at the workshops.

Staff Co-operation

Monthly meetings are held by the rolling stock engineers in Melbourne, at which all sections of the workshops and car-sheds, together with the drawing office, are represented.

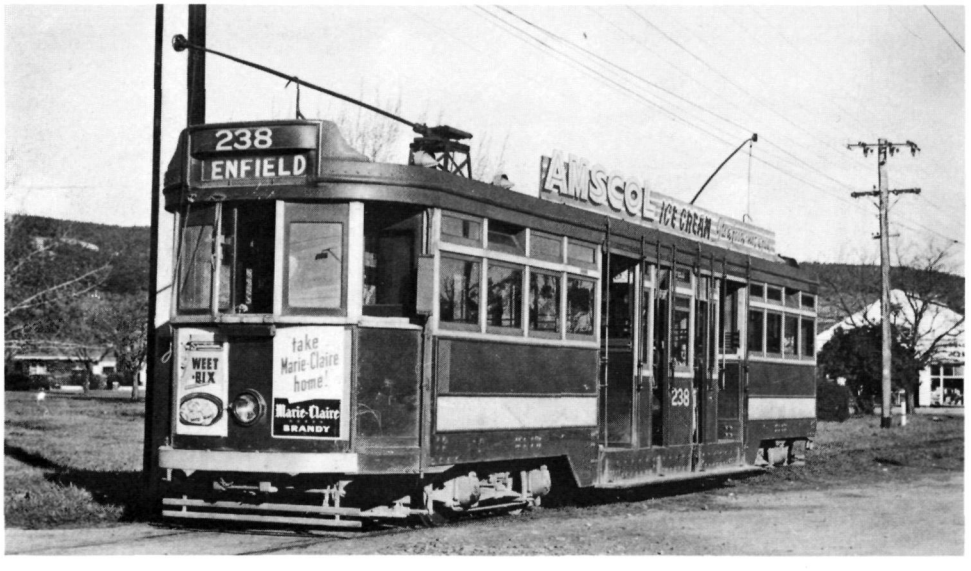
The Rolling Stock Drawing Office is located at the Workshops, which greatly facilitates co-operation with the staff of the workshops and the Testing Laboratory, and also enables close touch to be maintained with the rolling stock and the work in progress.

Fisher Bow

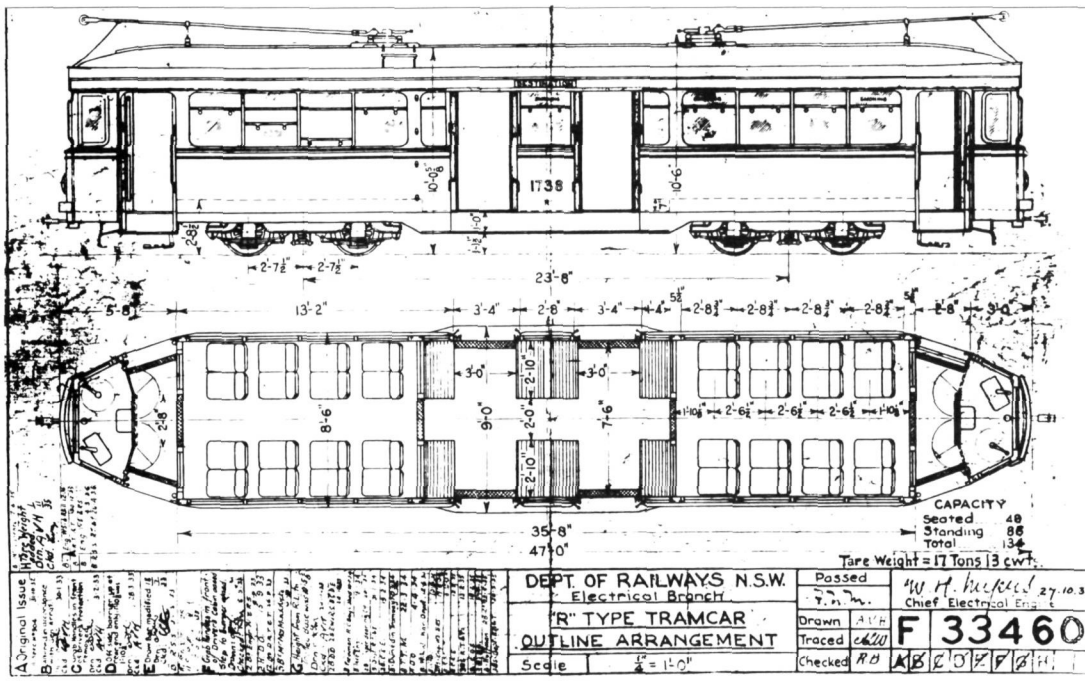
These are being tried in both Adelaide and Melbourne, so far in the latter place with satisfactory results, but in both places emphasis was made of the expense of altering the overhead wiring. Arrangements are in hand for a trial in Brisbane.

Trolley Bus

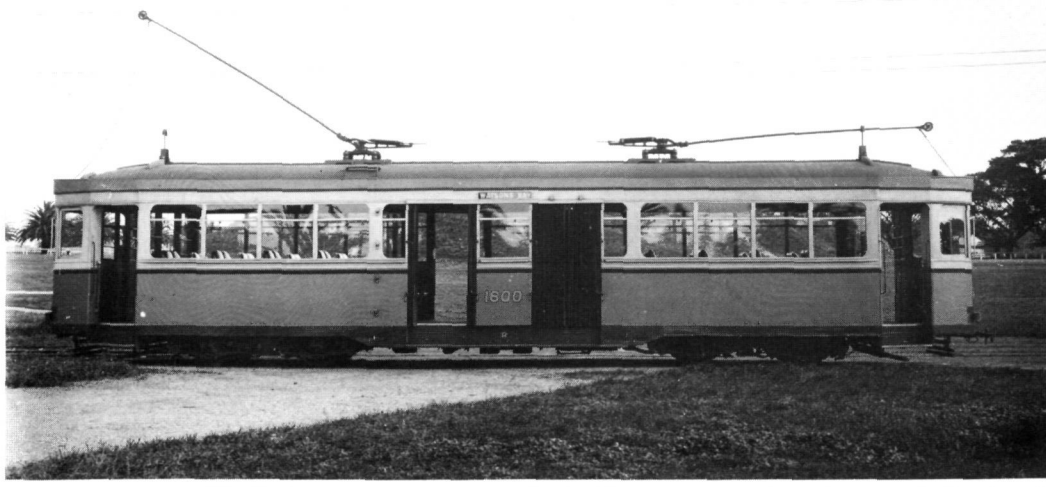
A favourable impression was formed of the speed, acceleration and manoeuvring capabilities



Adelaide drop-centre car 238 on the side of the road reserved track near the end of the Colonel Light Gardens line in the 1950s. The drivers' protection sash is open and has been slid behind the sash on the left. The glass louvre sashes above the saloon sashes which are fixed open for ventilation are clearly seen in this view. The torpedo ventilators on the roof can also be seen. D. A. COLQUHOUN



The accepted outline arrangement drawing for the R type car was signed by the Chief Electrical Engineer on 27 October 1932. A number of amendments were subsequently made to the drawing during 1933. R. MERCHANT COLLECTION



The Sydney R class tramcar as built. 200 cars were ordered from Clyde Engineering Co. and 195 were delivered between 1933 and 1935. The last five cars of the order were modified during construction and delivered as R1 type. The cars had end as well as centre entrances with leather upholstered seats in the saloons.

NSW GOVERNMENT PRINTER

of the trial bus running in Adelaide, which is a "Garford" petrol bus converted. This vehicle is fitted with equipment supplied by the English Electric Co. The controller is notched by a foot-pedal actuated through a ratchet device. Two additional trolley wires are erected outside the tramway trolley wire for this service, except over a section between the depot and the trial route,

where the tramway wire is used as a positive and the rail as a negative. When operating on this section, one pole is connected to the tramway trolley wire, the other pole is lowered, and negative contact is made to the rail by means of a trolley pole mounted upside down underneath the bus with a brass skate on the end of the pole running on the rail surface, with a flange in the rail groove to keep it in position. The skate is swivelled on a bolt, by means which it is attached to the trolley pole. This was a temporary measure, and there was considerable arcing.

Objectionable noise was experienced inside the bus from the traction motor and compressor motor, both of which, owing, it was stated, to the temporary nature of the installation, projected from their position in the bonnet of the old "Garford" bus into the bus interior at the dashboard.

Conclusion

Concerning the broad general question as to which type of single-deck tramcar is best suited for the contemplated future requirements in Sydney, the single-end type of corridor may be eliminated from consideration owing to the high cost which would be involved in altering and adding tracks at terminals and other places such as those along the routes where the cars must be reversed to obviate traffic blockages. This leaves the double-end corridor and the drop-centre types for consideration, and, in view of the success of the drop-centre cars in Melbourne, Adelaide and Brisbane, it is difficult to justify the adoption of a different type of car, such as the double-end corridor car, in Sydney.

The use of this latter type of car in America, and to some extent in Europe, as stated previously, is influenced by climatic conditions, for the greater portion of which, semi-open compartments as in the drop-centre car, are unsuitable. In addition to its uniform floor level, it possesses advantages over the drop-centre car in relation to the pronounced tendency, particularly in other countries, towards greater comfort and higher-class appearance as a result of bus competition.

This tendency has been most marked during the period from about 8 to 10 years ago since the Tramways authorities in Melbourne, Adelaide and Brisbane individually decided to adopt the drop-centre type of car, but the favourable features mentioned (their importance in the matter of bus competition notwithstanding) do not appear to outweigh the advantages of the drop-centre type of car which are achieved largely as a result of the climatic conditions in Australia permitting the use of semi-open compartments. These advantages of the drop-centre car are: Quicker loading due to the better disposition and greater number of door openings, greater passenger accommodation re-

The R1 class cars had a shorter drop-centre section to provide room for a chassis-mounted brake cylinder in place of the bogie-mounted type as used on the R car. The single centre entrance, lack of centre internal bulkheads and different window spacing identified these cars. 50 cars were built by Clyde Engineering in 1935-36. An order for 200 additional cars was placed with Commonwealth Engineering Co. 50 cars were delivered between 1950-53 and the remaining 150 cars cancelled.

NSW GOVERNMENT PRINTER

sulting from the seating arrangements inherent in this design, and lower steps from the road level due to the broken floor level.

In view of the significance attached to a decision to adopt any new type of tramcar, and the important effect which the adoption of a drop-centre type of tramcar would have on the development of Sydney, probably for many years to come, it should be emphasised that the features associated with this type of car, although advantageous for the reasons given, appear to conflict with the features mentioned above which are becoming increasingly evident on tramcars in other parts of the world, largely as a result of widespread evidence of the popularity of the motor-bus. As a matter of fact, the adoption of a drop-centre car in Sydney would appear, in some respects, to embody a reversion to features such as the combination of saloons and open compartments with broken floor level and broken lines generally which were regarded as obsolete on some of the earliest tramcars in Sydney such as the 'D', 'F', 'G' and 'L' types of cars.

A front view of Sydney P1482 showing the wide drivers' sash in the open position. The two side sashes are also open. NSW GOVT. PRINTER

SYDNEY'S TRAMWAY ROLLERS

by Adrian Price

In 1914 the New South Wales Government purchased four 12-ton steam rollers from Clayton & Shuttleworth of Lincoln, England for maintenance of its 300 miles of tramways then under the control of the Railways Department. The rollers had a 6nhp twin cylinder compound engine with two gears, a working gear and a travelling gear with a top speed of 4 miles per hour. The boiler operated at a pressure of 160 pounds per square inch maximum. The machines were ordered with extra long rear axles to allow the rear wheels to straddle the standard gauge tramlines as they would otherwise have wheel slip from steel to steel.

The rollers were all modified to carry a scarifier on the offside to tear up tar road surfaces. This device probably ensured their continuity in service for so long as they were involved in salvaging abandoned trackage from the streets from 1940 onwards. Rollers 1, 3 and 4 also had their rear tender tanks extended to 150 gallons capacity to give them longer working times between fill ups. The boilers were coal fired originally but coke was later used as it made no smoke.

The Tramways had a fifth roller which was ordered in the early 'twenties and differed from the first order in having renewable rolls and the perchbracket, chimmey base and smokebox cast in one piece. It did not see much use as a steam roller as it was converted to diesel operation in the late 'twenties or early 'thirties; no doubt as an experiment as steamers take one hour and thirty minutes each day to raise steam. The experiment using a Petter twin flywheel single cylinder internal combustion engine was obviously a failure as the roller was noted laid up in 1953 at Wolli Creek perway yard, probably since the late thirties.

Anbody who drove steam engines in those days was someone to be looked up to. It was a very responsible job and required a boiler attendant's ticket and an engine driver's ticket as qualifi-

cations. These required study and several hundred hours "apprenticeship" to obtain.

To most drivers steam was not romantic. It was hot, dirty and arduous. The roller driver had to arrive one hour before the track gang arrived at 7.30 am. In this time he had to relight the fire, check and oil up all the moving parts, take up any steam or water leaks, trim the fire, fill the coal bunker and top up the water tank.

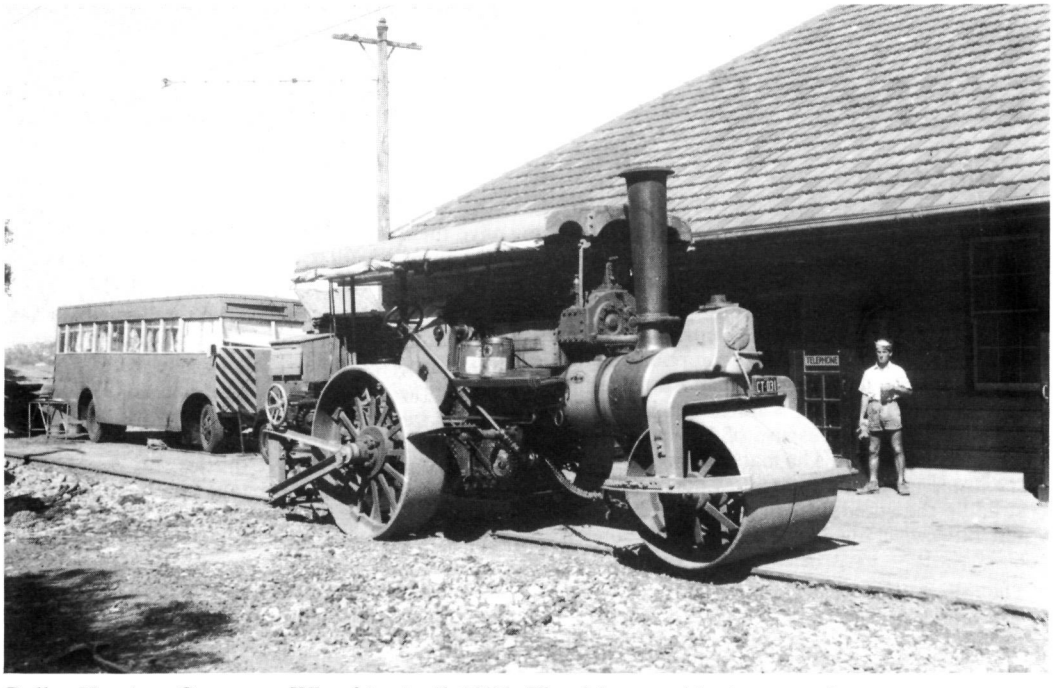
The rollers were one man operated. A working day of eight hours would have been very tiring. When steaming between suburban track jobs, the driver would have to stop regularly to do his own firing, oiling, bunkering and continue on for another mile. The rollers consumed about thirty gallons of water (120 litres) and about ½-cwt of coal (50 kilos) per mile.

The rollers worked all over Sydney gradually concentrating in the Eastern Suburbs where the last lines closed on 25 February, 1961. Roller No. 4 was the first to go in 1962. It broke a rear axle on the Alexandria line while scarifying and was cut up at Morts Dock. Number 3 retired in mid 1963 and went under steam to be preserved by the late E. M. Baldwin at Castle Hill. Number 1 was deregistered by October 1963 and Number 2 ceremoniously lifted the "last" tracks at Matraville on 30 April 1964. Number 1 was bought by Adrian Price and was delivered under steam on 6 July 1964 for preservation in the Campbelltown area. It cost £83 ($166). Unfortunately No. 2 was broken up for scrap the same month at the scrapyard of A. G. Sims at Mascot.

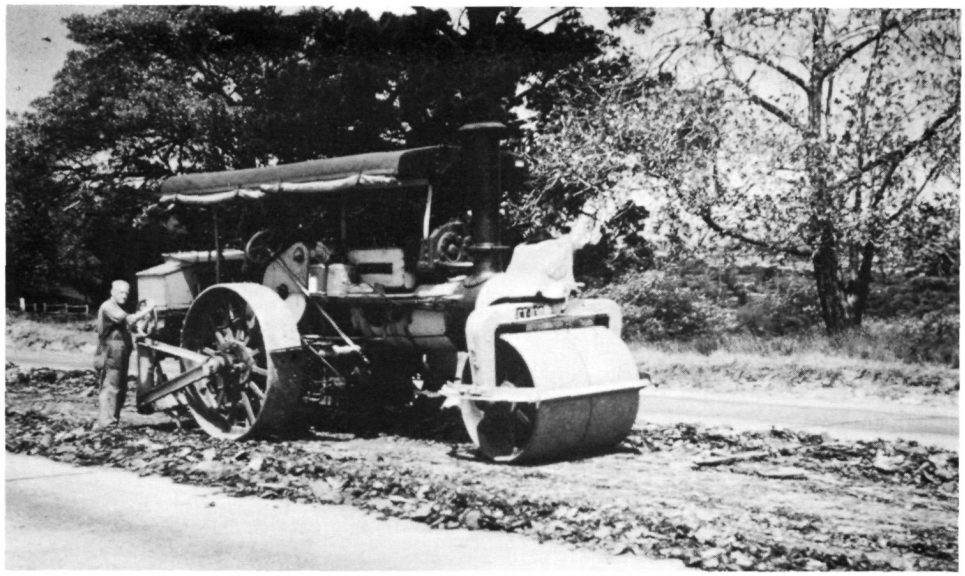
On 29 September 1985 No. 3 arrived at Menangle Park after being purchased by Brian Burke and the two surviving tramway Claytons were back together after 22 years. Both rollers are working exhibits at the Campbelltown Steam Museum of the NSW Steam Preservation Society and are important links with Sydney's colourful past. They are among only three compound Clayton rollers in the world which survive today.

Editor's Note

The author of this article is the Campbelltown Museum's Clayton Roller Research Project Co-ordinator and he would be interested in hearing from anyone with photos, anecdotes, actual work experiences, etc., pertaining to the tramway rollers at work. He may be contacted through the Editor of this magazine.



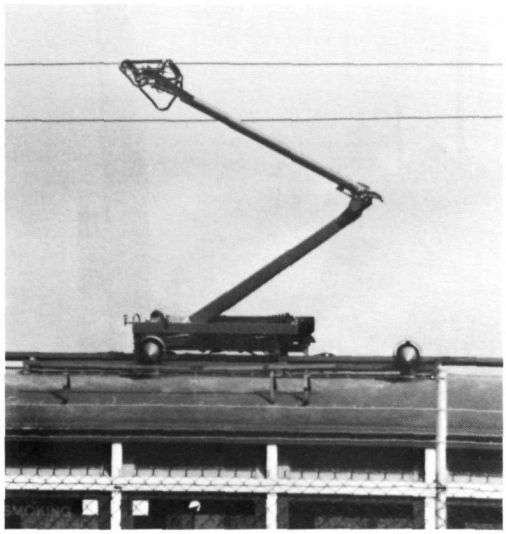
Roller No. 4 at Cremorne Wharf in April 1956. The driver at this time was Len Whitby. The former wartime austerity bus in the background is being used as a mobile workmen's shed. L. GALLOP



Tramways roller No. 3 being used to remove tramlines from Victoria Road, Gladesville during November 1957. R. B. CLARKE

HERE AND THERE

NEWS ITEMS OF INTEREST FROM ALL OVER



The pantograph fitted to Adelaide H car 369 is mounted in place of the spring trolley base.

Pantograph-fitted H car 369 at Glenelg during test running in September 1986.

BOTH: BOB MERCHANT

An evening view of Adelaide's City Depot in Angas Street on 18 June 1986. Home to the H cars since 1929, the last cars will leave the depot for Glengowrie on 18 October 1986.
DALE BUDD

Single track working has been in operation between Stop 11 Burke Road and Stop 14 Marion Road during track relaying.
BOB MERCHANT

H375 passes a rail-mounted tipper used to convey ballast to the location required along the relaid track. This view was taken near Stop 14 on 25 September 1986.
BOB MERCHANT

BALLARAT . . .

Ballarat Tramway Preservation Society

Penguin Vic

'Penguin Vic' is a children's character based on Phillip Island penguins and is Victoria's official tourism mascot. Penguin Vic is the promotional part of an educational programme to teach children about tourism in Victoria. He visited our tramway on Monday, 25 August 1986 as part of his week-long trip through the gold-fields area. During the early morning scenes were filmed on the tramway using 16mm film and video. The film will be screened at the Melbourne Show and the video footage will be seen on television.

Penguin Vic has a following of over 55,000 fan club members and the newsletter which each of these children receives includes free passes to many attractions when accompanied by a paying adult. Penguin Vic's newsletter includes passes to our tramway which will be valid until the end of the year.

Car No. 26

The dashes at both ends have been sanded back in preparation for repainting. During the sanding back four number 26's were revealed at one end, virtually painted on top of each other.

The timber for the bases of the bulkhead seating has been received.

Head Ganger Dave Macartney and former Community Employment Programme worker Jackie Edwards have worked full-time for the Society since early September and presently are working mainly on No. 26.

Car No. 39

Member Gary Wood works full-time on converting No. 39 for housing the Museum display. The end platform at one end have been removed, while the cabs at the other end are being repainted. Much rotten woodwork has been removed; this being an unfortunate legacy of the years this car spent in the open at Lismore, south-west of Ballarat.

As No. 39 will be sitting permanently on No. 1 Road, this road is no longer required for operational purposes. The pointwork leading from No. 2 Road to No. 1 Road has therefore been removed.

NEWCASTLE . . .

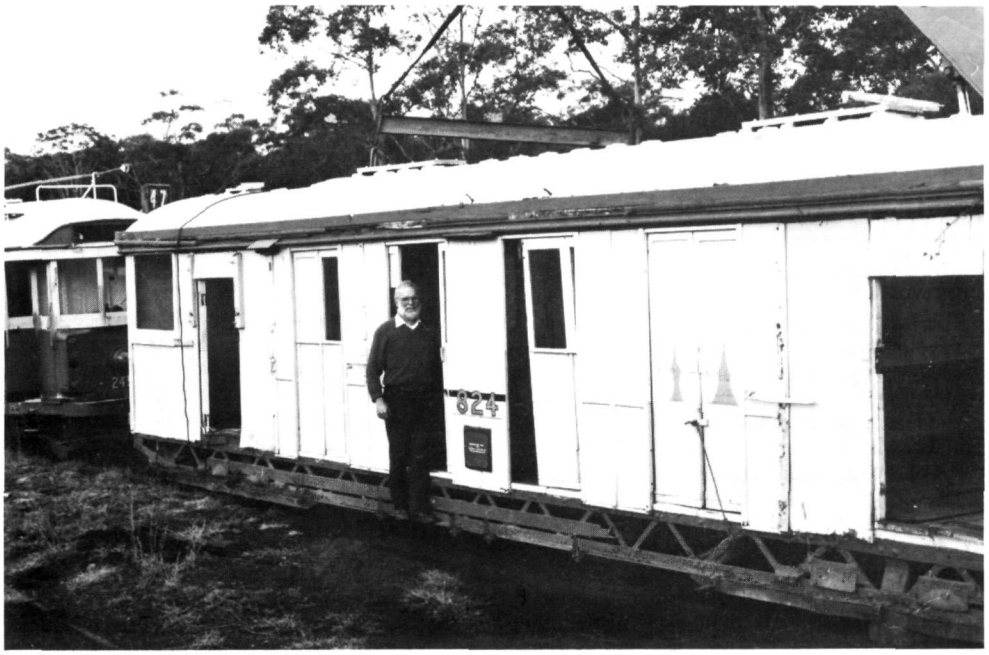
Newcastle Tramway Museum

Here are two photos of our latest acquisition, Sydney O class car No. 824. This tram body has been donated to the Museum and the car should be very popular when it has been restored. The experience overseas is that open cars are very popular even in climates which are colder than ours. One American tourist tramway restored one open trolley and built another at a cost of $250 000 and $28 000 because their enquiries had shown that that was what the riders wanted.

Our donor has been negotiating with the previous owners for nearly a year and Saturday, 28 June 1986 was the day appointed for taking possession of the car. A shed to replace the tram body, which was the agreed arrangement, had been purchased during the week. Early in the morning two members took a semi-trailer to Lurnea, just south of the Sydney suburb of Liverpool. Fortunately there is a reserve at the rear of the property and it made for easy removal of the tram. A 25-tonne crane had been ordered and it arrived five minutes before our intrepid two who had helped remove the back fence of the property while the crane was being brought onto the site. Much of the preparatory work had been done by the property owner, Mr Zorn who also kept us topped up with tea and coffee made with 'barbecued' water from a fire. Site preparation for the crane took about fifteen minutes; the lift went smoothly and the whole operation, from the taking down of the fence to the tieing down of the tram on the trailer took less than an hour.

The body of 824 had been placed on the property in 1957. Mr and Mrs Zorn lived and raised their family in it until they were able to build their handsome brick home on the land. Mr Zorn painted the roof every year. The car is in surprisingly good condition and remarkably complete. Mrs Zorn had a few regrets at losing the tram for it had been her home when she first came to Australia. We have promised to take good care of the tram and look forward to giving them a ride in it in the future.

Unloading O class body 824 at Rhondda on 28 June 1986. KERRY DUNN



O class 824 and W2 244 at Rhondda. KERRY DUNN

An easy drive of four hours, including a refreshment stop at the Oak milkbar at Freeman's Waterholes, brought us to Rhondda where the tram was unloaded in under half an hour. It sits on packing beside R1892 and in front of W2 244.

LP284

The painting of LP284 continues slowly, partly because the work on car 668, which is alongside it, sometimes raises dust. There are five colours in the buff and olive green colour scheme used at Newcastle and no area is bigger than a few square feet. The painting is a tedious job. The paint is being applied with great care as befits this tram which will be the prid of our fleet. We are very grateful to Bill Lacrosse for his advice on the correct colours.

R1892

The restoration of R1892 has begun. The first job was a general cleaning up of the inside, principally sweeping up broken glass. When the tram was at Warabrook vandals smashed every window and some of the panels. So far one of the saloon sliding doors and some of the panels have been scraped and revarnished.

W3 668

A lot of work has been done on this car. The rain had penetrated the roof during the ten years that the car was at Richmond Main Colliery. All of the ply, which had rotted, has been replaced and a lecturer at the CAE made two new roof ribs and a set of trolley base supports for us. We supplied the timber; he supplied the labour, and the workmanship on the very tricky ribs was so superb that the new ribs fitted like gloves. The roof has been canvassed and sealed, and part of the floor has been replaced as there was an area of rot at one doorway.

Many windows have been removed and sanded. The ceiling has been painted white. Yes, we know it was originally varnished but some damage had been done by the green fleck paint previously used and by the weather which had gotten into the car. Also we liked the brilliance of the interior of 284 — so the ceiling is white.

Tourism

Our Secretary has been appointed to the Board of Management of the Lake Macquarie Tourist Association. The Museum has been a member for a year. The duties will be to help foster tourism in the Lake Macquarie City area and there will be opportunities to integrate the tramway into tourist 'packages'. There is considerable interest in the proposed tramway by tourist operators. We will be able to share in the advertising of other ventures and to have them share in ours. "Take the train to Cockle Creek, visit the Museum, go by vintage tram to the ferry wharf, ferry to Wangi to see Dobell's house, coach to the train", etc. The possibilities are enormous.

ST. KILDA . . .

Australian Electric Transport Museum

Dropcentre 264

The last few months have seen feverish efforts by several members to complete the restoration of Dropcentre car F1 264. It is pleasing to report that tremendous progress has been made. Most of the restoration will have been completed in time for the COTMA Conference in late September.

All of the new sheet metal panels are now fixed and several areas have received their final colour coats. Rebuilding of the eastern end cabin is almost complete while the western end is well on the way. Headlights have been painted above each destination box. A South Australian Jubilee 150 logo will replace the car number on the dropcentre section side panels. (The tram is being restored as a Jubilee 150 Project as part of the State's 150th Birthday.).

New floor slats are being installed in the saloons and the end destination blinds have been installed. Sand boxes, windscreen wipers and pressure gauges have been restored and are ready for fitting. Installation of the saloon seating is complete. After several years as an unsightly hulk, 264 now looks like a tram again.

It is interesting to note that acceleration is slightly slower than our other dropcentre car, No. 282. This is because the 20 ton body of 264 is powered by four 40hp MV101A motors whilst car 282 is powered by four 50hp DK105F motors. The ex-MMTB 40hp motors were originally fitted under 17 ton W2 bodies.

Other News

The Samphire Road curve has received repairs following a slight spreading of the rails caused by earth subsidence due to our rather wet winter. A number of additional tie bars have been fitted at the offending location.

Ron Jenkins and Malcolm Butler have completed the cement flooring in the new overhead stores shed.

A general site cleanup has been carried out in preparation for the visit by the COTMA Conference delegates.

Mid-week charters continue to bolster attendances and are proving to be a major source of income this year.

Adelaide cars H1 381, E1 111 (behind 381), H362 and Birney G303 on the new depot fan at St. Kilda. JOHN RADCLIFFE

HADDON . . .

Melbourne Tramcar Preservation Association

Electrification Progess

Work continues in the substation on the termination of the 24 volt cables, with steady progress being maintained. The dropping resistor box for alarm relays has been completed and now awaits mounting at the breaker frame. A substation alarm bell has been mounted on the north wall of the workshop. The mimic display diagram has been connected to the 24 volt supply and the car shed panel breaker status lights have also been connected.

A large frame and panel has been constructed on which to mount the various fuses and switchgear required for the incoming mains. This panel currently awaits installation to the front of the workshop.

In preparation for erection of troughing in the running shed, member Arthur Ireland has been busy overhauling trolley ears. He has also refurbished eight pressed steel frog pans and frames, and is currently working on other fittings.

Trackwork

Additional point components have been acquired and delivered to the Museum. The point box components cast previously, have been machined and work has now commenced on fabricating the actual point boxes.

All the depot fan trackwork previously concreted has been filled to rail level.

Tramcars

The trolley skid heads on W2 357, L 103, W2 407, W3 663 and W4 670 have been reprofiled to ensure better tracking characteristics through the pressed steel pans which we will be using in our overhead. In addition the poles on W2 670 have been replaced due to their worn condition.

Work has commenced on overhauling the front windshields of W4 670 as they are in a somewhat deteriorated condition.

The depot pointwork as laid out prior to concreting, looking towards the top end terminus.
COLIN WITHINGTON

LOFTUS . . .

South Pacific Electric Railway

New Site

The rate of progress has been maintained since the last report, with approximately one kilometre of single track now being in position. It extends from thirty metres within the Society's fenced area on the southern side of Pitt Street, to just short of the Sutherland substation terminus. The track will be extended to the terminus as soon as the set of points for the double track to the end of the line is assembled.

The second track from Tramway Street is also in position from the Pitt Street level crossing to the end of the double track on the main line. Again pointwork has to be assembled and cut in at this location.

Twenty new wooden span poles have been purchased and these were delivered in August. It was necessary for these poles to be erected in the cutting north of Pitt Street prior to the second track being laid, and also on the embankment from the army crossing to the substation terminus, as access was restricted once the track was in position.

A concrete pad is now in position at the northern (substation) terminus for a further double track level crossing which will provide access to the car park and our 'grooved rail' (Tee rail with a welded angle) has already been prepared.

Our C.E.P. workers have also been busy inside the Museum area and have packed and levelled the line from the depot fan points to the headshunt at the southernmost end of our area.

Our Tramway Street, from the scissors cross-over to the Pitt Street gates, has been excavated to its correct level in preparation for the laying of the track from Pitt Street to the headshunt, to provide access from the carshed to the main line. Drainage work was carried out on the eastern, or highway, side of the track in conjunction with this work.

Inside the carshed, overhead troughing has been installed for the length of Road 3 and is in the process of being installed over Road 2. The space between Roads 3 and 4 has been excavated for most of its length for the laying of a concrete slab. This will eventually run the full length of the shed and is the first stage in dividing Roads 1, 2 and 3 from the remainder of the carshed roads, as the former are the roads on which the traffic cars will be stabled.

Norm Chinn has been spending most of his spare time on special projects at the new site and on many occasions negotiating with the Sutherland Shire Council on the Society's behalf. In this latter role he has managed to cut a wide path throught the jungle of red tape. As a result of Norm's many discussions with the Council, a start

Two tower wagons are put to good use during the erection of troughing over Road 3 in the new depot on 30 August 1986. BOB MERCHANT

The first new poles erected along the new right-of-way were on the grade from the Army crossing to the terminus. This view was teken looking north on 16 August 1986. BOB MERCHANT

Derek Butler and Bob Cowing at work on the drainage along the eastern side of Tramway Street, 30 August 1986. BOB MERCHANT

On 23 August 1986 drainage trench digging and earth removal from Tramway Street was being carried out as drainage pipes are unloaded near Pitt Street.

BOB MERCHANT

on the construction of the Bicentennial Workshop/ Restoration Building is not far away.

One of Norm's projects is the repainting of scrubber car 134s (ex D class 102), which will be pressed into service again to scrub the tracks of our new tramway. 134s, more than any other tramcar in our collection, has earned its place in the new building, as the hiring charges from its track scrubbing days on the Eastern Suburbs Railway contributed much towards the cost of the building.

Old Site

A considerable amount of rail and other equipment has been transferred to the new site to date but the more we look, the more rail we find. One large stack of ex-Randwick Repair Shops rail still remains and a recent stocktake has disclosed that we have sufficient rail for our immediate needs. With the lifting of the old site trackage once operations cease, we will have sufficient for the future extension into Sutherland.

Royal National Park Site — the Future

The Society recently received a reply from the National Parks and Wildlife Service in response to representations by our Board concerning the vacating of the old Museum site.

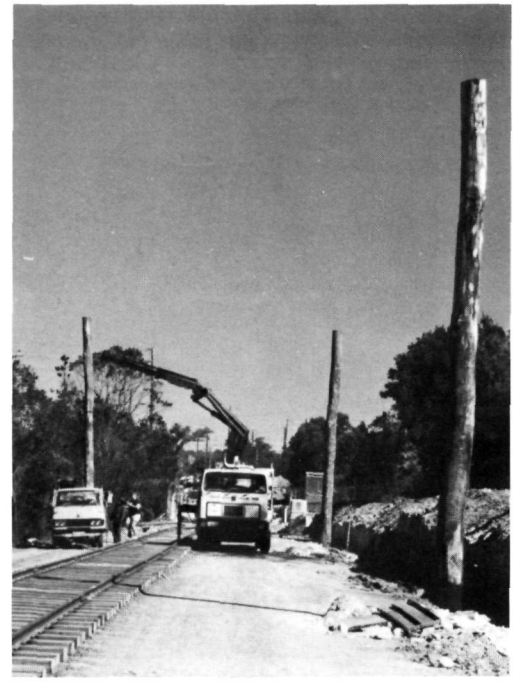
The letter briefly advised that in consideration of the Society's efforts to relocate and the progress being made at the new site, we would be permitted to occupy the site until 31 December 1987, after which time we would be expected to have the site restored to an acceptable condition, with all track and buildings removed.

Despite the great rate of progress, the carshed will need to be completed before all of our tramcars are able to be placed under covered storage and because of the Bicentennial Grant, we cannot commence operations before the first few months of 1988. Accordingly we have requested an extension of time until at least March 1989 for complete vacation of the site.

We are just as eager as the National Parks and Wildlife Service for us to cease operations at the site and confine ourselves to operating the new site.

A view looking south from near the terminus at Sutherland substation. The Army crossing is at the foot of the grade and it should be obvious why the poles were erected before the track was laid!

BOB MERCHANT



Erecting poles on the future double track section just north of Pitt Street on 30 August 1986.

BOB MERCHANT

The end of track as at 30 August 1986. The larger track timbers at this point mark the site of a gravel level crossing to provide access to a County Council pole line. The concrete slab in the background is the location of the car park level crossing.

BOB MERCHANT

Excavation work in progress in Tramway Street on 6 September 1986.

BOB MERCHANT