

Why not Learn to Drive your Trams

*A Motor School will shortly
be starting up to train
members as Motormen
and Conductors.*

WHY NOT JOIN

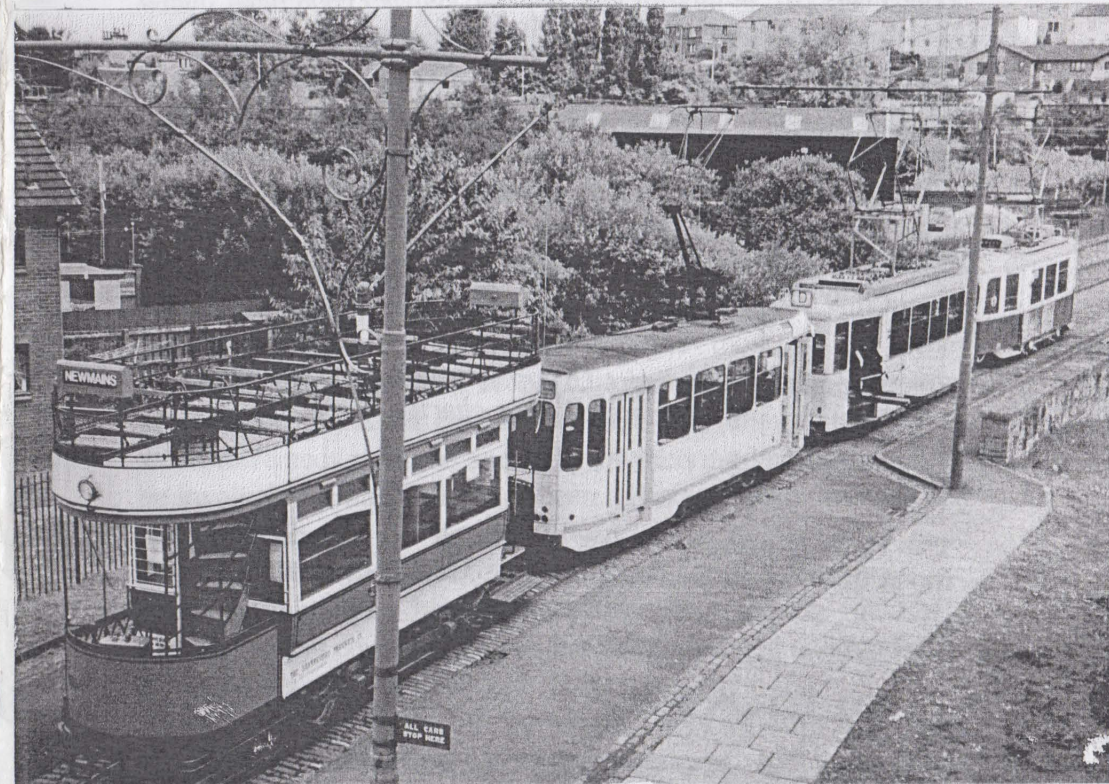
If interested please contact:
BRIAN LONGWORTH

01236 *****

TROLLEY

Newsletter of the Summerlee Transport Group

AUGUST 2001



THE FLEET ON PARADE



The Committee 2001

Chairman	Mr B. M. LONGWORTH
Secretary	Mr B. QUINN
Treasurer	Mr R. N. SUTHERLAND
Membership Secretary	Mr R. MACLEAN
Sales Officer	Mr G. BROOM
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Trolley Editor	Mr D. R. WHITE
Modelling Officer	Mr R. MACLEAN
Internal Liaison Officer	Mr M. CHALTON
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Ordinary Committee)	Mr R.A. CONNOR
Members)	Mr R. LOUDON

The Summerlee Transport Group is a voluntary group and is registered as a charity.

The views expressed in this newsletter are not necessarily those of the Editor, the Transport Group or Summerlee Museum.

**OPERATING SCOTLAND'S
ONLY WORKING TRAMWAY**

CHAIRMAN'S REMARKS

I am pleased to say that considerable progress is being made, thanks to the hard work put in by our small band of active members along with the contractors.

Our latest milestone was the fitting of the wheelchair lift to 392. Having secured the funding and finalised the details of what was required, we were all set to place the order. George Broom's wife Marjie discovered that this should be VAT exempted so Bob Sutherland contacted the Customs & Excise and obtained the necessary confirmation which thus saved us a fair sum. The Railway Inspector, David Thornton, has been and had a preliminary look at 392 and suggested a couple of modifications which have been carried out. He also looked at 1017 and again asked for a modification. He will be paying a return visit, hopefully in the summer, in order to look at everything in more detail. The draft application for exemption from the Railed Vehicle Access Regulations has been submitted to the DETR and we are awaiting their comments. In the meantime we intend to start training on the car in the very near future.

1017 is progressing well. We hope to have various parts manufactured from detail supplied from the Glasgow Museum of Transport and seem to have overcome most of the other problems. New member Doug Mitchell identified a potential problem on the truck on his first visit and immediately set to work to remedy this. His specialist engineering knowledge could be invaluable. Brian Quinn has been advising the contractors and has either known the answer to any questions that they have posed or is able to obtain information quickly.

Work is continuing behind the scenes in preparing for 1245. Storage within council premises has been arranged and funding is in the process of being secured for its transport.

The Council is actively investigating ways of attracting more visitors to Summerlee. Both management and consultants recognise that the tramway is the biggest attraction (as we have

always known) and are keen to build on its popularity. We have been asked for our views on various ideas for extending the tramway and we expect we will continue to have an input as these are firmed up.

With the change in office bearers on the Committee, Jim Wilson is now the contact with other organisations but he has continued to assist with sales, on one occasion single-handedly.

Marjie Broom has also helped out and has introduced Tramway Tombola, which is extremely profitable. George Broom has been developing the games side of our stall which again is helping to swell the funds. For the special events we need more help from members. Firstly Marjie would welcome donations of unwanted birthday or Christmas presents which can be used as prizes and we need members who can spare an hour or two to man the stall. The next event is the Models, Hobbies and Steam Fair on 25th and 26th August, so try to come along and if you can spare some time to get involved, even better. These events are now starting to attract a high number of visitors again so we need as much help as we can get. If you can let us know in advance it will help us to draw up a rota.

Just prior to that event, on Thursday 23rd August from 7pm, we are holding a members' night when you can come along and see what we do in the way of restoration, maintenance and training and weather permitting, will finish with a barbecue or at least a cup of tea.

On the subject of training, we are pleased to welcome George Broom to our elite band of qualified motormen. Barry Nisbet is progressing well under Brian Quinn's guidance and Bob Sutherland has been struggling to deal with the expanding group of pupils who turn up on a Thursday night. We have had to refuse further additions to the class in the meantime as it becomes unmanageable if there are too many pupils, but with at least two further potential trainees, will start a second class under Bob Connor. Any one else who would like to start training should contact me. What we require from you is a commitment

to operate the car for a minimum of one day a month after qualifying. We also require all trainees to conduct on 53. It is essential that trainees are fully competent in the conducting procedures for this car before they are allowed to start training to operate it. We would also welcome members who are interested in learning conducting duties.

At the moment, we are rather shorthanded as John Deegans, Bob Sutherland and Mike Chalton have all been unable to carry out their usual duties. We hope they will be fully fit soon and raring to go.

Our next goals will be the public launch of 392 and 1017. We hope to get maximum publicity for ourselves and the Museum from these events. Invitations will be sent to members as soon as dates can be set. We are expecting an article on to appear in the Sunday Post any time now along with an appeal for ex-tram crews to get in touch.

One other thing that has to mentioned at a time when many members have still to take their summer holidays, is a Christmas night out. Over several years we have had this but it has tended to be arranged at the last minute, so word has not spread throughout the membership.

We normally go for a meal on a Saturday evening near Christmas and do not want to make this an exclusive event, but open to all members. Make a note in your diary now to contact me by mid November if you would like to join in and you do not receive any further word by then.

Please let us know if you want to join the Motor School, or can help at the August weekend by contacting us at the Museum or phone me on 01236 782488 and try to come along to the Members' night on Thursday 23rd August.

Brian Longworth

Maintenance Report.

Bruxelles 9062.

The car has trudged on for the past six months. We had a major compressor failure early in the season which meant the car was out of service for several days while Mike, along with Allan Taggart, the Summerlee Engineer and other Summerlee staff, changed the compressor for a spare we had in stock. This is a very heavy and awkward job but was done in good time and the car returned to service. This compressor failed within the last month and after investigation a simple repair was made by Mike who had to do some detective work when the compressor still didn't work. It turns out there was a fuse inside the compressor switch which nobody knew about and it had disintegrated. Needless to say we had no spare, but Mike has rigged up a temporary fuse and holder and the car is running satisfactorily.

Graz 225.

Work has continued on this car. George Broom has led a team who have re-assembled the steps, lifeguards and side panels. The car has been run and needs some minor adjustments to the controllers. Work will continue and the car should be available for service in August.

Dusseldorf 392.

At long last we have had the wheelchair lift fitted. This is very easy to operate. There is still some cosmetic work to be done inside the car and a seat will have to be made to go on top of the motor generator box. We have been authorised to operate it for test and training purposes but are awaiting approval from H.M. Railway Inspectorate and the DETR before it can go into passenger service.

Glasgow 1017

This is still progressing well. The wood workers have completed the interior which has been varnished by Peter Price. They have still to complete the canopy and finalise the adjustments to the vestibule windows. They will also be modifying the seats which were supplied by Anniesland College but the main job which is outstanding is the construction of the bow tower. As no plans of this have been located, it has meant studying films and photographs to try to sort out the details. Bob Connor has had some of his negatives printed and which, being up to his usual high standard, will allow us to supply the wood workers with as much detail as possible. After much debate, it was decided to have additional parts welded on to the top plates of the truck, so that the sills would fit fully on to them rather than having new ones made. The use of our pressure washer when cleaning down the truck for its final re-assembly, revealed considerably more cracks on the wheels than we had known about originally. A quick decision was taken to have new wheels cast and it was arranged to borrow a pattern from the Birkenhead Tramway. Bob Docherty, who had dealt with similar problems in Sintra and was able to find a number of firms in Portugal which still used traditional engineering skills, believed welding could be the answer and suggested we ask Crich as they had had similar problems. David Baker, the TMS engineer told us to contact a firm which could test and analyze the wheels in order to decide whether they could be welded. The wheels were sent away to Mitchell Engineering of Cambuslang along with the extensions for the top plates. The parts are back, work having been completed, and are now being painted and re-assembled.

Lanarkshire 53.

This has continued to operate frequently, weather and staff permitting without any problems.

Brian Quinn.

S. T. G.

The Committee would like to thank the following members who have made a donation with their subscription.

B. Longworth	R.A Connor	B. Quinn
Dr I. Frew	D.S. Brown	S.M. McNaught
C. Macrae	J.P. Deegans	G. Ewing
Dr S.J.T. Robertson	J. Wilson	R.G. Dickson
R.E. Maclean	R. Sutherland	H.J. Milligan
T. Caldwell	J. Harkins	R. Loudon
M.J. Lea	J. Rutherford	E. Bailey
R. Logan	A.S. Brown	A. Jamieson
Rev E.J. Hart	A. Kyle	D.R. White
Dr P. Geissler	A. Hill	J. Stewart
G.P. Murray	F.A. Shinie	J.K. Spittal
H. Ross	J.P. Ricord	G.C. Train
H. Higton	K.B. Sinclair	S.H. Hughes
W. Smith	F. Landry	D. Rennie
J.C.B. Nisbet	G. Broom	N.K. Stewart
G.W. Price	Rev A.J. Cherry	G.A. Foulger
M. Denman	J.M. Riddell	K. Darroch
E.J.P. Brown	D. McVicar	

NEW APPOINTMENT

The Committee has pleasure in announcing the appointment of Mr Andrew Jamieson as Tram Cleaning Officer.

MEMBERS' NIGHT AND BARBEQUE THURSDAY 23rd AUGUST 2001

You are invited to come along from 7 p.m. onwards to see what is happening in your Transport Group.

Visit the Tram Depot and see your new wheelchair access tram, progress on Graz and the change in 1017. Visit the Model Club. See the driving school in action and have a shot at the controls of one of the trams.

Then weather permitting we hope to finish up with a Barbeque. Entry to the Park is by the bottom gate in Heritage Way.

1017'S HISTORY

BY John Kennedy Spittal

As 1017 is nearing completion I thought it appropriate to write a brief history of the car.

1017 started life as an open topped double decker running with the Paisley and District tramways company. Numbered 17, she was built in 1904 by the British Electric Car Company.

On the 1st of August 1923 the Paisley system and all of the company's cars were acquired by Glasgow Corporation. 17 was re-numbered 1017 and continued to operate as an open topper until the end of 1924 when it was taken to Coplawhill and rebuilt as the school car for training Glasgow's motormen. Included in this rebuild was the removal of the top deck, stairs and most of the bulkheads (so the aspiring motormen had a clear view of the controls). The longitudinal seats were replaced by 2+1 transverse seating mounted on a raised floor (again so the trainees could have a clear view of the controls and instructor) and the round dashes were replaced by hexagonal ones with vestibules which carried on round most of the platforms, only leaving enough room for two small platform doors.

Unlike the Ex-Paisley cars converted to single deck condition for the Duntocher route (these cars had to negotiate the low bridge at Kilbowie Road thus they were equipped with Coplawhill manufactured extra long bow collectors) 1017 was not required to pass under any low railway bridges. It was given a standard bow collector mounted on a wooden tower the car was then allocated to Langside Depot and could usually be seen running up and down the single line track of Coplaw Street.

Latterly it was based at Coplawhill where it often served as the shunter. When the second batch of Liverpool Green Goddesses was delivered and re-mounted on their bogies, 1017 was used to tow many of them to Newlands depot for storage until Coplawhill was ready to deal with them.

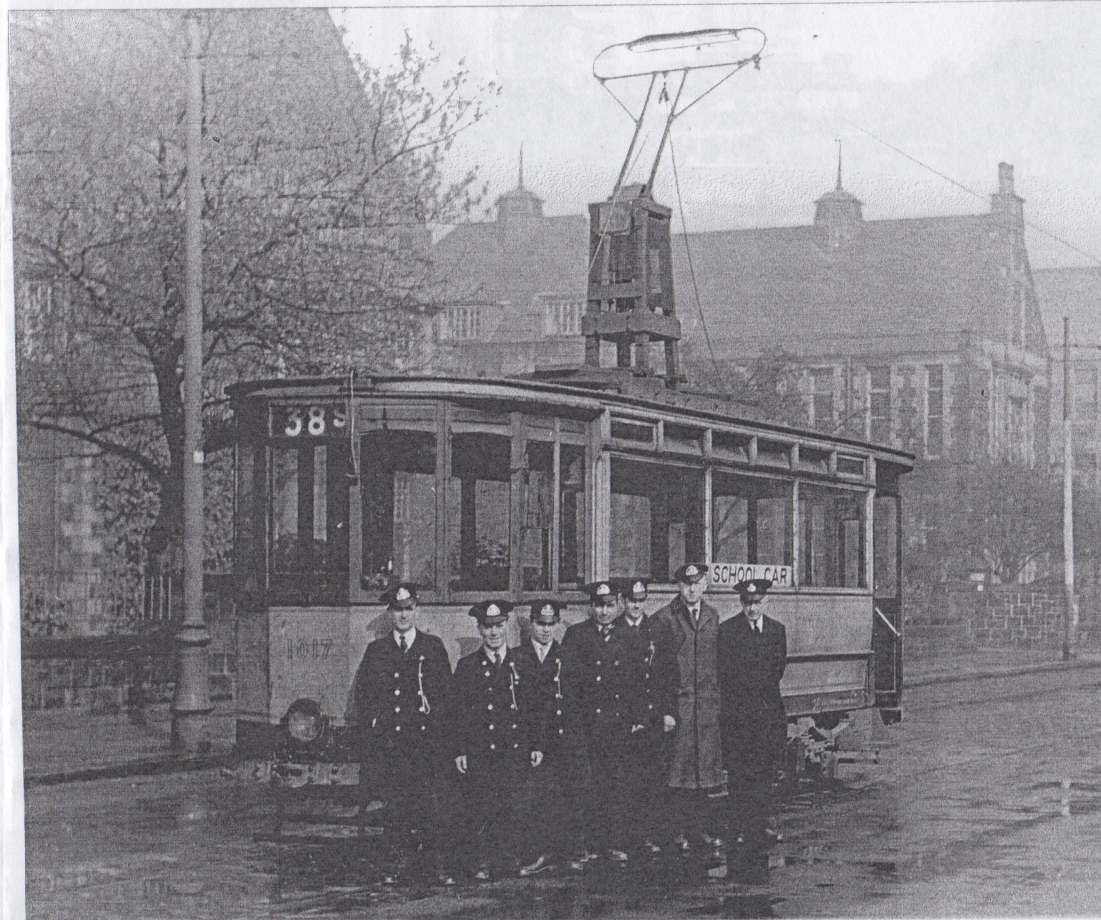
In August 1960 it was decided 1017 was no longer required as training of motormen had ceased.

The car was subsequently withdrawn from service to be used as a meeting room for a tramway society. The body went to a garden in Cambuslang and the truck, controllers and other electrical equipment went to the National Tramway Museum at Crich, Derbyshire.

The body was rescued from the garden in 1991 and brought to Summerlee for restoration. The Transport Group purchased an appropriate truck from Lisbon which had to be re-gauged to 4ft 8 1/2" for use at Summerlee not an easy job!!

Group members carried out a considerable part of the restoration over several years, renewing platforms, framing, exterior panelling and most of the roof. The interior was largely stripped and sanded but with less skilled members available, only the work on refurbishing the truck was continuing. Late last year the museum announced that they had found funding to complete the restoration, so Peter Price Electrical have been sub-contracted to wire the car and to apply the livery, Allwoods of Drumchapel have been awarded the contract to make replacements for damaged or missing parts of the interior, complete the canopy and vestibules, panel the interior ceiling and build a bow tower etc., all of which has been done to a very high standard.

Hopefully 1017 should be completed before the end of the year, and launched in the spring of 2002.



The Final G.C.T. Motorman's Class poses on the last day in May 1959 beside 1017 in Coplaw Street.

Trainee Motormen James Tibbs (5330 Partick), George Thachaberry (4243 Dennistoun), Arthur Graham (5119 Maryhill), Magindar Singh (4875 Partick), James Curran (5066 Maryhill) Eugene Lopkin (445 Partick) and Chief Motor Inspector Thomas Edgar.

New Motorman at Summerlee

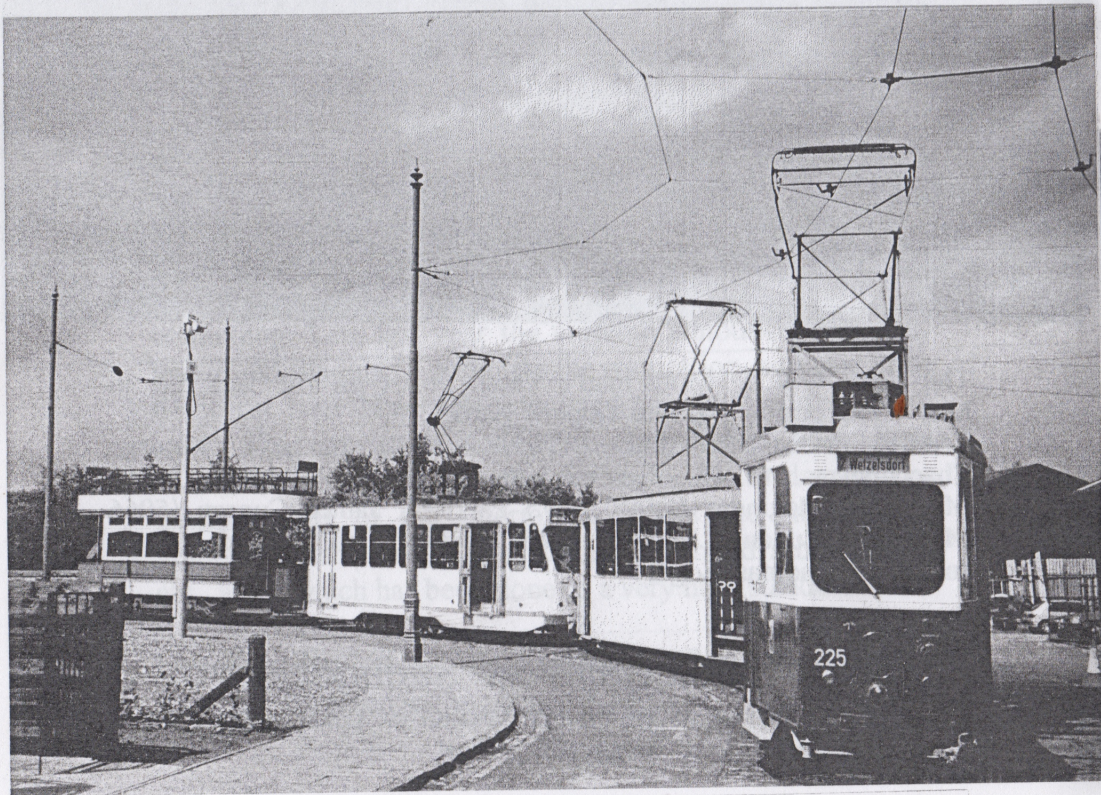
Congratulations to George Broom on passing his Motorman's Test.



The Chairman takes '53' up to the Main Gate



Our Sales Stalls at the Spring Fling



An early Sunday Morning Outing



FUND RAISING

WITH our fleet of 5 trams on-site, fund raising by necessity has become a very important role in the group's activities. Summerlee Heritage Park hold several very successful events during the year which can attract 4500 visitors a day. The group takes advantage of these days by running stalls, selling pocket-money toys, running simple games and organising a tombola. This formula has been very successful adding value to the visitors experience of the park and at the same time raising a considerable sum of money for tramway purposes.

The next big event will be the Model and Steam Fair to be held 25/26 August. Why not come along and experience the tramway in rush hour conditions and enjoy the other attractions. Introduce yourself to any of the members on site and we will make you feel most welcome, perhaps even to the extent of getting you to help out behind one of our stalls if you feel up to it.

The tombola organiser is always looking for prizes to add to the stall, unwanted Birthday/Christmas presents or business promotion items make great prizes, earlier this year Deloitte & Touche Edinburgh donated some excellent goods. The tombola is a big crowd puller if enough prizes can be made available, we intend to operate it over the two days.

If you can help us or have any ideas we can use in fund raising please contact the Sales Officer.

George Broom, ****_**** ****

WELCOME TO NEW MEMBERS

New Members since the last Trolley are:

M.D.Gurr of Cumbernauld	C. Lees of Airdrie
D. Boyle from Paisley	A.C. Porteous from Bellshill
C. Sutherland of Dumfermline	K. Darroch of Barrhead
M. Denman of Bearsden	D. Michael of East Kilbride
J.M. Riddel from Cumbernauld	

A Very Warm Welcome to You All

Some Thoughts on Tram Controllers Paul Geissler

A tram controller is a device to regulate the electric current passing to the traction motors and hence the speed of the tram.

There is a basic problem about electric currents. They are difficult to control. It is easy to make an electric connection; it is difficult to break it. An electric current has a "momentum": when you switch it off it wants to continue flowing. This can lead to arcing. If this happens damage to the contact faces will occur causing progressively more difficult contact at the faces. The contact faces may even weld together, with possibly disastrous results.

If examine an electric light switch it snaps closed to make the connection and it snaps open, breaking the current flow and preventing arcing. In this case we are dealing with small currents, e.g. 100W bulb will be carrying a current of 0.4A.

A tram controller, on the other hand, has to deal with currents of 150 - 200A (when the electric brake is employed the currents may be even greater) thus the problems of current control are severe.

There are several methods to overcome this problem which can be seen in the cars at Summerlee.

Car 53 shows the traditional British (and American) approach which used controllers from firms such as BTH, English Electric or Dick Kerr. With these controllers the contacts basically slide past one another. There are usually four series notches; thus there is a considerable voltage difference between the notches. Using this type of controller one accelerates by notching up slowly, and no problems arise. To switch off the current the control handle must be brought back smartly to the off position to prevent arcing. Between the layers of fingers and contacts are insulating arc shields. Thus, while an arc could form between the contact horn and finger if the controller is closed slowly, it would be difficult to arc between the various banks of fingers over the arc shields. Nevertheless, some designs of controllers had in-built magnetic circuits designed to pull any arc that arose and thus extinguish it.

When the electric brake is used the motor acts as a generator, large currents are generated and, as further notches are engaged, the system is progressively short-circuited. If the electric brake is used the car should be brought to a stop before the control handle is brought back to the off position; otherwise arcing is likely to occur between the fingers and contacts, and between the banks of contacts despite the arc shields.

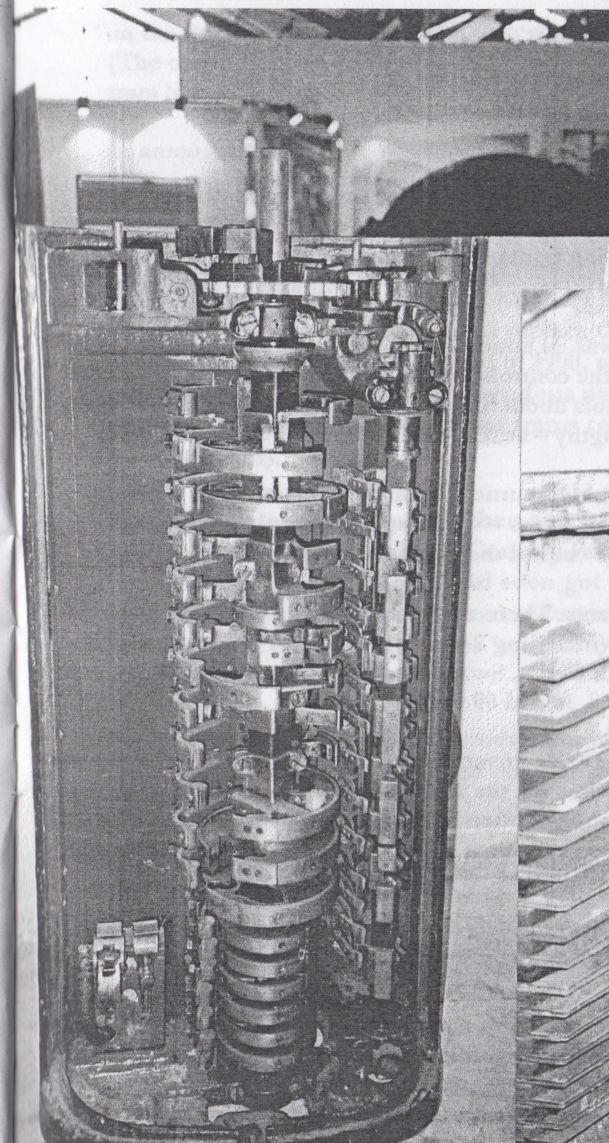
Car 9062 uses basically the same system except there is a line switch in circuit. Slight forward pressure on the control handle closes the relay, which activates the line switch and closes the contact. Releasing the handle snaps the line switch open, so no arcing occurs. Nevertheless, when using the electric brake the line switch is not in circuit so, to prevent arcing, the same procedure of coming to a complete stop must be followed as with 53.

Cars 225 and 392 have controllers with an entirely different contactor method. First, multiple contacts are employed. The result of this is that the voltage difference between the various contacts is more limited. Secondly, on these cars the contacts are opened and closed by steep cams on a geared camshaft. These causes the contacts to snap open and to snap closed, which overcomes the arcing problem, although arc shields are also provided as an additional precaution. These arrangements allow the all-electric controller to be used for normal acceleration and braking, but with the advantage that the rheostatic braking force can be varied as the driving conditions demand. The fact that there are many more notches for acceleration and braking gives a much smoother control.

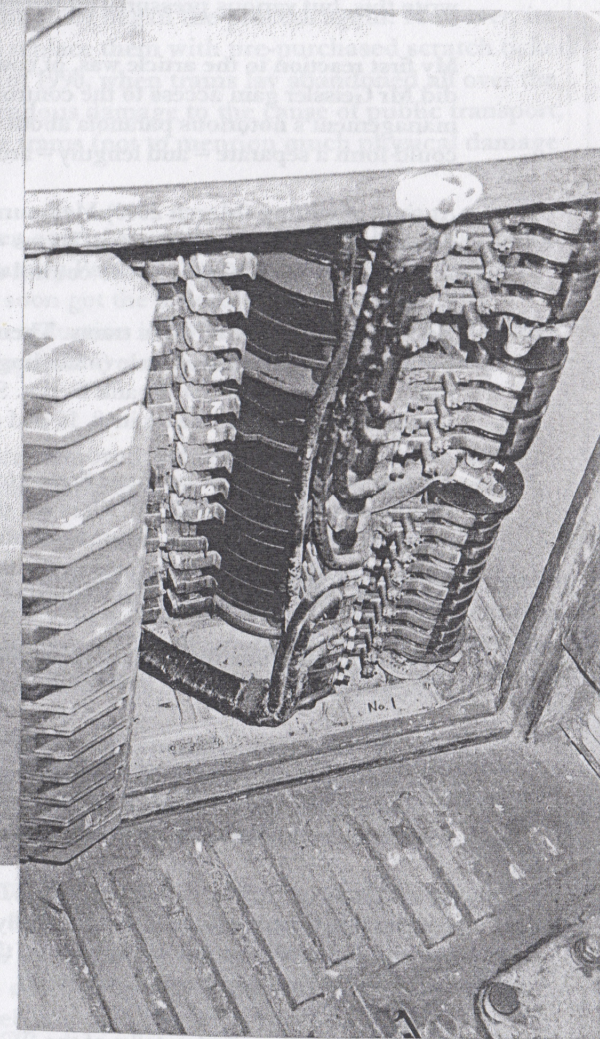
These controllers are obviously more complex and, before the introduction of choppers and thyristors, were the standard as used in Germany, the Netherlands and Austria.

Illustrations:

1. Dick, Kerr controller with front cover removed. Note how with this design the contacts slide past one another.
2. E.I. Controller from car 225 showing from left to right: the arc shield in its open position; the "snap" contacts; the high cams which operate the contacts; and the reversing drum with associated contacts.



1.



2.

MELBOURNE'S 'W' CLASS TRAM TODAY

(A STURDY WORKHORSE FALLEN ON HARD TIMES)

By Frank Dougan

Some time ago, the STG Newsletter featured an article on Melbourne's famous "W" class trams, by Paul Geissler. As an expatriate Glaswegian who has spent many years driving trams in Melbourne, I intended at the time to write this, but various pressures intervened to delay the thought – until now.

My first reaction to the article was, of course, great interest – and curiosity. How did Mr Geissler gain access to the controls of *any* tram in Melbourne, given the management's notorious paranoia about 'unauthorised' driving? That, however, could form a separate – and lengthy – article on its own.

At time of writing (March 2000) Melbourne's trams are split into two separate privatised companies: Swanston Trams – who roughly control the east-west routes – and Yarra Trams – who control the north-south lines.

Each company has 'W' class trams. There are 53 trams of the class still in service. Yarra has 10 on the City Circle (including 2 spares) and about 14 for use on its route 12. All based at Southbank Depot. Swanston has the remainder, based at my Depot (Malvern) for use on its 8, 16 and 69 routes.

An agreement with the previous State government (voted out last November) was supposed to require solely 'W' class on the routes mentioned. However, the actual situation fluctuates. Southbank often runs some articulated trams on the 12 line during the week; sometimes in the past no 'W's have run at all at weekends on the 12. The City Circle runs dedicated 'W's and nothing else.

Malvern Depot runs the Z-class interspersed with 'W's on its 8 and 16 routes. I have not seen a 'W' on the 69 (cross-suburban) route for a very long time.

The 'W' class tram originated in the 1920's as the standard tramcar for Melbourne. The then recently formed Melbourne and Metropolitan Tramways Board worked to standardise and rationalise the motley collection of different classes of electric tram it had inherited from the various Tramway Trusts it had taken over.

In addition to dealing with its acquired fleet of electric trams, the M&MTB also operated the cable tram routes, gradually replacing them with electric cars. The exception to this was the conversion of the last cable line in Bourke street in October, 1940 to double-decker buses.

Although everyone today talks of the 'W' class, in fact there was a long process of innovation and modernisation over the years, with "W" class, 'W1', 'W2' and so on up to the last of the type, the 'W7' built for the Olympic games in 1956, and to run

on the Bourke street lines which were converted from buses to electric trams. (The original trams on Bourke street were cable, until 1940 – when the last cable tram line in Melbourne was removed).

In amongst the many "W" classes over time, appeared myriad variations, such as SW2, or SW5, indicating sliding doors had been fitted, as well as class changes.

The 'W' class came under threat in the late 1980's, at a time when some 250 were still in service. The then labour government moved to scrap them, but backed away after an outcry, then surreptitiously began the process again. However, its efforts to remove conductors and replace them with pre-purchased scratch tickets led to the appalling tram dispute of 1990, when trams lay abandoned all over the city for five weeks, causing tremendous damage to the cause of public transport, and especially, to the cause of the trams (not to mention much physical damage by vandalism).

The Labour state government then agreed to retain conductors, but it lost power in 1992 to the Kennett Liberal-Country Party coalition. The Liberals quickly moved to smash the unions, and soon got the unions to agree to sweeping reforms, which led eventually to a reduction in 'W' class numbers to 53. Another 50 were to be kept in reserve for 'special events' and are still lying in storage at Preston workshops today.

After many delays, conductors were removed between 1997 and 1998 as ticket issuing machines were installed on trams, and the 'W' class was modified for driver-only operation.

The 'W' class tram was a sturdy workhorse, and the backbone of the fleet right up till about 1992 – popular and reliable with drivers and conductors. Unfortunately, the tram engineers, led by the then manager of the workshops, were against the 'W' class – because they objected to having to show on their C.V.'s that they maintained old trams!

The most common 'W' was the W2, and the last of these was withdrawn from service in 1987. The open door 'W's, such as the W5, disappeared into storage, and the 53 now in service are all equipped with sliding doors.

Unfortunately, these remaining 'W's have had all sorts of modifications made to them, too many to list more than a few here. However, the driver now has an internal mirror above his head on the left to see inside the tram. This at least is the theory. In practice, it is often difficult to see clearly due to reflections and shadows. Also, the old manual bell and cord has been retained, although not used, and usually this, and the stanchions supporting the cord, are what the driver sees most clearly. Glancing up at the awkwardly placed mirror, gives the drivers stiff necks.

The doors are now interlocked so the driver cannot take power until the doors close. The delay is supposed to be four seconds, but can be anything from 4 to 12 seconds, and indeed can fluctuate from stop to stop! Motorists at street stops become confused and irritated at delays – and often pass the stationary tram (illegal). The driver misses green lights due to door delays. And of course, the doors won't *begin* to open till the tram stops.

The *unmodified* 'W' would come to a halt with the doors just opened, and move off as the doors closed – on the conductor's starting signal – and catch the green light.

Now, the driver's view at one at one end is obstructed by the huge ticket machine, and he cannot see the platform behind it. An extra mirror and light over the door, installed at union insistence, makes little difference to the driver's view. In fact the safety light often is not working, and many drivers don't bother reporting it.

There are a host of design problems with the modified 'W' as currently in service. The original driver's external step mirror, on the side of the tram, was excellent, but has been removed to allow a flashing blinker to replace it (why not place the blinker further down the body, and leave the proven mirror in place?). The driver's rear view is now provided by two huge "B" class mirrors, one on each side. These create huge blind spots, and the driver has to push them forward to leave the cab, whether to change points manually, or to try to stop a car passing a stationary tram. By the time the driver has pushed the mirror aside, the car has usually gone past. Another safety hazard!

All these electronic modifications to a basic tram design have made it much more unreliable and prone to breakdowns. The doors frequently play up. Either they won't open (or shut) or *keep* opening and shutting. This is common, especially on a hot day. The brakes may 'lock on' – again, especially when it is hot. Result, the tram is immobile, and cannot be pushed out the way, as could be done with ease with an original 'W'. In any case, management have now banned pushing other trams, except by breakdown staff.

The 'W' class tram is a classic tram of 1920's design, and was never designed for the electronic intrusions which have been forced upon it. As these trams run on mainly tourist lines, they should have retained the conductor (by whatever name) for safety and service – not least, to deal with tourists' queries.

The driving cab of the 'W' is a tiny area, which has now become grossly cluttered with the technical junk of the tram engineers. I attach photographs of both a modified 'W' driving cab, and an unmodified cab – showing how cramped it now is for the driver.

Recently, a more serious problem has emerged. As these trams have always had to have the brakes manually adjusted every night, the managements have decided to get rid of most of the shed staff who performed this essential duty. This was done last year, following the installation of slack adjusters to all of these trams. These were supposed to automatically adjust the brake shoes as they wore down.

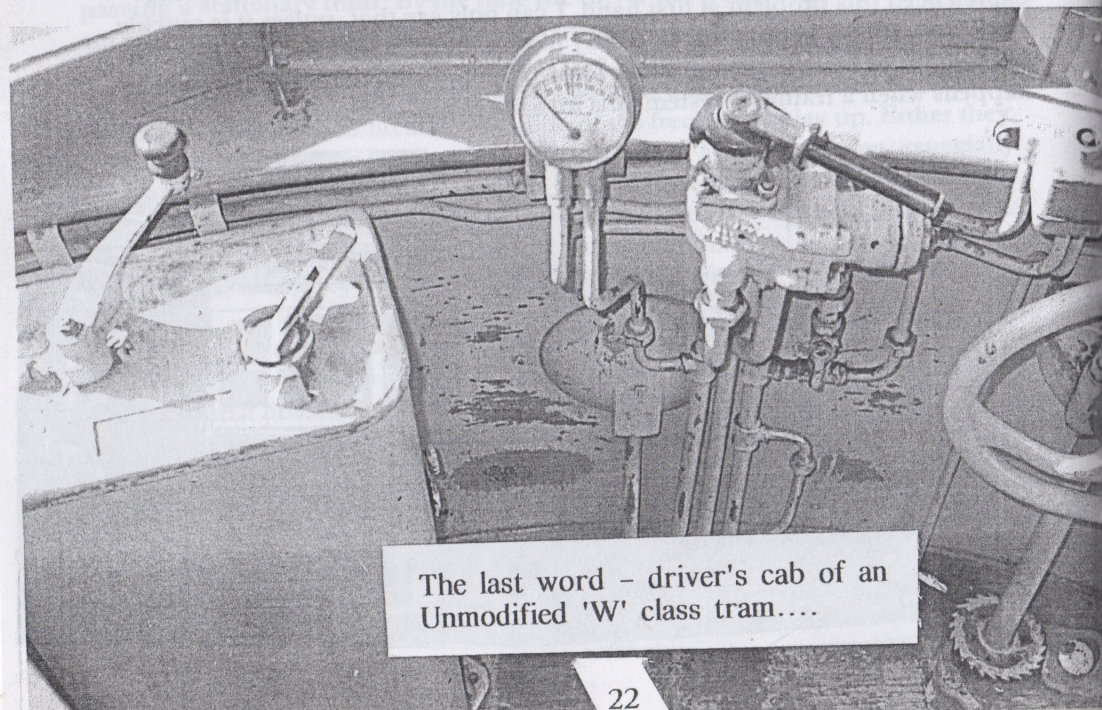
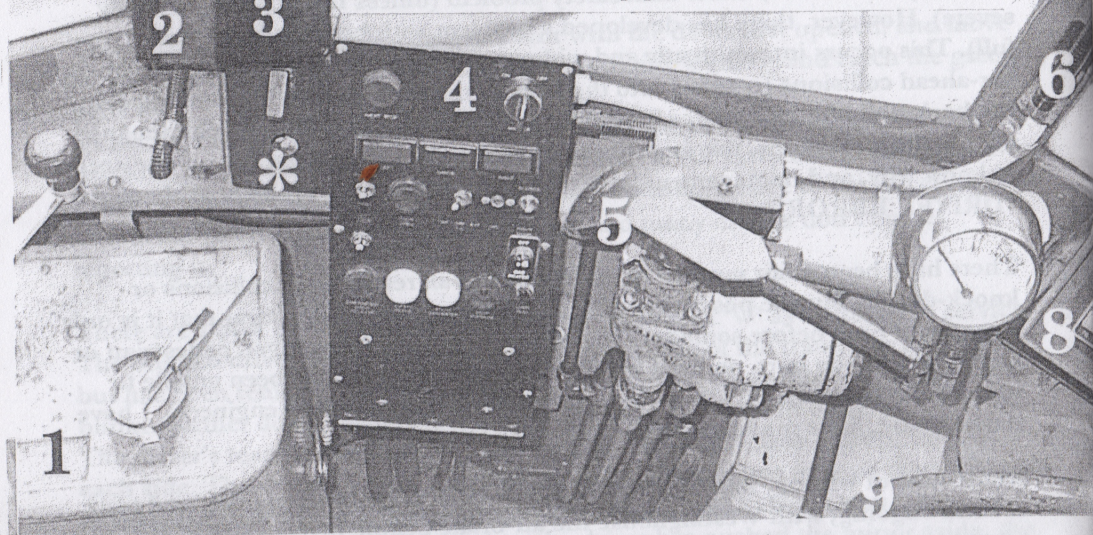
At first, the result was an increase in badly adjusted brakes, usually grabby. This is usually a nuisance, rather than safety problem (unless the grabbing is really severe). However, there has developed a problem with brake failure (partial or full). This occurs intermittently and without warning, and has caused a number of car-ahead collisions (running into the back of the tram in front) or running into the back wall of the depot (as happened at Malvern). According to maintenance staff at the workshops, this is attributable to the slack adjusters, but no one seems to know why, and management have tended to dismiss the problem as the usual "DRIVER ERROR!"

There have been a fair number of incidents, not all resulting in collisions or knock-downs, but the possibility of such is frightening, as it is clear that it is only a matter of time before someone – whether tram driver, passenger, pedestrian or someone else – is hurt, perhaps killed. The management have been unable to identify the problem, so it has not been rectified. The tramway engineers, I have heard it said, have made a mistake and will not admit it.

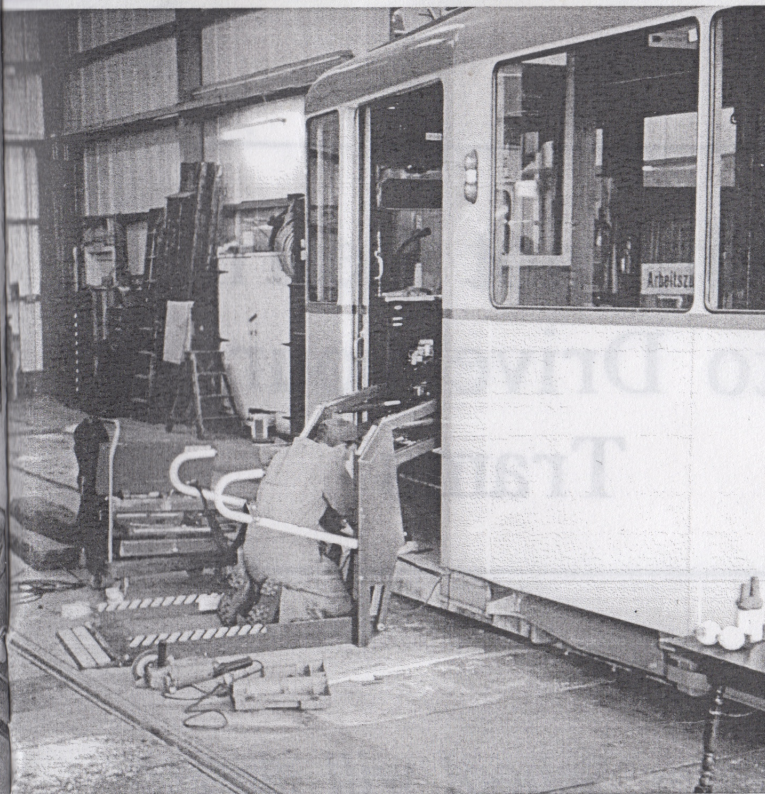
At the time of writing, four 'W's have had the slack adjusters removed, and tests are still ongoing, with Westinghouse the air-brake people involved. Having experienced this problem at first hand, I can only say that, unless it is quickly dealt with, it may be that the 'W' s may have to be withdrawn from service in Melbourne, at least in their existing form. Which, I suppose, just shows what happens when a tramway system falls into the hands of Philistines.....



1. Controller
 2. "Next Point" ticketing repeater display
 3. Automatic vehicle monitoring emergency switch
 4. Master (electronic) controller box
 5. Air brake handle with "deadman's" attachment
 6. P.A. microphone
 7. Air pressure gauge
 8. Automatic vehicle monitoring control box
 9. (Top of) hand brake handle
 10. Air operated wipers control knob
- * Switch for automatic popouts to be installed here (2000)



The last word - driver's cab of an Unmodified 'W' class tram....



TOP LEFT
Installing the
Wheel-chair Ramp
on the
Dusseldorf Tram

BOTTOM
Members working
on Brill Crossbench
No. 7 at Sintra
in the Spring

