ELIGTALITY S' IFLY LEPARTMENT BALLARAT BRANCH REC'D 3 0 JUN 1954 Ke ACK'D ANS'D ATTENTION REF'D TO REPORT NOTING

CORY FOR W/S

TRAMWAY MAINTENANCE

MINUTES OF 4TH ANNUAL CONFERENCE

> APRIL 26, 1954 AND MAY 3, 1954

MINUTES OF 4TH ANNUAL TRAMWAY MAINTENANCE CONFERENCE

HELD AT BALLARAT ON 26TH APRIL, 1954

AND AT MELBOURNE ON 3RD MAY, 1954.

Manager, Ballarat Branch Works Superintendent, Ballarat Manager, Geelong Branch Works Superintendent, Geelong Acting Manager, Bendigo Branch Works Superintendent, Bendigo Departmental Tramways Superintendent

ITEM NO.	ITEM	PAGE NO.
	RESUME OF ITEMS DISCUSSED AT PREVIOUS CONFERENCES	1
1 (a).	Cleaning sponges.	4
1 (b).	Smoking in rear saloons.	4
1 (c).	Testing of motormen.	. 5
1 (d).	Maintenance cost reduction.	5
1 (e).	Bumper tars.	6
	TRACKS	
2 (a).	Profile survey.	7
2 (b).	Specification for "cut-back" bitumen.	7
2 (c).	Bitumen pre-mix.	7
2 (d).	Heading of rails.	9
2 (e).	Installation of piping under tracks.	.10
	CAR RENOVATION	
3 (a).	Refresher coats.	10
3 (b).	Car washing.	11
3 (c).	Flooring.	11
4.	FIELD INSPECTION, BALLARAT.	12
5.	DISINFECTING OF TRAMCARS.	12
	BLINDS	
6 (a).	Weather blinds.	.13
6 (b).	Sun blinds.	14
7.	PUBLICATIONS.	14
	ELECTRICAL SYSTEM	
8 (a).	Lightning arresters.	15
8 (b).	Lamps - Interior of trams.	16
8 (c).	Contacts for governor switches.	18
	TRUCK MAINTENANCE	
9 (a).	Degreasing of components.	18
9 (b).	Brake blocks.	19
9 (c).	Side bearing wear plate clearance.	20
9 (d).	Tyre gauges.	21
	CASTINGS	
10 (a).	The economics of "patching" old castings compared with the fitting of new ones.	22
10 (b).	Metal reclamation.	23
11.	MAINTENANCE COSTS.	23

ITEM NO.	ITEM	PAGE NO.
	TROLLEY WHEELS	
12 (a).	Standard profile.	25
12 (b).	Effect of balancing.	25
13.	OILS AND GREASES.	26
14.	ALTERATION TO MAXIMUM TRACTION TRAMS.	28
15.	SPARE PARTS FOR MAXIMUM TRACTION TRAMS.	28
	GENERAL DISCUSSION	
16 (a).	Fatigue failure of axles.	29
16 (b).	Accidents.	30
16 (c).	Payment of track cleaners.	30
16 (a).	Shedman's assistants being paid shedman's rates when working during silent hours.	31
16 (e).	A.T. & M.O.E.A. proposed log of wages and conditions.	31
16 (f).	Amenities.	31
	SUMMARY OF ACTION	
	Works Division.	32
•	All Branches.	33
and the second	Ballarat Branch.	33
	Bendigo Branch.	34
	Geelong Branch.	34
	Departmental Tramways Superintendent.	35

3.

BALLARAT CONFERENCE

ITEM 1. RESUME OF ITEMS DISCUSSED AT PREVIOUS CONFERENCES.

This item was included in the Agenda to enable further discussion to take place on previous conference matters which members did not consider were adequately covered in the summary (supplied with the Agenda). The following were raised:-

(a) 1953 Conference Item No. 4(c) - Cleaning sponges.

REMARKS:

At the 1953 conference Geelong indicated their preference for synthetic sponges made from cellulose because their water holding capacity was better than that of rubber sponges. Nevertheless, all Branches had expressed the view that they did not last as long as rubber sponges, because of their low mechanical strength which permitted small pieces of sponge to be torn off when passing over projections on the surface of the tram.

Geelong now reported that cellulose synthetic sponges were being made with some type of reinforcement, possibly fibres, under the trade name of 'Enka" and sold by Macwill & Co., Ltd., England. It was suggested that Works Division should make inquiries regarding the possibility of purchasing samples of this sponge in Australia.

Bendigo had advised during the year their preference for "Aerub" sponges, but as far as could be ascertained the availability of this brand was irregular, and it therefore could not be held as stores stock.

However, Bendigo were satisfied with the "Disco" sponges at present being supplied by Stores Branch, and Geelong and Ballarat decided to use this type of sponge for the time being.

ACTION:

Works Division to endeavour to obtain samples of "Enka" sponges.

(b) 1953 Conference Item No. 6 - Smoking in rear saloons.

REMARKS:

At the 1953 conference it was decided that, following the conversion of maximum traction trams for dual operation, and certain complaints from the public, a recommendation should be made to the Engineer and Manager that smoking in rear saloons be permitted.

Bendigo reported that they had not made this recommendation because the proposed conversion of maximum traction trams for dual operation had not proceeded.

Geelong did not favour the idea of allowing passengers to smoke in the rear saloon of the dual-operated tram, while not making this concession in other maximum traction trams and, therefore, preferred not to make any change.

It was agreed that it would be preferable for each Branch to suit its own local conditions in this matter. The question of further alteration to maximum traction tramcars was discussed under Item 14.

ACTION:

Further action regarding smoking in rear saloons of maximum traction trams converted for dual operation, to be at the discretion of each Branch.

REMARKS:

Having perused the list of questions used for the examination of motormen in Ballarat, Geelong suggested that a standard form of examination, incorporating the viewsof Ballarat, Bendigo and Geelong, should be printed for use in the three Branches.

Geelong considered that the Senior Tramway Inspector would be quite competent to conduct these examinations, and sought the views of the other Branches on this matter. Bendigo stated that examinations in that Branch are conducted by the Branch Tramway Superintendent, but Ballarat considered that the examination and passing of motormen by the depot foreman is very good policy, as the depot foreman is responsible for the maintenance of rolling stock.

After some discussion, it was agreed that the testing of motormen should be carried out by the depot foreman, except in the matter of fares, sections, timetables and other traffic matters.

ACTION:

Bendigo and Geelong to work to a standard list of questions for examination of motormen, similar to that supplied by Ballarat.

Testing of motormen in tram driving and technical knowledge to be carried out by depot foreman, in all Branches.

(d) 1953 Conference Item No. 13 - Maintenance cost reduction.

REMARKS:

During the year the Branches had given consideration to the possibility of working the track welder, at least for part of the time, without the services of a tradesman's assistant. Bendigo and Geelong remained firm in their opinion that there were no occasions on which they considered that their track welders could safely and efficiently work singly, but Ballarat maintained that conditions in their city were such that this was practicable except in places such as Sturt Street where traffic was heavy. It was agreed that in Geelong and Bendigo tram tracks were mainly on highways and therefore an assistant definitely was required.

Bendigo doubted the effectiveness of the standard safety notices, as during the last 18 months track personnel had been hit by vehicles on two occasions. They suggested that the matter be referred to the Safety Branch.

Geelong also stressed the safety angle, as there were occasions in which it was not safe to ask a welder to do a job even with an assistant.

Both Geelong and Bendigo felt that the welder would not work as efficiently if he did not have an assistant to direct him in relation to traffic.

The Departmental Tramways Superintendent inquired whether the assistant was provided to enable the welder to give a better output, to give assistance to the operator of electrical apparatus in the event of injury, or to safeguard the welder against traffic. Welders' assistants apparently do not use a red flag. Geelong replied that an assistant was necessary for all three purposes, besides helping with part-time grinding. Ballarat considered that if the tradesman's assistant were required purely for watching purposes he should not be paid tradesman's rates.

The Works Manager considered that there was an analogy between this problem and that of an employee working with a ladder. In this connection, the appropriate paragraph of the "Blue Book" states that -

"In a public thoroughfare or where traffic, either pedestrian or vehicular, is liable to come in contact with the ladder, a red flag shall be attached to it about five feet from the ground, and warning signs exhibited in appropriate positions."

That is, a warning sign is all that is specified.

After some discussion, it was decided that Branches should suit their own local conditions by employing an assistant to the welder when they considered it desirable.

Bendigo requested Ballarat to advise the number of hours per week during which the track welder in that Branch works with an assistant.

ACTION:

Each Branch to act as it thinks best in employing an assistant to work with the welder.

Works Division, for the information of Branches, to ascertain the practice followed in Melbourne.

Ballarat to advise Bendigo and Geelong of the number of hours per week during which the track welder in that Branch works with an assistant.

(e) 1953 Conference Item No. 15(g) - Bumper bars.

REMARKS:

At the last conference it had been arranged that Ballarat would prepare a drawing showing the present position of bumper bars and the desired necessary extensions to avoid the possibility of the roof eaves coming into contact before the bumper bars. Bendigo referred to the fact that these details had not yet been received.

Ballarat stated that other more vital work had prevented the preparation of these sketches, but the matter would be attended to when possible.

ACTION:

Ballarat, at their convenience, to prepare a drawing showing the present position of bumper bars and the desired necessary extensions to avoid the possibility of the roof eaves coming into contact before the bumper bars.

ITEM 2. TRACKS

(a) Profile survey.

REMARKS:

Ballarat reported that a survey was being made to determine the extent of flange running on all tracks in that Branch. A wheel profile indicator had been converted for this purpose, but this had been discarded in favour of a simple rail profile indicator designed by them which would be demonstrated at the field inspection. At the date of the conference the survey was approximately 32% complete, and figures at that stage indicated that flange running was taking place on approximately 60% of tracks surveyed. The tread on the rail had worn 7/16", which in the case of 90 lbs. Bos. rail meant that 41% of the total thickness of the ball had gone. Due to increased flange running it had now become necessary to re-flange wheels after 41,000 miles instead of 60,000 miles as formerly. Ballarat considered that the life of tyres was being adversely affected.

Bendigo stated that flange running was evident in small portions of their system, mainly at the leads to some loops. Rail in these sections would be replaced when practicable. It was not considered that tyre life in that Branch was being affected to any extent.

Geelong agreed that flange running did shorten the life of tyres. A detailed survey of rail life would be essential in Geelong if the Transport Board decided to prolong the life of the tramway system in that city. Geelong's policy to date has been to replace rails in cases where tyre flanges are definitely "bottoming", and such positions are usually on curves. It was thought by Geelong that no great amount of flange running is taking place on the straight tracks, but this could only be shown definitely by conducting a similar survey to Ballarat.

The detailed survey was being carried out in Ballarat because the Department was endeavouring to peg expenditure on tramways, and it was desired in that Branch to ascertain just what work will have to be faced up to if present standards are to be maintained.

Ballarat queried when a rail has arrived at the point at which it is no longer safe. They considered that, with the rails in their present condition, it would be very easy for the tram to skid if it stopped quickly with half the weight on the flange and the other half on the ball.

ACTION:

Works Division to make inquiries from the Melbourne & Metropolitan Tramways Board regarding the point at which they consider rail has ceased to be safe.

Ballarat to loan the profile indicator to Bendigo and Geelong if desired by the latter Branches at a future date.

ITEM 2. TRACKS.

(b) Specification for "cut-back" bitumen.(c) Bitumen pre-mix.

REMARKS:

Geelong sought information from the other Branches concerning their specification for cut-back bitumen and bitumen pre-mix. They reported on their procedure as follows:-

80% 60%

7 miles

<u>Cut-back bitumen</u> is obtained from the Albion Quarrying Co., Pty. <u>Ltd.</u>, Geelong, and is received already fluxed with 10 parts fuel oil and 15 parts kerosine to 100 parts bitumen. This mix, mainly designed for summer use, is varied upon request by a slightly higher percentage of volatiles for use in winter. Some years ago when cut-back bitumen was in short supply, Geelong cut back their own bitumen by adding 7 gallons diesel oil to 35 gallons (a drum) of bitumen.

Bitumen pre-mix is made in an old type of concrete mixer with a 3-phase motor fitted to it. To every yard of aggregate is added 10 gallons of cut-back bitumen. Four pints of tar oil is also fed into the mixture, mainly to prevent it from adhering to the blades. This pre-mix is of the type commonly known as a "magpie" mixture.

Geelong considered that if the fluxing oils used in cut-back bitumen were too highly volatile a high percentage would be driven off during the heating operation of the bitumen kettle. With the starting up of oil refineries in this country there would be a tendency to vary the volatiles used for cutting back bitumen and, although satisfied with their present supplies from the Albion Quarrying Co., they considered that cut-back bitumen was open to exploitation and a rigid specification should be prepared with which the product supplied could be checked periodically. They also wished to know the amount of cut-back bitumen per yard of aggregate used in the other Branches.

Bendigo reported as follows:-

<u>Cut-back bitumen</u> has, in the past, been ordered only as 80-100 penetration, no other specification being stipulated. Asphaltic oil for reducing bitumen for road mending purposes has been the only detail given when ordering flux oil. Both these items have been supplied by the Vacuum Oil Co. It was considered that Australian Standard Specification No. A10-1938 "Residual bitumen and fluxed native asphalt for roadmaking purposes", could be adopted.

One or two drums of solid bitumen 80-100 Bitumen pre-mix: penetration is heated in the tar boiler till liquid. Asphaltic flux oil is then poured into the pot and the bitumen is drawn off several times and poured into the pot to ensure a proper mix. The usual proportion of bitumen to flux oil is 5 to 1, but this is governed by weather conditions, less oil being required in 1/4" metal screenings are used and the ratio of fluxed summer. bitumen is approximately 10 gallons per cubic yard of screenings. The screenings and fluxed bitumen are hand-mixed with shovels, usually four turns, depending on how clean the screenings are. After lifting and packing has been completed, a penetration of hot bitumen is poured on the clean metal to a depth of approxi-mately 4", over which is added a layer of pre-mix approximately This is then rolled and after allowing approximately a 1/2". fortnight for it to settle, it is sealed with a further layer of pre-mix and again rolled.

Ballarat also make their own <u>cut-back</u>, and the bitumen is used with dieseline, the proportion varying according to weather conditions and the purpose for which it is required.

Two types of pre-mix are used in Ballarat, and it is manufactured using a tar boiler and a concrete mixer. The bitumen and dieseline are heated in the boiler to 300°F -

- (i) 12 galls. dieseline to a 42 gall. drum of bitumen for 3/4" crushed granite.
- (ii) 10 galls. dieseline to a 42 gall. drum of bitumen for 1/4" guartz.

1

Owing to lack of sharps in the quartz, a higher proportion of bitumen is necessary. At first, doubts were expressed as to whether pre-mix could be made successfully with 1/4" quartz, but it has proved quite successful. The amount of cut-back or flux used per yard of pre-mix is 8 gallons for 3/4" granite and 10 gallons for 1/4" quartz.

It was decided that, as Ballarat and Bendigo make their own cut-back successfully, Geelong should do this also in preference to drawing up and policing a specification.

ACTION:

Geelong to make their own cut-back bitumen as in the other Branches.

ITEM 2. TRACKS.

(d) Heading of rails.

REMARKS:

Bendigo gave a further report on the .9% carbon steel heading carried out in that Branch at Langhorn's curve, Eaglehawk, and the adjacent switch casting. Confirming the doubt previously expressed with regard to the old rail being stressed during the welding process, two breaks developed in the rail on 14th May, 1953, and one break on 23rd June, 1953, in extremely frosty conditions. All breaks were fish-plated and in one case the heading rail broke approximately 2" away from the break in the rail. Five cracks were apparent in three other places. Corrugations were noticed in comparing the wear on the plate with the wear on the welds. Several places were evident where the plate was breaking away from the 3/4" welded spots. The ramping originally appeared to be slightly loose but this had not deteriorated. Over a short length of approximately 8 ft., up to 1/8" wear in the side of the groove had occurred. The heading on the switch casting appeared to be more successful, though the last weld near the heel appeared to be breaking away. In view of this, and taking into consideration the costs reported at the 1953 conference (see 1953 minutes page 28) it was not recommended that any further lengths of rail be treated in this way but that the method be used only for maintaining "special work."

Geelong advised that they also were no longer using the .9% carbon steel strip for heading of rails, although it was being used on "special work" where required. Practically all of the mild steel and hardened spring steel used for this work originally had been removed, but all the spring steel used in the annealed state was still intact. Geelong preferred to replace rails instead of heading them.

Ballarat had never experimented with heading of rails.

The three Branches requested that an endeavour be made to expedite deliveries from the order for rail placed with the Melbourne & Metropolitan Tramways Board, as existing stocks would not last very long.

ACTION:

Works Division to expedite delivery of rail from Melbourne & Metropolitan Tramways Board.

ITEM 2. TRACKS

(e) Installation of piping under tracks.

REMARKS:

Bendigo stated that for some years a round bar had been used to facilitate the installation of up to 3/4" G.I. water services under the tram track, but this method was not suitable for large services, and they desired details of the tool used at Ballarat to which reference was made at the 1953 conference.

Ballarat advised that this tool was no longer available, having been loaned to a plumber who had failed to return it. It was a 10 ft. bar made of 1-1/4" steel built up to 2" at the end, and was driven under the tracks with a sledge hammer.

Geelong referred to tools of this nature used by the Underground Mains Engineer in Melbourne, and it was agreed that Works Division should make inquiries.

ACTION:

Works Division to make inquiries from Underground Mains Engineer regarding tools used by him for installation of piping under tracks.

ITEM 3. CAR RENOVATION.

(a) Refresher coats.

REMARKS:

The refresher coat technique, consisting of one coat of clear "Dulux" on the panels and one coat of "Dulux" colour on the cream paint work, was applied to Car No. 31 in Ballarat 15 months ago, and was proving very satisfactory although the car was in continual service. The preceding cutting-back process consists of washing the panels with steel wool and water.

Since the last conference, eight cars in Geelong had been refreshed by cutting back the green paintwork with "Dulux No. 2 Cutting Compound" and giving the cream paintwork one coat of cream 'Dulux". This technique had considerably brightened the appearance of those trams, and they considered that it would extend the life of the paintwork by a further five years. Geelong had not had success with the use of clear varnish as a refresher coat, mainly because of the necessity to remove the refresher coat before subsequent repainting with 'Dulux" enamels. They queried whether other Branches considered it necessary to remove the 'Dulux" clear before repainting.

Bendigo had treated car No. 20 with "Wash Kleen" and clear "Dulux R.C. 147" in May 1953, and they were satisfied with the results. They considered this to be an economic method of preservation and maintaining appearance.

Neither Ballarat nor Bendigo had reached the stage at which trams treated with refresher coats had required repainting. The reason why Geelong in the past had found it necessary to remove the refresher coat of varnish was because it had a tendency to craze. It was suggested that this may have been caused by the undercoating being a different type of enamel from the clear varnish. It should be satisfactory to use a synthetic clear over a synthetic paint, but a synthetic clear would craze if used over a long oil base.

Geelong suggested that one coat of the green enamel would be just as cheap and effective as a clear varnish, but lines and badges would require repainting also and this would be expensive. Norks Division stated that the "Dulux" representative had indicated that it would not be necessary to remove the "Dulux" clear at later repaintings, but they agreed to make further inquiries in this regard from B.A.L.M., and also to ascertain what solvent could be used for the removal of clear "Dulux" if it were necessary. It was suggested that Geelong should try the refresher coat technique used in Ballarat and Bendigo.

In response to an inquiry from Geelong, Ballarat advised that chips in the paintwork are touched up with green enamel before the clear "Dulux" is applied.

ACTION:

1

Geelong to experiment with the refresher coat technique used in Ballarat and Bendigo.

Works Division to make further inquiries from B.A.L.M. regarding the necessity to remove clear "Dulux" before subsequent repainting, and also regarding the type of solvent required to remove it if considered necessary.

ITEM 3. CAR RENOVATION.

(b) Car washing.

REMARKS:

The former practice of using "Carfoam" added to the cleansing water had been discontinued in Ballarat, because results obtained from the use of "stripping solution" were in every way superior. The new solution was originally developed to remove encrusted wax from polished floors. At 12/6d. per gallon, compared with "Carfoam" at 22/6d. per gallon, it was not only more efficient but also more economical.

In Geelong, tramcars are washed with "Magnus Carfoam" (1 tablespoon to 1 bucket of water). "Carfoam" is mainly a wetting agent, and contains no alkalies nor acids harmful to the paintwork. Geelong considered that the "stripping solution" used by Ballarat appeared to be a solvent and may be harmful to paintwork. Ballarat stated that its pH-value had not been tested.

Bendigo reported that no detergent is used in normal car cleaning in that Branch. In the preparation of the exterior prior to giving refresher coats, "Wash Kleen" ammoniated liquid soap has been used. A liquid wetting agent was tried some $2\frac{1}{E}$ years ago, but it was found to be of no great advantage in the Bendigo climate. Geelong considered that some type of detergent or wetting agent was desirable.

ACTION:

Ballarat to supply other Branches with a sample of their "stripping solution" for trial.

ITEM 3. CAR RENOVATION.

(c) Flooring.

REMARKS:

A further report was submitted by Bendigo on the condition of the rubber flooring and "Flintkote" entrances laid in car No. 23 in September, 1951, as reported on page 17 of the 1952 conference minutes. The rubber flooring in No. 1 end saloon was considered to be still in perfect condition. The entrance at the door to No. 2 end saloon was slightly "bubbled," this defect having appeared shortly after installation but no deterioration having been apparent during the past 12 months. The "Flintkote" had deteriorated slightly on the platform, mainly in the No. 2 end entrance due to movement of the boards over the "lifeguard" spring. The installation cost of the rubber flooring of this tram was £54, and the 'Flintkote" £21.

It was decided to continue with this observation without extending the renovation to other trams, pending a decision as to the life of the tramway system in Geelong.

ACTION: Nil.

4

ITEM 4. FIELD INSPECTION, BALLARAT.

A visit was made to the tramway depot and various sections of the system, and the following items of interest were inspected and discussed:-

- (a) (i) Inspection of single truck car No. 31, which was given a "refresher" coat 15 months ago (12/12/52) 6 years after painting with Taubman's "Pearline" (16/12/46), and has been in continual service throughout these years. It was agreed by all that the appearance of this tram was still quite satisfactory. (Page 10, 1954 minutes.)
 - (ii) Inspection of single truck car No. 20 which was given a "refresher" coat on 4/2/54, eight years after painting. (Page 10, 1954 minutes.)
- (b) Inspection of the maximum traction tramcar converted for dual operation and in which the seats of the centre section have now been repositioned longitudinally. (Pages 4 and 28, 1954 minutes.)
- (c) Demonstration of a rail profile indicator designed and made at Ballarat. This rail profile indicator records on a small drawing the present shape of the rail both above and below the road surface (small hole must be excavated), and this can be readily compared with the drawing of the original profile. (Page 7, 1954 minutes.)
- (d) Inspection of creosote-impregnated pinus radiata sleepers laid 18 years ago (1936). These were in a far superior condition to their yellow stringy-bark controls laid at the same time. A large percentage of the latter sleepers had decayed and the end of their life is now in sight, whereas the pinus radiata sleepers were in perfect condition and appear to be good for many more years.

ITEM 5. DISINFECTING OF TRANCARS.

REMARKS:

Ballarat considered that the incidence of common colds among depot employees was unusually high, and because of this they had now commenced a system of disinfecting, although for many years disinfecting had not been carried out in that Branch. When a tramcar comes in for servicing, the doors are closed and the car is sprayed internally (back of seats, under seats, etc.) with "Eucopine" by means of a "Rega Atomiser." "Eucopine" costs 12/6d. per gallon, and 1/4 gallon is sufficient for five trams. At this stage, it was impossible to say whether or not it would be beneficial.

Geelong considered that the main objective of any disinfectant was to destroy vermin, though it was agreed that it had a psychological effect on the passengers. At present no regular disinfecting of trancars takes place in that Branch. The present practice in Bendigo is for the car cleaner on duty on Sunday mornings each week to spray the floors, seats and ceilings with neat "Formalin". This is done by means of a hand fly-spray and the saloon doors are closed for approximately six hours before the trams are put into service.

Geelong raised the point that "Formalin" is bad for asthma sufferers. There was also some doubt as to whether it would be effective in destroying vermin. Apart from this, it was agreed that "Formalin" is a very satisfactory disinfectant. It was decided that inquiries should be made from the Department of Health regarding these two queries, as it was definitely desirable that some form of disinfecting be carried out.

ACTION:

Works Division to make inquiries from the Department of Health regarding the possible effect of "Formalin" on passengers suffering from asthma, and also regarding its effectiveness in destroying vermin.

ITEM 6. BLINDS.

(a) Weather blinds.

REMARKS:

Ballarat wished the conference to examine the trial plastic weather blind which had been in service in Ballarat for two years, and with which they were very satisfied. It was suggested, subsequent to an examination of the blind, that some finality be reached concerning procurement of material in bulk for manufacture of replacement blinds.

Bendigo were still satisfied with the multi-coloured sun blind material which they considered more suited to their climate. The cost of these blinds was:- $\pounds15/10/7$ ($\pounds10/10/7$ material, $\pounds5$ labour) for one three-entrance maximum traction car, and $\pounds16/6/3$ for a four-entrance car.

Works Division reported that comparative costs were:-

Plastic - 1/3¹/₂d. per square foot Canvas - 1/2d. """"

The plastic could be obtained with a darker backing if it were being purchased in large quantities.

The plastic weather blind was later inspected by the conference and appeared to be quite satisfactory from the point of view of durability, but it had lost a lot of its colour. It is believed, however, that the colour could be improved if it were cleaned up.

ACTION:

Geelong to try a plastic weather blind on one tram, and Bendigo to continue with the use of multi-coloured canvas.

No action to be taken at this stage regarding the purchase of large quantities for more extensive use of the plastic material. (b) Sun blinds.

REMARKS:

Ballarat reported that all sun blinds in that Branch are in very poor condition. They suggested that these blinds be removed if the conference decided against renewal.

Geelong advised that sun blinds in the saloons of tramcars were not being replaced when rollers broke or the holland became dilapidated.

Bendigo asked that rollers of blinds removed in the other Branches be forwarded to them as spares.

ACTION:

Sun blinds in Ballarat and Geelong to be removed as they wear out.

Ballarat and Geelong to send to Bendigo the rollers of sun blinds removed from their trams.

ITEM 7. PUBLICATIONS.

REMARKS:

Bendigo desired to know what publications relative to tramways were received by other Branches, as the English publication "Passenger Transport" circulated in Bendigo contained very little information applicable to tramways.

Ballarat replied that no publications regarding tramways were forwarded to them, and Geelong reported that transport journals subscribed for and received by them were as follows:-

((a)	Transport World	-	Monthly
((b)) Mass Transportation	-	Monthly
(c) Electric Traction	-	Monthly

Works Division stated that, as far as could be ascertained, there is no publication dealing exclusively with the technical aspects of tramways operation. The publication 'Electric Traction" concerns Australian trams, but deals only with the various types of trams operating on different routes and, although interesting, is of no technical value.

Two additional publications to the above three, namely, "Passenger Transport" and "The Railway Gazette", are received at Works Division, but "Passenger Transport" is mainly concerned with bus operation, and "The Railway Gazette" is solely about trains.

ACTION: Nil.

----000----

The Ballarat Conference closed at 4.45 p.m.

14.

MELBOURNE CONFERENCE

ITEM 8. ELECTRICAL SYSTEM.

(a) Lightning arrestors.

REMARKS:

1

Ballarat inquired whether the other Branches have a regular periodical inspection of arresters, and whether they inspect after each heavy lightning storm. Two types of arresters are fitted in the Ballarat trams - "Air Gap G.E." and "Vickers Carborundum". During the recent annual inspection the tapping from current collector to arrester which passes under the trolley base board was found by test to be fractured on several cars, rendering the arrester inoperative. They considered that some regular set period should be determined for inspection of this equipment.

Geelong gave the following report on lightning arresters fitted in their trams:

"Trams Nos. 1-10 are fitted with Vestinghouse M.P. Carborundum arresters 0-1000 volt. These arresters consist principally of a block of specially prepared granular carborundum, having a high resistance at the working voltage. The type of carborundum used consists of silicon carbide bound together with felspar The block is mounted on porcelain (aluminium silicate). insulators and is insulated from the live terminal by an air gap formed by placing a sheet of perforated mica between a dished copper disc and the metal plate that forms the terminal. The arrester is connected between the line and earth, but normally no current flows through it because of the air gap between the line terminal and the carborundum block. When an excessive voltage rise takes place, the gap flashes over and the charge is diverted to earth. The air spaces between the carborundum granules split up the discharge so that the current flows by a large number of parallel paths. Instead of one main discharge, therefore, there are numerous minor discharges of harmless proportions spread over the whole block. The resistance of the block drops as the voltage increases, but is sufficiently high after the discharge to prevent the line voltage maintaining an arc: the arrester is, therefore, self-clearing. Care mu be exercised to ensure that these arresters are correctly Care must assembled, otherwise they are inoperative. For example, if you put fibre in the place where there should be mica you alter the air gap. With regard to maintenance, the carborundum block maintains its effectiveness over a long period, but in time may gradually deteriorate if subjected to continual discharges. The effect is shown by the element crumbling and turning grey, and when this is noticed it should be replaced. (The correct colour of the element is dark brown and it turns grey when it deteriorates.) This change occurs only after many hundreds of discharges, representing perhaps five to ten years' service, but it may be accelerated if the service is particularly severe. The diverters should be inspected occasionally to verify that they are still in a healthy condition.

Trams Nos. 16-23 are fitted with Metropolitan Vickers M.P. Carborundum arresters, which operate in the same manner as detailed above.

Trams Nos. 31-35 and Nos. 37-40 are fitted with General Electric Type M Form D3 arresters which are the gap, 70 ohm resistor and blowout coil type. During October, 1953, all of these were tested and the air gap set to 1/40"-.025". The lead on the line side of the arrester was found broken on Tram No. 34.

Geelong Branch policy is to inspect and test lightning arresters annually."

Bendigo reported that a superficial inspection is made of lightning arresters every three months when the trolley bases are greased. After an electrical storm, a thorough check is made of the circuit by means of a bell set on the "G.E. Air Gap" and "Westinghouse Carborundum" arresters, which are installed on trams in that Branch.

Bendigo queried whether these arresters operate satisfactorily, and Geelong also expressed doubt, in view of the fact that the earthing lead takes a series of rightangle turns. The Departmental Tramways Superintendent stated that this type of equipment is still accepted as being suitable for tram cars.

After some discussion it was decided that lightning arresters on all trams should be inspected and tested annually, and that trams in service should be similarly checked after each severe lightning storm. An indication of the severity of storms could be obtained from the number of failures with distribution substations and city signal lights.

Geelong raised the question of lightning arresters on signal lights. It was ascertained that lightning arresters are fitted to signal lights in Ballarat, but no necessity for this has occurred in Bendigo. Ballarat agreed to supply to the other Branches details of the arresters fitted to signal lights in that city. The suggestion was made that certain areas are more subject to lightning than others, and Geelong decided to make a survey of their signals as they were of the opinion that trouble with signals had only been occurring in one location. As Bendigo have not suffered trouble with failing signal lights, it was agreed that no action need be taken by them to fit arresters.

ACTION:

Lightning arresters on trams to be inspected and tested annually, and trams in service to be similarly checked after every severe lightning storm.

Ballarat to supply Geelong and Bendigo with details of arresters fitted to signal lights in that Branch.

Geelong to survey signals and fit arresters where it is considered desirable.

ITEM 8. ELECTRICAL SYSTEM.

(b) Lamps - Interior of trams.

REMARKS:

Works Division raised this matter in order to verify certain information given at the 1953 conference, before taking action on Bendigo's request that, with the approval of the other Branches, 60W. 110V. E.S. pearl lamps for maximum traction and single truck cars, and 40W. 110V. B.C. pearl for Birney cars, be held in stock. At the last conference Ballarat and Bendigo indicated that they had standardised on 110V. 60W. five in series for the maximum traction cars. However, subsequent inspection of Ballarat and Bendigo wiring diagrams dated 1949 and 1950 respectively, revealed lamp sizes as being 100V. 60W. six in series, which is the same as the maximum traction cars in Geelong. In view of this conflicting information, Works Division wished to know (a) whether Bendigo and Ballarat had changed to 110V. since completion of the drawings, (b) had there been any rewiring of trams in these centres to give five instead of six in series, or (c) did the trams received from the Melbourne & Metropolitan Tramways Board differ one from another? If all maximum traction cars were the same, it was considered that similar globes could be used in each centre. Bendigo stated that this item had been brought forward originally because Stores were supplying clear lamps, and pearl were preferred. Since the last conference, pending a reply to their request that 60W. 110V. E.S. lamps be held in store, they had obtained supplies from Noyes Bros. Approximately 500 40W. 110V. B.C. clear lamps available from the decorated tram recently dismantled would be suitable for Birney cars.

Geelong submitted the following information regarding lamps used by them:-

Tramcars Nos. 1-10 have four circuits of five 110V. 60W. B.C. lamps in series (10 lamps in destinations); Tramcars Nos. 16-23 have five circuits of five 110V. 60W. B.C. lamps in series (12 lamps in destinations); Tramcars Nos. 31-40 (maximum traction) have three circuits of six 110V. 60W. E.S. lamps in series (4 lamps in destinations).

Maximum traction trancars when received had only two circuits of six 110V. 60W. E.S. lamps. One additional circuit was added in Geelong, but the number per circuit was not reduced from six lamps to five.

To remove one lamp from each existing circuit and add one additional circuit of five 110V. 60W. E.S. lamps would cost approximately £35 per car. If it were decided to standardise on 110V. 60W. E.S. inside frosted lamps, alterations would need to be made to lamp holders of 18 trams at approximately £10 per tram to convert them from B.C. to E.S. The use of the 100V. lamps mentioned in the 1953 minutes has been discontinued as they were obtained only because of the difficulty in procuring 110V. lamps, Geelong considered that it was desirable to use clear lamps in all tramcar headlights.

Ballarat reported that the following lamps were now being used by them:--

Maximum traction cars	-	100V. 60W. E.S. Gas filled, frosted. Two cars have two circuits of six lamps,
Single truck cars Head lamps		three " " three " " " " " 100V. 60W, two circuits, 11 lamps total. Clear traction lamps.

The Departmental Tramways Superintendent considered that, having to contend with a voltage drop between the power station and the end of long runs, it made little difference whether you used 100V. or 110V. lamps. Ballarat stated that they were quite satisfied with 100V. and, as Works Division reported that it appeared much easier to get supplies of 100V. than 110V. lamps, all Branches agreed to standardise on the use of 100V. These are available in both E.S. and B.C., and it would not be necessary for Geelong to make any alteration to existing fittings in their Branch.

Ballarat stated that they would like to see some improvement in lamps used in the head lights, as traction lamps cannot be easily focussed. With street lighting erected on the footpaths in that city, traffic personnel often complained of poor visibility in tree-lined streets. Experiments with sealed-beam lights had not been satisfactory.

Bendigo advised that by cleaning the reflectors with methylated spirits and Goddard's plate powder they had greatly improved reflection of their headlamps.

Works Division agreed to investigate tramcar headlights in an endeavour to improve on the type used at present.

ACTION:

1

It was agreed that all Branches would use 100V. 60W.

lamps in trams (except Birneys) as these are more readily available both in E.S. and B.C. types.

Works Division to obtain information regarding suitable types of lamps for tram headlights.

ITEM 8. ELECTRICAL SYSTEM.

(c) Contacts for governor switches.

REMARKS:

Bendigo referred to difficulties experienced with the use of phosphor bronze contacts for governor switches cast to patterns 27Z and 28Z (Order No. 31945, 12/1/50), these contacts having arced and fused together. Copper contacts had been supplied on a later requisition (Order No. B38656, 15/6/53). A visit had been made to Bendigo in June, 1953, by a representative of The Morgan Crucible Co., who interested himself in the problems associated with our use of phosphor bronze contacts, and supplied two sample metal carbon moving contacts for trial. These were installed in cars Nos. 10 and 26, a new brass contact arm having been manufactured to accomodate them. The price of these contacts was quoted at 6/7d. each for a quantity of 24 MSC 10 Grade Link DM5A 13.0 x 23.0 x 12.7 m.m. Using copper bar of 2'6" lengths and allowing two manhours for manufacture, the estimated price of copper contacts would be 7/4d. each made at Bendigo. Bendigo considered that the use of a moving metal carbon contact with a fixed copper contact gave operating and maintenance improvement.

Neither Ballarat nor Geelong have used the metal carbon contacts, but they were each satisfied with the copper contacts manufactured by them.

As little or no trouble has been experienced in Ballarat and Geelong, it was decided to standardise on the use of copper contacts.

ACTION:

Copper contacts for governor switches to be used in each Branch.

ITEM 9. TRUCK MAINTENANCE.

(a) Degreasing of components.

REMARKS:

Ballarat felt that consideration should be given to degreasing of trucks of trams, particularly during overhauls, and suggested the use of a steam cleaner such as the "Anderson-Kerrick". Present attempts at cleaning chassis were totally inadequate and the accumulation of fine sand used in top-dressing of tracks adhering to the grease and lubricating oil around the chassis detracted from the general appearance of the finelypainted tram bodies which were washed and kept in good condition. On wet days when the track gang is available, Ballarat at present use them on chassis cleaning.

Geelong agreed that there was usually a marked contrast between the cleanliness of a tram car truck and its body. In that Branch, chassis are sprayed with a mixture of one part magnusol to six parts kerosine, and then hosed down. If the oily deposit is heavily caked the mixture is worked in with a stiff brush and allowed to soak for 10-15 minutes before hosing. Geelong, however, queried whether the "Anderson-Kerrick" unit would be suitable for use in depots, because the operators would be bathed in steam in such a confined space. They also suggested that the steam would have a detrimental effect on the appearance

of the paint work.

The present practice in Bendigo is to hand scrape all grease and dirt, brush with kerosine, then wipe with waste or blow surplus off with compressed air. Small components are soaked in a mixture of 12 parts kerosine to one part magnusol degreaser. When removed they are washed in water. Bendigo supported the suggestion of acquiring a portable degreaser.

The /orks Manager stated that "Anderson-Kerrick" units are very effective on dirty work, and that once the chassis was thoroughly cleaned a regular spraying with magnusol and water may suffice. It was not considered that the possible damage to paint work would be a very great problem, as the cars would be hosed down immediately after being degreased.

It was decided that Works Division should endeavour to hire a portable unit which would be lent to each Branch for a period.

ACTION:

Works Division to endeavour to obtain an "Anderson-Kerrick" portable degreaser on hire for the Branches to use for a set period.

ITEM 9. TRUCK MAINTENANCE.

(b) Brake blocks.

REMARKS:

Bendigo quoted the following figures which had been extracted by them from the 1952-53 annual reports to show the average mileages being obtained for brake blocks:-

33" standard blocks	Ballarat Bendigo Geelong	1,772 857 1,524	miles "
20" pony blocks	Ballarat	574	11
	Bendigo	1,751	11
	Geelong	3,108	11

It had been evident that there was room for improvement in the mileage being obtained from brake blocks in Bendigo, and since last November a closer supervision of discarded blocks had been given by the Depot Foreman, resulting in a considerable decrease in monthly usage of all sizes. During the six months ended 31st March, an average decrease of 29% had been made on 33" blocks, and 50% on 20" blocks, compared with the previous six months, and it was anticipated that the next annual report would show a marked improvement. Approximately 18 months ago, due to reports of ineffective braking, air pressures were increased from 60-75 lbs. per sq. inch to 65-80 lbs. per sq. inch. This alteration was made mainly because of the quality of the blocks then being received. Bendigo were of the opinion that the last two batches of blocks supplied by Hardings, Ballarat, had been superior to those previously received, and they queried whether Ballarat had been carrying out any tests to determine that the blocks were supplied in accordance with the current specification No. 53-54/31.

Ballarat replied that, before acceptance, the Workshop Superintendent carries out a Brinell hardness test on representative samples of all batches of brake blocks despatched to Bendigo, the standard being 200-250 for 33" blocks and 235-385 for pony blocks. Brake shoe castings used in Geelong are obtained from Rankin's Central Foundry, Geelong, and are quite satisfactory. In most cases they are only visually inspected, no Brinell hardness tests being carried out, and cases of rejection are rare. Air pressures of braking systems in Geelong were quoted as:-

Tramcars	Nos.	1-10	60-75	lbs.	per	sq.	inch
"	11	16-23	65-80	11	- 11	11	11
"	11	31-40	60-70	11	11	-11	11

In regard to the replacement of brake blocks, it was the policy in Geelong to replace the block if the thickness at the recess below the top pad was 3/4" or under when inspected on the weekly service.

The same figure of 3/4" applied to Bendigo, but in Ballarat it was the policy to wear the block to 1" and then allow a further seven days' service before removal. The figure accepted by the Melbourne & Metropolitan Tramways Board is 1".

Works Division queried whether Bendigo had been experiencing trouble with blow holes. Brake blocks are the only tramway castings not being inspected by Morks Division before delivery, all other castings being produced in the metropolitan area. The specification provides that faulty brake shoes may be rejected, and states:-

"All castings shall be of the best close grained homogeneous grey metal and shall be clean, sharp, free from surface scale, cold chuts, blow holes, honeycomb, cinder or any other imperfections, and shall be sound in every respect.....

All castings in which flaws or other defects become revealed may be rejected by the Engineer, in which case the Contractor shall replace such rejected castings free of all charges at the place of rejection."

Bendigo stated that the last two batches received had been of better quality, and it was agreed that no further action need be taken unless faulty blocks are again supplied.

ACTION:

Bendigo to contact Ballarat on each occasion when the condition of brake blocks received is not satisfactory.

ITEM 9. TRUCK MAINTENANCE.

(c) Side bearing wear plate clearance.

REMARKS:

Bendigo stated that when the bogies of maximum traction tramcar No. 26 were completely overhauled during December, 1953, it had been necessary to recondition the four mild steel angle wear plates and replace the gunmetal side bearing wear plates. It then became necessary to decide on the clearance between these angle plates and the side bearing wear plates, redrilling of the angle plates for the three holding bolts being the only form of adjustment. Finally this car was placed in service with 1/8"overall clearance, and no difficulty was experienced in taking curves or loops. A check on the same clearance on the other five maximum traction cars showed overall dimensions ranging from 3/16" to 1-1/2". It was realised that other factors such as clearances in body spring post and bushings and side frame also have a considerable influence on the riding of the car, and on the wear. Bendigo queried the clearance adopted by the other Branches. It was reported that Ballarat allow an overall minimum of 3/8", that is, 3/16" on each side, and Geelong allow 1/2" overall minimum, that is, 1/4" on each side. Geelong added that some years ago a maximum traction car which had been operating successfully with a clearance of 1-1/2" on each side had had its trucks overhauled to what was considered to be satisfactory engineering tolerances, the clearance being reduced to 1/16": a number of derailments followed immediately. In view of this and somewhat similar experiences Geelong considered that there were so many variabilities in connection with tramcars and tram tracks that the tolerances selected for tramcar work must be wider than for other types of engineering work.

ACTION: Nil.

ITEM 9. TRUCK MAINTENANCE.

(d) Tyre gauges.

REMARKS:

Geelong originally raised this item at the 1952 conference in an endeavour to obtain information in regard to what should be the minimum dimensions of tyre flanges for safe working conditions. They considered that, because of lack of a standard, there had been a tendency to permit operation of tramcars with tyres which should have been re-turned, ground, or rejected, for the sake of obtaining greater mileage.

Works Division submitted drawings of three gauges one for flange height, one for flange width and one for coning the design of which was generally based upon two in use in Geelong. As it was considered that a groove could be turned on tyres to denote minimum diameter (a procedure adopted by the Melbourne and Metropolitan Tramways Board who allow a minimum of 1" tyre thickness,) no diameter gauge had been drawn.

No gauges are used by the Melbourne and Metropolitan Tramways Board for flange wear, and reference was made to a visit by conference members to the Malvern Depot during which it was observed that wheel grinding was being carried out in situ, the correct size and profile of flange wear being obtained only by "sight and feel".

At the 1952 conference, Bendigo stated that their general practice was to allow the flange to wear to $3/8" \ge 3/8"$. However, the opinion also was expressed that the condition of tracks should be a deciding influence in giving consideration to minimum thickness for flanges.

A book on the Belfast Tramway system, which had been circulated among the Branches, stated that the flange was machined "when it became more than 3/16" above or below the standard section of flange of the original tyre." Working on this theory, our minimum flanges would be 3/8" high by 9/16" wide, but as it appeared that Branches do operate successfully with less width than 9/16" a compromise of 7/16" x 7/16" was suggested. The profile of the flange - that is, whether pointed or reasonably level - would also, of course, be a deciding factor.

Another interesting paragraph in the Belfast book, which was rather comprehensive on tyre wear, stated that "in re-turning worn tyres it is not the general practice to re-form the profile to its original contour because, if this were done, it would necessitate cutting away too much valuable material which, in turn, would shorten the life of the tyre. It should be borne in mind, however, that rate of wear increases as the width of the flange decreases." Geelong agreed in principle with a minimum tyre thickness of 1", although, with certain tramcars, it could not be applied at present in that Branch because if tyres were worn down to 1" thickness the bottom of the axle boxes would be rubbing on high stone sets in the tracks, and in some locations the bottom of the motor cases would rub on the cambered surface of the track. In regard to tyre flanges, Geelong suggested that the minimum width and height should be approximately 3/8".

It was decided that it would be preferable for the Branches to give consideration to the drawings submitted, and comment after this has been done.

ACTION:

Branches to study the drawings supplied and advise Vorks Division if they are in agreement with them.

- ITEM 10. CASTINGS.
- (a) The economics of "patching" old castings compared with the fitting of new ones.

REMARKS:

Works Division raised this item because it was considered possible that a large amount of patching of rolling stock and overhead components may be taking place when it would be cheaper to fit new castings. It was suggested that the Branches make cost comparisons in any cases where repairs to castings are likely to involve a large number of manhours.

Geelong stated that the repair of old castings was mainly carried out in their Branch in the following two cases:-

- (a) Where a casting is large, therefore costly, and involves a large amount of machining: - repair in this instance is economic.
- (b) Where, because of existing Stores stock policy, Stores are unable to deliver new castings when required:- repairs, though uneconomic, must be carried out to keep the tramcars in service.

Each case required individual consideration, as with the following example:-

- A new side bearing machined ready for use costs $\pounds 2/5/8$ A secondhand bearing built up 1/4" and machined costs $\pounds 2/-/6$
- A new side bearing top plate machined ready for use costs $\pounds 2/8/7$.
- A secondhand side bearing built up 1/4" and machined costs $\pounds 2/11/-$.

Geelong considered that in most cases it would be economic to fit new castings. There is no alternative to repair of special work, however, as new castings are not available.

Ballarat considered that, in many cases, the decision to patch was based on the time factor.

Bendigo reported that it had been the practice in a large number of cases to recondition and build up the half-ball hangers and brake shoe holders of brake gear, during overhauls. With the supply of cups and solid pieces, as detailed at the 1952 conference, however, this reconditioning could be avoided. To date, costs had not been recorded to enable a comparison to be made with new castings, but subsequent to the Works Manager's visits to Bendigo last year it had been decided that this should be done as opportunity occurred.

Works Division suggested that there may be parts which it may be more satisfactory and economic to manufacture in Melbourne.

ACTION:

The economics of repairing old castings compared with the fitting of new ones to be considered on each occasion.

ITEM 10. CASTINGS.

(b) Metal reclamation.

REMARKS:

Works Division reported that further inquiries had been made from foundries regarding the re-use of scrap metal for specific purposes, along the line that orders would read "Castings in metal supplied by the Commission," thus relieving the foundry of responsibility for specification. Some foundries were prepared to cast from scrap under these conditions, but before proceeding further with this matter it would be necessary to decide whether the quantities of non-ferrous scrap of the various specifications would be sufficient to justify such a change in procedure. Considerably more work would be involved in keeping the metals segregated.

All Branches agreed that the biggest percentage of scrap metal would be trolley wheels, but it was unanimously agreed that to permit the use of scrap metal without either analysis or specification would be a retrograde step. There would be no guaragtee that the foundry would use the metal supplied by the Commission. Moreover, since control of the metal used in castings has only been applied of very recent years, most of the scrap available at this stage would be of unknown analysis.

ACTION:

Scrap metal not to be used in the manufacture of tramway castings.

ITEM 11. MAINTENANCE COSTS.

REMARKS:

Further to Item 13 of the 1953 conference, Bendigo desired to make a comparison of workshop personnel engaged on tramway maintenance in the three Branches. It was agreed that to do this it would be necessary to know the respective manhours involved. Bendigo's figures for the 12 months ended 30th June, 1953, were:-

Permanent way	Allocation	31830	341	manhours
Overhead equipment	11	31831	176	"
Rolling stock	"	31832	11,802	"

Ballarat submitted the following figures:-

	Year ended 30th June, 1953	First quarter, year ending 30th June, 1954
Workshops Tracks Depot	20,587 hours = 10.9 men 22,040 " = 12 " 12,480 " = 6.5 "	2,559 hours = 5.25 men 5,740 " = 12 " 5,040 " = 10.5 "
	Total 29.4 men	Total 27.75 men

Their basis of calculation of manhours per man per year is:-Total manhours - Annual leave and public holidays = 2080 - 160.

The figures for the current year show a slight reduction from 29.4 men to 27.75 men. In addition, certain changes in organisation have taken place involving the transfer of some workshop personnel to the depot staff and this accounts for the wide variation in the current figures for these two allocations.

Ballarat further stated that to keep within the approved budget figure for the current year it had been necessary to curtail workshop manhours on reconditioning of W.H. 225 motors and brake gear sets. They desired it to be recorded that:-

"If this position of curtailed maintenance continues indefinitely, it is inevitable that breakdowns of trams in service must increase. Furthermore, if finance is not made available for routine preventative maintenance during 1954-55, standards of reliability must be lowered, the present 20 minutes service totally abandoned, and such type of service which it may be possible to operate must naturally result in a loss of prestige to the Commission."

Geelong had not segregated workshop manhours from total manhours, but they submitted the following figures for the current financial year:-

Allocation	Month	Average Labour Standard Rate	Monthly Labour Expenditure	Monthly Manhours
31830	July, 1953 Aug., 1953 Sept.,1953 Oct., 1953 Nov., 1953 Dec., 1953	s.d. 7/1 7/5 7/4 7/5 7/4 7/4	€ 667 723 485 633 559 604	1,866 1,954 1,310 1,689 1,518 1,628
31832	July, 1953 Aug., 1953 Sept.,1953 Oct., 1953 Nov., 1953 Dec., 1953	7/1 7/5 7/4 7/5 7/4 7/4	1,050 883 1,037 1,092 1,000 916	3,219 2,385 2,799 2,911 2,715 2,469

Geelong also considered that it would be necessary to curtail manhours and lower the standard of maintenance to keep within the current year's budget.

It was agreed that there were several factors which could lessen the value of a comparison of workshop hours spent on tramway maintenance in each centre. In the first place, each Branch would need to work to the same standard of maintenance. For instance, the condition of tracks between, say, Bendigo and Geelong is vastly different. Also, as each Branch differs in its organisational set-up the actual number of hours would necessarily vary. For example, in Ballarat the carriage painter is on the depot staff and in Geelong he is on the workshop staff. The only way of overcoming this difficulty would be for the timekeeper to allocate the hours spent on each job. Ballarat also considered that the number of breakdowns in service had an important bearing on the subject.

The Departmental Tramways Superintendent suggested that the only true basis of comparison would be one which would give the expenditure "per car mile". None of the Branches considered that present labour strengths could be reduced if satisfactory service were to be maintained.

ACTION: Nil.

ITEM 12. TROLLEY WHEELS.

(a) Standard profile.

REMARKS:

Geelong reported that on 10th January, 1954, all Geelong trancars were fitted with the standard 3-spoke "U" profile wheels. At the same time all the contactors for signal lights were re-set to conform to the altered width of wheel. Only minor and easily-rectified troubles were experienced with the change over from the "V" profile which had been in use for the previous 40 years.

All the standard trolley wheels were now operating satisfactorily, but it was too early to submit accurate mileage figures although it was anticipated that an improvement of from 33-50% could result. It had been noticed, however, that whereas it had not been important to reverse the "V" profile wheel on a weekly basis, this was essential to obtain the maximum life with a "U" profile wheel.

ACTION:

Geelong to continue to watch the performance of the "U" profile wheels and submit a further report at a later date.

ITEM 12. TROLLEY WHEELS.

(b) Effect of balancing.

REMARKS:

Works Division requested a further discussion on trolley wheels, mainly in respect to life and results of experiments with the two balanced wheels supplied to each Branch.

Geelong reported that their experiment was inconclusive, as they had been forced to remove the two balanced wheels from operation when the change was made to the "U" profile wheels. An estimate of the life remaining in the wheels at the time of removal, however, suggested that their performance would only be comparable with unbalanced wheels. They asked for further balanced wheels for continued tests.

Ballarat reported that the wheel fitted to car No. 14 had completed 15,775 miles and that fitted to car No. 28, 20,957 miles. They had not estimated the remaining life in the wheels, but they had possibly served only half their life. Ballarat considered that balancing of wheels probably could improve their life, but it was too early to form a reliable opinion at this stage.

Bendigo stated that trolley wheel life generally had shown a marked improvement in that Branch. Annual report figures for 1951-52 were 51 wheels with average life of 5,073 miles, and for 1952-53, 28 wheels with average life of 12,942. This improvement was mainly as a result of revised procedures. With regard to the balanced wheels, one had been installed in car No. 17, and on 13th April, 1954, had done 11,888 miles with an estimated further life of 4,000 miles. The standard wheel installed in the other end of the same car was scrapped after 10,432 miles. The other balanced wheel was installed in car No. 31 and after 8,790 miles did not appear to differ in wear from the standard wheel on the same tram. In view of this, Bendigo also considered that further time would be required before reaching a decisive conclusion.

It appeared that Bendigo and Geelong were still far behind Ballarat's figures for trolley wheel life. Geelong queried the method used by the other Branches for determining trolley wheel life. Bendigo and Geelong apparently divide the number of wheels used into the mileage of trams per year, making allowance for single and double truck cars. Ballarat, however, keep an individual record of each trolley wheel.

The Works Manager estimated that the additional cost involved in balancing may be 5/- to 7/6d. per wheel. The price of a trolley wheel in Geelong, complete with bushes, was ascertained to be $\pounds 2/7/3$. It was decided that the economics of having machining and balancing done at Richmond should be investigated. Branches agreed that if this were done there would still be ample work to keep their machines occupied.

Ballarat queried the additional mileage per trolley wheel which would be necessary to justify the added expense of balancing. In reply to a query from Works Division, Geelong stated that by the appearance of the balancing spots the wheels seemed to be well out of balance, and it was agreed that if this were so it would greatly accelerate wear on both wheel and wire.

It was decided that a further set of balanced wheels to the "U" profile should be forwarded to Geelong for trial, and action to have all wheels balanced would be deferred pending further reports from the Branches in three or four months' time.

ACTION:

Set of balanced trolley wheels to be forwarded to Geelong for trial.

Works Division to investigate the economics of having wheels machined and balanced at Richmond.

Action to have wheels balanced to be deferred pending further reports from the Branches in three or four months' time.

ITEM 13. OILS AND GREASES.

REMARKS:

Each Branch listed the oils and greases used by them as under:-

Components	Geelong	Ballarat	Bendigo
Armature bearings, motor suspension bearings, axle box bearings.	Caltex Aries 744 Oil.	Kalif EE.	Caltex Aries 744 Oil.
Compressors	-	Vacuum DTE Heavy Medium.	Vacuum DTE Heavy Medium
Trolley wheels, brake valves.	Shell Unedo Grease No. 3	Shell Unedo Grease No. 3	Caltex Star Grease No. 3
Controller seg- ments and finger tips.	Shell Diloma Compound D	Petroleum Jelly.	Caltex Petrolatum.
Spur wheels and pinions.	Shell Gear Shield MMTB.	Caltex Crater Com- pound.	Caltex Crater Com- pound No. 5

Components	Geelong	Ballarat	Bendigo
Side bearings, compression blocks and a general grease on trucks.	Caltex Star Grease No. 3	Oil lubri- cator on side bearings	Caltex Star Grease No. 3

Ballarat gave their annual usage figures as follows:-

Kalif EE260 galls.D.T.E. Heavy Medium12 galls.Shell Unedo Grease No. 312 lbs.Petroleum Jelly6 lbs.

The use of these oils and greases had been decided after "trial and error" in each particular Branch. No detailed specification had ever been prepared. Geelong suggested that automotive and tractor lubricants which are purchased by annual contract may be suitable for tramcar use, but the Works Manager stated that this would not be satisfactory.

A general discussion took place on the virtue of the greases used in each Branch. Ballarat emphasised that their experience with lubricants on armature bearings had caused them to determine on the use of the "Kalif EE" which was highly satisfactory.

It was agreed to standardise on the use of the following in all Branches:-

Component	Lubricant	
Armature, suspension bearings and axle bearings	Kalif EE	
Compressors	Vacuum DTE. Heavy Medium	
Trolley wheels, brake valves	Shell Unedo Grease No. 3	
Controller contacts	Shell Diloma Compound	

Spur wheels and Pinions:- Since Ballarat and Bendigo use Crater Compound and Geelong Shell Gear Shield M-MTB, it was agreed that Geelong should try Crater Compound on two or three trams and form an opinion.

For lubrication of radius and compression blocks, Bendigo use Caltex Star No. 3 and Ballarat use an oil lubricator with grooves in the side bearing wear plates to allow the oil to go in. It was decided, however, that oil lubricators would not be fitted to trams in Bendigo and Geelong at this stage, but that Branches would try to determine the difference, if any, in wear of these parts from the two systems of lubrication.

It was agreed that it would be preferable to have uniformity on all oils and greases so that they could be purchased under annual contract.

ACTION:

All Branches to use the standard oils and greases detailed in the minutes.

Geelong to try Crater Compound on spur wheels and

27.

pinions of several trams.

Ballarat and Bendigo to determine rate of wear of radius and compression blocks in order to compare the lubricating systems used in each Branch.

ITEM 14. ALTERATION TO MAXIMUM TRACTION TRAMS.

REMARKS:

Ballarat sought permission to alter their remaining three cars of the three-door type in the same way that Car No. 38 was altered at the time of its conversion for dual operation. On this car, the entrance to the centre section had been altered by removing some transverse seats and then, subsequently, the seats being changed from the transverse position to a longitudinal position. Ballarat considered that the alteration provided greater comfort and better accommodation for pushers, etc., and that the number of seats was still sufficient for requirements. The actual cost of this work was not known because of the amount of experimentation concerned with that car.

Bendigo agreed with Ballarat that the conversion to longitudinal seating, which they estimated would provide for 14 in lieu of 16, is an improvement, although Bendigo only have two three-entrance type trams of which one already has been altered. The Branch Tramway Superintendent, however, did not favour the alteration as he considered that the blind used in the centre section instead of glass detracted from its comfort. This blind could be replaced with glass to overcome this objection.

Geelong considered that it would cost £40 per car to convert from transverse to longitudinal seating, and that seating accommodation would be provided for 12. They had received a request from traffic personnel that this alteration be made, as the existing transverse seating in the car converted for dual operation made the conductor's work difficult. The Engineer and Manager had given his approval to their altering this car to longitudinal seating. At this stage, the expenditure for the remaining four cars hardly seemed warranted in Geelong.

It was agreed that Ballarat and Bendigo should make the alteration to longitudinal seating in the remaining cars, but that Geelong would make no further alteration at present.

ACTION:

Ballarat and Bendigo to convert remaining three-door type trams to longitudinal seating.

ITEM 15. SPARE PARTS FOR MAXIMUM TRACTION TRAMS.

REMARKS:

Geelong suggested that one or more additional maximum traction tramcars should be purchased from the Melbourne and Metropolitan Tramways Board and wrecked for spare parts, as they were holding insufficient replacement parts for such trams. This would overcome the protlem of having trams out of service while breakdowns are repaired or preventative maintenance carried out. Geelong reported that they held only one spare motor, one spare set of wheels, and no spare radial castings nor spare controllers nor compressors, etc. Furthermore, it had been necessary during the past year to have patterns made and expensive castings purchased and machined when similar parts could have been obtained cheaply from a scrapped tram. In addition to truck parts, quite a number of parts from the bodies could be used on unrecoverable accidents. They could also be used on recoverable accident jobs by valuing them and debiting the particular chargeable job number. There are ten maximum traction cars in Geelong, seven in Ballarat and six in Bendigo, and although there is a dearth of spare parts for these trams there has not been, as yet, an actual interruption to service because of breakdowns. However, it has been necessary at times for the depots to issue a single truck car in place of a maximum traction, and such a condition is viewed with disfavour by the traffic section.

Ballarat considered that a spare maximum traction car for scrapping would be useful, but they suggested that it could be used as a replacement for car No. 37 which was badly damaged in an accident, and the latter car could be wrecked for spare parts.

Bendigo supported Geelong's suggestion.

Works Division, however, reported that the only car available for purchase from the Melbourne and Metropolitan Tramways Board was a passenger car converted some years ago for the carriage of dogs to the Melbourne Coursing Grounds. Body fitments would not be suitable for use, although trucks and electrical equipment could be used as spares.

In view of the uncertainty of the future of the tramway system in Geelong, it was considered inadvisable to go to the expense of purchasing this car.

It was suggested, however, that Branches could borrow from one another in the event of an emergency. Ballarat apparently hold some spare motors and if they were held in that Branch they would be in a central position for either Geelong or Bendigo to call on them if necessary. Bendigo suggested that Ballarat should fit armatures to these spare motors to enable speedy transfer if required, but it was felt that this would not be so convenient if the motors were required in Ballarat.

ACTION: Nil.

ITEM 16. GENERAL DISCUSSION.

(a) Fatigue failure of axles.

REMARKS:

Ballarat reported that during March, 1954, a 1926 pony axle which had completed 3/4 million miles in Ballarat fractured under the wheel seat 1-1/4" from the outside face of the wheel base. They referred to a number of axle failures of a similar type which the Melbourne and Metropolitan Tramways Board had experienced in 1944. In every case the mileage had been in the vicinity of 770,000, and the Board, after withdrawing all axles for inspection, discovered that 29 were fractured and only 3 intact. Ballarat understood that the Board now test all axles in situ with special imported equipment, and they suggested that, in the event of further failures of axles in that Branch, Works Division be requested to inquire into the possibility of obtaining the services of the Melbourne and Metropolitan Tramways Board to test all axles in their fleet. It was pointed out by Works Division that the large number of fractured axles discovered by the Melbourne and Metropolitan Tramways Board were found to have been manufactured from the same batch of material, and evidently had always been faulty. Details of this were submitted to the Branches in September, 1952.

Bendigo had had no axle failures during the last three years, and no records had been kept previous to this. Geelong averaged about one failure per year, and they put this down to the fact that they were still using some of the small 4-1/2" axles obtained from Ballarat many years ago. Works Division stated that they were giving consideration to the acquisition of a crack detector for testing axles. A cheap model may be available which would allow us to make our own check without much capital outlay. Also, there would be a lot of application for such a piece of equipment in Branches associated with a power station. The Victorian Railways are using an instrument of this type.

It was suggested that Ballarat should carry a spare axle ready for use. A number of 4" axles recently listed for disposal by Ballarat could be turned down to make spare pony axles as none is held at present. ACTION:

Works Division to ascertain the life of axles on trams in Melbourne.

Ballarat to arrange for spare axles to be held to cope with further failures.

Works Division to continue with investigations into possible acquisition of a crack detector.

(b) Accidents.

REMARKS:

Bendigo reported that a representative of the Claims Branch had visited them concerning a claim of £50 on the Commission made by a lady passenger because of injury to her collar bone caused by a falling weather blind roller. Apparently the roller had fallen out as the tram passed through a loop. The passenger did not contact the traffic staff at the time of the accident, and the first intimation the Branch received was a communication from her solicitor. When this was received, the traffic staff stated that they did remember finding a roller blind on the floor of the tram at the end of the trip. The Claims Branch had criticized Bendigo on the condition of their blinds.

The Branches considered that the Commission's Claims Branch should be asked to follow up carefully any claims which the Commission make for recoverable accidents, as they held the impression that, while all claims against the Commission are carefully investigated, those which the Commission make against others are often allowed to lapse.

ACTION:

Departmental Tramways Superintendent to take up with the Claims Officer any matter which the Branches considered has been allowed to lapse.

(c) Payment of track cleaners.

REMARKS:

The Departmental Tramways Superintendent raised a question which had been submitted to him by Geelong. The Union had requested that track cleaners receive the same benefits as traffic personnel in relation to days off in lieu of public holidays. Apparently traffic personnel on duty on Anzac Day were to receive one day's accrued leave for their work on that day, and the track cleaners considered they should receive similar benefits. The Departmental Tramways Superintendent doubted whether track cleaners could rightly be regarded as shift workers, and sought clarification of this point.

Track cleaners in Bendigo work a five-day week from Monday to Friday. In Geelong, one track cleaner works on Saturday morning but not on Sunday. He is paid time and a half for his Saturday morning work, although he only works a 40 hour week. This rostering of duty was introduced to give the cleaners a higher wage as otherwise it was impossible to compete with outside firms for suitable labour. In Ballarat, track cleaners work a five-day week from Monday to Friday, and are only worked on Sunday if there is special work or if the previous Friday and the following Monday are public holidays.

From this information, it was obvious that track cleaners could not be regarded as shift workers, and therefore there was no basis for the Union's claim.

ACTION: Nil.

(d) Shedman's assistants being paid shedman's rates when working during silent hours.

REMARKS:

This matter will be the subject of a special letter to the respective Branch Managers dated 25th June, 1954.

(e) A.T. & M.O.E.A. proposed log of wages and conditions.

REMARKS:

The Departmental Tramways Superintendent wished to know whether it would be desirable to have a conference with Branch Superintendents for a discussion on the log of wages and conditions put forward by this Association.

All Branches agreed that a conference was advisable, and it was arranged that timekeepers from each Branch would be present also.

ACTION:

Branch Tramway Superintendents and Timekeepers to confer with Departmental Tramways Superintendent as soon as possible regarding A.T. & M.O.E.A. log of wages and conditions.

(f) Amenities.

REMARKS:

The Departmental Tramways Superintendent raised the question of mess room facilities for tramway employees. Geelong have a 4-drawer pie warmer of a type which does not meet present requirements, modification to provide a large oven compartment being necessary. Employees in that Branch have asked for facilities for heating soup. Ballarat also have raised a requisition for a modern table oven for their mess room.

At the Ballarat conference it was suggested that this matter be referred to the Amenities Section for investigation, but the Departmental Tramways Superintendent reported at the Melbourne conference that the Purchasing Officer had been requested to proceed with the purchase, and it was now agreed that Geelong should raise a similar requisition and list their pie warmer for disposal.

ACTION:

Geelong to raise a requisition for an oven similar to that being purchased for Ballarat, and to list their pie warmer for disposal.

----000-----

CONCLUSION OF CONFERENCE.

SUMMARY OF ACTION

WORKS DIVISION:

Item 1 (a)	•	Works Division to endeavour to obtain samples of "Enka" sponges.
Item 1 (d)	•••	Works Division, for the information of Branches, to ascertain the practice followed in Melbourne in relation to assistants working with track welders.
Item 2 (a)	:	Works Division to make inquiries from Melbourne and Metropolitan Tramways Board regarding the point at which they consider rail has ceased to be safe.
Item 2 (d)	•	Works Division to expedite delivery of rail from Melbourne and Metropolitan Tramways Board.
Item 2 (e)	•	Works Division to make inquiries from Underground Mains Engineer regarding tools used by him for installation of piping under tracks.
Item 3 (a)	•	Works Division to make further inquiries from B.A.L.M. regarding the necessity to remove clear "Dulux" before subsequent repainting, and also regarding the type of solvent required to remove it if considered necessary.
Item 5	:	Works Division to make inquiries from the Department of Health regarding the possible effect of "Formalin" on passengers suffering from asthma, and also regarding its effectiveness in destroying vermin.
Item 6 (a)	:	No action to be taken at this stage regarding the purchase of large quantities of plastic material for more extensive use in weather blinds.
Item 8 (b)	:	Works Division to obtain information regarding suitable types of lamps for tram headlights.
Item 9 (a)	:	Works Division to endeavour to obtain an "Anderson- Kerrick" portable degreaser on hire for the Branches to use for a set period.
Item 10 (b)	:	Scrap metal not to be used in the manufacture of tramway castings.
Item 12 (b)	:	Set of balanced trolley wheels to be forwarded to Geelong for trial.
		Works Division to investigate the economics of having wheels machined and balanced at Richmond.
		Action to have wheels balanced to be deferred

Action to have wheels balanced to be delerred pending further reports from the Branches in three or four months' time.

Item 16 (a) : Works Division to ascertain the life of axles on trams in Melbourne.

Works Division to continue with investigations into possible acquisition of a crack detector.

BRANCHES:

ALL BRANCHES:

- Item 1 (b) : Further action regarding smoking in rear saloons
 of maximum traction trams converted for dual
 operation to be at the discretion of each Branch.
- Item 1 (c) : Testing of motormen in tram driving and technical knowledge to be carried out by depot foremen in all Branches.
- Item 1 (d) : Each Branch to act as it thinks best in employing an assistant to work with the welder.
- Item 8 (a) : Lightning arresters on trams to be inspected and tested annually, and trams in service to be similarly checked after every severe lightning storm.
- Item 8 (b) : It was agreed that all Branches would use 100V. 60W. lamps in trams (except Birneys) as these are more readily available both in E.S. and B.C. types.
- Item 8 (c) : Copper contacts for governor switches to be used in each Branch.
- Item 9 (d) : Branches to study the drawings of tyre gauges supplied and advise Works Division if they are in agreement with them.
- Item 10 (a) : The economics of repairing old castings compared with the fitting of new ones to be considered on each occasion.
- Item 12 (b) : Action to have trolley wheels balanced to be deferred pending further reports from the Branches in three or four months' time.
- Item 13 : All Branches to use the standard oils and greases detailed in the minutes.
- Item 16 (e) : Branch Tramway Superintendents and Timekeepers to confer with Departmental Tramways Superintendent as soon as possible regarding A.T. & M.O.E.A. log of wages and conditions.

BALLARAT:

- Item 1 (d) : Ballarat to advise Bendigo and Geelong of the number of hours per week during which the track welder in that Branch works with an assistant.
- Item 1 (e) : Ballarat, at their convenience, to prepare a drawing showing the present position of bumper bars and the desired necessary extensions to avoid the possibility of the roof eaves coming into contact before the bumper bars.
- Item 2 (a) : Ballarat to lend the profile indicator to Bendigo and Geelong if desired by the latter Branches at a future date.
- Item 3 (b) : Ballarat to supply other Branches with a sample of their "stripping solution" for trial.
- Item 6 (b) : Sun blinds in Ballarat to be removed as they wear out.

Ballarat to send to Bendigo the rollers of sun blinds removed from their trams.

33.

8

Item 8 (a)

- of arresters fitted to signal lights in that Branch. : Ballarat and Bendigo to determine rate of wear of radius and compression blocks in order to compare Item 13 the lubricating systems used in each Branch. Item 14 : Ballarat to convert remaining three-door type trams to longitudinal seating. Item 16 (a) : Ballarat to arrange for spare axles to be held to cope with further failures. BENDIGO: : Bendigo to work to a standard list of questions for examination of motormen similar to that supplied Item 1 (c) by Ballarat. Item 6(a): Bendigo to continue with the use of multi-coloured canvas in weather blinds. Item 9(b): Bendigo to contact Ballarat on each occasion when the condition of brake blocks received is not satisfactory. : Bendigo and Ballarat to determine rate of wear of radius and compression blocks in order to compare Item 13 the lubricating systems used in each Branch. : Bendigo to convert remaining three-door type tram Item 14 to longitudinal seating. GEELONG:
- Item 1 (c) : Geelong to work to a standard list of questions for examination of motormen, similar to that supplied by Ballarat.
- Item 2 (b) : Geelong to make their own cut-back bitumen as in the other Branches.
- Item 3 (a) : Geelong to experiment with the refresher coat technique used in Ballarat and Bendigo.
- Item 6 (a) : Geelong to try a plastic weather blind on one tram.
- Item 6 (b) : Sun blinds in Geelong to be removed as they wear out.

Geelong to send to Bendigo the rollers of sun blinds removed from their trams.

- Item 8 (a) : Geelong to survey signals and fit arresters where it is considered desirable.
- Item 12(a) : Geelong to continue to watch the performance of the "U" profile wheels and submit a further report at a later date.
- Item 13 : Geelong to try Crater Compound on spur wheels and pinions of several trams.

Item 16 (f) : Geelong to raise a requisition for an oven similar to that being purchased for Ballarat, and to list their pie warmer for disposal.

: Ballarat to supply Geelong and Bendigo with details

DEPARTMENTAL TRAMWAYS SUPERINTENDENT:

1

Item	16 ((b) :	Departmental Tramways Superintendent to take up
			with the Claims Officer any matter which the
			Branches considered has been allowed to lapse.

Item 16 (e) : Branch Tramway Superintendents and Timekeepers to confer with Departmental Tramways Superintendent as soon as possible regarding A.T. & M.O.E.A. log of wages and conditions.

----000----