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MELBOURNE AND METROPOLITAN TRAMWAYS BOARD
ENGINEERING DEPARTMENT

COMPARISON BETWEEN SERVICE REQUIREMENTS USING TWO BOGIE
TRAMS ONLY AND A MIXED FLEET OF THREE BOGIE ARTICULATED
TRAMS AND TWO BOGIE TRAMS FOR KEW DEPOT ROUTES.

JUNE, 1965.

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Comparison between service requirements using two bogie trams only and a mixed fleet of three bogie articulated trams and two bogie trams for Kew Depot Routes.

This study is based on the assumption that a base service would be provided throughout the day using two bogie trams for economy and in the mixed fleet case, three bogie articulated trams would be used to provide the additional capacity to meet peak demands.

In the case of the Kew Depot Routes it shows that a mixed fleet of two bogie and three bogie articulated trams can affect a saving of more than 20% in the number of trams (and also crews) rostered to meet the peak demands.

For average conditions the ratio of two bogie to three bogie trams would be of the order of 2 to 3, but it could vary from 30% to 55% depending on the standards of peak and off peak service to be provided.

1. Introduction.

The purpose of this exercise was to determine the approximate number of trams required to operate the week day services on the Kew Depot Routes with -

- (a) A fleet composed entirely of modern maximum capacity two bogie trams;
- (b) a fleet of modern maximum capacity trams consisting of the optimum ratio of two bogie trams and three bogie articulated trams.

The numbers required have been based on two sets of loading conditions namely -

- (a) Seated loads but with a 100% load factor during peaks and no allowance for service irregularities;
- (b) 80% of crush loads based on 16" square for each standee (in accordance with ANZTC code). This allows for some service irregularity without intending passengers being left behind.

All loads are based entirely on the results of the "Melbourne Metropolitan Transportation Study" for June/July 1964, which are shown on graphs appendix 6.

The loading in Collins Street for the Preston trams has been ignored on the assumption that the ratios of both services and loadings would remain the same.

2. Tram Capacities.

This exercise is based on the probable capacity of new maximum capacity trams as follows -

- | | | |
|---------------|-----------------------------------------|--------------------|
| 2 bogie trams | 50 seats & 70 standees (16" squares) | 80% crush = 95. |
| 3 bogie trams | 70 " " 145 " (16" squares) | 80% crush = 170. |
| 6f SW6 trams | 48/52 seats & 43 standees (16" squares) | 80% crush = 73/76. |

3. Basic services.

North Balwyn and Burwood Routes.

A basic week day service with a 10 minute headway has been assumed on each of these routes combining to give a 5 minute headway from Burwood Road/Church Street Junction to the city.

If it is assumed that 5 minute reserve plus a rest period of approximately 10 minutes is required, 9 trams would be required for this service on the North Balwyn route and 10 trams on the Burwood route.

Mont Albert Route.

The cases with a 10 minute headway and a 5 minute headway for the basic service have both been considered. It is assumed that 9 and 18 trams are required respectively for the above headways.

These basic services it is assumed would be operated for economy by two bogie trams and additional services required to meet excess demands would be operated by three bogie articulated trams for the case of the mixed fleet.

4. Running times.

The present running times are -

Mont Albert to City Terminus	8.5 miles	42 to 47 mins.	= 12.1 to 10.9 mph.
Burwood to City Terminus	9.2 miles	47 to 53 mins.	= 11.7 to 10.4 mph.
North Balwyn to City Terminus	8.3 miles	43 to 48 mins.	= 11.5 to 10.3 mph.

It is assumed that new trams could be scheduled at at least $4\frac{1}{2}$ minutes per mile (13.3 mph). Return trips could then be scheduled as below allowing 5 minutes reserve. However, during the evening peak, a further 20% is allowed.

City Terminus to Burwood Road	3.9 miles	40 minutes
" " " Camberwell Junction	6.5 "	63 "
" " " Burwood Terminus	9.2 "	88 "
" " " Kew Depot via Bridge Road	4.4 "	45 "
" " " Kew P.O. " " "	5.0 "	50 "
" " " Harp Road " " "	6.3 "	62 "
" " " North Balwyn " " "	8.3 "	80 "
" " " Kew Depot via Victoria Street	3.9 "	40 "
" " " Burke Road " " "	6.3 "	62 "
" " " Mont Albert" " " "	8.5 "	81 "

As result are given in 1 hour periods with a split at 16.45 hours and 17.45 hours, the nearest larger interval is taken in each case. Allowance has also been made for non uniform distribution of demand over each interval.

5. Rostering of crews.

No allowance has been made for problems associated with rostering of crews, as this exercise has been restricted to the minimum number of trams that must be run to meet the above stated conditions.

6. Basis of calculation.

The data which is the basis of this exercise are shown graphically in appendix 6 in the form of passengers per hour along each route for each hour throughout the day and also of passengers per hour passing selected stops throughout the day.

It is based on the number of passengers actually passing given points.

In this study the results of the Melbourne Metropolitan Transportation Study have been adjusted for the alteration of the Burwood route from Batman Avenue to Flinders Street on the assumption that 90% of the passengers at Hawthorn Depot are City passengers.

Appendice 1 to 5 tabulate the loading for the cases where it is in excess of the basic service seating capacity only, namely 300 per hour for the 10 minutes headway and 600 per hour for the 5 minute headway.

In the calculations allowance has also been made for non uniform loading over stated periods.

7.

TRAMS REQUIRED FOR "UP" SERVICE

Refer appendice 1 & 3

Route	Seated Load		80% Crush Load	
	2 Bogie	3 Bogie	2 Bogie	3 Bogie
<u>Basic service with 10 minute headway</u>				
Burwood route	10		10	
North Balwyn route	9		9	
Mont Albert route	9		9	
<u>Additional trams to meet peak demand</u>				
<u>Burwood route</u>				
From Warrigal Road	15	or 12	4	or 3
" Camberwell Junction	2	" 1	1	" -
" Hawthorn Depot	5	" 4	2	" 1
<u>North Balwyn route</u>				
From Balwyn Road	3	" 3	-	-
" Bulleen Road	15	" 11	4	" 3
" Harp Road	10	" 6	5	" 3
" Kew Post Office	1	" 1	-	-
<u>Combined route</u>				
From Burwood Road	15	" 6	5	" 2
<u>Mont Albert Route</u>				
From Union Road	14	" 10	2	" 2
" Campbell Road	8	" 6	4	" 2
" Charles Street	12	" 8	5	" 3
" Kew Depot	16	" 12	8	" 5
Total - All 2 Bogie	144		68	
Totals - Mixed Fleet	28	+ 80	28	+ 24
Saving in trams		36		16

UP
BURWOOD RD. STOP 30
HAWTHORN & NTH. BALWYN ROUTES
 JUNE / JULY 1964



