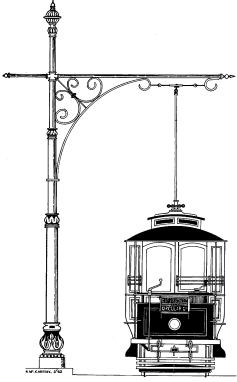


SYDNEY TRAMWAY MUSEUM



SYDNEY TRAMWAY MUSEUM

SPEED AND STOPPING DISTANCES **AND ROLLING STOCK STANDARDS**

~~October 2006~~ **MARCH 2016**

SYDNEY TRAMWAY MUSEUM

Speed and Stopping Distance Tramcars in Museum Collection

1. Purpose

To define the speeds and stopping distances of tramcars at the Sydney Tramway Museum. Also the list the Rolling stock standards applicable based on the MMTB standards

2. Scope

This detail applies to all trams operated by the Sydney Tramway Museum.

3. Responsibilities

TBA.

4. References

MMTB Drawing # R3444C, revised 21/3/1941.

5. Definitions

MMTB – Melbourne Metropolitan Tramways Board

6. Speeds & Distances

6.1 Speed

The tramcars in the museum collection (with the exception of Melbourne Z 111 and San Francisco PCC 1054) were designed to operate in suburban street conditions at speeds of motor vehicles in, say, 1930 i.e. approximately 30 mile per hour or 48 kph.

All tramcars within the collection (again with the exception of Melbourne Z 111 and San Francisco PCC 1054) are of the series-parallel controller type. The earliest example of this type of controller is Sydney C class tram no. 290 of 1896 and the latest Brisbane Phoenix car no. 548 of 1963.

With these controllers there are only two power positions, series where half voltage is applied to the motors and parallel where full voltage is applied to the motors. Motors are of the type where the tractive effort and power applied reduces as the speed increases. This results in the speed being limited to what is called the balancing speed. For level track this speed for STM cars is as below:

Series speed	28 kph
Parallel speed	56 kph

The method of operation at the Sydney Tramway Museum is to use series speed only, except when ascending the hill to the Sutherland terminus where parallel is utilised. For down hill running coasting, without power, with some brake application if necessary, is employed.

Melbourne Z and San Francisco PCC were designed for a later period and have increased speed performance. However both cars have deadman controls, superior braking and the Z car has speedometer. By comparison with other cars, drivers are able to control the speed of the PCC car.

SYDNEY TRAMWAY MUSEUM

6.2 Stopping Distances

The series parallel controller cars are not fitted with speedometers as their speed is limited by the characteristics of the motors. Accordingly the normal method of testing braking performance was to operate the tram in series speed and measure the distance to stop. This method is subject to much variability in speed before brakes are applied.

Sydney Tramway Museum utilises a Tapley Brake Test Meter which measures the deceleration rate. Typical deceleration measured on air-braked trams is 1.5m/s^2 .

Stopping distances, for air-braked trams, are typically or better as below:

Speed	Stopping distance*
40 kph	51m
25 kph	37m
20 kph	16m
10 kph	6m

* Calculated, includes 1 second reaction and brake application time.

The Z and PCC are fitted with magnetic track brakes for emergency stopping as well as service brakes. Maximum deceleration for these cars is 4m/s^2 . The stopping distances are proportionally less for these cars.

Richard Clarke MIEAust
15 July 2006

SYDNEY TRAMWAY MUSEUM

CONVERSIONS							
Imperial	Metric		Imperial	Metric		Imperial	Metric
1/16"	1.6mm		23"	584 mm		2 LBS	0.91kg
1/8"	3 mm		25"	635 mm		4 LBS	1.81kg
1/4"	6 mm		26"	660 mm		6 LBS	2.77kg
1/2"	12 mm		26½"	673mm		8 LBS	3.63kg
¾"	18 mm		28"	711mm		10 LBS	4.54kg
1"	25.4mm		30"	762 mm		12 LBS	5.44kg
3¼"	83mm		33"	828mm		20 LBS	9.07kg
3½"	89mm					25 LBS	11.34kg
4"	102mm		10'-6"	3.2 m			
4½"	114mm		12'-6"	3.8 m		50000 miles	88514 kms
6"	152 mm		18' 0"	5.5 m			
6½"	165 mm		20'-6"	6.25 m			
7"	178 mm						
7¼"	184 mm						