MELBOURNE AND METROPOLITAN TRAMWAYS BOARD

24th July, 1950.

MODERN TRAMCAR WITH P.C.C. EQUIPMENT

The latest tramcar built by the Melbourne & Metropolitan Tramways Board is equipped with the latest P.C.C. equipment and bogies imported from America.

The drawings and photographs illustrate the new car mounted on its trucks. The car is 46'-6" long, 8'-0" wide over pillars and 9'-1" over footboards, 10'-3" high from rail to roof and weighs 17.02 tons. The seating capacity is 48 persons, but the total crush loading capacity is 150 passengers.

There are saloons at either end each seating 16, and a vestibule in the centre to seat 12. Two sliding doors each 3'-6" wide are fitted to the entrances at each side of the car and are operated with compressed air by a valve placed in the Motorman's Cabin. This valve is arranged so that the doors on each side can be opened or closed independently, or alternatively, all doors may be opened or closed together. A communicating door connects with the motorman's cabin which is totally enclosed.

The seating throughout is fitted with Latex rubber cushions and backs, and covered with brown leather. A combination of transverse and longitudinal seats is provided in the saloons and longitudinal seats on each side of the centre vestibule. Ample strap hangers and stanchions have been provided for standees.

The floor has been made level throughout. The floor level in the centre vestibule being brought to the same level as the saloon floor, and the smoker's seats placed longitudinally; although this was necessitated by the electrical equipment it is considered to provide more circulating space in the centre of the car and greater ease of movement.

The ceiling, which is formed with Masonite, is finished in high gloss cream enamel and is provided with 20-60 watt 100 volt - lamps set in special fittings with opalescent shades.

The strap hanger brackets are of a new design and have been made to match the sockets of the vertical grab rails and stanchions. The grab rails and stanchions at entrances are covered with doverite and the vertical grab rails in the centre compartment are of stainless steel. The destination and route boxes have been built into the canopy and are operated from the motorman's cabin. The windscreen has been sloped back from the rounded dash to suit the wide destination boxes and provide clearer vision. All windows throughout the car are fitted in chromium plate metal frames, the saloon windows are of the half drop type with standee windows above which hinge inwards. The windscreens, motorman's cabin and bulkheads are all glazed with safety glass.

The P.C.C. equipment comprises the bogies, motors, control and braking equipment.

The bogies were supplied by the St. Louis Car Company of America and are known as their B.3 type. They are each fitted with 2/300 volt 55 horse power motors which drive through carden shaft and hypoid gears to the axles which are fitted with 25" diameter P.C.C. resilient wheels. There are no shoe brakes applied to these

wheels, the braking is done by dynamic braking on the motors, drum brakes on the armature shafts and magnetic track brakes on the rails.

The bogies are supplied with bolsters supported at each end on large compound helical steel springs fitted with rubber internal buffer spring to take the overload. A large conical centre bearing is provided upon which the car body rests, and to which the king pin is attached, there are no side radial bearings on the bogies, the whole of the work being done by the centre bearing and king pin. The axle is totally enclosed in a housing and fitted with roller bearings and hypoid spiral bevel gearing. The motors are placed transversely to the axle and held in cradles supported on rubber mountings. The drum brakes are 12½" dia. x 1¼" wide and are fitted with sintered material liners. The magnetic track brake shoes are 3'-8" long x 2-13/16" wide and are fitted with a non-magnetic separator between the shoes.

The electrical equipment was supplied by the General Electric Company of America and consists of 4/55 H.P., G.E.1220 type 300/600 volt forced ventilated type motors, two combined power and brake motor controllers, line breaker, automatic accelerator, grid resistors, group of contactors, remote controlled reverser, motor generator with ventilating fans, 36 volt battery, magnetic track brakes and drum brake actuators.

The control equipment is operated by 36 volt current supplied by motor generator and battery. The motor generator is of 5 K.W. capacity and has fans attached to the spindle for supplying air to cool the resistors and traction motors. The automatic accelerator is their commutator type No. 17KM:12N. and has 127 notches for acceleration and double this number for the dynamic brake cycle. This gives remarkably smooth acceleration and braking.

The master controllers are type G.E.17.K.C.56 designed for double end car operation, the controllers were supplied for pedal operation but it was decided to have these hand operated and they were fitted into the Board's standard controller cases, and are operated in the same way as its standard equipment with standard controller and brake handles.

The controllers contain drums for power and braking, and a reversing drum.

The power control handle has 3 main positions the first is the switching notch which produces slow acceleration, the next is the first acceleration notch which gives the rate of acceleration at which the automatic rate is fixed, the full on position gives the maximum rate of acceleration. The brake handle has been mounted to resemble the ordinary brake valve and to be operated in the same manner. It is provided with 3 notches, the first applies the dynamic braking and moving the handle further round it applies the various intensities of magnetic track brake. The armature shaft drum brake automatically applies when the car speed is reduced to 1 M.P.H. It is released by the brake handle being placed in the release position. This brake also acts as the parking brake and becomes automatically spring applied when all power is switched off. The reverser is remote controlled and is operated from the controller by the standard reverse lever. This is also arranged for emergency braking by "bucking" the motors. This arrangement of controls has made it very easy to handle this car, and there is nothing unusual about it to confuse motormen.

The Board's S.W.6 car was taken as a basis for the design of car to be fitted with this equipment. It was found that owing to the large depth of the equipment to be placed under the centre of the car, the floor had to be at least 2'-10" from the rail so it was decided to raise the centre portion floor level to that of the saloon, and have a level floor throughout (as mentioned before) with a 6" well step at each entrance. The structural framework of the car was

adopted with the minimum of alteration; the principle alterations were to the bolsters, which had to be designed to allow the air ducts to provide forced ventilation to the motors to pass through, and to the underframe of the centre compartment which had to have the equipment compartments and supports built in with the car framing.

All the electrical control equipment with the exception of the line breaker is supplied without covers and has to be fitted into special compartments built into the car body and connected to the ventilating system. Large covers are fitted to the bottom of these compartments and held in position with bonnet clips. These compartments have air blown through them by the ventilating fans. The equipment compartments and ventilating ducts presented most intricate design and construction, and to develop this work for one car was costly and took a long time.

The trolley bases are the Ohio-Brass Company's type No.11 and are mounted on rubber cone mountings supplied with the P.C.C. equipment, the Board's standard 6" trolley wheel and harp are used.

The sliding doors are operated by the Board's patented pneumatic door engines which have been in successful operation on other cars. A small tramcar type air compressor is installed to provide air for doors, sand gear and screen wipers. The destinations are the Boards own make and have 42" curtains and 6" route numbers.

The car has been finished in the Board's standard colours, copper green and cream, with green fascia and stone colour roof.

The general performance and appearance of the car has created a very favourable impression. The Board hold the License from the P.C.C. committee for the manufacture of this car in Australia, and it is expected that much valuable information for the guidance of future car design in Australia will be obtained from it.

The principal dimensions of the car is as follows:-

Length over bumpers	46'-6"
" " corner posts	40'-1"
Width over pillars	8'-0"
" " footboards	9'-1"
Height rail to footboard	1'-2½"
" footboard to step	12⅝"
" step well to floor	6"
Bogie centres	28'-0"
" wheel base	6'-3"
Seating capacity	48
Crush load capacity	150
Weight	17.02 tons.

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24/7/50