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Incorporating many of the ideas gleaned by the Chairman (Mr. H. H. Bell, J.P.) in the course of his tour of Great Britain, the Continent, the United States and Canada last year, the new tram of the Melbourne and Metropolitan Tramways Board has been received with marked demonstrations of public approval, while the Press spared no pains in illustration and description and Cinesound Productions Ltd. took a newsreel for exhibition all over Australasia.

Known as the SW6 class, the new car is 46' 6" long, 8' wide over pillars, 9' over the footboards, 108 4" high from rail to roof, and weighs 16 tons 18 cwts., and has a seating capacity of 48, the crush load design being for 150. As the illustrations show, there are saloons at each end with seats for 16 persons. In the centre is the vestibule, also seated for 16, which is regarded as the smoking compartment and provides for loading. Two sliding doors each 3' 6" wide are fitted to the entrances at each side of this compartment, and are operated with compressed air by a valve in the motorman's cabin. Through this valve, the doors on each side can be opened and closed independently, or alternatively, or may be opened and closed together, a provision designed to counter the capricious changes of the Melbourne climate, which is capable of producing all known varieties of weather within the space of a few hours. At the end of each saloon a communicating door connects with the motorman's compartment, which is totally enclosed. In the smoking compartment, the seats are of the back-to-back cross type constructed of wood, while the seats in the saloons are all fitted with Latex cushions and backs and are upholstered in leather. The four centre seats in each saloon are of the reversible type, the remainder being fixed.

As it was considered unnecessary to enclose the saloons in view of the presence of doors on the outside of the car, the interior bulkheads with sliding doors, features of the trams built hitherto by the Board at its Preston Workshops, have been dispensed with, but to protect the passengers in the saloons when the doors are opened, and to provide also for the break in the floor level, a specially designed bulkhead with safety glass windscreen and dozerite covered stanchions has been provided. The framework of the car is of all-steel construction, and electric welding has been used extensively. So as to permit of easy fabrication and the quick replacement of portions damaged in collision, the design followed has been along straight and simple lines, arranged in sections. The sills are of $3\frac{1}{2}$ " x $2\frac{1}{2}$ " x $5/16$ " angle steel, the belt rail 2 " x $1\frac{1}{2}$ " $3/8$ " angle, and the cant rail $2\frac{1}{2}$ " x 2 " x $3/16$ " angle. With corner posts of $2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $\frac{1}{4}$ " angle, the pillars are $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $3/16$ " tee section, the roof ribs $1\frac{1}{4}$ " x $1\frac{1}{4}$ " x $3/16$ " tee section, and the arch rails $3\frac{1}{4}$ " x $1\frac{3}{4}$ " tee. Of the box type, built up with $\frac{1}{2}$ " top and bottom plates and $\frac{1}{4}$ " web plates strengthened with ribs, all held together by electric welding, the bolsters are 10 " wide x $7\frac{3}{4}$ " deep at the centre.

lb.

The cross members are 4 " x 2 " x 7.09/channel section, and the end sills 5 " x $2\frac{1}{2}$ " x 10.22 lb. channel. All the saloon panels are of 14 gauge, with the central panels 16 gauge special panel steel electrically welded to the pillars and riveted to the still plate and belt rail. All sections and mild steel used are of ordinary commercial quality.

of $2\frac{1}{2}$ " x $\frac{3}{8}$ "

Oregon boards/covered with cotton duck and supported on hardwood roofsticks compose the roof, while the ceiling is made of $3/16$ " hardboard glued on wooden frames of the correct shape and then placed in position in long sections, giving a smooth appearance without any screws being visible. T & G hemlock timber $\frac{7}{8}$ " thick has been used for the

floor. Tasmanian mountain ash has been used for the end bulkheads, the doors being fitted with flush panels of figured timber. Reversible seats in the saloon of the tilting type have concave cushions and backs, and are supported on aluminium alloy pedestals, while the fixed seats are built on light steel frames supported on aluminium legs. Specially shaped plywood framed in blackwood and supported on light pipe framework has been used for the seats in the smoking compartment. The windows are all of the metal framed type. The ventilator windows are pivoted along the bottom rail by means of a special drawn section, while the main windows can be dropped their full depth when the climatic conditions make that desirable. Louvre sun blinds are fitted to each saloon window, and are arranged to slide up and down the pillars in extruded brass sections. Tasmanian mountain ash has been used again for the entrance doors, which are fitted with 3/16" safety glass and are 3' 6" wide, 5' 11" high, and 1 1/8" thick. Special rubber edging with sponge rubber filling has been fitted to these doors as a safety measure. The doors slide on two rollers provided at the top running on a loose round runner bar supported in a metal carrier. Guides are provided in conjunction with the step treads for the bottom of the door.

Of the single stroke differential type, the pneumatic door engines are fixed to the cant rails behind the advertisement coves. They have been designed for quick opening and closing, with a cushioning action towards the finish, and work with the normal air brake pressure of 60-70 lbs. per sq. inch. These engines, as well as the operating valves, runner bars and door fittings were supplied by Messrs G. D. Peters, England. The motorman's cabin is totally enclosed and is fitted with doors on both sides with an emergency

door between the compartment and the saloon. The centre window of the windscreen is fixed and fitted with a "Cinch" hand-operated wiper, which has a horizontal blade wiping up and down over the full surface of the glass. Two side windows are fitted with half-drop sashes. A rear-vision mirror is placed on the left hand corner pillar, enabling the motorman to see the car entrances. Both the destination and route number mechanisms are of the Board's own design and manufacture. They are provided with white veluna cloth curtains with the names and numbers showing white on a black background, and are illuminated. A public address system operating from a 600 volt supply and with loud ~~speakers~~ speakers installed in both ends of the car, and a microphone in the motorman's cabin controlled by a foot pedal switch, enables the motorman to switch on the system and announce the stopping places, transfer points, and other information for passengers.

Much thought was devoted to the interior appearance of the saloons, and eventually it was decided to line them with leathercloth up to the window level, with the pillar facing strips and mouldings of Australian blackwood finished in its natural colour and the ceiling in a semi-gloss ivory shade. An experiment with rubber-covered floors on the Board's buses not having given the results desired, it was resolved to use linoleum for the saloon floors, hardwood slats being put down on the floor of the smoking compartment. Aluminium anti-slip tread plates are fitted to the steps, all grab rails are made of Doverite covered tubing, and the strap hanger handles are of bakelite. The Board's standard colours of chrome green and cream enamel decorated with gold lining, and with the Board's monogram and car number in gold, comprise the exterior finish. The roof is of stone colour, while the trucks have been sprayed with black enamel.

While in Great Britain and the United States, Mr. Bell gave particular attention and study to the question of lighting. The result of all his investigations is seen in the great advance which has been made with the interior lighting. Twelve lamps in specially designed fittings provided with polished stainless steel reflectors and 8" diameter flashed opal bowls, made with a hole in the centre for the removal of the lamp without disturbance of the fitting, ensures direct vertical lighting, while all horizontal and angular lighting is diffused, protecting the passengers from direct glare and at the same time permitting efficient reflection from the light-coloured ceiling. Six lamps are placed under a canopy fitted to the front dash of the car. These light up the front and illuminate the sign, or slogan, board placed on the dash plate. It is the intention of Mr. Bell to use this board for the advertisement of particular events appealing to the fancy of the public. Indicating stop lights which show a red light when the power is switched off, and a green light when it is switched on, to the motors, and operated by contacts in the master controller, are provided on the rear near corner of the car. The conductor's signalling system is by electric buzzer working from the 600 volt supply, and operated by leather cords along either side of the ceiling.

The trucks, following the lines of the Board's recent design, which has been found in service to possess many favourable features, have steel section side frames supported on long semi-elliptic springs rigidly attached to the axle boxes, and joined to the side frame by a pin on one end and a sliding shoe on the other. The pins are provided with rubber bushed bearings, and the sliding end with

rubber pads. The bolster is box section built up of mild steel plate, electrically welded, and supported on helical springs carried on a spring plank swung on links 12-5/16" long. The wheels, which are of 28" diameter, are of the one wear solid rolled steel type, while the axle boxes are fitted with Timken taper rolling bearings. The truck brake gear is of the clasp type, equalised throughout. It is hung on cone-shaped brake hanger links and applied through a radial brake beam. A new method has been adopted for securing the brake shoes to their holders. In place of the brake shoe keys, which frequently get loose and so cause rattle and noise, the shoes and holders have been designed for bolting solidly together with a 3/8" diameter bolt, which allows more easy replacement of shoes than with the keyed type. The truck leverage is 6.334 to 1, and the foundation brake gear leverage on the car body 2.114 to 1, giving a total overall leverage of 13.39 to 1. The brakes are operated by compressed air applied by means of a self-lapping type of motorman's brake valve. With this type, the pressure corresponds to the position in which the handle is placed. Any desired pressure up to the maximum can be obtained and held in the brake cylinder. A relay valve is provided to give speedy operation of the brake.

The car is equipped with four 40 h.p. General Electric 247A motors with 15/58 gear ratio. This equipment is capable of average rates of acceleration and retardation of 3 m.p.h.p.s. from 0 to 12 m.p.h., or 2 1/2 m.p.h.p.s. from 0 to 15 m.p.h with a seated load on level tangent track without discomfort. The free-running speed is 28 m.p.h., and the schedule speed 12 m.p.h. with seven stops of 6 seconds each per mile. The electrical control equipment is of the remote contractor control type, arranged for series parallel operation with 7 series and 7 parallel resistance ~~stap~~

steppings. The master controller has an aluminium case enclosing the control drum, line breaker trip switch, and reverser. The controller handle is in the form of a horizontal lever which is geared to the control drum by a sector and pinion, and operates with a backward and forward motion. The hand-operated reverser barrel is made in two sections, either of which can be locked in the neutral position to isolate one pair of motors. The contactors are of the E. E. Co.'s No. 35, Form A magnetic type, and are arranged in two boxes with five units in each. The line breaker is of the E. E. Co.'s No 6 Form C magnetic type fitted with adjustable overload device, and operates in series with the contactors. General Electric supplied also the resistors, which are of the light weight edge wound strip unbreakable type. The brake equipment consists of a W.H. D.H. 16 compressor, a 8" x 12" brake cylinder, a 60" x 16" air reservoir, W. H. type "W" self-lapping motorman's brake valve, and a W. H. type "E" relay valve. All the motors, gears, control and brake equipment were manufactured in Australia, while the hand brakes, trolley bases, destination signs and route numbers are of the Board's own design and manufacture. The principal dimensions of the new car are as follow :--

Length over bumpers	46' 6"
Length over corner posts	40' 1"
Width of car over pillars	8'
Width of car over footboards	9'
Height, rail to footboard	1' 2 $\frac{1}{2}$ "
Height to vestibule floor from footboard	1' 1 $\frac{1}{2}$ "
Height, vestibule to saloon floor	6"
Truck centres	28'
Truck wheel base	5' 2"
Size of wheels	28"
Seating capacity	48
Crush load capacity	150
Weight	16 tons 18 cwts.