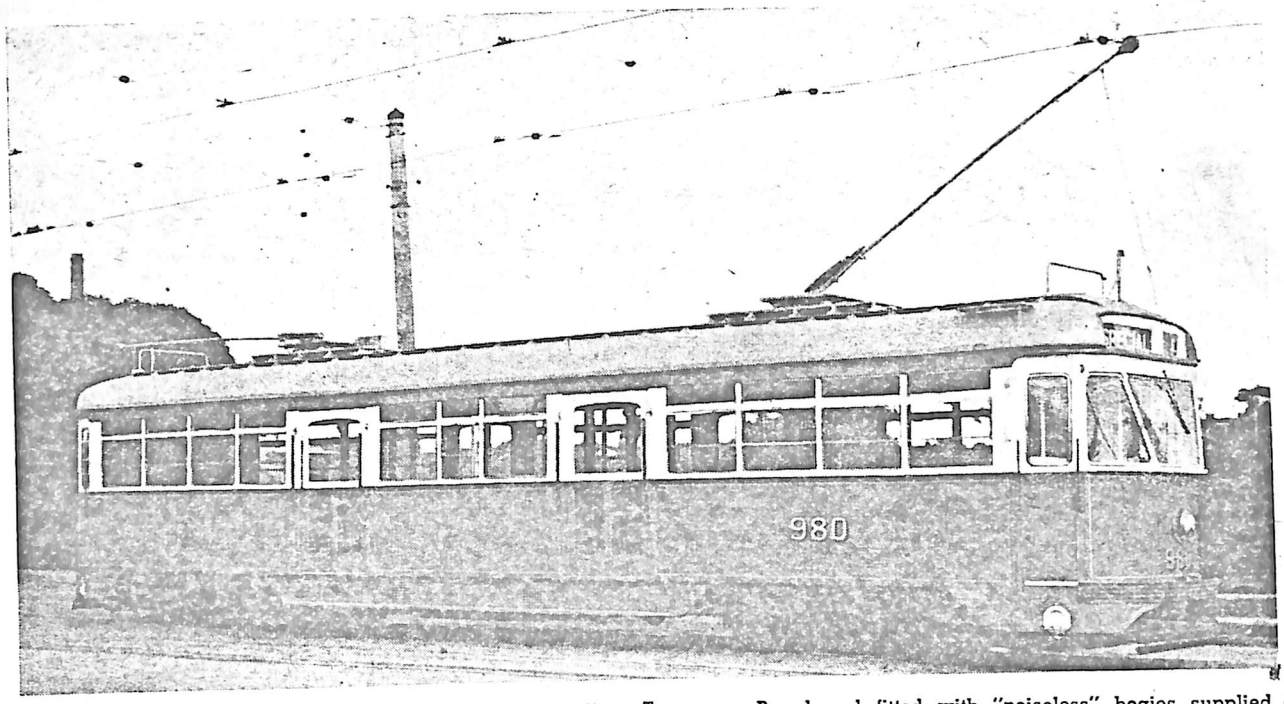

● Fig. 1.—Tramcar built by the Melbourne and Metropolitan Tramways Board and fitted with "noiseless" bogies supplied by the St. Louis Car Co., U.S.A. This car has been placed in service to obtain operating experience.

"Noiseless" Tramcar . . First Australian Vehicle

Bogies Fitted Have Special Noise Reducing Features . . . Motor Drive through Bevel Gears . . . Dynamic Braking

TRAMCARS fitted with bogies of the "noiseless" type have been in use in the U.S.A. for a number of years. The design of these cars resulted from a conference of American city transport authorities that had been called to investigate the problem of noisy running of tramcars. It had long been recognised that these vehicles running with steel wheels on a steel track rigidly embedded in a street pavement were a "noise nuisance." As a result of the conference, which was attended by the presidents of the various street companies, a car design was developed termed the P.C.C. (Presidents' conference car).

For several reasons adoption of the "noiseless" type of bogie has been slower here in Australia. However, the Melbourne and Metropolitan Tramways Board has always been keenly interested in the P.C.C. car and imported from the U.S.A. a set of special noise-reducing bogies. A complete car, equipped with these bogies, and embodying other noise-reducing features, has now been placed in service (Fig. 1). Operating information is now being collected. One matter that will be studied closely is of course maintenance.

Noise Reducing Features of New Car

Main differences in design that contribute to noise reduction are:—

(1) **Special wheel construction.** On each wheel the steel tyre is separated from the hub by rubber inserts. The rubber absorbs the noise.

(2) **Car body supports.** The car body is supported through central bearing and king pin to bogie bolster. The bolster is supported at each end on large compound helical steel springs fitted with a rubber internal buffer spring to take overload.

3) **Drive.** The driving motors are mounted in rubber supports. Hypoid spiral bevel gearing is used instead of the normal spur gearing.

4) **Braking.** There are no brake shoes on the wheels.

5) **Trolley mounting.** Rubber mounts are provided between the platform of the overhead trolley and the roof of the car.

Description of Bogies

The bogies, which are of the B3 type, were supplied by the St. Louis Car Co., U.S.A. Each is provided with two 55 h.p., 300 V motors which drive through a carden shaft and hypoid gears to the axles. The axles are fitted with 25 in. dia. P.C.C. resilient wheels.

An interesting feature is that no ordinary shoe brakes are applied to these wheels, the retardation is effected by dynamic braking on the motors, and by drum brakes on the armature shaft. A magnetic track brake is also fitted but this is for emergency use only. The magnetic brake shoes are 3 ft 8 in. long by 2-13/16 in. wide and are mounted parallel to the rails and between the wheels of each bogie. A non-magnetic separator is fitted to each shoe between the shoe and rail.

The bogies are supplied with bolsters supported at each end on large compound helical steel springs fitted with a rubber internal buffer spring to take the overload. A large conical central 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. Totally enclosed in a housing, the axle is fitted with roller bearings and hypoid spiral bevel gearing, while the motors are placed transversely to the axle and held in cradles supported on rubber mountings.

Electrical Equipment

Supplied by the General Electric Co., U.S.A., the electrical equipment comprises:—

(1) Four 55 h.p. motors of the G.E. 1220 forced-ventilated type for operation on 300/600 V.
(2) Two combined power and brake motor controllers.
(3) Line circuit breakers.
(4) Automatic accelerator.
(5) Grid resistors.
(6) Contactors.
(7) Remote controlled reverser.
(8) Motor-generator with ventilating fans.
(9) Battery (36 volts).
(10) Magnetic track brakes.
(11) Drum brake actuators.

Controllers

Remarkably smooth braking and acceleration is given by the automatic accelerator, which is of the company's commutator type and has 127 notches for acceleration and double that number for the dynamic brake cycle. While the controllers were supplied for pedal operation, as in the P.C.C. cars, the Board decided to convert them for hand operation. They have been fitted into the Board's standard controller cases and are operated in the same way as the standard equipment on the SW6 cars.

Drums for power and braking and a reversing drum are contained in the controllers. the power control handle has three main positions: (1) the switching notch which produces slow acceleration; (2) the first acceleration notch which gives the rate of acceleration at which the automatic rate is fixed; (3) the full-on position which gives the maximum rate of acceleration.

● **Fig. 2.—Interior of car showing seating arrangement and wide corridor space for crush loading.**

Brakes

Mounted to resemble the ordinary brake valve and operated in the same manner, the brake handle has three notches, the first applying the dynamic braking and the others the various intensities of the magnetic track brake. When the car speed falls to 1 m.p.h. the armature shaft drum brake is applied automatically and is released when the brake handle is placed in the release position. This brake acts also as the parking brake and is automatically spring applied when all power is switched off.

Remote controlled, the reverser is operated from the controller by the standard reverse lever, which is also arranged for emergency braking by "bucking" the motors.

This arrangement of controls has been adopted deliberately so as to obviate confusion for the driver; consequently the car is very easy indeed to handle.

Car Body

The car body is a modification of the Board's standard SW6 body. It will seat 48 passengers: 16 in each saloon and 12 in the vestibule. The crush loading capacity is 150. Principal dimensions are:—

Length over bumpers	46 ft 6 in.
Length over corner posts	40 ft 1 in.
Width over pillars	8 ft
Width over footboards	9 ft 1 in.
Height—	
rail to footboard	1 ft 2¼ in.
footboard to step	1 ft 0⅝ in.
step to floor	6 in.
rail to roof	10 ft 3 in.
Bogie centres	28 ft
Bogie wheel base	6 ft 3 in.
Seating capacity	48
Crush load capacity	150
Weight	17.02 tons

There are four sliding doors (two on each side) each 3 ft 6 in. wide, and these are operated with compressed air by a valve in the driver's cabin so arranged that the doors on each side can be opened or closed independently. Alternatively, all doors may be opened or closed together.

Latex rubber cushions and backs covered with brown leather provides comfortable seating. A combination of transverse and longitudinal seating is provided in the saloons but only longitudinal seats in the vestibule, an arrangement that ensures greater ease of movement and facilitates the work of the conductor (see Fig. 2). The floor is level from one end of the car to the other.

The Masonite ceiling is finished in high gloss cream enamel and is fitted with 20-60 watt 100 V lamps set in special fittings with opalescent shades. The windscreen has been sloped back from the rounded dash to suit the wide destination boxes — operated from the driver's cabin — and to give clearer vision. All windows are fitted in chromium plate metal frames. Those in the saloons are of the half-drop type with standee windows above which hinge inwards, while the windscreens, driver's cabin and bulkheads have all been glazed with safety glass.

It was found that because of the depth of the equipment to be placed under the centre of the car the floor had to be at least 2 ft 10 in. from the rail. It was decided to raise the centre portion floor level to that of the saloons and have a level floor throughout with a 6 in. well step at each entrance. The standard SW6 car has a drop centre.

Structural framework of the SW6 car has been adopted with as few alterations as possible. The principle alterations are to the bolsters, which have been designed to allow the air ducts for forced ventilation to the motors to pass through them; and to the underframe of the centre compartment, which has had the equipment compartments and supports built in with the car framing. All the electrical equipment with the exception of the line breaker was supplied without covers and has been 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 are 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 this work for one tram has been a long and costly job.

Sliding doors are operated by the Board's own patented door engines, which have been in successful operation on the SW6 cars for several years. A small tramcar type compressor provides air for the doors, sand gear and screen wipers. The destination indicators are of the Board's own make and have 42 in. curtains and 6 in. route numbers.

The Melbourne and Metropolitan Tramways Board holds the licence from the Transit Research Corporation of New York for the manufacture of the P.C.C. car in Australia.

Acknowledgment

Acknowledgment is made to Mr. R. J. H. Risson, chairman of the Melbourne and Metropolitan Tramways Board, for permission to publish this article and to Mr. H. Stephenson, designing engineer, for supplying technical information.

Australian Black Coal Resources

Reserves of bituminous and sub-bituminous coal in Australia exceeds 15,000 million tons, according to the last survey made by the Standards Association of Australia. This figure includes only commercially recoverable coal. At the present rate of consumption of 2 tons per head per annum these resources would last for 750 years. Of the total reserves 11,668 million tons is in New South Wales which is the major source of high quality gas, steam and coking coal. By 1953 Australia will need 18 million tons of New South Wales coal, a 50 p.c. increase on the highest output. Over 60 p.c. of the output of electricity in Australia is from black coal and 25 p.c. from brown coal.

The foregoing has been abstracted from "Coal Facts" No. 5, issued by the Joint Coal Board.