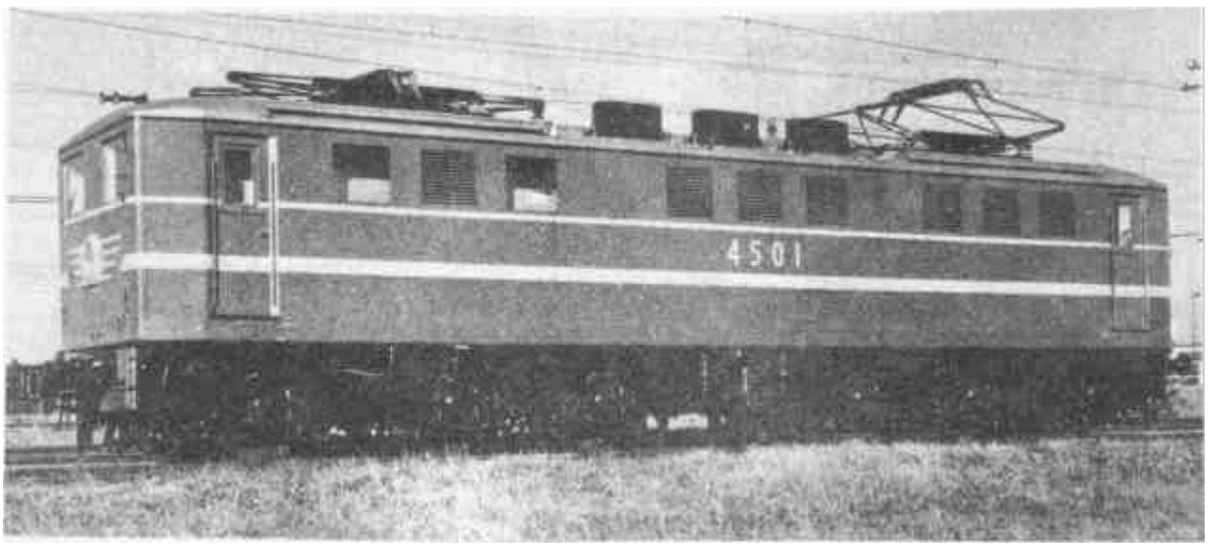
New South Wales Government Railways



Electric Locomotive

The Department's first electric locomotive was completed in June, 1952, in its Chullora Workshops in conjunction with a number of contractors. (Commonwealth Engineering supplying the body and Metropolitan-Vickers the electrical equipment).

This locomotive and 40 others on order in Great Britain will be used between Sydney and Wallerawang on the main western line when it is electrified. Two of these units will be capable of hauling 2,000 ton trains between Zig Zag Signal Box (from Lithgow when the proposed deviation is completed) and Enfield with the assistance of a third unit between Katoomba and Valley Heights for braking. and for assistance on the return trip. With such tractive power and with speeds up to 70 miles an hour these locomotives will be operated in services now provided by the Department's fastest and most powerful passenger and freight locomotives.

The first electric locomotive carries the road number 4501.

It has a box style cab, with driver's controls at each end, carried on two six wheel bogies having six 450 horsepower motors providing a starting tractive effort of 60,000 lbs.; 38,700 lbs. for one hour at 25½ m.p.h. and 28,000 lbs. continuous at 28.3 m.p.h.

The current collection is by two interconnected pantographs that are raised by compressed air, controlled by electro-pneumatic valves, and operated from the driver's cabin. Air pressure of 70 lbs. is used. A hand pump is provided for use in the absence of air pressure.

After collection, the current passes through one of the three main fuses and isolating switches serving the three motor groups, each of which consists of two 450 horsepower l,500 volt motors. These are so arranged as to operate either in series or parallel. They may be switched out without affecting the operation of the other two motor groups.

Control is exercised by three handles: the reverse handle controls the motor combinations (series, series-parallel. and paralled) in each direction; the main handle controls the resistance in the motor circuit and the shunting of the fields; and the regenerative handle selects the regenerative brake or motoring and varies the braking resistance. Suitable provision has been made to avoid undesirable combinations of handle grouping.

Resistances are cooled by natural circulation assisted by an 80 watt 36 volt motor driven fan under each resistance bank.

Included in the auxiliary plant are two motor generator sets, one supplying 36 volt current for controls, lighting. and battery charging, and the other supplying current for separately exciting the traction motor fields. Both generator sets also drive centrifugal fans supplying 2,000 cubic feet of free air per minute to each traction motor for cooling purposes.

Air for braking is obtained from two 1,500 volt motors driving two compound compressors, each handling 75 cubic feet of free air per minute.

For operating controls and lights when the motor generator set is not working, a 17 cell lead acid battery of 120 A.H. capacity is provided.

The underframe carries the body on the bogies and does not take any draw gear stresses, these being confined to the bogies. It is made of two welded headstock units

attached to welded bolsters and 9" x 3" channel solebars by riveting. The centre longitudinals form the sides of the air duct that delivers the circulating air for the traction motors. Transomes are welded to the centre longitudinals and riveted to the solebars, and form air ducts for motor cooling. The whole of the underframe is covered with ½ inch plate, provision being made for motor inspection hatches.

Body side frames are of welded steel faced with 3/32 inch riveted steel plates. Fixed windows and louvred openings are provided along the body sides except at the four doors which have drop windows. All glass, including that in the two fixed front windows, is 1/4 inch armour plate.

The bogie frames have cast steel headstock, bolster, and transome units attached to mild steel solebars by rivets. The solebars consist of two frame plates tied together by three axlebox guide plates that reinforce the openings in the main frame plates and by one top flange plate. Each solebar is welded as a unit.

On the outer end of each bogie are mounted buffers and draw gear, the inner end being coupled to the inner end of the other bogie by means of a draw bar and a special spring controlled coupling which permits relative lateral movement under restraint. The shortening of bogie centres that takes place on curves is provided for by allowing longitudinal movement of one bogie centre casting. By this construction all the tractive effort of the motors is taken through the bogies and does not pass through the superstructure.

Springing is provided by laminated main and helical auxiliary springs fully compensated on each side of each bogie.

Tilting of the bogies is prevented by resilient and bearers between the bogie headstock and the underframe. These end bearers carry an initial spring load to damp out oscillations.

Axle boxes are of the SKF self-aligning type sealed against the entrance of dust.

Each bogie carries three 450 horsepower motors with 19/70 gear ratio driving 48 inch diameter wheels.

Other equipment includes an 18 inch 250 watt headlight at each end, marker lights, a speedometer with range to 75 m.p.h., two cab heaters, an air-operated chime horn, and pneumatic sanding gear.

General Particulars

Voltage	1,500 D.C.
Wheel arrangement	0 - 6 plus 6 - 0
Weight	112 tons 7 cwt.
Axle load	18¾ tons
Wheel diameter	48 inches
Bogie wheel base	14' 0"
Total wheel base	41' 0"
Length over body	51' 2"
Length over coupling faces	55' 4"
Tractive effort: one hour rating full field	38,700 lbs.
25 per cent adhesion	66,000 lbs.

The 40 electric locomotives ordered from Great Britain are similar to electric locomotive 4501 described above, but they will be provided with the necessary equipment for multiple unit control and will be fitted with six 630 horsepower motors.
