NOTES ON

ROLLING STOCK MAINTENANCE PRACTICE.

Rolling stock maintenance practice vitally affects the economic administration of all transport systems. It is not enough to put a good tram on the street; the greater job is to keep it on the street and in service for as many days in the year as possible. In Melbourne we have 520 electric cars in service spread over 10 depots, and it is at these depots and at Preston Workshops that the work of maintenance is carried out. Every car has its regular day in the depot each week. ~~While~~ although on that day it may go into service for the morning peak load, it is brought in immediately afterwards so that its equipment may be inspected and adjusted. Inspection covers all working parts. For instance, the clearance between the armatures and the poles of the motors is examined, the wear of suspension bearings is checked to see that our limit of 1/16th. of an inch is not being exceeded, commutators and brushes are looked after, the controllers and contactors are scrutinised, fingers and segments are cleaned up or renewed and carbon removed. We are experimenting with light oil for lubricating fingers and segments. Practically we allow no wear on our armature bearings. Particular attention is paid to brake gear, and the trolley gear also receives attention. A carbuilder then comes along and examines the body and carries out such minor repairs as he finds necessary. Each car is then washed, first being run through a spray slowly, wiped down with sponges, and then taken through the spray once more before being wiped down with chamois. The spray not only saves time but provides clean water, which is very difficult to ensure when buckets are used. Even on their day in all cars must be available for the evening peak.

In addition to the day shift which carries out the work I have detailed briefly, we have an evening shift of pitmen who work until the last car is brought in. These men stand by in case of mishaps and attend to cars which have finished for the day. The brake adjustment is seen to as each car enters. At 4 a.m., the cleaners arrive, sweep out and dust all cars and clean the windows. Advantage of the morning peak is taken when the depots are empty by observing the breakfast hour and in sweeping out the sheds, work which in the absence of the cars is performed with

ease and much more ~~efficiency~~ effectively than it would be if done at any other time. At all depots a single truck car is kept available with an emergency outfit, while at the city depot a motor lorry similarly equipped stands by at all times. During the running hours an emergency fitter is stationed in Swanston Street.

We have installed wheel grinders at two of our depots for taking out flats. These are fixed machines. When a car has to be treated it is placed so that the wheels which require treatment are over the grinding wheels. Mechanical non-reversible jacks then take the weight of the axle under the suspension bearings, and two short lenghts of rails are removed, this allowing the emery wheels to be brought up to the treads. The emery wheels are set on saddles with **hand** travel. They are driven by motors in the pit while the axle is rotated by the tram motor, a resistance being used so that the speed is about 25 r. p. m. For small flats carborundum brake shoes are used; the drawback is that they do not leave the wheel perfectly round.

On the average our bogie cars run 37,000 miles a year, ~~which we find necessitates about two visits per annum~~ They are out about twice a year Trips to the Preston Workshops for rewheeling and for the adjustment of defects or repairs due to collisions. Our practice is, no matter for what purpose the ~~visit~~ trip is made, for each car to be inspected by all the foremen. By so doing we detect trouble in the early stages and are consequently very free from breakdown on the road. For the year which ended on the 30th. June last the number of cars brought of the road for defects was only 3·13 per 100,000 miles As our cars ran 15,600,000 miles last year that figure is one which gives us much satisfaction. The percentage of cars available for maximum service during maximum loading periods was 94·94 & the mileage obtained from steel tires with 26" wheels was 80,000 & these figures, I think, demonstrate clearly the value of systematic inspection & maintenance. When each car completes 100,000 miles it is sent to the workshops for a general and complete overhaul. All parts are taken down and renewed or repaired as required.

For some time we have not ~~kept any particular motors, or~~ confined certain makes of motors to cars of a particular class. All our standard bogie cars have 40 h. p. motors with characteristics so similar that they permit the use of common controllers and rheostats. This practice in turn has enabled us to keep our spare trucks and motors at a minimum and reduce the time off the road of a car developing motor fault.

The Board has a number of roller bearings on armatures. Great difficulty was experienced in the early days in running these satisfactorily. It is now our practice to fit alemite greasers, using a stiff grease, and to make the lubrication the work of one man, who travels round to all depots.

For two years we have been experimenting with gear lubricants. To shorten the tests, soft nickel-steel pinions were installed, each treated with a different lubricant. To date some of these have run 90,000 miles with a minimum wear of sixteenth-thousandths. We have found that the bituminous mixtures have given the best results. We are now using a lubricant known as "Gear Shield". This comes to us in thin rectangular cakes of 3 ozs. Every two weeks one of these cakes is pushed in between the pinion and the spur. In changing over we have found it necessary to remove all the old grease and to use as an initial supply of 10 ozs. of the gear shield pasted round the wheel. The use of cakes in this way ensures sufficient supply without waste and enables the greasing to be carried out rapidly and cleanly.

So far as car painting is concerned, the Board decided about three years ago to alter the standard colour from brown to green for two reasons, first, because green was brighter and more cleanly looking and cheerful, and, second, because enamels in dark colours are not satisfactory The change enabled the general use of enamels to be made with a saving in cost and a reduction of time in the workshop. We have investigated the use of nitro cellulose lacquers, and several cars have been treated by various makers. Until the last 12 months our experiments were not a success, but cars treated recently appear likely to be satisfactory.

None of the brushing lacquers appear to be suitable for our large surfaces, so that spraying is necessary. We have found that the greatest care is necessary in preparing the under coatings; any oil or grease must be entirely removed. Experts are now discarding the old quick-drying undercoat material for a slow-drying mixture. As any scratches or imperfections show up when the job is finished, the rubbing down of undercoats must be done carefully. A temperature of not lower than 60 degrees is advisable. Moist weather is a handicap, as it is likely to spoil the surface by bringing a bloom on it. Even with the slow-drying undercoats a car can be put through in 10 days as against 14 for enamel, while there is every reason to believe that the life of

lacquer will be longer than that of enamel, although there is little difference in first cost.

Owing to the heavy wear they get, seats have to be re-varnished every six months. We have tried out various makes of clear lacquer without success. They do not appear able to stand up to the direct rays of the sun, and flake off. Lacquers have not been very successful on wood, although considerable improvement in this connection has been noted recently. We have had several steel cars treated by the makers' experts with a view to arriving at an opinion on the relative merits of the makes offering. Several cars have been treated by our own staff also. One firm has been allowed at its own expense to lacquer over the enamel on one of our composite steel and wood cars. All these tests are being regularly watched and the behaviour of the lacquer recorded.