BALLARAT TRAMWAYS

1st November, 1949

To MANAGER, BALLARAT BRANCH

TRAMWAYS - TAIL LIGHTS

Reference instructions from Engineer & Manager contained in memorandum dated 30th September, 1949, (THT/MO'N). From the installation details it would appear that the Commission's specifications require, additional to the independent power supply by acid batteries, that :-

(a) Red lights are to be shown at both ends of the tram when power goes off traction at night or the pole is removed from the wire.

(b) Under normal conditions the red light shall be at rear end only.

(c) It is desirable that the normal headlight change-over switch effect the automatic change of tail lights also.

These conditions are contained in the experimental installation detailed in Drawings Nos. 8356-8357, but the manner in which the installation is developed creates some difficulties incurring considerable expense, and also a very definite economic factor in respect to battery charging. The system is, therefore, subject to criticism as follows :-

(1) The use of packing ring (A) has not been necessary in this branch, and its provision would incur some expense. In explanation, the use of Edison Screw Lamps provides for batten type lamp holders, which are mounted in our headlight castings on adjustable brackets to permit lamp focus to the reflector.

(2) The type of headlight casting shown in the drawing is only on eleven trams in this branch, and fourteen trams have A.G.E. headlights of shallow type in which the reflector is held by a central bolt to the back of the casting. In these the tail lamp must be separately housed at the back of the casting, and in this regard a special type of elbow has been used.

(3) The obscure position of the tail lamp and the small lens used require the use of comparatively high wattage lamps to be reasonably effective.

(4) The obscure position of the tail lamp and the small lens used gives a reduced efficiency other than to the direct rear of the headlamp fitting, the efficiency being almost nil at 90° angle thereto.

(5) Whilst the tail light is effectively neutralised by the headlight, it is uneconomic that both lamps are required to exert a drain on the battery continuously.

(6) There is a reduction in red light efficiency in the partial neutralisation effected by motor car headlamps impinging on the lens and reflector of the tram headlight, and this neutralisation is greater at the angles where the red light is less effective.

Of little or no importance.

(7) The provision of special resistance units to provide for battery charging has not been undertaken so far because it is considered that the current consumption entailed renders the system untenable, and also that the disabilities of stability, ventilation and fire safeguards necessary for the dissipation of some 1,750 watts of energy at 560 volts potential, require special consideration. From tests carried out on No. 26 tram, the current taken from the battery rates at 4 amps, and with an average of, say, six hours' operation of tail lamps, would take 24 amp-hours from the battery. The instructions show a resistance to pass 3 amps, and this would require eight hours' operation to maintain the battery. The resistance would be of 185 ohms, and would use 1,750 watts, or approximately 14 kWhrs. per tram per day. With a nominal service of sixteen trams, the daily consumption for battery charging would be approximately 224 kWhrs. On this basis, the estimated consumption would be 1,568 kWhrs. per week, and 81,536 kWhrs. per annum. The added annual cost for power at 0.68d. per kWhr. would be approximately £230. However, on the basis that this load has no diversity and is coincident with peak, the actual cost would be the full demand, plus energy charge, amounting to approximately £325 per annum.

To summarise these features, therefore, it is submitted that alternative methods of tail light installations should be investigated in view of :-

(i) Installation costs (alteration to headlamp castings and special fittings)
(ii) High wattage lamps required.
(iii) High battery drain (continuous use of both tail lamps)
(iv) Cost of special resistance units.
(v) Uneconomic use of power for battery charging.
(vi) Weaknesses incidental to location of tail lamp.

It is suggested, therefore, that the requirements of the Commission could be more cheaply and economically obtained by -

(A) Use of separate tail lamps for greater efficiency and use of low wattage lamps.

(B) Reduction of battery drain would permit battery charging through lamp circuits, and eliminate both the use of resistance units and any increase in power consumption.

(C) Use of relays in headlight circuits to automatically operate the tail lamps.

Experimental tram No. 26 has accordingly been fitted at one end with tail lamps under this scheme, and they also have operated satisfactorily during the three weeks of the tests. It was found that the battery charging rate through the lamp circuits is 1.05 to 1.10 amps. Using twin tail lights of 6-volt 3-watt auto type, the consumption is 1.00 amp. The net result, therefore, of the battery being under charge when the tail lamps are in use is a charge condition of only from 0.05 to 0.10 amp.

The maximum discharge rate with tail lights at both ends would be only 2.00 amps. when power is off or pole removed from the overhead wire. An advantage of the use of twin tail lights would be in the event of a lamp failure, the lamps being wired in parallel. The parts used were obtained from Auto Services, the tail lamps at 6/- each and horn relays at 5/6d. each. The cost of the necessary parts, therefore, would be nominally less than 35/- per tram. No alteration is required to existing fittings, and the wiring is simplified by the reversing of the usual operation of the relay.

Details of the car lighting and the alteration to wiring necessary for this system are shown on the accompanying sketch.

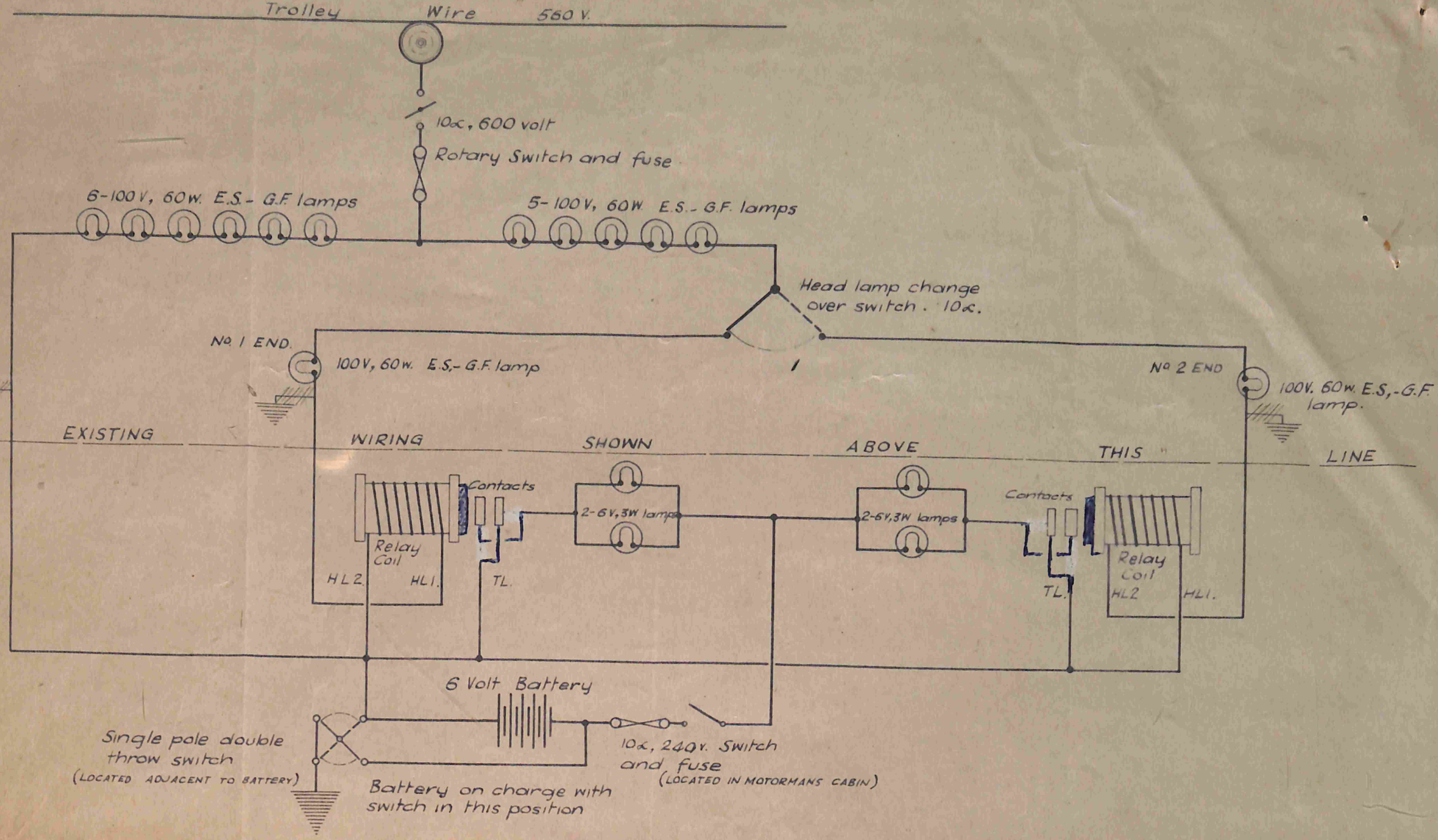
(SIGNED) A. V. MAWBY

B.T.S.

STATE ELECTRICITY COMMISSION OF VICTORIA

ELECTRICITY SUPPLY DEPARTMENT

BALLARAT ELECTRIC TRAMWAYS



REVISION	DATE	REMARKS	CHECKED	PASSED

WIRING DIAGRAM

TRAMCAR TAIL LAMP AND BATTERY CHARGING ARRANGEMENT.

SECTION No.

DRAWN

TRACED

CHECKED

CHIEF DRAUGHTSMAN

DRG. BA-T8-8100.

MANAGER

BALLARAT BRANCH