

THE
ELECTRIC TRAMCAR
HANDBOOK

THE ELECTRIC TRAMCAR HANDBOOK

FOR MOTORMEN, INSPECTORS, AND
DEPÔT WORKERS

BY

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INTRODUCTION.



THIS handbook has been compiled with a view of bringing together, in convenient form, a simple description of modern electric tramcars, and to give instruction regarding the proper operation of these vehicles on the road.

The recent great development of electric tramway systems in this country has occasioned a wide-spread demand for capable and intelligent men to act as motormen, and in the car sheds and depôts of the various companies and corporations a large and increasing number of engineers and assistants find daily employment.

Information is given in the following pages which will be useful to men wishing to qualify for positions as motormen who are at present gaining practical experience in operating cars for the first time.

It will also be of assistance to those readers who are earning a livelihood at such work, and who desire to know more about the vehicles under their charge, with the view of becoming more expert at their work or securing promotion to better positions on the staff.

To men engaged in car depôts and repair sheds the chapters dealing with car equipments and apparatus will be of interest, as also the chapter relating to "faults and breakdowns," and may assist them to more fully understand the machinery under their care and indicate the precautions necessary to ensure its proper working.

In taking up the subject of electric cars the novice would be well advised to carefully read and master each chapter in the order given, otherwise he may find some difficulty in understanding the matter dealt with towards the end of the book and be needlessly discouraged from further effort.

Many people think electrical machinery so mysterious and complicated in action as to be quite beyond their understanding; while it must be admitted that some electrical appliances are rather complicated in construction, yet a great deal of the mystery vanishes when the simple fundamental laws which govern the electric current have been mastered and the knowledge thus gained made use of.

The first chapter of this handbook explains some of these laws relating to the current, and mentions the different effects to which the passage of a current may give rise when sent along a suitable "conductor."

Mention is also made of the methods of producing and controlling the electric current, and the meanings of the units volt, ampère, and ohm are explained in simple language.

Some motormen know nothing whatever beyond the actual manipulation of the platform handles, and yet are able to run their cars with safety and dispatch under ordinary circumstances; but when a breakdown occurs they are unable to effect a remedy, and if a defect develops in certain parts of the equipment may allow their cars to get beyond control, with disastrous consequences to all concerned.

A motorman of this class, who does everything in a mechanical fashion, cannot appreciate the possibilities of economically operating his car, and cannot understand the meaning and reason of the rules issued to him by his superiors.

It is evident that the more a man knows about his work the better is his chance of securing steady employment and better pay.

The best motorman is the one who understands the apparatus he is handling, and operates it as instructed by his employers, and in accordance with the dictates of common sense.

He must be physically strong enough to control the car under all conditions and to withstand the constant exposure to the weather on a car platform.

He is expected to keep himself mentally alert and capable of performing his duties without accident, and to this end must rigidly abstain from stimulants during working hours, and pay attention to the ordinary rules of health and good living.

A motorman, to be able to safely operate a heavy car through the crowded streets of one of our large cities, and on the severe grades and slippery tracks which often exist, must necessarily keep himself in fit condition, otherwise he risks being put aside for abler men, and may have to take up less exacting duties at a correspondingly less rate of pay.

Tramway managers are always ready to recognise good men and retain their services, while being just as anxious to get rid of ignorant and unsatisfactory men who are always in trouble.

The writer will be pleased to receive criticisms and suggestions for improvement in future editions, should such be called for, and he wishes to thank the British Thomson-Houston Company, the British Westinghouse Company, the Brush Electrical Engineering Company, the British Electric Car Company, Messrs. Dick, Kerr and Co., Messrs. Estler Bros., Messrs. Bruce, Peebles and Co., and other firms for their kindness in furnishing diagrams and descriptions of the various machines and fittings manufactured by them.

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CHAPTER I.

THE ELECTRIC CIRCUIT.

Conductors and Insulators.—To convey electricity to any distant point, a suitable conducting path must be provided along which it may travel.

If a continuous flow of current is required the conducting path must be arranged in a complete loop or circuit, so that the power may arrive back again at the generating point.

Many different materials are able to "conduct" electricity, but certain of these are better than others, as they offer comparatively little resistance to the passage of the current. Silver is the best conductor, but copper is most commonly used. Some metals and alloys offer great resistance to the current, and are only used where this property is found serviceable.

Materials which are unable to conduct electricity are termed **non-conductors** or **insulators**.

The insulators in general use are wood, indiarubber, asbestos, mica, cotton, paper, etc., and these are used when it is necessary to protect a conductor from leakage or to keep it from coming in contact with other conductors.

When a bare conductor is used it must be supported at intervals on suitable insulators. A familiar example of this is seen in telegraph or telephone lines.

When conductors are bunched together or are likely to touch other conductors, they are usually protected by a covering of insulating material.

Properties of the Current.—When electricity is flowing along a metallic conducting path it shows its presence in two ways :

(A) By heating its conductor.

(B) By a magnetic effect.

Heating Effect.—The first-noted property is taken advantage of to produce light, as in electric glow lamps,