I. C. S.

REFERENCE LIBRARY

A SERIES OF TEXTBOOKS PREPARED FOR THE STUDENTS OF THE INTERNATIONAL CORRESPONDENCE SCHOOLS AND CONTAINING IN PERMANENT FORM THE INSTRUCTION PAPERS, EXAMINATION QUESTIONS, AND KEYS USED IN THEIR VARIOUS COURSES

TRAMWAY SYSTEMS
TRAMWAY TRACKS
TRAMWAY OVERHEAD WORK
TRAMWAY CARS AND EQUIPMENT
BRAKES AND BRAKE RIGGING
TRAMWAY MOTORS AND CONTROLLERS
DIRECT-CURRENT RAILWAYS
ALTERNATING-CURRENT RAILWAYS
ELECTRIC SIGNALLING ON RAILWAYS

7 1489

LONDON
INTERNATIONAL CORRESPONDENCE SCHOOLS, LTD.
22

Copyright. Entered at Stationers' Hall, London.

Tramway Systems: Copyright, 1905, by International Textbook Company. Entered at Stationers' Hall, London.

Tramway Tracks: Copyright, 1905, by International Textbook Company. Entered at Stationers' Hall, London.

Tramway Overhead Work: Copyright. Entered at Stationers' Hall, London.

Tramway Cars and Equipment: Copyright. Entered at Stationers' Hall, London.

Brakes and Brake Rigging: Copyright, 1905, by International Textbook Company. Entered at Stationers' Hall, London.

Tramway Motors and Controllers: Copyright, 1905, by International Textbook Company. Entered at Stationers' Hall, London.

Direct-Current Railways, Part 1: Copyright. Entered at Stationers' Hall, London.

Direct-Current Railways, Part 2: Copyright, 1905, 1909, by International Textbook Company. Entered at Stationers' Hall, London.

Alternating-Current Railways, Part 1: Copyright. Entered at Stationers' Hall, London.

Alternating-Current Railways, Part 2: Copyright, 1905, 1908, by International Textbook Company. Entered at Stationers' Hall, London.

Electric Signalling on Railways: Copyright. Entered at Stationers' Hall, London.

All rights reserved.

4891 WYMAN & SONS, LTD., PRINTERS, READING AND LONDON 22

CONTENTS

	Section	Page
TRAMWAY SYSTEMS	63	1
Construction and Equipment	63	1
Development of Tramways	63	3
Power Supply	63	4
Methods of Current Collection	63	22
Transmission and Distribution of Current	63	25
Estimate of Power Required	63	41
Situation of Power House	63	47
Examples of Small Tramway Power Stations	63	50
Tramway-Station Records	63	
TRAMWAY TRACKS	64	1
Track Work	64	1
Rails and Rail Adjustments	64	13
Rail Joints	64	24
Rail Corrugation	64	26
Special Track Work	64	37
Track Construction and Paving	64	42
Electrical Considerations	64	
TRAMWAY OVERHEAD WORK	65	1
Mechanical Considerations	65	1
Suspension of Trolley Wires	65	14
Trolley Wire	65	19
Insulating Fittings	65	29
Frogs and Crossings	65	35
Erection of Overhead Work	65	

Tramway Overhead Work—*Continued*	Section	Page
Electrical Considerations	65	41
Supply and Control of Current to Trolley Wires	65	41
Economical Use of Feeders	65	49
Accidents Due to Fallen Trolley Wires	65	62
Tramway Cars and Equipment		
Construction of Cars	66	1
Car Bodies	66	1
Trucks	66	8
Car Wheels	66	23
Life Guards	66	27
Equipment of Cars	66	28
Collectors	66	28
Auxiliary Apparatus	66	37
Car Resistances	66	37
Switches and Circuit-Breakers	66	40
Fuses	66	47
Car Meters	66	49
Lightning Arresters	66	51
Leakage Indicators	66	52
Car Wiring	66	54
Car Depot	66	57
Arrangement of Car Shed and Repair Shops	66	57
Brakes and Brake Rigging		
Tramway Brakes	67	1
Mechanical Brakes	67	1
Hand-Applied Wheel Brakes	67	4
Track Brakes	67	10
Electric Brakes	67	16
Combined Electrical and Mechanical Brakes	67	18
Brakes for Electric Railways	67	22
Arrangement of Rigging	67	22
Braking Systems	67	26

Brakes and Brake Rigging—*Continued*	Section	Page
Compressed-Air Brakes	67	26
Vacuum Brakes	67	31
Tramway Motors and Controllers		
Tramway Motors	68	1
Selection, Rating, and Lubrication of Motors	68	1
Gears and Motor Characteristics	68	6
Examples of Tramway Motors	68	17
Westinghouse No. 200 Motor	68	17
British Thomson-Houston G.E. 52 Motor	68	24
Dick-Kerr 25A Motor	68	30
Dick-Kerr Interpole Motor	68	33
Tramway Controllers	68	35
Rheostatic Control	68	35
Series-Parallel Control	68	46
Regenerative Control	68	68
Direct-Current Railways		
Principles of Design	69	1
Types of Railways	69	1
Calculations	69	4
Control	69	16
Multiple-Unit System	69	16
Energy Consumption	69	19
Energy Supply	69	28
Track	69	32
Electrification of Railways	69	38
Rolling-Stock Accessories	70	1
Railway Motors	70	1
Motor Coaches	70	15
Current Collectors	70	19
Systems of Control	70	28
General Requirements of Control Systems	70	28
Sprague-General-Electric Type M Control	70	36
Westinghouse Electro-Pneumatic Control	70	54
Dick-Kerr Control Systems	70	61

DIRECT-CURRENT RAILWAYS—*Continued*	*Section*	*Page*
Conductor Rails	70	73
Track Construction	70	81
ALTERNATING-CURRENT RAILWAYS		
Three-Phase Railways	71	1
Characteristics of Three-Phase Motor	71	1
Speed Control of Induction Motors	71	10
Examples of Three-Phase Railways	71	32
Equipment of Burgdorf-Thun Railway	71	32
Equipment of Motor Coaches for Valtellina Railway	71	39
Two-Speed Locomotive for Valtellina Railway	71	43
Three-Speed Locomotive for Valtellina Railway	71	53
Two-Speed Locomotives for Simplon Tunnel Railway	71	57
Four-Speed Locomotive for Simplon Tunnel Railway	71	60
Overhead Construction for Three-Phase Railways	71	64
Single-Phase Railways	72	1
Series Alternating-Current Motor	72	1
Compensated Repulsion Motor	72	27
Systems of Motor Control	72	39
Current Collectors	72	69
Suspension of Overhead Conductor	72	74
Feeder Systems on Alternating-Current Railways	72	87
ELECTRIC SIGNALLING ON RAILWAYS		
Systems of Signalling	73	1
Forms of Railway Signals	73	1
Telegraphic Block Systems	73	5
Lock-and-Block Systems	73	13
Operation of Single Lines	73	36
Power Operation of Points and Signals	73	37
Automatic Signalling Systems	73	44