

**ELECTRICAL
MEASUREMENT AND THE
GALVANOMETER: ITS
CONSTRUCTION AND USES**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649536016

Electrical Measurement and the Galvanometer: Its Construction and Uses by T. D. Lockwood

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

T. D. LOCKWOOD

**ELECTRICAL
MEASUREMENT AND THE
GALVANOMETER: ITS
CONSTRUCTION AND USES**

ELECTRICAL MEASUREMENT
AND THE
GALVANOMETER:
ITS CONSTRUCTION AND USES.

By **T. D. LOCKWOOD.**

PUBLISHED BY
J. H. BUNNELL & CO.,
No. 112 Liberty Street.

NEW YORK,
1883.

PREFACE.

THE author has made it his aim, in the preparation of this little book, to set forth the principles of electrical measurement and the construction and uses of the most important forms of the galvanometer in as simple and concise a manner as lay in his power, and in language as plain as possible.

All who have passed through the amateur stage of electrical science, know that, irrespective of the clearness and lucidity of explanations made in that science, there remains, owing to the absolute mystery of the force on which it is based—electricity itself—a certain darkness and ambiguity which is very difficult to dispel, and which, to students, is in the highest degree discouraging. Yet, by bringing common sense, common sense language, industry and perseverance to bear upon the subject, much of this darkness may be dissipated.

There is no branch of electrical science more beautiful, more interesting, and we may even say more entertaining, than electrical measurement and testing; yet it is well known that its processes have been contemplated with strong aversion by many to

whom a knowledge of such manipulations would prove invaluable.

Knowledge of the higher mathematics is such an invaluable aid in these processes, that it is not surprising that those familiar with algebra, and the differential and integral calculus, should have availed themselves extensively of such an aid ; it is, however, to be lamented that nearly all the text books on this most important subject assume their readers to be proficient in mathematical knowledge, and use mathematical symbols to explain, or rather to disguise, the most ordinary measurements.

Many students are thus frightened away from galvanometrical tests, for just as the school-boy dreads the processes of arithmetic, and sings the old rhyme :

“ Multiplication is vexation,
Division twice as bad ;
The rule of three doth puzzle me,
And practice drives me mad,”

so the majority of his full-grown brethren regard with suspicion algebraic equations and symbols, whether easy or complicated.

Whatever otherwise may be the faults of this little book, and doubtless they are many, it is the proud boast of both author and publisher that no algebraic equation appears therein, and that arithmetic has been found sufficient for the formulæ contained in

its pages. It is not expected that the information contained herein will be greatly beneficial to experienced electricians; but it is hoped that students, operators, inspectors and amateurs will find it an assistance in their labors and in their pursuit of knowledge, and that it will measurably fill a long-vacant niche in electrical literature.

The best electrical text-books have been, in its preparation, consulted and extensively drawn upon. We are especially indebted to Kempe's "Electrical Testing," Haskins' "Galvanometer, and its Uses," Schwendler's "Testing Instructions," and Thompson's "Electricity and Magnetism."

MALDEN, Mass., March, 1883.



ELECTRICAL MEASUREMENT AND THE GALVANOMETER :

ITS CONSTRUCTION AND USES.

WHEN a man, intending to build a house, a business block, or a factory, goes to buy his land as the preliminary transaction, he has usually calculated the cost, size and character of the buildings he purposes to erect, and he has estimated the quantity of land necessary. Finding a lot which, in other respects, meets his requirements, he ascertains its size by measuring ; for if his intention is to put up buildings covering a superficial extent of ten acres, it is hardly probable that he will attempt to do it on a five-acre lot. He will not ordinarily set out to build a block having a frontage of five hundred feet on a land frontage of a hundred feet.

If we are buying our winter's supply of coal, we buy it by the ton, and we want it weighed ; we do not care to have the coal dealer guess at the weight, and pay him perhaps for six tons when we receive but five. Similarly, the coal dealer himself finds it to his interest to weigh his coal, as he on his part does not care, as a rule, to receive a cash equivalent for five tons, when he has furnished six.

In carpeting a room, a person with but a grain of common sense, first measures the room, and orders

accordingly, saying, "I want so many yards." He would never think of looking at the room, and then walking off to the carpet store and saying, "Well, unroll your carpet; I'll tell you when there's enough."

In commencing any branch of manufacture requiring power, no one would think for a moment of putting in a hundred horse-power steam engine to do work requiring but one horse-power; neither would we contemplate the desirability of utilizing a donkey engine to set a dozen quartz mills in motion.

The power of the steam engine or other motor is always in some degree at least proportionate to the work to be done.

Thus, in all the daily commercial and mechanical transactions of life, we are accustomed to institute some system of measurement, weight, or comparison, whereby we may intelligently buy, sell, and use the various agencies, necessaries and comforts of civilized life.

Singularly enough, during the early days of telegraphy, and, indeed, until a comparatively recent date, measurements in electricity were scarcely heeded or thought of, and the chapter of accidents was, in a great measure, trusted to, in the construction and maintenance of a line of telegraphy.

The line was built, perhaps, of several gauges and grades of wire, the ground plates consisting of two