

**MANUAL OF
TOPOGRAPHY, AND TEXT-
BOOK OF TOPOGRAPHICAL
DRAWING**

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Manual of Topography, and Text-Book of Topographical Drawing by J. Enthoffer

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J. ENTHOFFER

**MANUAL OF
TOPOGRAPHY, AND TEXT-
BOOK OF TOPOGRAPHICAL
DRAWING**

MANUAL OF TOPOGRAPHY,

AND

TEXT-BOOK OF TOPOGRAPHICAL DRAWING;

FOR THE USE OF

OFFICERS OF THE ARMY AND NAVY, CIVIL ENGINEERS, ACADEMIES,
COLLEGES, AND SCHOOLS OF SCIENCE.

BY

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(FORMERLY OF THE IMPERIAL AUSTRIAN MILITARY GEOGRAPHICAL INSTITUTE,
AND OF THE IMPERIAL RUSSIAN TOPOGRAPHICAL DEPOT.)

WITH AN ATLAS.

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P R E F A C E .

THE art of topographical drawing, at the present time, is pursued only in military schools, with more or less assiduity, and in polytechnic institutions, as far as it is deemed necessary to enable the future field-engineer to represent a plan in outline. From what can be ascertained, it appears, however, that proper attention, if any at all, is not awarded in higher schools to this art: proper attention, we say, because we believe that no clear conception of the configuration of surface can be formed from the study of geography or geology, if these branches of science are represented by sketches of physical outlines on a small scale, such as from four to ten-millionth only. In profile-drawings these are sufficient; but a topographical plan, in order to show the true formation of a ground, must be drawn on a larger scale. In reduced maps the picture diminishes gradually into an abstract form, and deviates the more from the real the less the space given to the object. The purpose of a map will therefore always regulate the scale of its construction; and it is evident that, when the latter becomes so large that the use of conventional signs is no longer applicable, because of all objects appearing in their true outline, it requires superior abilities on the part of the student; besides a regular course of instruction and opportunities for practical improvement must be afforded him in order to attain usefulness and proficiency in the art.

Topographical drawing must go hand in hand with geodesy;

the latter determines the relative proportions of a part of the earth's surface, and the former represents the same in bird's-eye view. Both studies owe their cultivation to the importance of a knowledge of topography, which plays an essential part, not only in national economy, but also in the development and progress of nations.

The great usefulness of topographical knowledge in war is forcibly proclaimed in Greek and Roman annals. The art of surveying can be traced back as far as the Pharaohs; yet the art of topographical drawing remained in a state of imperfection down to the early part of the nineteenth century.

With the ability of manœuvring large bodies of troops, arose the necessity of a more exact acquaintance with the condition of the ground upon which they were to be moved. To this end Napoleon I. organized a distinct body, the *Corps des Guides*,* whose duty it was to examine the country in advance of the armies, and to make sketches and plans, which might serve as a basis for the position of troops. The art of topographical drawing, however, was rescued from its former vaguely-defined character by the Saxon major, Lehmann, first in 1811, and established on mathematical principles. From that time Lehmann's system, with slight modifications, has been introduced into nearly all European countries, and also into the United States.

If it is an undeniable fact that all strategic as well as tactic combinations are based upon an accurate knowledge of the organization of states and of the conformation of their territory, then the importance of the science of topographical design is sufficiently established, and it ought to be considered as one of the principal requirements of a military education.

* The engagement at Valleggio, 1796, in Italy, gave rise to the organization of the *Corps des Guides* in the French army; for, when Napoleon had established his headquarters near that place, some Austrian troops succeeded in surprising it, and the commander-in-chief escaped being made a prisoner only by accident.

Of no less importance is this science to the engineer who lays out highways, canals, railways, and cities. He who understands drawing correctly, and has studied the topographical relations of the surface, can alone form a true estimate of the value of a correct topographical drawing.

Not only to engineers and soldiers has this branch of knowledge become indispensable, but also to the learned in general, since it enables them to follow intelligently the graphic representations which accompany works of natural history.

The author of this work, well acquainted with the requirements of the soldier and engineer, and having gained his experience by a service of thirty years in topographical institutions of both the Old and the New World, hopes that he will be successful in supplying a want long felt. To this end the most prominent systems, those of Lehmann, Dufour, and Olsen, have been examined, and in the selection of illustrations the best surveys and maps have been consulted. Not content with simply presenting models for graphical imitation only, the work endeavors to direct the attention of the student to their physical and military significance in a brief summary.

In giving directions for drawing and copying the plates, it was deemed necessary to modify the method hitherto in use, in order to avoid, as much as possible, the technical difficulties which could have been overcome in the old way only by much practice and loss of time, and to facilitate the process by expedients, so as to enable the student to produce in less time not only correct but even well-executed copies.

With regard to the style and phraseology of the work, the author feels himself obliged to apologize to the public for certain Germanisms, which even sundry English scholars whom he consulted could not altogether avoid, without running the risk of misrepresenting the subject-matter described. This has been the more difficult, as the English literature has hitherto not been called upon to effect much in this branch of knowl-

edge; thus the all-important references to authorities do not exist. As the German literature is in this science so amply provided for, the author wrote the work in the first instance in German, for the sake of comparison; consequently he found how difficult it would have been to compose such a work in English.

He is indebted to many of his friends for kind suggestions, and thinks it proper to add some remarks by Mr. Noel Hope, who revised the work, on translating in general:

"Lamartine has somewhere said that, of all literary work, a translation is the toughest. The dictum is correct, for, not only must the translator have the idioms and genius of two languages at command, but, in order to insure perfection, he must be conversant with the subject under consideration.

"It is utterly impossible to avoid, *in toto*, giving a foreign aspect to the phraseology of a rendering from the German, unless a freedom be adopted which, in works relating to certain special sciences, is not permissible.

"Any one curious enough to compare the superabundance of words the German language luxuriates in, with the paucity of any other in this regard, need but to try his hand at a translation where science is concerned, to be convinced at once that the Teuton tongue is a grand old oak, the mere offshoots of which have become cognate dialects; and that, despite whatever beauties may be claimed for them, they are, nevertheless, one and all, vastly inferior to the parent stem."

J. ENTHOFFER.

WASHINGTON, D. C., May 1, 1870.

CONTENTS.

	PAGE
PREFACE,	5
INTRODUCTION,	13
Preparatory Studies,	14
Literature,	15

PART I.

MATERIALS, INSTRUMENTS, ETC.

Drawing Materials,	17
Instruments,	18
Technical Facilities in copying Topographical Drawings,	18
Scales,	19
Projection,	20

PART II.

OF LETTERS USED IN TOPOGRAPHICAL DRAWINGS.

Proportionality in a Special Sense, and the Principle of Proportionality in general,	24
Construction of Map Letters,	27
Map-lettering,	32

PART III.

CONVENTIONAL SIGNS.

A.—Conventional Signs of the Army and Navy,	34
B.—Conventional Signs of Topography,	34
Condition of the Ground,	37
Conventional Signs of Hydrography,	44
Natural and Artificial Passages over Water (see Plate VIII.),	53
Conventional Signs of Habitations—Plates IX. and X.,	54
Remarks on copying the Preceding Plates,	61