

DEPARTMENT OF THE INTERIOR  
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY  
George Otis Smith, Director

Bulletin 788

TOPOGRAPHIC INSTRUCTIONS  
OF THE  
UNITED STATES GEOLOGICAL SURVEY

C. H. BIRDSEYE  
Chief Topographic Engineer



OHIO STATE  
UNIVERSITY

UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON  
1928

Q1 75

32

No. 788-791

Copies 6

JAN 27 1975

ADDITIONAL COPIES  
 OF THIS PUBLICATION MAY BE PROCURED FROM  
 THE SUPERINTENDENT OF DOCUMENTS  
 U. S. GOVERNMENT PRINTING OFFICE  
 WASHINGTON, D. C.  
 AT  
 60 CENTS PER COPY

U.S. GOVERNMENT PRINTING OFFICE  
 WASHINGTON, D. C.

## CONTENTS

---

[The letters in parentheses preceding the titles are those used to designate the papers for advance publication]

	Page
(A) Administration, by H. M. Frye (published November 15, 1926).....	1
(B) Triangulation, by E. M. Douglas (published December 22, 1926)....	47
(C) Transit traverse, by E. M. Douglas (published December 18, 1926)..	89
(D) Leveling, by E. M. Douglas (published December 13, 1926).....	117
(E) Topographic mapping, by W. M. Beaman (published April 2, 1928)...	161
(F) Map compilation from aerial photographs, by T. P. Pendleton (pub- lished February 27, 1928).....	379
Index .....	421

## ILLUSTRATIONS

---

	Page
PLATE 1. Observing tower and signals.....	52
2. Vernier transit-theodolite.....	52
3. Micrometer theodolite.....	52
4. Geological Survey marks for triangulation, transit traverse, and leveling .....	52
5. Apparatus used in transit traverse.....	90
6. Vernier transit, stadia rod, and range rod.....	91
7. Instruments used in leveling.....	128
8. Bumstead projection plate.....	178
9. Plotting scales.....	178
10. Plane table and tripods.....	194
11. Telescopic alidades.....	194
12. Stadia rod and rope.....	194
13. Aneroid barometer.....	194
14. Baldwin solar chart.....	218
15. Marginal lettering for topographic maps.....	282
16. Marginal lettering for river survey sheets.....	282
17. Reproduction of part of a topographic map.....	282
18-23. Standard map symbols.....	282
24. A single-lens camera.....	382
25. T-2 camera: <i>A</i> , Rear view; <i>B</i> , front view.....	382
26. T-2 camera: <i>A</i> , Focal planes and dark chambers; <i>B</i> , arrange- ment of lenses.....	382
27. The fixed T-2 transforming printer.....	382
28. Displacement chart.....	390
29. Map compiled from aerial photographs.....	402

	Page
FIGURE 1. Quadrilateral for adjustment by least-square method.....	70
2. Condition to be introduced in connecting new triangles to those previously adjusted.....	78
3. Method of adjusting a level net.....	158
4. Diagram illustrating 1° polyconic projection.....	168
5. Diagram illustrating 15' polyconic projection.....	171
6. Graphic solution of three-point problem.....	203
7. Diagram illustrating correction of base line.....	210
8. Graphic adjustment of traverse.....	214
9. Pattern and symbols for designation of forest land.....	260
10. Patterns and symbols for designation of arable land.....	260
11. Pattern and symbols for designation of grazing land.....	261
12. Diagram showing registration marks for rectangular grid.....	300
13. Lateral field of view of T-1 camera.....	382
14. Nodal points of a double convex lens.....	387
15. Conjugate focal planes.....	388
16. Relation of angles on photographic plate to corresponding angles on the ground.....	391
17. Displacement of photographic image due to relief.....	392
18. Displacement of photographic image due to tilt.....	393

## PREFACE

---

This manual is intended to replace all former instructions relating to the topographic work of the United States Geological Survey and to provide a manual of instruction for the personnel of other organizations engaged in topographic surveying. An attempt has been made to have these instructions complete so far as the technical work of topographic mapping is concerned. General regulations and instructions for the Geological Survey have for the most part been omitted, but those relating to fiscal affairs and to a few other important phases of administration have been digested and repeated herein.

The manual is issued in several parts, each covering a general subject, thus saving public funds by providing a distribution of separate parts to those interested only in one or more of the subjects. These several parts have been prepared by the members of the topographic branch best qualified for each task, and each part has been reviewed and revised by the section chief responsible for the administration of that particular part of topographic work.

Each part, except "Administration," has been approved by the Board of Surveys and Maps. In fact, all the technical parts have been reviewed by a committee of the board and made a part of a report of that committee.

Criticism of these instructions, suggestions for their improvement, and notice of errors or omissions are invited.

C. H. BIRDSEYE,  
*Chief Topographic Engineer.*

Approved:

GEO. OTIS SMITH, *Director.*

WASHINGTON, D. C., *June 7, 1926.*

