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The New Base Map of Ohio

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The necessity for reliable maps based upon actual surveys is apparent to most persons, but more especially so to engineers since they must be sure of the correctness of the data used in their work. Too many maps are merely patched up compilations from previous ones the accuracy of which is not to be relied upon. The result is that mistakes and errors are transmitted from one map generation to another. The new Base Map of Ohio, the original drawing of which has been recently completed, is based upon an actual topographic survey of the entire State and should, therefore, prove of great value.

The purpose in making this new base is to give to the various departments of the State an accurate map of Ohio on which the steam and electric railroads may be printed in colors to form a new railroad map, the highways printed as an overlay in colors to form a new highway map, and a special overlay to form a water resource map for the State Board of Health.

It is my purpose to give a description of this base map with such details of the drafting work as will be of interest to readers of The Ohio State

Engineer. The work is being done by authority of the Commissioners of Public Printing under the supervision of Prof. C. E. Sherman of the Civil Engineering Department of the University and the writer as Chief Draftsman.

The State of Ohio in cooperation with the Federal Government has been engaged for the past fifteen years in making a topographic survey of the State. This survey was completed recently, making Ohio the first large State in the Union to be thus completely surveyed. We are extremely fortunate in this particular as the war has stopped all similar mapping of interior portions of the country. In making this topographic survey Ohio was divided into *quadrangles* of 15 minutes of latitude and 15 minutes of longitude each. This area mapped to a scale of one mile to the inch gives a sheet approximately 13 inches by 17 inches. These sheets if pasted together would make a complete topographic map of the State some twenty feet square. Most readers of The Engineer are no doubt familiar with these quadrangle maps which show the topography by means of contours, the rivers, creeks, lakes, ponds, railroads, highways, cities, towns, villages, and even the houses.

The problem in making the original drawing for the new base map was to reproduce the essential features of these quadrangles (it takes 212 whole and partial quadrangles to cover the entire State) to such a scale as would give a smaller map of the State and at the same time give a drawing large enough to insure good and accurate drafting. After taking into consideration the amount of detail required to be shown and the amount of lettering of different sizes which would be necessary to give the names of the different cities, towns, and villages their proper emphasis, a scale of five miles to one inch was adopted. This made the size of the drawing 50 inches by 66 inches. In addition to the State proper, there was room enough to show a portion of each of the bounding states and also inset maps, to enlarged scale, of the eight largest cities.

The map was laid down on the polyconic projection plotted by rectangular coordinates taken from *Geographic Tables and Formulas* compiled by S. S. Gannett of the United States Geological Survey, Washington, D. C.

It was found that meridian 82° 45' (see diagram, Fig. 1) most nearly runs through the center of the State from north to south, consequently this was adopted as the principal meridian and

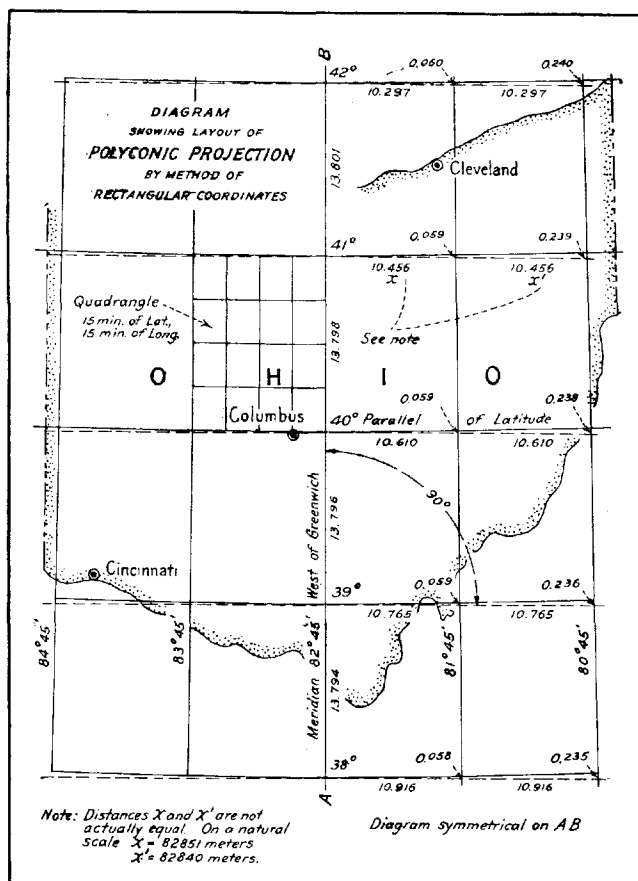


Fig. 1.

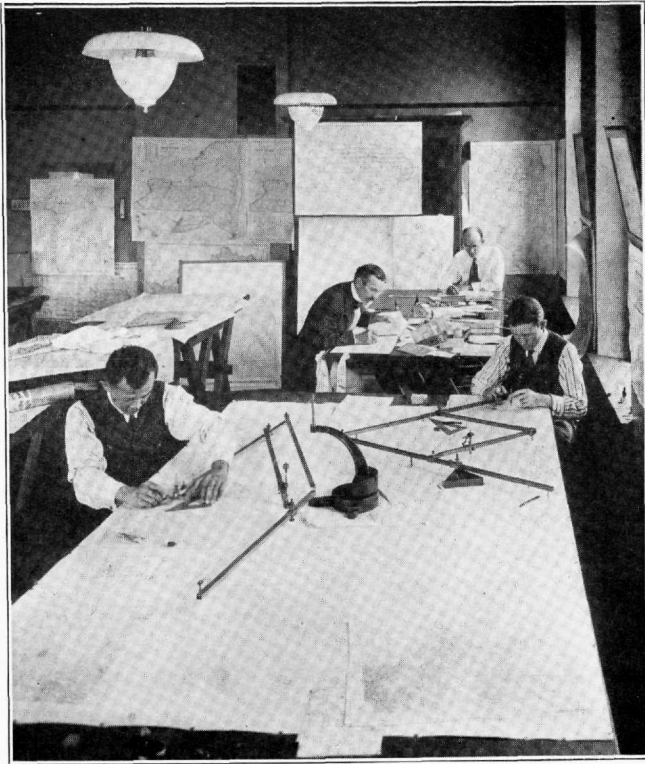


Fig. 2.

the right and left border lines of the map made parallel to this as an axis. Since the fortieth parallel of latitude runs from east to west near the center of the State, the intersection of these two lines—meridian $82^{\circ} 45'$ and parallel $40^{\circ} 00'$ —gave a starting point near the center of the sheet of drawing paper. The distances between even degree parallels, measured along a meridian, did not vary enough to make any appreciable difference on a map to a scale of five miles in the inch, as the following figures show: From 38° to 39° , distance 13.794 inches; 39° to 40° , distance 13.796 inches; 40° to 41° , distance 13.798 inches; 41° to 42° , distance 13,801 inches. Since the distances for a whole degree varied so slightly in the different latitudes, the meridional distance for one degree was divided into four equal parts, each part representing 15 minutes of latitude. (Fig. 1.)

The curving of the parallels of latitudes was of course very appreciable. At the crossing point of meridian $82^{\circ} 45'$ and parallel $40^{\circ} 00'$ a right angle was constructed. Measuring along this right angle line 10.61 inches as abscissa, then at right angles 0.06 of an inch as ordinate, gave the crossing point of meridian $81^{\circ} 45'$ and $40^{\circ} 00'$ (see Fig. 1). At latitude $41^{\circ} 00'$ the abscissa was 10.46 inches as compared with 10.61 inches above. Meridians one degree apart converged a distance of 0.62 of an inch in four degrees of latitude. After having thus laid out the parallels and meridians of fifteen minutes of arc, the topographic quadrangles described above were then pantographed on to the paper drawing to a scale

of five miles to the inch. In Fig. 2 will be seen the two large steel pantographs which were used.

The original paper drawing (Fig. 2) contained the following all drawn in black, on Dietzgen's "Double Force" drawing paper: state, county, and township lines; county and township names; streams and stream names; cities, towns, and villages; city corporation lines; steam and electric railroads; inter-county and main market highways; canals. At the top of the drawing were shown inset maps, to enlarged scale of Akron, Cleveland, Canton, Toledo, and Youngstown; at the bottom Cincinnati, Dayton, and Columbus. These insets show city car lines, steam and electric railroads, principal streets, and public places of interest.

Eight different sizes of lettering were used for the names of various cities, towns, and villages. The size of letters in each case being dependent on the population of the place in question. All towns listed in the latest Official Postal Guide have their names designated by upright letters, all others by inclined letters. This classification comprised all the places in the State from Cleveland, the largest city, down to hamlets of one hundred population.

In preparing the map the topographic sheets were supplemented by the U. S. Army Engineers' latest maps of the Ohio River, State Highway Department's corrected county maps, U. S. Lake Survey charts of Lake Erie, U. S. Geographic Board decisions, and U. S. Postal Guide of 1917. Detailed information was furnished by the various railroad, city, and county engineers.

After completing the large drawing it was lithographed to full scale and proofs pulled in light blue. An edition of fifty of these large scale maps was printed for special uses of the State departments. Some of these proofs were then inked by hand in black over certain portions only. Take the case of the drainage plate for example: all streams were inked in black on one of the large light blue proofs, the drawing then reduced by photography from 50 inches by 66 inches to 32 inches by 42 inches. All features not inked in black by hand but remaining in light blue, which does not photograph, are thus eliminated by the camera and we have the drainage plate. These large inked proofs are now in the hands of The New Columbus Lithograph Company for reduction and final printing.

The first finished map will be the new Railroad Map of the State which will be printed in seven colors. It will show all the necessary features for a complete combination railroad and postal map. It will be 32 inches by 42 inches and contain: geography in black; drainage in blue;

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NEW BASE MAP OF OHIO

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Pennsylvania System in red; Baltimore and Ohio in blue; New York Central Lines in orange; Erie Railroad and interurban electric lines in green; all other minor railroad systems in black.

The first edition showing railroads will consist

of 18,300 copies. A later edition for the State Highway Department showing inter-county and main market roads will consist of 5000 copies. The railroad edition will be ready for distribution about May 1st and may be had by applying to the Secretary of State. The cost will be approximately fifty cents each.