

various operations which result finally in the finished map or plan. A valuable feature of the book is that the accuracy attainable in an operation is clearly stated, and the surveyor is taught to plan his work according to the accuracy which the purpose that it is to serve demands, while not attempting such a degree of precision as would lead to an expenditure of time and money which would not be economical under the conditions existing. In this connection a little more might, perhaps, be said on the selection of the scale of maps as determined by the permissible errors of the work and the limitations of the draughtsman. A short account of the theory of errors and its application to survey measurements would also seem to fall within the scope of this text-book.

The theodolite and its adjustments are fully dealt with as regards vernier instruments, since those fitted with micrometer microscopes are considered to belong to the more precise work of higher surveying. At the same time, it may be questioned whether the simpler forms of microscope which are in use abroad are not both more easy to read and less liable to injury than the vernier.

The execution of a small triangulation, in which plane trigonometry only is required, furnishes an instructive example of the various operations involved, base measurement, selection of stations, and measurement of angles, and these are discussed with special reference to the errors which are liable to occur, and the limits within which they may be expected to fall.

Levelling with the spirit-level is dealt with in the same detailed manner, and a simple formula is given to guide the leveller in judging of the accuracy of his work.

In the chapter on the calculation of areas, the more modern patterns of planimeter might be mentioned, since with them the instrumental error can be eliminated from the result by changing the position of the fixed point and repeating the measurement; also a convenient check on the accuracy of the measurement is provided. A reference to the slide rule, and to computing machines, computing table, etc., would be of value as indicating to the surveyor ways in which he may save time in his work.

The tachometer is not mentioned, since it is probably considered as more suited for topographical surveys, but in many countries it is largely employed in preliminary surveys and in much large scale work.

Theoretical accounts of most operations are given, and these might even be extended with advantage, since they indicate clearly the directions in which errors are to be anticipated,

and the conditions under which they tend to increase in magnitude.

The book is well illustrated and contains numerous practical examples, which have been well chosen with the view of showing such cases as may be expected to occur in ordinary practice.

H. G. L.

OUR BOOKSHELF.

Unit Photography. By F. M. Steadman. Pp. xi + 160. (London: Constable and Co., Ltd., 1914.) Price 8s. 6d. net.

THE author deplors the "whole train of lamentable conditions in photography relative to exposure," and sets himself "to establish a rational scientific foundation for the practice of photography and for the study of light as it is daily observed in nature." He says that the apertures of lenses, the sensitiveness of emulsions, and the chemical energy of lights lack simple units of measurement, and that therefore photography is not scientifically practised. He adopts $f/64$ as the unit for lens apertures, calling the figures which represent the intensities of the ordinary apertures up to $f/1$ the "cone unit values." His standard of "actinic" is "that rate of emission which will produce a least visible tint in one minute (or 64 seconds) when the convergence is $f/1$ (or 4000 cone units)." This is an "actino." "The speed of an emulsion is defined as the time required for it to suffer an effect which is known as normal exposure, when it is exposed to a surface having an intensity of one actino and through a diaphragm having a convergent value of one cone unit." He gives full instructions for the use of these standards, and works out a number of problems that will prove of much interest to the curious. His " $f/1$ actinometer" is a box which has an opening equal in diameter to its distance from the opposite side, where a piece of sensitive paper is placed. The first experiment suggested in "unit actinometry" is to measure or estimate the average diameter of a flame, put the sensitive paper at a distance of two diameters ($f/2$) from it, and time the period necessary to produce the first visible effect. The calculation as explained gives "the average intensity of the flame in actinos."

The volume contains useful suggestions, though we cannot see that the methods propounded are any more "scientific" than the ordinary procedure with commercial exposure meters, and we distinctly differ from the author in his idea as to the "lamentable condition" of photography with regard to exposure, so far as this country is concerned. It may be different in America.

The Student's System. By V. Russell. Pp. 113. (London: J. M. Dent and Sons, Ltd., 1915.) Price 1s. 6d. net.

THIS book advocates the use of a loose-leaf notebook by University students, and by all who are engaged in study or research. It is claimed that, by adopting this system, a student need not carry