Plane and Geodetic Surveying – The Management of Control Networks

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This book aims to provide the theory and practice associated with conventional surveying techniques and GPS for the observation, computation and management of control networks. Specifically it is concerned with the management of error within the work of the surveyor. The author accepts quite a challenge to cover such a very broad ranging topic in just 190 pages.

Throughout the text there is the emphasis on understanding and managing error as the primary business of the surveyor and on the orders of magnitude of survey error compared with those in the general run of civil engineering. Wisely, the author focuses more on principles and general applications of practice rather than on the details of transient technology and thereby ensures that the book will have relevance for many years to come.

The book is written at an undergraduate level and can serve as a first reader on the subject of control networks for both surveyors and civil engineers, though it is at a higher level than you expect from a first reader on the subject of surveying. It is not intimidating in that although there are fewer illustrations than this reviewer would have liked there is barely a single formula until about half way through the book. Initially the tone of the text reflects the author's academic rather than his practical background. In style the use of footnotes can be distracting in that it breaks the flow of the text.

The brief introductory chapter describes how surveys may be classified by their purpose, scale, the measurement types and the equipment used to take the measurement.

Chapter 2 introduces the reader to the general principles of surveying by an early consideration of the nature of error and the benefits of redundancy. A section on "stiffness" is used to illustrate the effect that geometry has on the robustness of networks. The term "adjustment" is used in its conventional sense, by surveyors, with respect to networks although there is no mention of what is "adjusted" or that adjustment is a form of estimation by a particular mathematical process.

The next chapter, on "Principal Surveying Techniques", covers a number of disparate surveying activities and starts with triangulation and traverses and goes on to introduce ideas of coordinate systems for networks. The section on "mapping" is concerned with maps and plans at scales around 1:10000 and with "mapping" details of façades and three-dimensional structural steelwork; a rather unhelpful mix of ideas. The section on setting out introduces some basic ideas and refers to other texts for more detailed explanations. The particular method expounded, although bringing out a number of useful teaching points, is not one that the hard-pressed engineering surveyor is ever likely to use in practice. "Resectioning" identifies the problem of ill conditioned figures by considering the danger circle associated with three-point resections, and "Deformation Monitoring" emphasises the high precision nature of that activity.

From here on the book becomes much more focused and the next few chapters on the principal technologies of measurement are well thought out, concise and informative. Chapter 4 on angle measurement is particularly well and tightly written and covers almost all the basics of theodolite work from optical mechanical instruments to electronic theodolites and total stations. There is some confusion in the discussion of vernier scales and surprisingly no mention of the spire test for trunion axis dislevelment. Chapters 5 and 6 on distance measurement and levelling respectively cover the subjects to an appropriate depth, referring outdated and obscure ideas to other authors. The diagram on the simple 2-peg test is particularly clear, would that there were more illustrations throughout the text.

Writing a chapter on satellite surveying in a book such as this will always be problematic. Other authors have written whole books on subsets of this subject. How much detail should the author go in to? Recognising that satellite technology moves on apace this author has wisely kept to a minimum, explaining principles rather than practice and has largely kept clear of specific manufacturers of equipment and their technology of the moment. Thus we have a chapter that stands a good chance of remaining current, as much as a chapter on this fast evolving subject can.

A minimum of necessary geodesy follows and we are out of the formula free zone. Much of the discussion centres on applications in the UK with reference to data available from the Ordnance Survey. Standard formulae for datum transformations are presented. Inevitably the discussion follows in the next chapter to the issue of map projections, their nature and limitations. The short sections on the realisation of the British National grid and coordinate systems for engineering works are particularly useful.

The next chapter, on adjustments, which this reviewer was expecting to be the central focus of the book is very short; just twenty pages or about 10% of the book. Since this includes arbitrary adjustments such as traverses there is very little left on the subject of Least Squares. For example, error ellipses are mentioned and formulae shown, but there is nothing on relative error ellipses, surely of greater significance to the engineering surveyor and there is nothing on the interpretation of patterns of error ellipses in networks. The whole business of adjustments is only treated in two dimensions. Blunder detection is not rigorously treated and reliability as a concept is not even introduced. However the section on the interpretation of Least Squares results is useful.

Adjustments would be the natural place for this book to conclude but there are two further chapters on the reduction of distance measurements and on reciprocal vertical angles. The placing of these chapters, concerned with data reduction, after the chapter on the adjustment of networks suggests that the author considers this material to be of less importance.

Some annexes follow. Annex A gives numerical values for some basic geodetic constants. Curiously the subject of monumentation is consigned to an annex. This is fundamental to the practical application of control networks and should have come much earlier in the main text. The next three annexes give worked examples of transformations of coordinates, computation of sale factor for projections and of a traverse adjustment by Bowditch. In this last annex there is also an example of a

small network adjusted with the author's own programme, available free from the publisher's website. This "added value" to the book is to be applauded. However, to access the software you will need a password, the first word on page 79 of the book. The final annexes contain various booking forms and calculation sheets. A useful glossary concludes.

Overall this book contains much of merit, but in the desire to keep it to a manageable size and hence price, many of the more complex subjects appear to have been cut short. A book that truly did justice to all the subjects addressed would be a considerable volume, but as a second reader in survey, covering the material at second or third year level for engineering undergraduates and others with a similar interest, this book gives a very useful introduction to the subject of control networks.

Plane and Geodetic Surveying book. Read reviews from worldâ€™s largest community for readers. Plane and Geodetic Surveying blends theory and practice, conv...Â Start by marking â€œPlane and Geodetic Surveying: The Management of Control Networksâ€ as Want to Read: Want to Read savingâ€¦ Want to Read.Â Preview â€” Plane and Geodetic Surveying by Aylmer Johnson. Plane and Geodetic Surveying: The Management of Control Networks. by. Aylmer Johnson. 0.00 Â· Rating details. Â· 0 ratings Â· 0 reviews. Plane and Geodetic Surveying blends theory and practice, conventional techniques and GPS, to provide the ideal book for students of surveying. The network provides for the determination and maintenance of vertical reference datums used for surveying and mapping, dredging, coastal construction and restoration, water level regulation, marine boundary determinations, tide prediction, and determination of long-term water level variations (e.g. trends).Â This guide provides references to several National Geodetic Survey (NGS) documents related to the standard methodologies and tools used to derive geodetic elevations using differential and trigonometric leveling. These references do not supersede the information in this document as this document is specifically written to determine and monitor water level sensor and bench mark network elevations for the determination of tidal datums and subsequently the sea level trend. A geodetic control survey consists of establishing the horizontal and vertical positions of points for the control of a project or installation site, map, GIS, or study area. These surveys establish three- dimensional point positions of fixed monuments, which then can provide the primary reference for subsequent engineering and construction projects. These control points also provide the basic framework from which detailed site plan topographic mapping, boundary demarcation, and construction alignment work can be performed. Precisely controlled monuments are also established to position marine construction vessels supporting the Corps navigation mission--e.g., the continuous positioning of dredges and survey boats. General geodetic surveys land surveys photogrammetry location surveys construction surveys procurement, management and maintenance of equipment safety and traffic control. FOREWORD The sophisticated surveying technology developed for the space programs opened the way to research and development on new surveying theory and practice. In 1971 the Minnesota Highway Department, now the Department of Transportation, engaged Professor Jesse E. Fant from the Department of Civil Engineering at the University of Minnesota, to assist the Department in the development of a â€œModern Surveying System.â€ A geodetic control network (also geodetic network, reference network, control point network, or control network) is a network, often of triangles, which are measured precisely by techniques of terrestrial surveying or by satellite geodesy. A geodetic control network consists of stable, identifiable points with published datum values derived from observations that tie the points together.