

Terrestrial Magnetism, Carnegie Institution of Washington, is to the effect that, owing to interruptions and delays incident to the war, it is not at present possible to purchase on the market equipment such as they propose to install at their observatories.

The mean annual values of the magnetic elements as far as they are available at present are shown in the following table :—

*Table of Mean Values of the Magnetic Elements at Christchurch Observatory.*

Date.	Declination E. of N.	Annual Change.	Horizontal Force.	Annual Change.	Vertical Force.	Annual Change.	Inclination South.	Annual Change.	Date.
	° ' "	' "	C.G.S. Unit.	γ	C.G.S. Unit.	γ	° ' "	' "	
1902 ..	16 15.1	+3.2	0.22694	-25	0.55277	+9	67 40.8	+1.50	1902
1903 ..	16 18.3	+3.5	0.22669	-25	0.55286	+21	67 42.3	+1.80	1903
1904 ..	16 21.8	+3.6	0.22644	-16	0.55307	+41	67 44.1	+1.70	1904
1905 ..	16 25.4	+2.4	0.22628	-23	0.55348	+28	67 45.8	+1.80	1905
1910 ..	16 37.6	+1.4	0.22515	-27	0.55485	+12	67 54.8	+1.40	1910
1911 ..	16 39.0	+2.5	0.22494	-23	0.55497	-9	67 56.2	+1.00	1911
1913 ..	16 44.0	+0.8	0.22449	-35	0.55478	-13	67 58.2	+1.60	1913
1914 ..	16 44.8	+2.2	0.22414	-27	0.55465	+7	67 59.8	+1.67	1914
1915 ..	16 47.0	+2.8	0.22387	-32	..	..	..	..	1915
1916 ..	16 49.8	+3.2	0.22355	-27	..	..	..	..	1916
1917 ..	16 53.0	+2.7	0.22328	-24	0.55486	+30	68 4.8	+1.90	1917
1918 ..	16 55.7	+2.9	0.22304	-24	0.55516	-9	68 6.7	+1.10	1918
1919 ..	16 58.6	..	0.22280	..	0.55507	..	68 7.8	..	1919

The mean variation of the declination for the period 1902-19 is found to be at the rate of +2.56' per annum, increasing easterly.

#### TOPOGRAPHICAL SURVEY.

An estimate of the cost of a topographical survey of the Dominion was given in my report of the 25th October, 1919. The instrumental outfit was carefully considered, and the details of the organization of the field parties decided. The conclusions arrived at were based on the experience gained on the surveys that have been made on similar lines to the proposed work by Mr. K. Graham, District Surveyor at Auckland and Wellington, and my own survey of the Dunedin centre.

In the open country it is proposed to use the plane table in connection with a hand-level, pocket-compass, aneroid, &c., and to have recourse to the tachometer when forest or scrub is encountered. On the broken and mountainous parts of the country it is proposed to introduce the photo-theodolite. In recent years stereo-photogrametric methods have become of great practical and economic advantage in such work, where the ordinary methods of topography are difficult, if not impossible. Its chief advantage lies in the permanency and accuracy of the records made, and the comparative rapidity of the field-work, particularly where climatic conditions are severe, for one need not enter much of the territory that is being surveyed, and measurements can be taken to and from objects that are inaccessible to the surveyor or his assistant. The photo-theodolite, however, is not intended to compete with the plane table on the flat or undulating open country. According to the opinions, founded on extensive experience, of many surveyors, the plane table is the most economical instrument in use at the present time for most classes of topographical surveys.

A co-ordinate scheme of map reference is being prepared for the maps to be supplied to the Defence Department, based on the Allied system as described in Appendix 3 of the "History of Survey Operations" which is in preparation at the War Office, and a copy of which was kindly forwarded by Lieut.-Colonel R. B. Smythe. The mean sea-level is the datum to which all heights are to be referred, and lines of levels on the main roads are recommended in order to pick up and co-ordinate a great amount of work done in the past by the Departments of Roads, Public Works, and the various County Councils. These levels will be invaluable as checks on the contouring, and for future use when internal improvements involving engineering surveys are undertaken.

#### OFFICE APPLIANCES.

A Layton's improved arithmometer was installed for the use of the Computing Division during the year under report. It is claimed by the maker that this is the best machine on the market, either British or foreign. The performance of this arithmometer has been satisfactory, and it has been found very useful in doing the drudgery connected with the work of the division.