TRANSACTIONS

OF THE

ROYAL SOCIETY

0F

EDINBURGH.

VOL. XVII.-PART I.

CONTAINING THE

MAKERSTOUN MAGNETICAL AND METEOROLOGICAL OBSERVATIONS

FOR

1841 AND 1842.

EDINBURGH:

PUBLISHED BY ROBERT GRANT & SON, 82 PRINCES STREET; AND T. CADELL, STRAND, LONDON.

MDCCCXLV.

PRINTED BY NEILL AND CO., OLD FISHMARKET, EDINEURGH.

OBSERVATIONS

IN

MAGNETISM AND METEOROLOGY,

MADE AT

MAKERSTOUN IN SCOTLAND,

IN THE OBSERVATORY OF

GENERAL SIR T. M. BRISBANE, BART.,

G.C.B., G.C.H., D.C.L., LL.D., COR. MEM. INST. FR., PRES. R.S.E., F.R.S., F.R.A.S., H.M.R.I.A., &c. &c.

1841 AND 1842.

UNDER THE DIRECTION OF

E. RUSSELL, Esq., IN 1841, AND OF JOHN A. BROUN, Esq., IN 1842.

THE WHOLE EDITED BY

JOHN A. BROUN, Esq.

EDINBURGH: PRINTED BY NEILL AND COMPANY.

MDCCCXLV.

CONTENTS.

	PAGE
Preface,	vii
INTRODUCTION-	
Description and Position of the Observatory,	ix
Personal Establishment,	x
MAGNETICAL INSTRUMENTS-	
Declinometer—	
Description of the Declinometer,	xi
Value of the Scale Divisions,	xii
Reading for Magnetic Axis,	xiii
Effect of Bifilar and Balance Magnets,	xiv
Effect of Copper Ring,	xv
Suspension Thread and its Torsion Force,	xvi
Values of $\frac{H}{F}$,	xvi
Facts relating to Suspension Threads,	xvii
Absolute Declination,	xix
Method of Observing,	xxiii
Bifilar Magnetometer	
Description of the Instrument,	xxiii
Constants for the Reduction of Observations after altering the Reading of the	
Torsion Circle,	xxv
Adjustments,	xxv
Value of Scale Divisions,	xxvi
Times of Vibration,	xxviii
Mode of Observing and Reductions,	xxix
Values of k and q , \cdots	xxx
Sources of error in determining the Temperature of the Magnet,	XXX
Absolute Horizontal Intensity,	xxxi
Balance Magnetometer-	
Description of the Instrument,	xxxii
Value of Micrometer Divisions,	xxxiii
Deviation of Magnetic Axis from the line joining the Bisection Crosses,	xxxiv
Times of Vibration in a Horizontal Plane,	xxxv
Times of Vibration in a Vertical Plane,	xxxvi
Effect of other Magnets,	xxxvii
Observations and Reductions,	xxxvii
Values of k and q ,	xxxix
values of k and q ,	XXXIX

CONTENTS.

	PAGE
Observations for the Temperature Corrections—	
Method of Observation,	xxxix
For the Bifilar Magnet,	xli
For the Balance Magnet,	xlii
New Method of determining the Temperature Correction,	xliv
Inclinometer	
Description of Instrument, and Method of Observing,	xlv
Observations in different Azimuths,	xlvi
Meteorological Instruments.	
Barometer	
Description of the Instruments used,	xlvii
Comparisons with the Royal Society's Standard,	xlvii
Thermometers	
Positions of the Thermometers,	xlvii
Corrections of the Thermometers to the Standard,	xlix
Rain Gauges—	
Positions of the Gauges,	xlix
Anemometer	
Description of the Instruments,	1
State of the Sky	
Mode of Observation,	li
General and Recapitulatory Remarks—	
Stove,	li
Clock,	li
Time used, ·····	li
Times of Observations for each Instrument,	li
Initials of Observers for each Hour on the Term-days,	lii
How to obtain the Absolute Declination from the Observations,	lii
Remarks on the Reductions and Abstracts,	lii
MAGNETICAL OBSERVATIONS-	
Daily Observations of Magnetometers,	9.
TERM-DAY OBSERVATIONS OF MAGNETOMETERS,	22 22
Extra Observations of Magnetometers,	 50
OBSERVATIONS OF MAGNETIC DIP,	62
Observation of Absolute Horizontal Intensity,	66

METEOROLOGICAL OBSERVATIONS_

DAILY METEOROLOGICAL OBSERVATIONS,	68
TERM-DAY AND EXTRA METEOROLOGICAL OBSERVATIONS,	110
REMARKS ON THE WEATHER,	118
ABSTRACTS OF THE RESULTS OF THE MAGNETICAL OBSERVATIONS-	
Abstracts for the Magnetic Declination,	136
Abstracts for the Horizontal Force,	140

CONTENTS.

	PAGE
Abstracts for the Vertical Force,	145
Abstracts for Disturbances,	152
Abstracts for the Magnetic Dip,	154
Abstracts for the Total Intensity,	156
ABSTRACTS OF THE RESULTS OF THE METEOROLOGICAL OBSERVA- TIONS	
Abstracts for the Barometer,	158
Abstracts for the Thermometers,	161
Abstracts for the Aqueous Vapour in the Atmosphere,	162
Abstract for the Force of Wind,	164
Abstract for the Quantity of Clouds,	164
Abstract for the Rain Gauges,	165

ERRATA.

Introduction, page ix., foot-note, for simultaneous at read simultaneous observations at.

- x., line 6, for Magnetomers read Magnetometers.

- - xxv., line 5, for $\cos v + \beta$ read $\cos (v + \beta)$.

Enter under No. 34, page xxxi. Introduction, the following :----

The effect of the Declination magnet on the Bifilar magnet is zero; the effect of the Balance magnet N. pole E. on the Bifilar magnet is - 3.15 Sc. div. This correction has not been applied to the observations.

Enter before Table 15, page xxxv. Introduction :---

The relative moments of the three magnets were determined by placing their centres successively on the same point at right angles to a spare magnet suspended in the Declinometer box and observing the deflections; the following are their ratios—

Declination : Bifilar : Balance = 1.000 : 0.828 : 0.185.

Introduction, page xxiv., line 16, and page xl., line 27, for K read k.

_____ xlvi., last line of Table 22, for 21 read 71.

Sept. 26d 23h 1841, page 4, Balance Thermometer, for 5.13 read 51.3.

Aug. 6^d 7^h 1842, - 58, for 29.43 read 129.43.

Oct. 29^d 20^h 1841, - 74, transpose the observations under Max. and Min.

July 27^d 20^h 1842, — 93, for 6.68 read 66.8.

- 100, carry foot-note to page 101.

Introduction, page lii., No. 79, for 24° read 23°.

V