APPENDIX II.

REGULATIONS

OF THE

ROYAL OBSERVATORY, GREENWICH.

THE following account of the Regulations, public and private, of the Royal Observatory, Greenwich, was drawn up by the Astronomer Royal, at the request of the Lords Commissioners of the Admiralty, on a special occasion; and is now printed by order of their Lordships.

Royal Observatory, Greenwich, 1853, *Dec.* 14*th*.

G. B. AIRY.

INDEX.

Regulations of the Royal Observatory, Greenwich.

I. *On the position of the Royal Observatory in relation to the Government; and on the position, duties, and responsibilities of the Astronomer Royal.*

1. The Astronomer Royal is appointed by the First Lord of the Treasury, and holds his warrant of office under the Royal Sign Manuel. By this warrant he is directed "to apply himself with the most exact care and diligence to the rectifying the Tables of the Motions of the Heavens and the places of the Fixed Stars, in order to find out the so much desired Longitude at Sea, for the perfecting the Art of Navigation;" and his salary is fixed at 800*l.* (subject to the same deductions as the salaries of other officers). It is well, in illustration, to remark, that the original inscription over what was the principal entrance door of the Observatory states that "Carolus Secundus, rex optimus, astronomiæ et nauticæ artis patronus maximus, speculam hanc in utriusque commodum fecit."

2. A Board of Visitors of the Royal Observatory is appointed by warrant under the Royal Sign Manual. The constitution of this Board has once been changed; at present it is as follows:—The President of the Royal Society, and all who have held that office, the President of the Royal Astronomical Society (not being Astronomer Royal), and all who have held that office, the Savilian Professor of Astronomy at Oxford for the time being, and the Plumian Professor of Astronomy and Experimental Philosophy at Cambridge for the time being, are *ex officio* visitors. Five Fellows of the Royal Society and five Fellows of the Royal Astronomical Society were appointed by name in the warrant, and on the occurrence of a vacancy a successor is appointed, from the Society from which the last member had been selected, by the President of that Society, for the time being. The number of Members of the Board at this time is sixteen.

3. The Board of Visitors is authorised to direct the Astronomer Royal to make such Observations as the Board shall think proper; to inspect the instruments, and communicate with the Lords of the Admiralty upon the arrangements for maintaining them in efficient order; to make any suggestions to the Lords of the Admiralty touching the Observatory; to require from the Astronomer Royal every three months a copy of the observations made, with a view to the printing of them; and to meet at the Observatory on a certain day in every year, and to meet at such other times as may seem expedient to the Lords of the Admiralty.

4. It has been customary for the Board of Visitors to invite the attendance of the Astronomer Royal during a part of their annual meeting, and the communications which have then been made have rendered it unnecessary to exercise some of these powers. At its first institution, the Board actually did direct the Astronomer Royal to make specific Observations, but this has not been done for many years. The present Astronomer Royal has introduced the custom of presenting to the Board, at their annual meeting, a very full report on the state and employments of the Observatory (usually printed by order of the Board), the discussion of which has enabled the Board to exercise sufficient influence without actually giving directions. The instruments are always inspected; but the principal changes and additions in late times have been the result of suggestions of the Astronomer Royal, laid before the Board of Visitors. The signed copy of observations (it appears) was regularly presented, as late as the first ten years of this century; at present great exertions are made to bring the printing to the most advanced state possible, and the Astronomer Royal reports on this to the Board of Visitors; and this is accepted as equivalent to the regular presentation of a copy of the observations.

5. By Order in Council, the Lords of the Admiralty are authorised to issue to the Astronomer Royal Official Instructions. These prescribe—that he usually reside at the Observatory, not absenting himself for any long time without leave from the Lords of the Admiralty; that he give his whole time to the duties of the Observatory; that the observations be of standard excellence and carefully selected; that great attention be given to the calculations; that charge be taken of the chronometers belonging to the Royal Navy, and of other chronometers which may be ordered for trial by the Admiralty; that magnetical and meteorological observations be made; that correspondence be kept up with the Astronomer at the Cape of Good Hope; that repairs of the buildings, or expensive purchases, are not to be made without the sanction of the Lords of the Admiralty; and that at the end of every quarter an account of expenses incurred be presented for approval and directions for payment. These instructions have been practically followed with great accuracy.

6. When the business of the Observatory requires any interference with the grounds of Greenwich Park, within which the entire inclosure of the Observatory and Observatory grounds is contained, it is necessary for the Astronomer Royal, either immediately or through the department of the Admiralty, to address himself to the Commissioners of Woods, Parks, and Public Works, with whom rests the management of Greenwich Park.

7. At the end of each year, the Astronomer Royal prepares an estimate of the expenses likely to be incurred, and the sum which it is necessary to provide for meeting them, in the next year ; and this estimate is submitted to the Lords of the Admiralty, and if approved by them is laid before Parliament. The total amount, including all salaries, but excluding extraordinary expenses for new buildings, &c., usually somewhat exceeds 3,000*l.*

8. In every transaction in or originating in the Observatory, without any exception, the Astronomer Royal alone is responsible to the Government. Even in the case of his absence on leave granted by the Admiralty, it is his duty so to direct the First Assistant by written instructions that as little as possible may be left to his discretion.

9. The assistance of the Astronomer Royal is sometimes requested for special purposes, by different departments of the Government.

II. *On the position, duties, and responsibilities of the Assistants.*

10. By order in Council, the Lords of the Admiralty are authorized to appoint a First Assistant, of rank superior to the other assistants, and competent to represent the Astronomer Royal in his absence ; and five other assistants (this number now has been increased to six). Another assistant has been appointed, by the special authority of the Lords of the Treasury, for magnetical and meteorological observations. The nomination is usually made by the Astronomer Royal, and submitted to the Lords of the Admiralty for their approval.

11. By Order in Council, a scale is fixed limiting the salaries of the assistants. The actual salaries are determined from time to time by the Lords of the Admiralty. At the present time, the first assistant receives a salary of 400*l.* yearly, with 70*l.* for house rent ; the youngest assistants receive each 100*l.* salary and 30*l.* for house rent. (It will be remarked that no one of the assistants resides in the Observatory ; the Astronomer Royal is the only officer of the establishment for whom a residence is provided.) There are also a labourer and a watchman.

12. The assistants can be dismissed only by the Lords of the Admiralty, generally on the representations of the Astronomer Royal.

13. For several years past a sum has been placed annually in the hands of the Astronomer Royal for the employment of supernumerary computers. They are engaged and dismissed, and their salaries are increased or diminished, entirely at the discretion of the Astronomer Royal.

14. The duty of the assistants is, to undertake no work except that of the Observatory ; to give their whole time to the Observatory ; and to obey strictly the commands of the Astronomer Royal. Their responsibility is limited to these duties, and to general good conduct. They are not immediately responsible to the Admiralty or the public for their astronomical observations or investigations, or for any other conduct in the ordinary course of Observatory duties.

15. On written application from the assistants, leave of absence is granted in writing by the Astronomer Royal. The aggregate of these absences for each assistant is not to exceed six weeks for the First Assistant, or four weeks for the youngest assistants. In late years it has been usual also to suspend calculations for one day about the time of each new moon.

III. *On the general objects to which the Royal Observatory is practically devoted.*

16. The selection of the objects on which the establishment of the Observatory is employed, has been guided, partly by the professed object of its institution, partly by a consideration of its history, and partly by examination of the objects usually pursued in other observatories.

17. The adopted astronomical objects are standard meridional observations of fundamental stars, and of other stars to a moderate but not a very great extent ; standard meridional observations, at every possible opportunity, of the sun and planets, and more especially of the moon ; observations of the moon with the altazimuth on every day on which she is visible ; rating of marine chronometers, and trials of new constructions ; dissemination of accurate time by public signal ball and public clock at the Observatory, and by galvanic signals to London and other places. The search for comets, &c., the regular observation of double stars, and the physical scrutiny of celestial bodies do not fomr a part of the usual business of the Observatory.

18. The adopted objects in the magnetical and meteorological department are, the most continuous and perfect record by photographic and other self-registering methods (and, where these fail, by eye observations) of the usual subjects of magnetical and meteorological observation, and the fitting up of the photographic sheets with proper co-ordinate lines of time and measure, so as to make them available at once as a measurable record.

19. In all cases the prompt and careful reduction of the observations is considered equally important with the observations themselves.

IV. *On the internal arrangements applying to the daily business of the Observatory.*

20. One assistant (the third in rank) superintends the magnetic and meteorological Observatory, and is also charged with maintaining order in the library and manuscript room. He usually has under his direction the special magnetical assistant and two supernumerary computers. They meet for daily computations in the ante-room of the magnetic Observatory.

21. The rest of the establishment is attached to the astronomical and general department of the Observatory. They meet in the computing room of the Observatory. The fifth assistant has specially under his superintendance the supernumerary computers, and is thus employed in calculations through a greater number of hours each day, and therefore is not expected usually to make observations. The other assistants make observations with any instrument and computations of any kind. They are, however, as much as possible confined to special trains of calculation ; the second assistant is charged with the reduction of circle observations, and with the rating of chronometers ; the fourth with the reduction of observations made with the altazimuth ; the sixth with the reduction of transit observations, and with the business of galvanic communications ; the seventh assists the second, and has also the charge of stationery stores. The First Assistant observes occasionally with any of the instruments. The Astronomer Royal and the First Assistant superintend all, and enter into details of each as far as they judge necessary.

22. The First Assistant, and the other assistants in the astronomical department who are also observers, are employed in the computing room during five hours (from 9^h A.M. to 2^h P.M.) The fifth assistant, and the supernumerary computers, are employed during seven hours (from 8^h A.M. to noon, and from 1^h P.M. to 4^h P.M.)

23. The course of ordinary observations in each year is arranged (in great part) before the end of the preceding year by the Astronomer Royal.

24. On the morning of Monday of every week, the Astronomer Royal, or more usually the First Assistant, prepares, upon a proper printed form (No. 33, of which a specimen is subjoined) the arrangement of the astronomical observations to be made by each of the assistants in the following week. This paper is signed by the Astronomer Royal, and is then placed for the view of the assistants in the Computing Room. In filling up the various columns with the assistants' names, it is to be remarked that one assistant is made responsible for all the observations that are to be made with a meridional instrument from 3^h A.M. to the following 3^h A.M., or for the observations that are to be made with the altazimuth during the night. The same assistant is never charged (except in cases of extreme difficulty) with observations on two successive days. A paper of arrangement (No. 55, of which a specimen is subjoined) for the observers in the Magnetical and Meteorological Department, is prepared at the same time by the third assistant, is signed by the Astronomer Royal, and is placed in the ante-room of the Magnetic Observatory.

25. A Report on the astronomical observations made in the preceding twenty-four hours is prepared, between 9^h and 10^h A.M. every day, by the First Assistant, on a proper printed form (No. 45, of which a specimen is subjoined), distinguishing the observations of different classes, and is laid before the Astronomer Royal.

26. A Report on the magnetical and meteorological observations, the state of the photographic sheets, &c., is also prepared every day by the third assistant, and is laid before the Astronomer Royal. At present, a printed form is not used for this Report.

27. The calculations in the Observatory are, in every possible instance, reduced to such an order, that they can be made upon printed skeleton forms. These forms (nearly 100 in number, in addition to many others for the daily administration of the Royal Observatory) are most carefully prepared by the Astronomer Royal, who is authorized to demand from the Queen's Stationery Office such printed forms (as well as paper and other stores required for daily use) as he may judge necessary. Not the slightest deviation from the order of calculation directed by these forms is permitted to the assistants.

28. From time to time, the Astronomer Royal requires, from the First Assistant and the third assistant, Reports on the progress of calculations in the Astronomical Department, and in the Magnetical and Meteorological Department. These are furnished upon printed forms (Nos. 46, 82, and 114, of which specimens are subjoined), which are so prepared with reference to the

printed skeleton forms mentioned in Article 27, that the work of the reporting assistant consists in merely writing down the date to which each line of the calculation is completed; and the examination of these Reports then gives the Astronomer Royal a most rapid and accurate view of the state of these complicated calculations.

29. The marine chronometers, the property of the Government, which are kept in store in the Royal Observatory, (usually about 100 in number,) are regularly rated; all are compared with a corrected solar clock once a week, and many are compared every day. Chronometers on trial for purchase, are exposed to alternations of heat (by means of a stove heated by flames of gas) and of cold (by exposure to the open air), and are in all cases compared every day. A report of the rates of all chronometers at the Observatory is made to the Admiralty every week.

30. Chronometers are supplied from the store to the ships of the Royal Navy, on the indication of the Hydrographer.

31. The Astronomer Royal judges on the necessity of repair to Government chronometers, communicates with chronometer makers, and sanctions the estimates of expense of repair given by them. Chronometer makers are admitted to the Royal Observatory, for the purpose of inspecting and removing the chronometers, and for other business, on Mondays only. The sanctioned estimates are reported to the Admiralty every month. The details of the business are in ordinary cases conducted by the First Assistant.

32. The Astronomer Royal reports on the trial chronometers after a trial of six or seven months, and advises the Admiralty on their purchase. A digested abstract of the rates is annually printed and circulated among chronometer makers and others, and is also attached to the annual volume of observations.

33. Every day, about noon, the galvanic clock which maintains the movement of various sympathetic clocks in the Observatory and in London, and which drops the signal balls in the Observatory, in the Strand, and at Liverpool, is adjusted to correct mean solar time.

34. Every month, a special inspection is made of the state of the instruments (in addition to the inspection continually going on during their daily use) by the First Assistant, and a report on their condition is made by him to the Astronomer Royal

35. The arrangement of the library and manuscripts is directed by the Astronomer Royal. From time to time, a report on the state of the library and the manuscripts is required from the third assistant.

36. Occasional orders to the assistants are given, as far as possible, in writing; and copies of the written orders are preserved.

V. *On the printing and distribution of the Observations.*

37. The Observations are printed, under the authority of the Lords of the Admiralty, by the printers employed by the Queen's Stationery Office. The management of the expenses of printing does not rest with the Astronomer Royal. The number of copies is fixed by the Lords of the Admiralty; at present, 350 copies of the whole work are printed, with an additional number of copies of special parts.

38. The proof sheets are read, and revised after correction, by the assistants at the Royal Observatory.

39. The principal part of the impression of the Observations is intrusted for distribution to the Councils of the Royal Society and the Royal Astronomical Society; a small portion only being assigned to the distribution of the Astronomer Royal; and a few copies being placed in the hands of the Admiralty publishing agent for sale.

VI. *On the management of the Buildings, Grounds, and Moveable Property of the Royal Observatory.*

40. Considerable discretionary power is left to the Astronomer Royal; but it is expected that in all cases of erection of new buildings of permanent character, of expensive alteration of existing buildings, and of purchases of expensive instruments, books, &c., he will apply to the Lords of the Admiralty for authority. The erection of buildings is sometimes (but rarely) effected under the superintendance of the Civil Architect of the Admiralty.

41. Ordinary repairs of buildings, and ordinary repairs of instruments, are made under the authority of the Astronomer Royal without reference to the Admiralty.

VII.—*On the management of the Money Accounts of the Royal Observatory.*

42. On January 1, April 1, July 1, and October 1, of every year, the Astronomer Royal requires from all the tradesmen with whom he has had transactions on account of the Observatory, the bills for expenses incurred up to those times.

43. These bills are strictly examined by the Astronomer Royal himself, or under his immediate direction. The tales of days' works are compared with the daily register or "workmen's book," kept by the labourer of the Observatory. The materials are compared with the lists furnished at the time of delivery of the materials.

44. For the payment of small bills and of supernumerary computers, a sum of money is placed to the Public Account of the Astronomer Royal in the Bank of England.

45. The unpaid tradesmen's bills, with notes and certificates by the Astronomer Royal, together with statements of the sums paid by the Astronomer Royal himself, are transmitted to the Admiralty, and are shortly afterwards liquidated by Navy Bills drawn by the Accountant-General of the Navy upon the Paymaster-General.

46. Copies of the bills, notes, and papers of every kind relating to expenses are preserved, among the manuscripts of the Observatory.

VIII.—*On the Admission of Visitors to the Royal Observatory.*

47. The regulations for the admission of Visitors are laid down by the Astronomer Royal.

48. In strict rule, no one is admitted except on introduction from some department of Government or from some competent scientific authority. When the employments of the assistants permit, this restriction is somewhat relaxed. The rule is always interpreted liberally as regards foreigners.

49. No person, whatever be his claims, is admitted except by the express permission of the Astronomer Royal, or (in his absence) of the First Assistant.

50. No person can be introduced by an Assistant.

51. No visitor is admitted except between the hours of 9 A.M. and 2 P.M.; and no visitor is admitted on Sundays. These rules are most strictly maintained.

IX.—*Miscellaneous Business of the Royal Observatory.*

52. The Astronomer Royal considers it his duty always to maintain friendly relations with the Hydrographer of the Admiralty, the Superintendant of the Nautical Almanac, the Superintendant of the British Trigonometrical Survey, the Astronomer Royal at the Cape of Good Hope, and the Superintendant of the Ordnance Magnetical Observatories; as well as with the heads of all astronomical and other observing institutions, and the officers of the Royal Society and other scientific bodies, foreign as well as British, with whom he may be brought in contact.

53. The Astronomer Royal also considers it his duty to receive and to answer with courtesy, the inquiries on scientific subjects addressed to him by strangers, and if possible to aid them in any scientific investigations which they may undertake.

Royal Observatory, Greenwich.
1853, November 5.

G. B. AIRY.

ROYAL OBSERVATORY, GREENWICH.

[Form No. 33.**]

Arrangement of Observers for Eight Days, commencing with the morning of Monday, (Civil Reckoning) 18 , .

Day of the Week, (Civil.)	Month and Day, (Astronomical.)	Division of Day. (Astronomical.)	Transit Circle.	Reflex Zenith Tube.	Equatoreal E. , N.	Eclipses, Occultations, &c.	Micrometer Observations.	Chronometers and Ball.	Month and Day, (Astronomical.)	Hours, Astronomical)	Altazimuth.	Magnetic and Meteorological ,Observations.	Miscellaneous.
Monday.		15h to 15h						Monday.		h 16 20 0 4 8 12			
Tuesday.		15h to 15h						Tuesday.		16 20 0 4 8 12			
Wednesday.		15h to 15h						Wednesday.		16 20 0 4 8 12			
Thursday.		15h to 15h						Thursday.		16 20 0 4 8 12			
Friday.		15h to 15h						Friday.		16 20 0 4 8 12			
Saturday.		15h to 15h						Saturday.		16 20 0 4 8 12			
Sunday.		15h to 15h						Sunday.		16 20 0 4 8 12			
Monday.		15h to 15h						Monday.		16 20 0 4 8 12			

Stars for Meridional Observations.	Planets for Meridional Observations, beginning at 15h.	Subjects of Micrometer—Observations.	Subjects of Magnetic Observations.	Subjects of Meteorological Observations.	Miscellaneous Directions.

(*Signed*)

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Public and Private Regulations

ROYAL OBSERVATORY, GREENWICH.

[Form No. 45.*]

Objects observed in the day ending 185 , 21h.

	Transit Circle.								Reflex Zenith Tube.	Altazimuth.	Equatoreal [N. or E.]	Double-Image Micrometer.		Eclipses, Occultations, &c.	Miscellaneous.
	Observations of R. A.				Observations of Z. D.										
	Clock Stars.	Stars for Azimuthal Error.	Other Stars.	Planets.	Stars by reflexion. N.	Stars by reflexion. S.	Other Stars.	Planets.	Object.	Object.	Object or Comparison.	Object.	No. of Measures.		
To 15h.															
Observers.															
After 15h.															
Observers.															

(*Signed*)

First Assistant.

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OF THE ROYAL OBSERVATORY, GREENWICH.

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Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
1	Transits.	Transits on separate Wires Means of Wires Corrections for omitted Wires *entered* Observed Transit Error of Collimation and Level Error *entered* Product for 1st and 2nd Error Application of 1st and 2nd Error Azimuthal Error *entered* Product for Azimuthal Error True Transit Clock Error and Rate *entered* Proportional part of Rate True Apparent Right Ascension Semidiameter *entered* Right Ascension of Center Stars' corrections *entered* Mean Right Ascension Last discussion of Personal Equation Personal Equation applied Computation for defective limb of Moon and Planets		
2	Completion of Transits.	Corrections to separate Wires applied		
3	Collimation of Transit.	Last investigation of value of Transit-Micrometer Collimation Error computed		
4	Levelling of Transit.	Level Error computed		
5	Azimuthal Error.	Azimuthal Error computed		
6	R. A. of Nautical Almanac Stars.	Corrections to Jan. 1 Corrected R. A. for day		
7	R. A. of Polaris and δ Ursæ Minoris.	Corections to Jan. 1 Corrected R. A. for day		
8	Clock Errors.	Apparent R. A. *entered* True Transit *entered* Apparent Error and Mean Error Clock's Loss in 24 hours Rate adopted Clock's Error at 0^h Sidereal		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46.*]

(continued.)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
89	New Constants for B. A. C. Stars in R. A.	Stars' Names *entered* Nos. in B.A.C. *entered* Logs. *a, b, c, d, entered* Logs. e, f, g, h, formed Value of l computed		
91	New Constants for uncatalogued Stars in R. A.	R. A. and N. P. D. *entered* Functions of R. A. and N. P. D. *entered* Logs. of e, f, g, h, formed Value of l computed		
93	Corrections of Small Stars in R. A.	Reference for Star Constants *entered* Log. E, F, G, H, and L, *entered* Log. e, f, g, h, and l *entered* Sums of Logarithms Natural numbers Sums of numbers Result complete		
10	Mean Time.	Sidereal Time for meridional results *entered* Mean Solar Time Sidereal Time for Obs. with Altazimuth *entered* Mean Solar Time Sidereal Time for other extrameridional Obs. *entered* Mean Solar Time		
11	Adjustments of Transit.	Last examination of Transit Pivots Last observations or remarks		
12	Ledger of Stars' R. A.	Separate determinations of R. A. Means taken		
14	Transit Copy for Press.	Copy complete Notes		
15	Approximate Clock Errors.	Last determination from Transits Clock Errors prepared Comparisons of Clocks reduced		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
16*	Circle Observations.	Readings of separate Microscopes Uncorrected Mean of Microscopes Correction for Runs for 100″ *entered* First Part of Correction for Runs Second Part of Do. Micrometer Reading and Equivalents Correction for Error of Division and Flexure *entered* Circle Reading at Observation Correction for Curvature and Inclination *entered* Correction for Change of N. P. D. *entered* Concluded Circle Reading for Meridian Observation Zenith Point Correction *entered* Apparent Zenith Distance Refractions *transferred* True Zenith Distance Geocentric Zenith Distance N. P. D. of Limb N. P. D. of Center Star Corrections *entered* Mean N. P. D. Refraction numbers for Barometer and Thermometer Refraction numbers for Zenith Distance Sums Natural numbers Application of correction for Defective Limb of Moon and Venus Observed Diameters of Sun, Moon, and Planets		
16* (reverse)	Small Corrections for Circle Observations.	Change of N.P.D. for Moon Parallax for Moon Reduction of Observations of Moon Parallax for Sun and Planets Correction for Defective Illumination Refractions for low objects		
20	Adjustments of Circle.	Observations for Runs Last entry of other matters		
23	Zenith Points.	Concluded Circle Readings *entered* Circle Readings combined Zenith Point Corrections adopted		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
25	N. P. D. of Nautical Almanac Stars.	N. P. D. and Corrections to Jan. 1		
90	New Constants for B. A. C. Stars in N. P. D.	Stars' Names *entered* Nos. in B. A. C. *entered* Logs. a', b', c', d' *entered* Logs. e', f', g', h', formed Value of l' computed		
92	New Constants for uncatalogued Stars in N. P. D.	R. A. and N. P. D. *entered* Functions of R. A. and N. P. D. *entered* Logs. e′, f′, g′, h′, formed Value of l' computed		
94	Corrections of Small Stars in N. P. D.	Reference for Star Constants *entered* Log. E, F, G, H, and L *entered* Log. e′, f′, g′, h′, and l', *entered* Sums of Logarithms Natural numbers Sums of natural numbers Result complete		
27	Copy of Circle Observations for Press.	Copy written { Left Page Right Page Notes		
29	Ledger of Stars' N. P. D.	Separate Determinations of N. P. D. Means taken		
30	Interpolations.	Times and subjects for Merid. Obs. *entered* Numbers from N. A. *entered* Interpolation completed Times and subjects for Altazimuth Obs. *entered* Numbers from N. A. *entered* Interpolation completed Times and subjects for Equatoreal Obs. *entered* Numbers from N. A. *entered* Interpolation completed Times and subjects for Occultations *entered* Numbers from N. A. *entered* Interpolation completed		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Deductions from Meridional Observations.	Investigation of R—D Investigation of Correction of Latitude Star Catalogue Comparison of Observed and Tabular Diameters of Sun, Moon, and Planets Comparison of Observed and Tabular R. A. Comparison of Observed and Tabular N. P. D. Investigation of Position of Ecliptic Errors of Sun and Planets in Long. and E. P. D. Heliocentric Errors of Planets Errors of Moon in Long. and E. P. D.		
60	Reflex Zenith Tube.	Last Observation Micrometer and Level Readings *entered* Equivalents *entered* Sum of Equivalents Instrumental Constant *entered* Correction to Mean Z. D. *entered* Mean Z. D. Jan. 1		
68	Zenith Distances observed with the Altazimuth.	Transits on Separate Horizontal Wires Means of Wires Last examination of Intervals of Wires Clock Time of Vertical Transit Clock Error and Rate *entered* Sidereal Time of Vertical Transit Readings of separate Microscopes of Vertical Circle Last examination of Runs Correction of Runs for 100″ *entered* Correction for Collimator or omitted Wires Concluded Reading of Vertical Circle Reading Corrected for Level Refractions *transferred* Circle Readings corrected for Refraction Zenith Point *entered* True Observed Zenith Distance Approximate Zenith Distance Refraction numbers for Barometer and Thermometer Refraction Numbers for Zenith Distance Sums Natural numbers		

Report of the state of Astronomical Calculations, on 18 , . [Form 146*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examina
69	Azimuths observed with the Altazimuth.	Transits on separate Vertical Wires Means of Wires Last examination of intervals of Wires Clock Time of Horizontal Transit Clock Error and Rate *entered* Sidereal Time of Horizontal Transit Readings of separate Microscopes of Horizontal Circle Last Examination of Runs Correction of Runs for 100″ *entered* Correction for Collimator or omitted Wires Concluded Reading of Horizontal Circle Correction for form of Pivots *entered* Factors for Collimation and Level *entered* Errors of Collimation and Level *entered* Reading of Horizontal Circle corrected Zero of Azimuth *entered* Observed Azimuth Level Error as applying to Horizontal Axis		
70	Comparisons of South Dome Clock with Transit Clock.	Times by Clocks and Chronometers *entered* Correction from Solar to Sidereal Time *entered* Chronometer's Losing Rate *entered* Interval in Sidereal Time Transit Clock slow at 0h Sidereal and Rate *entered* Sidereal Time at comparison with Transit Clock Error of South Dome Clock		
71	Corrections for Figure of Earth, Moon's Semidiameter, and Moon's Parallax, for observations with Altazimuth.	Observed Z. D. of Limb *entered* Approx. Tab. Geoc. N. P. D. *entered* Approx. Tab. Normal Centric Z. D. *entered* Tab. Hor. Eq. Parallax *entered* Tab. Geoc. Semidiameter *entered* Normal Centric Correction to N. P. D.		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examinations.
81	Conversion of Errors of Azim. and Zen. Dist. into Errors of R. A. and N. P. D.	Mean Solar Time, Hour Angle, and N. P. D. *entered* Errors of Azimuth and Zenith Distance *entered* p, q, r, s, *entered* Error of R. A. and Error of N. P. D. found		
96	Altazimuth Copy for Press (Azimuths.)	Left page *entered* Right page *entered* Notes		
97	Altazimuth Copy for Press (Zenith Distances.)	Left page *entered* Right page *entered* Notes		
98	Altazimuth Copy for Press (Tabular Section.)	Left page *entered* Right page *entered*		
64	Equatoreal Computations in R. A.	Last observations Last examination of Runs for Hour Circle Microscopes Concluded Reading of Hour Circle in Time Refraction in R. A. *entered* Parallax in R. A. *entered* Instrumental R. A. corrected Assumed R. A. of Star *entered* R. A. of Comet, &c. Interpolated R. A. *entered* Last Transits for Moon's Diameter Error of Moon's Diameter computed		
65	Equatoreal Computations in N. P. D.	Last observations Last examination of Runs for Dec. Circle Microscopes Concluded Circle Reading in Arc Last examination of Sector Div^{s}. and Micrometer Div^{s}. Pointer Reading and Micrometer Reading in Arc Refraction in N. P. D. *entered* Parallax in N. P. D. *entered* Instrumental N. P. D. corrected Assumed N. P. D. of Star *entered* N. P. D. of Comet, &c. Interpolated N. P. D *entered*		

Report of the state of Astronomical Calculations, on 18 , . [Form No. 46*.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Computation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Double Image Micrometer.	Last determination of value of divisions Last determination of Polar Point Last observation Reductions made to		
	Eclipses and Occultations.	Last observation Time by Transit Clock Sidereal Time Mean Time		
31	Calculation of Occultations.	Times *entered* Numbers from Interpolation Book *entered* Places of Stars *entered* F. and G. computed Approximation made Distance of corresponding Point found Final equation formed		
115	Conversion of Errors of R.A. and N.P.D. into Errors of Long. and E. N. P. D.	(For Meridional Observations) R. A. and N. P. D. *entered* P, Q, R, S *entered* Errors of R. A. and N. P. D. *entered* Results complete		
		(For Observations with Altazimuth) R. A. and N. P. D. *entered* P, Q, R, S *entered* Errors of R. A. and N. P. D. *entered* Results complete		
	Miscellaneous Computations.			
	Preparations for next Year's Work.	Phœnomena of Sun and Planets prepared Phœnomena of Moon prepared Phœnomena of Occultations Phœnomena of Jupiter's Satellites Other Astronomical Phœnomena Magnetical and Meteorological Observations Other matters		

(Signed) FIRST ASSISTANT.

ROYAL OBSERVATORY, GREENWICH.

[Form No. 55.*]

MAGNETICAL AND METEOROLOGICAL DEPARTMENT.

Arrangement of Observers for Eight Days, commencing on Monday, 185 , d, (Civil Reckoning).

Day of the Week.	Magnetometer Observations and Meteorological Observations.	Dip Observations.	Trial of Torsion, and of Perpendicularity of Barometer.	Observations of Deflexions for Absolute Measure of Horizontal Force.	Observations of Vibrations for Absolute Measure of Horizontal Force.	Observations for Zero of Theodolite.	Miscellaneous.
MONDAY - -							
TUESDAY - -							
WEDNESDAY -							
THURSDAY - -							
FRIDAY - -							
SATURDAY - -							
SUNDAY - -							
MONDAY - -							

(*Signed*)

Report of the state of Magnetical and Meteorological Calculations, on 18 , . [Form No. 82.*]

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Adjustments of Declination—Magnetometer.	Last determination of Micrometer Scale of Theodolite ——— of Line of Collimation of Theodolite ——— of Inequality of Pivots of Theodolite ——— of Value of Level Scale ——— of Error of Collimation of Plane Glass ——— of Error of Collimation of Magnet ——— of Effect of Disturbing Causes ——— of Constant for Ordinary Observations ——— of Time of Vibration of Magnet ——— of Torsion-Force Last Insertion of Brass Bar		
	Adjustments of Horizontal Force—Magnetometer.	Last Determination of Angle of Torsion ——— of Times of Vibration and of Scale-Readings for different Readings of Torsion-Circle Last Determination of Time of Vibration at right angles to Magnetic Meridian Last Determination of Value of Scale ——— of Temperature-Correction ——— of Effect of Disturbing Causes		
	Adjustments of Vertical Force Magnetometer.	Last Determination of Time of Vertical Vibration ——— of Time of Horizontal Vibration ——— of Value of Scale ——— of Temperature-Correction		
	Adjustments of Barometer.	Last Comparison with Royal Society's or other Standard Last Adjustment of Perpendicularity		
	Adjustments of Dry & Wet Bulb Ther.	Last Comparison with Standard Last Comparison with each other		
	Adjustments of Standard Therm.	Last Comparison with External Standard		
	Adjustments of Max. & Min. Therm.	Last Determination of Corrections		
	Adjustments of Ther. for Radiation.	Last Determination of Corrections		

Report of the state of Magnetical and Meteorological Calculations, on 18 , . [Form No. 82.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Adjustments of Anemometers	Last Verification of Force-Scale of Osler's ——— of Direction-Zero of Osler's ——— of Space-Scale of Whewell's ——— of Direction of Whewell's		
	Adjustments of Pluviometers.	Last Valuation of Scale of Osler's ——— of Scale of No. 1, placed near Osler's ——— of Scale of No. 2, placed on the Library ——— of Scale of No. 3, placed on the ground ——— of Scale of Crosley's		
50 (Right Page.)	Daily Observations of Magnetometers.	Mean of Readings for the Three Magnetometers Circle Reading for Declination Magnetometer Constant for Declination Magnetometer *entered* Equivalents for Micrometer *entered* Sum Theodolite Reading for Astronomical Meridian *entered* Western Declination Constant for Horizontal Force *entered* Difference Equivalent for Difference *entered* Temperature Correction *entered* Sum Constant for Vertical Force *entered* Difference Equivalent for Difference *entered* Temperature Correction *entered* Sum		
50 (Left Page.)	Daily Observations of Meteorological Instruments.	Barometer Readings corrected Thermometer Readings corrected Excess of Dry Thermometer above Dew-Point Excess of Dry Thermometer above Wet Thermometer Dew-Point deduced		
49	Record of Osler's Anemometer and Pluviometer	Register of Rain inked Register of Wind-Direction inked Register of Wind-Pressure inked		

Report of the state of Magnetical and Meteorological Calculations, on 18 , . [Form No. 82.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Whewell's Anemometer.	Daily Descent for each Direction of Wind Daily Sum of all the Descents Monthly Sum of all the Descents		
53	Observations with Magnetic Theodolite.	Sidereal Clock Slow *entered* Greenwich Sidereal Time R. A. of Star *entered* Star's Hour Angle Star's N. P. D. *entered* Star's Altitude Mean of Microscope Readings Correction to Meridian in Azimuth *entered* Reading for North Meridian Correction for Level Mean Adopted Reading for Astronomical Meridian		
52	Magnetic Dip.	Dip computed Monthly Means taken Yearly Values deduced		
	Deflexion Observations	Date of last Observation First stages in Reduction Equations Formed Equations Solved Vibrations corrected for Arc Result for Horizontal Force		
	Vibration Observations.	Date of last Observations Vibrations corrected for Arc First Result for Horizontal Force Temperature-Correction Result for Horizontal Force		
117	First Abstract of the Barometer & Determination of its mean Daily Reading.	Readings *entered* Sums taken Means taken Correction *entered* Corrected Mean Reading deduced		

Report of the state of Magnetical and Meteorological Calculations, on 18 , . [Form No. 82.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
118	First Abstract of the Readings of the Dry Bulb Therm. and determination of the Mean Temperature of the Air.	Readings *entered* Sums taken Means taken Corrections *entered* Adopted Mean Temperature deduced		
119	First Abstract of the Readings of the Wet Bulb Thermometer, and Determination of the Mean Temperature of Evaporation and Dew Point.	Readings *entered* Sums taken Means taken Corrections *entered* Adopted Mean Temperature of Evaporation deduced Factor to deduce difference of Readings of Dry Bulb and Dew Point Thermometers *entered* Adopted Mean Temperature of Dew Point deduced		
120	First Abstract of the Observations of the Maximum and Minimum Thermometers.	Readings *entered* Sums taken Means taken Corrections *entered* Approximate Mean Daily Temperature deduced		
121	Copy for Press of Indications of Magnetometers.	Western declination Horizontal Force Vertical Force Readings of Thermometers Notes complete		
	Copy for Press of Magnetic Dip.	Individual results Notes complete Mean Monthly results Yearly Means Notes complete		
	Copy for Press of Deflexions for Absolute Measure of Horizontal Force.	Observations Values of Absolute Measure of Horizontal Force Values of Absolute Measure of Horizontal Force Vibrations		

Report of the state of Magnetical and Meteorological Calculations, on 18 , . [Form No. 82.]

(*continued.*)

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Copy for Press of Ordinary Meteorological Observations.	Barometer and Thermometer Winds Rain Clouds Phases of the Moon Remarks complete Notes complete		
	Copy for Press of Extra. Meteorological Obs.	Copy complete Notes complete		
	Miscellaneous Magnetic and Meteorological Observations and Computations.			

(*Signed*)

Superintendant.

Report of the state of Photographic Records and their Reductions, on 18 , . [Form No. 114*.]

No. of Book.	Subject of Book.	Line or column of Calculation.		Date at Completion of Entry or Computation.	Date at Completion of Examination.
	Photographic Sheets for Declination and Horizontal Force.	DECLINATION.	Times of interruption *entered* -		
			Time-scale laid down - -		
			Value of instrumental base-line *entered*		
			New base-line laid down - -		
		HORIZONTAL FORCE.	Times of interruption *entered* - -		
			Time-scale laid down - -		
			Value of instrumental base-line *entered*		
			New base-line laid down - -		
	Photographic Sheets for Vertical Force and Barometer.	VERTICAL FORCE.	Times of interruption *entered* - -		
			Time-scale laid down - -		
			Value of instrumental base-line *entered*		
			New base-line laid down - -		
		BAROMETER.	Times of interruption *entered* - -		
			Time-scale laid down - -		
			Value of instrumental base-line *entered*		
			New base-line laid down - -		
			Thermometer-readings *entered* -		
	Photographic Sheets for Thermometers.	Times of interruption *entered* - - -			
		Time-scales laid down - - - -			
		Check-observations *entered* - - - -			
	Photographic Copies for Declination and Horizontal Force.	Secondary or Negative obtained - - -			
		Tertiary or Copy obtained - - -			
	Photographic Copies for Vertical Force and Barometer.	Secondary or Negative obtained - - -			
		Tertiary or Copy obtained - - - -			
	Photographic Copies for Thermometers.	Secondary or Negative obtained - - -			
		Tertiary or Copy obtained - - - -			

Report of the state of Photographic Records and their Reductions, on 185 , . [Form No. 114.*]

(*continued*)

No. of Book.	Subject of Book.	Line or column of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
100	Times of breaking Magnet. & Barom. Registers.	Times *entered* Clock-errors *entered* Göttingen Times formed		
101	Times of breaking Thermometer-Registers.	Times *entered* Clock-errors *entered* Göttingen Times formed Greenwich Times formed		
102	Base-line Reading for Declination.	Times *entered* Distances of Register from Instrumental Base *entered* Observed Declinations *entered* Base-line Readings from single observations Means for Groups Base-line Reading adopted		
103	Base-line Reading for Horizontal Force.	Times *entered* Distances of Register from Instrumental Base *entered* Equivalents of observed scale-reading *entered* Thermometer-readings *entered* Base-line Readings from single observations Means for Groups Base-line Reading adopted		
104	Base-line Reading for Vertical Force.	Times *entered* Distances of Register from Instrumental Base *entered* Equivalents of observed scale-reading *entered* Thermometer-readings *entered* Base-line Readings from single observations Means for Groups Base-line Reading adopted		
105	Reduction of Photographic Readings of Horizontal Force.	Times *entered* Distances from adopted Zero *entered* Thermometer-readings *entered* Corrections for Temperature *entered* Horizontal Force corrected Readings deduced		

Report of the state of Photographic Records and their Reductions, on 18 , . [Form No. 114.*]

(*continued*)

No. of Book.	Subject of Book.	Line or Column of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
106	Reduction of Photographic Readings of Vertical Force.	Times *entered* - - - - -		
		Distances from adopted Zero *entered* - - -		
		Thermometer-readings *entered* - - - -		
		Corrections for Temperature *entered* - - -		
		Vertical Force corrected Readings deduced - -		
107	Base-line Reading for Barometer.	Times *entered* - - - - -		
		Reduced distances of Register from Instrumental Base *entered*		
		Readings of Standard Barometer *entered* - -		
		Attached-Thermometer readings *entered* - -		
		Base-line Readings from single observations - -		
		Means for Groups - - - - -		
		Base line reading adopted - - - -		
108	Reduction of Photographic Readings of Barometer.	Times *entered* - - - - -		
		Distances from Adopted Zero *entered* - - -		
		Adopted Thermometer-readings *entered* - - -		
		Corrections for Temperature *entered* - - -		
		Barometer-readings deduced - - - -		
109	Corrections to Photographic Register of Dry Bulb Therm.	Times entered - - - - -		
		Readings from Register *entered* - - - -		
		Readings of Standard Dry Bulb Therm. *entered* - -		
		Excesses formed - - - - - -		
		Corrections deduced - - - - -		
110	Reduction of Photographic Readings of Dry Bulb. Therm.	Times *entered* - - - - - -		
		Readings from Register *entered* - - -		
		Corrections *entered* - - - - -		
		Corrected Readings formed - - - -		
111	Corrections to PhotographicRegister of Wet Bulb Therm.	Times entered - - - - -		
		Readings from Register *entered* - - -		
		Readings of Standard Wet Bulb Therm. *entered* - -		
		Excesses formed - - - - -		
		Corrections deduced - - - - -		

Report of the state of Photographic Records and their Reductions, on 18 , . [Form No. 114.*]

(*continued*)

No. of Book.	Subject of Book.	Line or Column of Calculation.	Date at Completion of Entry or Computation.	Date at Completion of Examination.
112	duction of Photographic Readings of Wet Bulb. Therm.	Times *entered* - - - - -		
		Readings from Register *entered* - - - -		
		Corrections *entered* - - - - -		
		Corrected Readings formed - - - -		
	Miscellaneous.			

(*Signed*)

Superintendant.