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APPENDIX.

REGULATIONS

OF THE

ROYAL OBSERVATORY, GREENWICH.

GREENWICH OBSERVATIONS, 1873.—APPENDIX.

(ADVERTISEMENT TO THE FIRST EDITION.)

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. 14th.

G. B. AIRY.

(ADVERTISEMENT TO THE REPRINT.)

IN this reprint, the general arrangement of the first Edition is preserved unaltered ; but numerous changes are made in the details.

Royal Observatory Greenwich, 1874, August 5th.

G. B. AIRY.

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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 Manual. By this warrant (in which the terms of the original warrant to Flamsteed are strictly preserved) 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." His salary is now fixed at 1,000*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 twice been changed; at present it is as follows:—The President of the Royal Society (not being Astronomer Royal or Assistant of the Royal Observatory), the President of the Royal Astronomical Society (not being Astronomer Royal or Assistant of the Royal Observatory), the Savilian Professor of Astronomy at Oxford for the time being, the Plumian Professor of Astronomy and Experimental Philosophy at Cambridge for the time being, and the Hydrographer of the Navy, are *ex officio* visitors. Six Fellows of the Royal Society and six 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 late 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 fifteen.

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 to 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 President or 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 no repairs of the buildings, or expensive purchases, 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 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 and ordinary expenses, but excluding extraordinary expenses for new buildings, &c., usually approaches to 6,000*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 Chief 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 authorised to appoint a Chief Assistant, of rank superior to the other assistants, and competent to represent the Astronomer Royal in his absence ; a Superintendent of the Magnetical and Meteorological Department ; two First Class Assistants ; four Second Class Assistants ; and an Assistant in the Magnetical and Meteorological Department. The nomination is made after competitive examination by the Commissioners of Civil Services, subject to probationary trial by the Astronomer Royal.

11. By Order in Council, the following scale is fixed for the salaries of the assistants. For the Chief Assistant, 500*l*. to 600*l*. per annum ; for the Superintendent of the Magnetical and Meteorological Department, and for the First Class Assistants, 320*l*. to 450*l*. ; for the Second Class Assistants, 200*l*. to 300*l*. ; and for the Assistant in the Magnetical and Meteorological Department, 180*l*. to 250*l*. (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, a watchman, and a gate-porter.

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 (at present 600*l*.) 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 or magnetical or meteorological 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 Chief 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 ; spectroscopic observations of the sun and stars, and photographs of the sun ; 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 form 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 three local magnetic elements, of magnetic disturbances, and of spontaneous galvanic earth-currents ; and of the usual subjects of 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 First Class Assistant superintends the magnetic and meteorological Observatory. 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 Rooms of the Observatory. One First Class Assistant has specially under his superintendence 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 ; one First Class Assistant (mentioned above) superintends the Transit reductions ; a First Class Assistant is charged with the management of chronometer-business, with galvanic communications and the issue of time-signals, and with the money-accounts ; of the other Assistants, one has charge of the Library, the Manuscripts, and the distribution of Observatory Publications ; another superintends the Altazimuth reductions ; a third is charged with the Meridian Circle-reductions ; and the fourth undertakes the Photographic and Spectroscopic observations. The Chief Assistant observes occasionally with any of the instruments. The Astronomer Royal and the Chief Assistant superintend all, and enter into details of each as far as they judge necessary.

22. The Chief Assistant, and the other assistants in the astronomical department who are also observers, are employed in the computing room during five hours. One First Class Assistant, and the supernumerary computers, are employed during six and a half hours in summer and six hours in winter.

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 Chief 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 6^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 Superintendent, 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 Chief 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 Superintendent on a printed form (No. 144**, of which a specimen is subjoined) and is laid before the Astronomer Royal.

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 (about 150 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 authorised 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 Chief Assistant and the Superintendent of the Magnetical and Meteorological Department, 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*, 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 150 or more 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 alterations of heat (by means of a stove heated by flames of gas) and of cold (sometimes 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 Chief Assistant, or by the Assistant in immediate charge of chronometers.

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 extensively circulated among chronometer makers and others, British and Foreign, and is also attached to the annual volume of Observations.

33. Every day, before 10^h A.M. and again before 1^h P.M., 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 and at Deal, and which gives hourly signals to the South Eastern Railway and to the General Post Office (used for extensive distribution in the provinces, for dropping time-balls, and for firing signal-guns), is adjusted to correct mean solar time.

34. Occasionally 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 Chief 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 Assistant in charge of these departments.

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. Every effort is made to prepare the observations and reductions for press as early as possible. 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, 300 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 distributed by the Astronomer Royal; a small portion being intrusted for distribution to the Council of the Royal Astronomical Society; 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 superintendence 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. New books, &c., are procured through H. M. Stationery Office.

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 Chief 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 Superintendent of the Nautical Almanac, the Superintendent of the British Trigonometrical Survey, and Her Majesty's Astronomer at the Cape of Good Hope; 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.
1874, August 6.

G. B. AIRY.



PUBLIC AND PRIVATE REGULATIONS

ROYAL OBSERVATORY, GREENWICH.													
[Form No. 83***.]													
Arrangement of Observers for Eight Days, commencing with the morning of Monday, (Civil Reckoning) 187 ,													
Month and Day. (Astronomical.)	Day of the Week (Civil). 15 th to 15 th . (Astronomical.)	Limb of Moon.	Transit Circle.	Reflex Zenith Tube.	Equatorial.	Photoheliograph.	Eclipses, Occultations, &c.	Normal Clock, Chronometers, and Ball.	Month and Day (Astronomical), with Position of Moon.	Hours. (Astronomical), (Civil Reckoning).	Altazimuth.	Magnetic and Meteorological Observations.	Miscellaneous.
	Monday						Monday		R V S	h 16 20			
	Tuesday						Tuesday		R V S	0 4 8 12 16 20			
	Wednesday						Wednesday		R V S	0 4 8 12 16 20			
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	Saturday						Saturday		R V S	0 4 8 12 16 20			
	Sunday						Sunday		R V S	0 4 8 12 16 20			
	Monday						Monday		R V S	0 4 8 12 16 20			Transit Adjustments

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

(Signed)

ROYAL OBSERVATORY, GREENWICH.

[Form No. 55*.]

MAGNETICAL AND METEOROLOGICAL DEPARTMENT.

Arrangement of Observers for Eight Days, commencing on Monday, 187 , a, (Civil Reckoning).

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

(Signed)

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ROYAL OBSERVATORY, GREENWICH.

[Form No. 45**.]

Objects observed in the day ending 187	21 ^h .
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[illegible]

Chief Assistant.

(Signed)

[Form No. 144**.]

ROYAL OBSERVATORY, GREENWICH.

MAGNETICAL AND METEOROLOGICAL DEPARTMENT.

Report on Photographic Records and General Observations for the _____ day ending 187 _____, 23rd.

The Photographic Sheets are good.

The H.F. and Declination registers are perfect.

The V.F. and Barometer registers are perfect.

The Earth-current registers are perfect.

The Thermometer registers are perfect.

Check observations were taken at ^h 0 ; ^h 3 ; ^h 9 ; ^h 21 ; ^h ; ^h ; ^h ; ^h 21 .

Basement { Near V.F. Magnet ; ; ; ; ; ; ; ; .

Temperature { Near H.F. Magnet ; ; ; ; ; ; ; ; .

The amount of cloud at each }
time of observation was ; ; ; ; ; ; ; ; .

The Reading of the Barometer in. in.

The Maximum Temperature of the Air

The Minimum Temperature of the Air

The Anemometer Sheets are good.

The Direction of the Wind was

The pressure of the Wind in lbs. per square foot was

The Horizontal Movement of the Air by Robinson's Anemometer was miles. ; and miles.

The amount of Rain 5 inches above the ground was inch .

The following Observations have also been made, viz. :

Of Dip by Needle B₁, = . ; B₂, = . ; C₁ = . ; C₂ = . ; D₁ = . ; D₂ = . of
Deflexion, of Circumpolar Star, of Theodolite Mark, of Electricity.

(Signed)

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PUBLIC AND PRIVATE REGULATIONS

[FORM No. 46**.]

ROYAL OBSERVATORY, GREENWICH.

REPORT of the STATE of ASTRONOMICAL CALCULATIONS, on 18 ,

No. of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
1*	Transits with Transit Circle.	Transits <i>entered</i> Means of Wires taken Reduction to Central Wire Observed Transit Mean of Limbs Collimation Error <i>entered</i> Collimation Error applied Level Error <i>entered</i> Level Error applied Azimuthal Error <i>entered</i> Azimuthal Error applied True Transit Clock Slow at 0 ^h Sidereal <i>entered</i> Adopted Losing Rate <i>entered</i> Observed R. A. Duration of Passage of Semidiameter <i>entered</i> Observed R. A. of Center Star Corrections <i>entered</i> Observed Mean R. A. Jan. 1 Tabular R. A. <i>entered</i> Personal Equation applied Correction for defective illumination applied		
2*	Completion of Transits.	Last Investigation of Intervals of Wires Calculation for Stars and Planets Calculation for Moon Calculation for Polar Stars		
3*	Collimation of Transit Circle.	Readings of Micrometer of South Collimator <i>entered</i> Readings of Transit Micrometer <i>entered</i> Concluded Reading for Line of Collimation Corrected Error of Collimation determined Press Copy prepared		
4*	Level Error of Transit Circle.	Readings of Transit Micrometer <i>entered</i> Means taken Application of Reading for Line of Collimation Error of Level Press Copy prepared		

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Report of the State of Astronomical Calculations, on 18 , —continued.				
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
5*	Azimuthal Error of Transit Circle.	Observed transits and factors <i>entered</i> Tabular Places <i>entered</i> Clock rates applied Azimuthal Error determined Azimuthal Error adopted Press Copy prepared		
6	Tabular R. A. of N. A. Stars.	Tabular Places determined Star Corrections determined		
7	Tabular R. A. of Polar Stars.	Tabular Places determined Star Corrections determined		
91	Computation of Star Constants in R. A.	Names <i>entered</i> Elements <i>entered</i> Computation performed Press Copy prepared		
93	Computation of Star Corrections in R. A.	Day Constants <i>entered</i> Star Constants <i>entered</i> Star Correction computed Tabular Places for supplementary Clock Stars formed		
8*	Clock Errors.	Approximate Mean Times <i>entered</i> Apparent R. A. <i>entered</i> True Transit <i>entered</i> Apparent Clock Error formed Means taken Personal Equation applied Clock's Loss in 24 ^h Rate adopted Clock's Error at 0 ^h Sidereal		
10	Mean Time.	Sidereal Time for Meridional Observations <i>entered</i> Mean Solar Time computed		
11*	Adjustments of Transit Circle in R. A.	Last Examination of Transit Pivots Last observation or remarks		
12	Ledger of Stars' R.A.	Separate determinations of R. A. <i>entered</i> Means taken Fraction of year <i>entered</i> Means taken		

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Report of the State of Astronomical Calculations, on 18 ,				—continued.	
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion		
			of Entry or Computation.	of Examination.	
14*	Transit Copy for Press.	Names of Objects. Seconds of Transit over Wires Concluded Transit Instrumental Errors Seconds of Transit corrected Tabular R. A. of known Stars Clock apparently slow Adopted Clock slow at 0 ^h Sidereal Adopted Losing Rate Apparent R. A. Correction to Mean R. A. Notes written			
155	Clock Comparisons.	Last determination of approximate Clock Error . . Comparisons of Clocks reduced			
16*	Zenith Distances with Transit Circle.	Readings of separate Microscopes <i>entered</i> Means taken Correction for Runs <i>entered</i> First Part of Correction for Runs computed Second Part of Correction for Runs computed Micrometer Reading and Equivalents Correction for Flexure and Errors of Division Circle Reading at Observation Correction for Curvature and Inclination of Wire Correction for Change of N.P.D. Circle Reading for Observation on Meridian Zenith Point Correction <i>entered</i> Apparent Zenith Distance Refraction <i>transferred</i> True Zenith Distance Parallax <i>transferred</i> Geocentric Zenith Distance Observed N.P.D. Correction for defective illumination <i>entered</i> Corrected N.P.D. of Limb Semidiameter <i>entered</i> N.P.D. of Center Star Corrections <i>entered</i> Mean N.P.D. Jan. 1. Tabular N.P.D. <i>entered</i> Refraction Numbers for Barometer Refraction Numbers for Thermometer Refraction Numbers for Zenith Distance Additional Numbers t. and b. Sums Refraction found			

Report of the State of Astronomical Calculations, on 18 , —continued.				
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
16*	Zenith Distances with Transit Circle— <i>continued</i> .	Refraction for Zenith Distances greater than 85° calculated		
		Change of Moon's N.P.D. for One Interval of Wires calculated		
		Moon's Parallax calculated		
		Sun and Planets' Parallax calculated		
		Correction for defective illumination calculated		
		Observations of Moon completely reduced		
20*	Adjustments of Transit Circle in Z. D.	Last Observations of Runs		
		Last Entry of other Matters		
23*	Zenith Points.	Concluded Circle Reading <i>entered</i>		
		Means of Groups taken		
		Zenith Point adopted		
25	Correction in N. P. D. for N. A. Stars.	Tabular Places <i>entered</i>		
		Star Corrections found		
92	Computation of Star Constants in N.P.D.	Names <i>entered</i>		
		Elements <i>entered</i>		
		Computation performed		
		Press Copy prepared		
94	Computation of Star Corrections in N.P.D.	Day Constants <i>entered</i>		
		Star Constants <i>entered</i>		
		Star Correction computed		
29	Ledgers of Stars' N.P.D.	Observations <i>entered</i>		
		Means taken		
		Correction for R—D applied		
		Fraction of Year <i>entered</i>		
		Means taken		
30* or 30**	Interpolations for Meridional Observations.	Mean Times <i>entered</i>		
		Numbers for Epochs <i>entered</i>		
		Coefficients formed		
		Interpolation complete		

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PUBLIC AND PRIVATE REGULATIONS

Report of the State of Astronomical Calculations, on 18 ,					—continued.	
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion			
			of Entry or Computation.	of Examination.		
48*	Z.D. Copy for Press.	Names of Objects Readings of Circle Microscopes Reading of Telescope Micrometer Seconds of Concluded Circle Reading Apparent Zenith Distance Barometer and Thermometers Refraction Geocentric N.P.D. of Center Change of N.P.D. for one interval of wires Parallax and Semidiameter Correction to Mean N.P.D. Notes written				
13	Planet Results.	Mean Solar Time <i>entered</i> R. A. from Observation <i>entered</i> Tabular R.A. <i>entered</i> Apparent Error of Tables in R.A. N.P.D. from Observation corrected for R—D <i>entered</i> Tabular N. P.D. <i>entered</i> Apparent Error of Tables in N.P.D.				
	Grouping Book.	Errors of R.A. and N.P.D. <i>entered</i> for Means taken for				
	Deductions from Meridional Observations.	Investigation of R—D Investigation of Correction of Latitude Yearly Star Catalogue : Names of Stars <i>entered</i> Mean R. A. and Fraction of Year for R. A. <i>entered</i> Annual Variation in R.A. <i>entered</i> Mean N.P.D. <i>entered</i> Concluded N.P.D. and Fraction of Year for N.P.D. formed Annual Variation in N.P.D. <i>entered</i> Comparison of Observed and Tabular Diameters of Sun, Moon, and Planets Investigation of Position of the Ecliptic				
115	Computation of Errors of Long. and E.N.P.D. for Planets.	Errors of R.A. and N.P.D. <i>entered</i> Values of P, Q, R, S, <i>entered</i> Computation performed Press Copy prepared				

Report of the State of Astronomical Calculations, on 18 , —continued.				
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion of Entry or Computation. of Examination.	
	Computation of Errors of Long. and E.N.P.D. for Moon.	Errors of R. A. and N.P.D. <i>entered</i> Values of P, Q, R, S, <i>entered</i> Computation performed Press Copy prepared		
	Computation of Errors of Long. and E. N.P.D. for Planets out of Range of the P, Q, R, S, Tables.	Names <i>entered</i> Elements <i>entered</i> Computation performed Press Copy prepared		
Pl. 19	Normal Heliocentric Errors.	For principal Planets For Minor Planets Press Copy prepared		
60*	Reflex Zenith Tube.	Micrometer Readings <i>entered</i> Sum Level Readings <i>entered</i> Sum Equivalent for Wire Equivalent for Sum of Micrometer Readings Equivalent for Sum of Level Readings Sum of Equivalents Instrumental Constant formed Star's Z.D. found Star Correction <i>entered</i> Star's Mean Z.D. found Press Copy prepared		
68	Zenith Distances observed with the Altazimuth.	Transits on separate Horizontal Wires <i>entered</i> Means of Wires Clock Time of Vertical Transit Clock Error and Rate <i>entered</i> Sidereal Time of Vertical Transit Readings of separate Microscopes of Vertical Circle <i>entered</i> Correction for Runs for 5' <i>entered</i> Correction for omitted Wires <i>entered</i> Concluded Reading of Vertical Circle Reading corrected for Level Refraction <i>transferred</i>		

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Report of the State of Astronomical Calculations, on 18 , —continued.				
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion of Entry or Computation. of Examination.	
68	Zenith Distances observed with the Altazimuth— <i>continued.</i>	Circle Reading corrected for Refraction Zenith Point <i>entered</i> True Observed Zenith Distance Approximate Zenith Distance <i>entered</i> Refraction Numbers for Barometer and Thermometer Refraction Numbers for Zenith Distance Sums Refraction found Last Examination of Intervals of Wires Last Examination of Runs		
69	Azimuths observed with the Altazimuth.	Transits on separate Vertical Wires <i>entered</i> Means of Wires Clock Time of Horizontal Transit Clock Error and Rate <i>entered</i> Sidereal Time of Horizontal Transit Readings of separate Microscopes of Horizontal Circle Correction for Runs for 5' <i>entered</i> Correction for omitted Wires <i>entered</i> Concluded Reading of Horizontal Circle Correction for form of Pivots <i>entered</i> Factors for Collimation and Level <i>entered</i> Errors of Collimation and Level <i>entered</i> Reading of Horizontal Circle corrected Zero of Azimuth <i>entered</i> Observed Azimuth Readings of Level <i>entered</i> Mean Level Indication Level Error as applying to Horizontal Axis Last Examination of Intervals of Wires Last Examination of Runs		
70	Comparisons of Altazimuth Clock with Transit Clock.	Times by Clocks and Chronometers <i>entered</i> Correction from Solar to Sidereal Time <i>entered</i> . . . Chronometer's Losing Rate <i>entered</i> Interval in Sidereal Time Transit Clock slow at 0 ^h Sidereal and Rate <i>entered</i> . Sidereal Time at comparison with Transit Clock . . Error of Altazimuth Clock		
10	Mean Time.	Sidereal Time for Altazimuth Observations <i>entered</i> . Mean Solar Time computed		

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Report of the State of Astronomical Calculations, on 18 ,					—continued.	
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion			
			of Entry or Computation.	of Examination.		
30*	Interpolation of Moon's R. A.	Mean Times <i>entered</i> Numbers from N. A. <i>entered</i> Co-efficients formed Interpolation complete				
30**	Interpolation of Moon's N. P. D.	Mean Times <i>entered</i> Numbers from N. A. <i>entered</i> Co-efficients formed Interpolation complete				
30*	Interpolation of Moon's Hor. Parallax and Semidiameter.	Mean Times <i>entered</i> Numbers from N. A. <i>entered</i> Co-efficients formed Interpolation complete				
71	Corrections for Figure of Earth, Moon's Semidiameter and Moon's Parallax, for observations with Altazimuth.	Observed Z. D. of Limb <i>entered</i> Approx. Tab. Geoc. N. P. D. <i>entered</i> Approx. Tab. Normal Centric Z. D. <i>entered</i> Tab. Hor. Eq. Parallax <i>entered</i> Tab. Geoc. Semidiameter <i>entered</i> Normal Centric Correction to N. P. D. Semidiameter in Azimuth Normal Centric Semidiameter Normal Centric Parallax				
72	Tabular Azimuths and Zenith Distances of Stars and Moon's Limb for observations with Altazimuth.	Sidereal Time of Observation <i>entered</i> Tabular R. A. of Center <i>entered</i> Hour Angle in Arc Tabular Geoc. N. P. D. of Center <i>entered</i> Normal Centric N. P. D. of Center formed Azimuth of Center found Azimuthal Semidiameter <i>entered</i> Tabular Azimuth of Limb Observed Azimuth <i>entered</i> Error of Tabular Azimuth Normal Centric Zen. Dist. of Center found Normal Centric Semidiameter <i>entered</i> Normal Centric Parallax <i>entered</i> Tabular Greenwich Zenith Distance of Limb Observed Zenith Distance of Limb Error of Tabular Zenith Distance				

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PUBLIC AND PRIVATE REGULATIONS

Report of the State of Astronomical Calculations, on 18			—continued.	
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
73	Zenith Points of Vertical Circle of Altazimuth.	Corrected Circle Reading <i>entered</i> Tabular Zenith Distance <i>entered</i> Groups formed Zenith Points adopted		
74	Error of Collimation of Altazimuth.	Zenith Distances, Cosecants and Cotans. <i>entered</i> . . Level Readings <i>entered</i> Concluded Reading of Circle <i>entered</i> Tabular Azimuth <i>entered</i> Results for Error of Collimation complete		
	Level Reading for Horizontal Position of Horizontal Axis of Altazimuth.	Zenith Distances and Cotans. <i>entered</i> Level Readings <i>entered</i> Concluded Reading of Circle <i>entered</i> Tabular Azimuth <i>entered</i> Results for Level Reading complete		
75	Zero of Azimuth of Horizontal Circle.	Readings of Horizontal Circle <i>entered</i> Tabular Azimuths <i>entered</i> Groups formed Zero adopted		
76	Adjustments of Altazimuth.	Date of last computation or remark		
81	Conversion of Errors of Az. and Z. D. into Errors of R. A. and N. P. D.	Approx. Mean Solar Time <i>entered</i> Hour Angle and N. P. D. <i>entered</i> Errors of Azimuth and Z. D. <i>entered</i> p, q, r, s, <i>entered</i> Errors of R. A. and N. P. D. found		
115	Computation of Errors of Long. and E. N. P. D. for Altaz. Obs.	Errors of R.A. and N. P. D. <i>entered</i> P, Q, R, S, <i>entered</i> Computation performed		
96	Azimuth Copy for Press.	Names of Objects <i>entered</i> Left page <i>copied</i> Right page <i>copied</i> Notes written		
97	Zen. Distances Copy for Press.	Names of Objects <i>entered</i> Left page <i>copied</i> Right page <i>copied</i> Notes written		

Report of the State of Astronomical Calculations, on 18 , —continued.				
No of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
98	Comparison of Tab. and Obs. Azimuths and Zen. Distances. Copy for Press.	Names of Objects <i>entered</i> Numbers from Form 72 <i>copied</i> Mean Times from Form 10 <i>copied</i> Log. Normal Centric Parallax from Form 71 <i>copied</i> .		
	Altazimuth Copy for Press.	Separate Results for Collimation Level Indication for Hor. Position of Axis of Vertical Circle Separate Results for Zero of Azimuth Separate Results for Zenith Point Errors of Moon's Tabular R. A. and N. P. D. Errors of Moon's Long. and E. N. P. D.		
64	Equatoreal Computations in R. A.	Last Observations Concluded Reading of Hour Circle in Time Refraction in R. A. <i>entered</i> Parallax in R. A. <i>entered</i> Instrumental R. A. corrected Assumed R. A. of Star <i>entered</i> R. A. of Object formed Mean Solar Time <i>entered</i> Interpolated R. A. <i>entered</i> Error of Interpolated R. A. Last examination of Runs of Hour Circle Microscopes		
65	Equatoreal Computations in N. P. D.	Last Observations Circle Reading in Arc Micrometer Reading Concluded Circle Reading Refraction in N. P. D. <i>entered</i> Parallax in N. P. D. <i>entered</i> Instrumental N. P. D. corrected Assumed N. P. D. of Star <i>entered</i> N. P. D. of Object formed Mean Solar Time <i>entered</i> Interpolated N. P. D. <i>entered</i> Error of Interpolated N. P. D. Last Examination of Runs of Declination Circle Microscopes		
10	Mean Time.	Sidereal Time for Equatoreal Observations Mean Solar Time computed		

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Report of the State of Astronomical Calculations, on 18 ,			—continued.	
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion of Entry or Computation.	Date of Examination.
30* or 30**	Interpolations for Equatoreal.	Mean Times <i>entered</i> Numbers for epochs <i>entered</i> Coefficients formed Interpolation complete		
	Double Image Micrometer.	Last Determination of Value of Divisions Last Determination of Polar Point Last Observation Reductions made to Press Copy prepared		
	Eclipses of Sun and Moon.	Last Observation Time by Transit Clock Sidereal Time Mean Solar Time Press Copy prepared		
	Eclipses, &c. of Jupiter's Satellites.	Last Observation Time by Transit Clock Sidereal Time Mean Solar Time Press Copy prepared		
	Occultations of Stars	Last Observation Time by Transit Clock Sidereal Time Mean Solar Time Press Copy prepared		
30* or 30**	Interpolations for Occultations of Stars.	Mean Times <i>entered</i> Numbers from N.A. <i>entered</i> Coefficients formed Interpolation complete		
31*	Calculation of Occultations of Stars.	Mean Times <i>entered</i> Interpolated Numbers <i>entered</i> Places of Stars <i>entered</i> F. and G. computed Approximations made Distance of corresponding Point found Final Equation formed Press Copy prepared		

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Report of the State of Astronomical Calculations, on 18 , —concluded.				
No. of Form.	Subject of Form.	Line of Computation.	Date of Completion	
			of Entry or Computation.	of Examination.
	Miscellaneous Computations.			
	Preparation for next Year's Work.	Assumed R.A. of Naut. Alm. Stars Assumed N.P.D. of Stars for Altazimuth Working Star Catalogue Times of Transit of Sun, Moon, and Planets Angle of defective Illumination for Moon Times of Moon's Limbs being Vertical Other matters		
	State of Printing.			

(Signed)

Chief Assistant.

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PUBLIC AND PRIVATE REGULATIONS

[Form No. 82*.]

ROYAL OBSERVATORY, GREENWICH.

REPORT of the STATE of MAGNETICAL and METEOROLOGICAL CALCULATIONS, and of the STATE of PHOTOGRAPHIC RECORDS and their REDUCTIONS, on 18

No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion	
			of Entry or Computation.	of Examination.
	Adjustments of Declination Magnetometer.	Last Determination of Micrometer Screw 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 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 Standard Last Adjustment of Perpendicularity		
	Adjustments of Dry and Dew Point Thermometer.	Last Comparison with		
	Adjustments of Wet Thermometer.	Last Comparison with Dry Thermometer		

Report of the State of Magnetical and Meteorological Calculations, &c.— <i>continued</i> .				
No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion	
			of Entry or Computation.	of Examination.
	Adjustments of Anenometers.	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 of Scale of Robinson's		
	Adjustments of Pluviometers.	Last Valuation of Scale of Osler's of Scale of No. 2 Library Gauge 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 <i>entered</i> Equivalents for Micrometer <i>entered</i> Sum Theodolite Reading for Astronomical Meridian <i>entered</i> Western Declination determined Equivalent for Mean Reading, Horizontal Force Temperature Correction <i>entered</i> Sum Equivalent for Mean Reading, Vertical Force Temperature Correction <i>entered</i> Sum		
50 (Left Page.)	Daily Observations of Meteorological Instruments.	Barometer Readings corrected Thermometer Readings corrected Excess of Dry Thermometer above Wet Thermometer Excess of Dry Thermometer above Dew-Point Dew-Point deduced		
53	Observations with Magnetic Theodolite.	Sidereal Clock Slow <i>entered</i> Greenwich Sidereal Time R.A. of Star <i>entered</i> Star's Hour Angle Star's N.P.D. <i>entered</i> Star's Altitude Mean of Microscope Readings Correction to Meridian in Azimuth <i>entered</i> Reading for North Meridian Correction for Level Mean adopted Reading for Astronomical Meridian		
52	Magnetic Dip.	$\theta_1, \theta_2, \theta_3, \theta_4$, formed Dip computed Value of $\frac{b}{c}$		

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PUBLIC AND PRIVATE REGULATIONS

Report of the State of Magnetical and Meteorological Calculations, &c.— <i>continued</i> .				
No. of Book.	Subject of Book.	Line of Calculation.		Date at Completion of Entry or Computation.
	Deflexion Observations.	Date of last Observation First stages in Reduction Equations Formed Equations Solved Vibrations corrected for Arc Result for Horizontal Force		
	Photographic Sheets for Declination and Horizontal Force.	DECLINATION. Photographic Trace marked with Sepia Times of Interruption <i>entered</i> Time-Scale laid down Value of Instrumental Base-line <i>entered</i> New Base-line laid down HORIZONTAL FORCE. Photographic Trace marked with Sepia Times of Interruption <i>entered</i> Time-Scale laid down Value of Instrumental Base-line <i>entered</i> New Base-line laid down Thermometer Readings <i>entered</i> Secondaries complete to		
	Photographic Sheets for Vertical Force and Barometer.	VERTICAL FORCE. Photographic Trace marked with Sepia Times of Interruption <i>entered</i> Time-Scale laid down Value of Instrumental Base-line <i>entered</i> New Base-line laid down Thermometer Readings <i>entered</i> BAROMETER. Photographic Trace marked with Sepia Times of Interruption <i>entered</i> Time-Scale laid down Value of Instrumental Base-line <i>entered</i> New Base-line laid down Secondaries complete to		
	Photographic Sheets for Thermometers.	Times of Interruption <i>entered</i> Time-Scales laid down Check Observations <i>entered</i>		
100	Times of breaking Magnetometer and Barometer Registers.	Times <i>entered</i> Clock-errors <i>entered</i> Greenwich Times formed		
101	Times of breaking Thermometer Registers.	Times <i>entered</i> Clock-errors <i>entered</i> Greenwich Times formed		

Report of the State of Magnetical and Meteorological Calculations, &c.—concluded.				
No. of Book.	Subject of Book.	Line of Calculation.	Date at Completion	
			of Entry or Computation.	of Examination.
102	Base-line Reading for Declination.	Times <i>entered</i> Distances of Register from Instrumental Base <i>entered</i> . . Observed Declinations <i>entered</i> Base-line Readings from Single Observations. Means for Groups Base-line Reading adopted		
103	Base-line Reading for Horizontal Force.	Times <i>entered</i> Distances of Register from Instrumental Base <i>entered</i> . . Equivalents of Observed Scale-reading <i>entered</i> Base-line Readings from Single Observations Means for Groups Base-line Reading adopted		
104	Base-line Reading for Vertical Force.	Times <i>entered</i> Distances of Register from Instrumental Base <i>entered</i> . . Equivalents of Observed Scale-reading <i>entered</i> Base-line Readings from Single Observations Means for Groups Base-line Reading adopted		
107	Base-line Reading for Barometer.	Times <i>entered</i> Reduced Distances of Register from Instrumental Base <i>entered</i> Corrected Readings of Standard Barometer <i>entered</i> Base-line Readings from Single Observations Means for Groups Base-line Reading adopted		
	Miscellaneous Mag- netical and Meteoro- logical Obser- vations and Com- putations.			
	Copy for Press.			

(Signed)