

R E P O R T
OF THE
METEOROLOGICAL COUNCIL

For the Year ending 31st of March 1896 ;

SUBMITTED TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Presented to Parliament by Command of Her Majesty.



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MAP SHOWING THE APPROXIMATE POSITIONS OF THE STATIONS FROM WHICH OBSERVATIONS ARE RECEIVED.



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THE METEOROLOGICAL COUNCIL,

1895-96.

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R E P O R T
OF THE
METEOROLOGICAL COUNCIL
TO THE
ROYAL SOCIETY,

For the Year ending March 31, 1896.

THERE has been no change in the Council during the year. *Introductory.*
The executive officers are, as stated in the last Report :—

Mr. Scott, Secretary.

Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., Marine Superintendent.

The Report is, as usual, divided into four sections or parts :

- I. OCEAN METEOROLOGY.
- II. WEATHER TELEGRAPHY.
- III. CLIMATOLOGY.
- IV. MISCELLANEOUS.

PART I.

OCEAN METEOROLOGY.

Collection of Information.—The practice followed by the Office Collection of information.
in the collection of information has been to supply observers with a complete outfit of verified instruments, on the condition of their returning the instruments, and the log of observations made with them, to the Office at the completion of the voyage.

The instruments supplied are :—

One barometer ; six thermometers, with a screen ; four hydrometers.

The first record of observations is made in a rough book supplied for the purpose, which is retained by the Captain, who copies the observations into a regular form of log kept for the Office. As regards the Royal Navy, Her Majesty's ships are supplied by the Office with the meteorological instruments used in the Service, and the Council are glad to say that they receive meteorological logs of high value from this source.

In order to facilitate the communications between the Office and the observers, agencies are established at some of the principal ports, and instruments are supplied direct from them to the ships.

Collection of
information.

The following is a list of the agents at present in connexion with the Office :—

Agents.

Cardiff, T. L. Ainsley, Bute Docks.
Dundee, Capt. A. Wood, Navigation School.
Glasgow, Messrs. D. McGregor and Co., Clyde Place.
Greenock, Messrs. D. McGregor and Co., Brymner Street.
Hull, Messrs. Castle and Co., Commercial Road.
Liverpool, J. Gill, Nautical College.
Southampton, Capt. D. Forbes, High Street.

Mr. Z. Scaping, who had been agent for the Office at Hull since 1854, resigned the appointment at the end of the year 1895, having carried out the duties of the agency, during the whole of this long period, most satisfactorily.

The Council much regret to announce the death of Mr. J. R. Jones, who had been agent for the Office at Aberdeen since 1869, and they cannot speak too highly of the manner in which the agency had been conducted by him.

Occasionally captains are supplied at ports where there are no agencies, and in these cases the instruments are sent direct from the Office in London. The number of merchant ships supplied with standard instruments and log books during the year was 112.

A set of instruments is kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the handling and reading of all the instruments. A notice to captains is frequently distributed to vessels lying in the various London docks, and copies of it are also supplied to each agent for circulation.

Recognition of
"excellent"
observers.

Various publications (see App. XVI., p. 120) are presented by the Council to observers who supply the Meteorological Office with thoroughly well kept logs, in recognition of their co-operation in a work which is calculated to be of very great advantage to navigators and to science generally.

Appendix I. (p. 35) contains a list of all the observers who during the past year have contributed logs classed as "excellent." Several of these observers have regularly co-operated with the Office for many years. The names which appear in the list for the first time are as follow :—

Observer's Name.	Ship.
Dupen, P. P.	S.S. "Cabenda."
Glossop, Lieut. H. A. P., R.N.	H.M.S. "Rambler."
Goodrham, H.	S.S. "Woolloomooloo."
Livett, H. W.	S.S. "Ormuz."
Lobb, Staff-Commr. F. J., R.N.	S.S. "Richmond."
McKilliam, R.	"Salamis."
Milward, C. A., R.N.R.	S.S. "Otarama."
Mullan, F. C., F.R.G.S.	S.S. "Romney."
Nedden, H. zur	S.S. "Madelaine."
Payne, C. J.	S.S. "Elton."
Plunket, C. E.	"Hurunui."

Observer's Name.	Ship.	Recognition of "excellent" observers.
Renaut, W. - - -	"Timaru."	
Richards, Commr. G. E., R.N. -	H.M.S. "Rambler."	
Tuke, F. M. - - -	S.S. "Ormuz."	
Willis, J. - - -	S.S. "Hardanger."	
Worcester, W. D. G., R.N.R. -	S.S. "Victoria."	

The Council take this opportunity of expressing their best thanks to the observers who have assisted them during the past year.

They regret to have to announce the death of one of their old observers, Captain Alexander Murray, which occurred in the summer of 1894. Captain Murray had commenced to observe for the Office in 1869, and had kept as many as 14 logs, many of them being "excellent." Captain Murray was one of the whaling captains whose observations have been peculiarly valuable, inasmuch as the Arctic seas are not much frequented by shipping.

The total number of meteorological logs received in the year ending March 31, 1896, was 143, of which 131, or over 91 per cent., have been classed as either "excellent" or "very good." Character of logs received.

The Council continue to receive, through the Ocean Steamship Company of Liverpool, a considerable number of ships logs, mostly from voyages to and from the China Seas, viâ Suez.

The British India Steam Navigation Company have also kindly presented the Office with 560 logs of their ships.

Appendix II. (p. 37) gives a list of the meteorological logs from ships, received at the Office during the year.

The following list gives a summary of the voyages for each Ocean, made by the ships specified in this Appendix :— Districts from which observations are obtained.

North Atlantic - - -	457	Pacific Ocean, South -	77
South " - - -	157	Mediterranean - - -	150
Indian Ocean - - -	187	Red Sea - - -	108
Pacific Ocean, North -	62	Arctic Ocean - - -	6

The following is an account of the works either published or in course of preparation in this branch of the Office during the year :— Publications.

Red Sea Charts.—These charts were issued early in the year. Red Sea Charts. They are mainly constructed from observations obtained by steamships whose tracks lie along the central line of the sea, and they are designed to show the meteorological conditions along that line.

The wind charts have been constructed from about 75,000 observations, and the new wind-rose, referred to in the Annual Report for 1892, has been introduced, enabling an estimate to be formed of the strength as well as of the direction of the wind likely to be experienced in any part of the sea.

The well-known periodic variations in the winds are clearly shown, and minor details of the gradual advance and retreat of the

Publications.
Red Sea
Charts.

southerly winds, prevalent in the southern part of the sea for some two-thirds of the year, are well marked.

Gales, which are most frequent during the winter months, generally blow from the southward, and they are encountered chiefly in the southern part of the sea.

The currents in the Red Sea are somewhat erratic. They do not usually attain great velocities over large areas, but strong streams, frequently across its central line, may be experienced locally.

As an instance of this, currents, setting towards the Avocet Rock, are shown on some of the charts.

The range of sea temperature in and about the Straits of Bab-el-Mandeb, near the Island of Perim, is remarkable, amounting to 26° , at the period of the South-west monsoon. For example, in September the highest temperature recorded is 92° , and the lowest 66° . A similar difference has been observed in July and August. In June and October the difference in the extreme temperatures is 16° , and the least difference, 7° , occurs in February.

Current
Charts.

Current Charts for all Oceans.—This heavy piece of work, which has occupied a portion of the staff continuously for eight years, is now approaching completion. The individual observations of current are now plotted on 48 large sheets, and the work of obtaining generalized results, which has been undertaken by the Hydrographic Department of the Admiralty, is in progress. The charts of the Indian Ocean have been printed and published. The generalized sheets, now issued, show the average direction of the current, and the minimum and maximum velocities which have been experienced. The Agulhas current, is, naturally, well shown, and the currents in the Bay of Bengal are of special interest to the navigator. From October to January there is a decided South-westerly set down the whole western coast of the Bay, but from February to June the currents entirely change their direction and set to the North eastward. In July, August, and September, however, the set of the currents is not nearly so decided along this coast.

The changes which occur in the direction of the currents round the South point of Ceylon are worthy of notice, for at the period of the North-east monsoon, November to April, the currents set to the westward round this point, but they set to the eastward when the South-west monsoon is blowing. These are some of the features shown on the charts, and it is hoped that the navigator, who until now has been obliged to rest satisfied with a single chart for the whole year, will find these monthly charts of great assistance.

Current Charts of the Arctic Regions.—These charts are for the area lying North of 60° north latitude. The information is naturally comparatively scarce, but all that is available is being used, including the currents contained in the records of the various Arctic voyages, but these are chiefly obtained from ships drifting

while fast in ice-floes, and in many cases the direction of the set only is shown on the charts, the velocity not being obtainable. Current observations are less frequently recorded in these high latitudes than in other parts of the sea. Publications.

The Meteorology of the South Sea.—The charts for this region embracing the area from the Cape of Good Hope to New Zealand and south of latitude 30° S., have been completed, and sent to the engraver. They have been drawn for each month of the year, and the whole series consists of 12 wind charts, 12 current charts, and 12 sea temperature charts. The wind charts show the prevailing winds over areas contained by 3° of latitude and 10° of longitude, and the form of wind-rose is the same as adopted in the Red Sea charts. Isobars have also been drawn on the wind charts, so that the relation between the winds and the barometrical pressure may be perceived. In the corners of the areas the percentage of fog to the number of weather observations is also given. A small inset chart shows by means of isotherms the temperature of the air, and lines indicating the limits of fog have been drawn on this chart. Meteorology
of South
Indian Ocean.

The Current charts for the district have been copied from the Indian Ocean charts before referred to, but they have been extended further eastward to the 180th meridian, so as to include New Zealand.

On the sea temperature charts the temperature of the sea surface is represented by isothermal lines, and the areas over which the range of temperature amounts to 20° and upwards are coloured blue.

The charts, which are the first published for that part of the ocean ought to be found very useful by the navigator, especially in connexion with the question of the westward homeward route from Australia, which is now attracting attention.

The South Atlantic and West Coast of South America.—The preparation of the logs for this district has been completed, and the extraction of the data is progressing satisfactorily. South Atlantic.

Supply of Instruments to Distant Stations.—Since the date of the last Report, an application has been received from the Foreign Office for the supply of outfits for four stations in Uganda. These instruments were at once procured and forwarded, their entire cost having been defrayed by the Foreign Office. In addition, thermometers and a rain-gauge have been supplied to Messrs. A. Miller and Co. for use near Cape Coast Castle; a barometer has been lent to the British Association African Committee for observations at Mombassa, and two rain-gauges have been issued to Mr. Hands, the observer at St. Helena, for erection at stations in that island. Supply of
instruments to
distant
stations.

Climatological Information for Sailing Directions.—Requests are from time to time received from the Hydrographic Department for statistics as to the climates of foreign ports, for insertion in the various sailing directions and other works issued by that Information
supplied for
sailing
directions

Office. All information available has been supplied, and the work has entailed a certain amount of labour in searching for the data in the pages of foreign publications.

The Barometer
Manual for
Seamen.

The Barometer Manual for Seamen.—The Board of Trade has recently made fresh regulations with reference to the examination for certificates in the Mercantile Marine, and has introduced into the examination the subjects of the use at sea of the Thermometer and Hydrometer. It has therefore become necessary to add to the Barometer Manual for Seamen, published in 1884, an appendix containing the most important particulars as to these instruments which a sailor might require.

Collection of
specimens of
sea water.

Collections of Specimens of Sea Water.—A number of scientific men, at the suggestion of Prof. Petterson of Stockholm, have been carrying on inquiries into the amount of salt present in the water of the North Sea and the Baltic respectively. The research has been taken up by Mr. H. N. Dickson, F.R.S.E., who was allowed to cruise in H.M.S. "Jackal" in the North Sea in the autumn of 1894. Mr. Dickson has obtained permission from the Council to place himself in communication with captains who may be willing to fill bottles, supplied by him, with specimens of sea water collected in various positions, and to send the bottles to him from time to time for examination.

Stock of
instruments
belonging to
the Office.

Supply and Stock of Instruments.—In Appendix III. (p. 42) is given a list of the meteorological instruments supplied by the Office to ships in the Royal Navy during the year, with a statement for the 31st March 1896 of the stock and distribution of the instruments standing on the books to the account of the Admiralty. The recent augmentation of the number of ships in commission and in reserve has led to the necessity of providing a considerably larger stock of instruments than had been required in former years.

Appendix IV. (p. 43) gives similar information with regard to the disposal of the other instruments belonging to the Office, remaining in store, or which have been supplied to the Mercantile Marine, and to observatories, telegraph stations, &c.

PART II.

WEATHER TELEGRAPHY AND FORECASTS.

Administra-
tive.

There have been no serious interruptions of telegraphic communication during the year, for we have fortunately escaped any serious storms, such as those which visited us in the late autumn of 1894, and, in addition, the winter of 1895–6 has been free from snow.

Among the observers there has been only one change, at Malin Head, where Mr. James Williams has succeeded Mr. Owen O'Doherty, who was obliged to resign on account of ill-health.

At St. Ann's Head, Pembrokeshire, the postal telegraph station has been abolished, but the Admiralty have been pleased to

allow the Office to make use of their telephone for communications to and from the reporting station at that place. Administrative.

A list of the telegraphic reporting stations in the United Kingdom is given in Appendix XI. (p. 84), and of the Foreign stations at the end of the same Appendix.

The work in this department goes on without any serious alteration except what arises from the constantly increasing inquiries from the public as to weather, not only current, but past, inquiries which always call for a considerable amount of investigation and research.

The only addition to the list of reporting stations has been Karlstad on Lake Wener in the interior of Sweden.

Inspection of the Telegraphic Reporting Stations.—The telegraphic reporting stations have been inspected during the year, in England by the late Rev. W. Clement Ley and Messrs. R. and J. Curtis, in Scotland by Mr. Buchan, and in Ireland and Wales by Mr. Scott. The reports submitted to the Council by the Inspectors, which are printed in Appendix V. (p. 44), show that the efficiency of the service has not been impaired. The stations in Foreign countries are controlled by the Meteorological authorities of the respective countries. Inspection of the Stations.

Discussion and Publication of the Information received.—The practice of the Office in collecting, discussing, and disseminating the meteorological information received by telegraph is described in Appendix X. of the Report for 1891. The Daily Weather Report has appeared regularly during the year; for details see that Appendix. It is distributed free of cost as follows:—To newspapers, seven copies; to seaports, for public exhibition, 71 copies; to Government offices and public institutions, 80 copies; to correspondents of the Office, 61 copies; and to foreign meteorological establishments, 35 copies. Nearly 200 copies are issued regularly to paying subscribers. Discussion of the reports.

The Weekly Weather Report, with its Monthly Appendices, has also appeared regularly; for particulars of this publication see Part III. (p. 19) and Appendix VI. (p. 72). Weekly Weather Report.

Public display at the Meteorological Office in London of the State of the Weather on British Coasts.—This arrangement, which was made with a view to the earliest possible supply to the public of the latest information as to the weather received from the principal points on the eastern, southern, and western coasts, has been regularly carried out, and it is believed with general public approval, to judge from the number of persons constantly found examining the maps and frames. The frame supplies at 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, of the state of the weather and sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia, and this is displayed in a conspicuous manner on the front of the Office, 63, Victoria Street, S.W. In addition, charts are exhibited at the Office door showing the very latest information which has reached the Office. These are put up at 9.30 and changed at 3 p.m. daily. Display of information in front of the Office.

Forecasts for the Admiralty. *Supply of Forecasts to the Admiralty.*—At the request of the Admiralty daily forecasts were supplied to the Commander-in-Chief, Devonport, as in previous years.

Forecasts. *Weather Forecasts.*—Forecasts are prepared three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts prepared at 11 a.m., on the information derived from the 8 a.m. reports, refer to the probable weather between noon on the day of issue and noon on the following day. They are publicly exhibited in several places in London,* and are supplied to the afternoon editions of the newspapers. The 3.30 p.m. Forecasts are employed for storm warnings principally, excepting in the hay harvest season, when they are issued as subsequently explained. The forecasts at 8.30 p.m. are specially prepared for publication in the morning newspapers, but all the forecasts are available for the information of anyone who applies for them at the Office.

Inquiries at the Office. The inquiries received through the Post Office for special forecasts during the year amounted to 82, and the personal applications to 65. The rules of the Office relating to such inquiries are stated in Appendix VI., p. 75.

Results of Forecasts. The results of a comparison of the Forecasts issued at 8.30 p.m. during the year, with the weather actually experienced, are given in Appendix VII. (p. 77). The following summary shows the successes and failures over the whole United Kingdom, estimated as explained in that Appendix.

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1895-96.

Districts.	Per-centages.				Total percentage of Success.
	Complete Success.	Partial† Success.	Partial† Failure.	Total Failure.	
SCOTLAND, N. - -	54	28	12	6	82
„ E. - -	52	28	14	6	80
ENGLAND, N.E. - -	58	25	12	5	83
„ E. - -	58	25	14	3	83
MIDLAND COUNTIES -	57	25	14	4	82
ENGLAND, S. - -	61	25	12	2	86
SCOTLAND, W. - -	52	25	15	8	77
ENGLAND, N.W. - -	50	28	14	8	78
„ S.W. - -	60	22	10	8	82
IRELAND, N. - -	51	25	15	9	76
„ S. - -	51	22	16	11	73
Summary - -	55	25	14	6	80

* Viz., in the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons, at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street; and at the Office, 63, Victoria Street.

† Note, "partial" implies "more than half."

The following table shows for each year from 1886 to 1895 inclusive the per-centages of complete and partial success of the Forecasts issued at 8.30 p.m. for the whole year. It will be seen that the total for "complete success" was highest in 1893.

Results of
Forecasts.

PER-CENTAGES OF RESULTS OF FORECASTS for the whole of the
BRITISH ISLES.

Year.	Complete Success.	Partial, i.e., more than Half Success.	Total Success.
1886 - -	49	31	80
1887 - -	52	32	84
1888 - -	51	31	82
1889 - -	49	32	81
1890 - -	50	32	82
1891 - -	50	30	80
1892 - -	46	33	79
1893 - -	59	25	84
1894 - -	56	27	83
1895 - -	55	25	80
Average - -	51·7	29·8	81·5

Hay Harvest Forecasts.—The Council renewed in 1895 the offer made in previous years to the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society to send Daily Forecasts *gratis* during the haymaking season to a number of observers selected by those Societies, on two conditions, viz., that the information should be made known as widely as possible, and a record of the weather actually experienced sent weekly to the Office. The Societies accepted the proposal, and the Forecasts were issued as shown in the following table:—

Hay Harvest
Forecasts.

LIST of those who received HAY HARVEST FORECASTS in 1895.

Districts.	To whom sent.	Address.
0. SCOTLAND, N.	Rev. Dr. Joass -	Golspie.
	Major Smith -	Munlochy, Inverness.
1. SCOTLAND, E.	T. Wilson -	Glamis Castle, by Forfar.
	C. Pirrie -	Rothiemay, Huntly.
	T. Bett -	Dalnaline, Aberfeldy.
2. ENGLAND, N.E.	Sir J. Wilson -	Chillingham Barns, Chatton, Northumberland.
	J. Smith, F.R.H.S. -	The Ferneries, Ulceby.
3. ENGLAND, E.	W. Birkbeck -	High House, Thorpe, Norwich.
	Sir J. B. Lawes, Bt., and Sir J. H. Gilbert, Ph.D.	Rothamsted, Harpenden.
4. MIDLAND COUNTIES	Royal Agricultural College.	Cirencester.
	Major Fosbery -	Warwick.
	T. H. Thursfield -	Barrow, Broseley, Salop.
	E. E. Harcourt-Vernon	Grove Hall, East Retford.
	The South-Eastern Agricultural College.	Wye, near Ashford, Kent
5. ENGLAND, S.	C. Whitehead -	Barming House, Maidstone.
	E. P. Squarey -	The Moot, Downton, Wilts.
	M. J. Sutton -	Kidmore Grange, Caversham.

Hay Harvest
Forecasts.

Districts.	To whom sent.	Address.
6. SCOTLAND, W. - {	W. Calder - - -	Castle Hill, Dalreoch, Dum- barton.
	Sir M. J. Stewart, Bt., M.P.	Ardwell, Stranraer.
7. ENGLAND, N.W. - {	J. Forbes - - -	Eallabus House, Islay.
	R. Metcalfe, M.D. -	Leyburn, Yorkshire.
8. ENGLAND, S.W. - {	The Earl of Ducie -	Tortworth, Gloucestershire.
	T. Dyke - - -	Long Ashton, Clifton, Bristol.
9. IRELAND, N. - {	R. Neville Grenville -	Butleigh Court, Glastonbury.
	E. F. Farrell - - -	Moynalty, Co. Meath.
10. IRELAND, S. - {	J. M. Wilson, J.P. -	Currygrane, Edgeworthstown.
	D. A. Milward - - -	Lavistown, Kilkenny.
	W. Talbot Crosbie, D.L.	Ardfert Abbey, Tralee, Co. Kerry.

The telegrams were sent daily for the period of about five weeks commencing in some districts on June 10th. In some cases, by special request, they were continued for the period of the corn harvest.

In addition to the above the Forecasts were sent daily, by wire, to five gentlemen at their own cost.

The general result of the issue of these forecasts, shown by the subjoined table, has been prepared solely from the reports of the above-mentioned gentlemen, and is entirely independent of any estimate formed within the Office itself:—

SUMMARY of RESULTS.—HAY HARVEST FORECASTS, 1895.

Districts.	Names of Stations.	Per-centages.				Total per-centage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. -	Munlochy and Golspie - - -	53	32	15	—	85
„ E. -	Aberfeldy, Glamis, and Rothiemay -	56	34	9	1	90
ENGLAND, N.E. -	Chatton and Ulceby - - -	54	38	7	1	92
„ E. -	Rothamsted and Thorpe - - -	76	22	2	—	98
MIDLAND COUNTIES	Cirencester, East Retford, Warwick, Broseley.	69	20	11	—	89
ENGLAND, S. -	Maidstone, Downton, Caversham, and Wye.	67	26	6	1	93
SCOTLAND, W. -	Ardwell, Islay, and Dumbarton -	53	28	17	2	81
ENGLAND, N.W. -	Leyburn - - -	50	44	6	—	94
„ S.W. -	Tortworth, Clifton, and Glastonbury -	56	27	14	3	83
IRELAND, N. -	Moynalty and Edgeworthstown -	69	22	3	6	91
„ S. -	Tralee and Kilkenny - - -	59	30	7	4	89
	Mean for all districts - - -	60	29	9	2	89

These figures show that the Forecasts for 1895 gave a total percentage of useful forecasts of 89, the same as in the preceding year.

Storm Warnings for the Coasts of the United Kingdom.—In Appendix VIII., p. 78, are given the names of the stations furnished with signals for Storm Warnings, in accordance with Circular 717 of the Board of Trade, issued in February 1874.

These stations were, at the end of March 1896, 206 in number, situated :—

112 in England and Wales, 60 in Scotland, 27 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands. The number of stations has been materially increased during the year by the addition of a number of lighthouses, in accordance with a suggestion made by the Royal Commission on Electrical Communication with Lighthouses.*

A comparison has been made in the Office between the warnings issued during the year and the weather experienced on our coasts, the warnings being tested by the method referred to in Appendix VI., p. 76. The results of this comparison are shown in the following tables :—

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1895.

Coasts.	Total No. of Orders to hoist and repetitions.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 9 reached at two Stations before issue.	Warnings partially late. Force 9 reached at one Station before issue.	Storms for which no Warning was issued.
Scotland, N.E. -	49	30	13	5	—	1	March 3, May 15-16.
„ E. -	34	18	12	4	1	—	—
„ N.W. -	48	30	14	4	1	—	—
„ W. -	45	19	20	6	—	—	—
Ireland, S.W. -	43	26	10	3	2	2	Jan. 2-3.
„ N.W. -	53	33	15	3	—	2	—
Irish Sea -	39	31	5	2	—	1	May 15-16.
St. George's Channel	32	17	12	3	—	—	—
Bristol Channel -	31	23	7	—	—	1	—
England, S.W. -	30	25	2	1	1	1	—
„ S. -	27	18	8	1	—	—	Nov. 24.
„ S.E. -	30	19	9	2	—	—	Jan. 23.
„ E. -	32	24	6	1	—	1	Jan. 23, Mar. 24.
„ N.E. -	30	18	5	7	—	—	Jan. 23.
Totals -	523	331	138	42	3	9	
Per-centages -	—	63·3	26·4	8·0	0·6	1·7	

* The following is the lists of the stations added to the lists in accordance with the suggestion above mentioned :—

Anvil Point.
Orfordness.
Montrose (Scurdyness).
Tarbetness.
Fair Isle (north end).
Ru Stoer.
Corsewall.
Point of Ayre (Isle of Man).
South Stack.

Bull Point.
Galley Head.
Tuskar.
Loop Head.
Gunfleet.
Souter Point.
Girdleness.
Cantick.

Cape Wrath.
Mull of Cantyre.
Mull of Galloway.
Point Lynus.
Nash.
Hartland Point.
Mine Head (Dungarvan).
Tory Island.

Storm
Warnings.

NOTES as to GALES EXPERIENCED in 1895 but for which no WARNING was issued.

January 2nd and 3rd.—Fresh to strong gale from N.W. on the south-west and south coasts of Ireland. Our northern and north-western coasts were duly warned, but the gale spread further than was expected.

January 23rd.—A North-Westerly to Northerly gale over the north-eastern and eastern parts of England. This gale was caused by the development of a depression over the North Sea. The depression was secondary to a larger system lying over the north of Russia, and its development could not be detected from the 6 p.m. observations of the previous day.

March 3rd.—Strong Northerly gale over the Orkneys and extreme north-east of Scotland on afternoon of 3rd. A very partial gale, caused by sudden increase of pressure in extreme north. The 8 a.m. observation in no way justified the issue of warnings.

March 24th.—England E. A very strong gale from the south-westward fell within a limited zone lying over the Midland and Eastern counties. At 8 a.m. on 24th (Sunday), the centre of a small and comparatively unimportant secondary depression lay over the south of Ireland. Thence it moved east-north-eastwards at a rate of more than 60 miles an hour, and reached Denmark by 6 p.m. The appearance of the 8 a.m. map was by no means bad, and the energy developed by the system later, though not unique, cannot be accounted for.

May 15th and 16th.—Scotland N.E. and the Irish Sea. A Northerly gale on various parts of the coasts named. Caused by a depression which at 8 a.m. on 15th lay over Denmark, thence it moved southward and increased in depth. We had forecasted very strong and squally winds, but did not look for this gale.

November 24th.—England S. A North-Easterly gale, due to the unexpected extension to the district named, of a gale on our east and south-east coasts, which had been duly warned for in those regions.

Comparison of
results for
1895 with
previous years.

The following table contains a comparative statement of the storm warnings and their results in 1895, and in the nine preceding years. It will be seen that the total per-centage of warnings justified was very good, although not equal to that for 1894.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1886	542	55.3	26.9	82.2	15.9
1887	472	55.5	26.1	81.6	16.4
1888	539	55.3	28.6	83.9	14.3
1889	373	47.7	33.5	81.2	16.9
1890	525	61.0	25.5	86.5	9.3
1891	522	62.3	24.5	86.8	7.5
1892	488	59.4	31.2	90.6	6.8
1893	480	60.8	28.6	89.4	7.1
1894	502	68.5	23.5	92.0	6.0
1895	523	63.3	26.4	89.7	8.0

Fishery Barometers.—To add to the means available to the sea-going population for obtaining warnings of stormy weather barometers have for many years been supplied by the Office on loan to fishing villages and other places on the coast, to be set up for public information. The whole number of stations provided by the Office with these instruments is 213. Of these 64 are in England, 7 in Wales, 62 in Ireland, 70 in Scotland, 4 in the Isle of Man, and 1 in Jersey. The list is given in Appendix IX., p. 80.

PART III.

CLIMATOLOGY.

A.—BRITISH ISLES.

Observations relating to the climate of the British Isles are received by the Office from 253 stations in all. These stations may be divided into seven classes, according to the kind and completeness of the observations supplied to the Office from them, as follows:—

1. *Observatories.*—Seven Observatories, furnishing a continuous record of pressure, temperature, wind, sunshine, and rainfall, with frequent eye observations of cloud and weather. These alone afford the materials necessary for the study of the periodic variations of the meteorological elements. At Fort William there is no anemometer, as the country is very hilly.

2. *Anemographic Stations.*—Nine Anemographic stations furnishing a continuous record of the wind. The records from these stations relate rather to weather as distinguished from climate, and are especially important in connexion with storms. They are often useful in affording evidence available in courts of law with respect to collisions at sea, and damage done by wind.

3. *Barograph Stations.*—15 stations furnishing a continuous record of pressure obtained from some form of self-recording aneroid. These are valuable as giving the exact time of the occurrence of pressure maxima and minima at certain stations, and thus helping to determine the rate of movement of the various depressions that cross these islands.

4. *Sunshine Stations.*—Forty-eight stations furnishing a continuous record of bright sunshine. At 47 of these stations, the instrument in use is the Campbell-Stokes recorder (see Report for 1879, p. 32); at the other station the Jordan photographic recorder is employed. A return of the daily duration of sunshine is also received from ten other stations.

5. *Telegraphic Stations.*—Thirty Telegraphic Reporting Stations, at which the observations are taken by eye, but supplemented in some cases by self-recording aneroids, &c. These supply the material upon which the daily weather reports and forecasts are based.

Telegraphic
Reporting
Stations.

The hours of observation at these stations are determined by the requirements of the telegraphic system, as explained in Part II., but the data which they furnish are also utilized to afford climatological information for parts of the country where Stations of the Second Order do not exist.

Stations of
Second Order.

6. *Second Order Stations.*—Seventy-three Stations of the Second Order, furnishing complete climatological information from eye observations taken twice a day. The observers at these stations are all volunteers.

Stations of the
Third Order.

7. *Third Order Stations.*—Stations of the Third Order furnishing returns similar in kind to those in Class 6, but with less completeness and detail.

It must be explained that some of the stations are really of a higher class than would appear from the list in App. XI., p. 84, which is compiled solely with reference to the amount of the data supplied to this Office.

For instance, at Liverpool (Bidston) and Oxford, there are regularly equipped meteorological observatories, though the stations appear only as telegraphic or Second Order Stations in the list; and the same remark applies to other cases.

A fuller account of the methods employed by the Office in dealing with these records will be found in Appendix X. (p. 81).

List of
Stations.

Appendix XI. (p. 84) contains a list of the stations furnishing information relating to the land meteorology of the British Isles during the year.

Inspection of
Stations.

Inspection of the Stations.—The self-recording observatories and the anemographic stations (Classes 1 and 2), as well as the Telegraphic Reporting Stations (Class 5), are regularly visited each year by the Inspectors of the Office. The extra stations (Class 7) are inspected as opportunity offers. Of the Stations of the Second Order (Class 6), some belong to the Royal Meteorological Society, and these are visited by an Inspector appointed by that Society, an allowance being made by the Office toward the cost of the inspection, in accordance with the recommendation of the Treasury Committee (1877). The remaining Stations of the Second Order, including those belonging to the Scottish Meteorological Society, are visited, most of them annually, by the Inspectors of the Office. The inspection of the self-recording observatories was carried out by Mr. Charles Chree, D.Sc., Superintendent of the Kew Observatory, and Messrs. T. W. Baker and E. G. Constable, his assistants.

Extracts from the reports of the Inspectors are given in Appendix V. p. 44.

Reports sup-
plied to
Registrar
General for
Ireland.

Information supplied to the General Register Office, Dublin.—Reports from the Irish stations of the Office have been regularly supplied to the Registrar General for Ireland, for his Weekly and Quarterly Returns.

Information
supplied to the
Welsh Land
Commission.

Information on the Climate of Wales.—At the request of the Treasury such information as to the climate of Wales as was

obtainable was supplied to the Royal Commission on Land in Wales.

The Weekly Weather Report, which is prepared in the Tele-graphic Branch of the Office (see Appendix VI., p. 72), supplies, by its synchronous charts and Monthly Summaries, a very complete and instructive view of the chief meteorological changes, day by day, over the greater part of Europe, such as is believed not to be found in the similar publications issued by the offices in any other country.

Publications.
Weekly
Weather
Report.

Appendix I. to the Weekly Weather Report for 1895 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature for each district, for the 30 years 1866–1895, and also the Monthly and Progressive values of Accumulated Heat, Rainfall, and Bright Sunshine for all the districts in each month of 1895. Appendix II. to the same Report gives the Weekly and Progressive values for the same elements during the year 1895 (in continuation of Appendix II. for the year 1894).

Appendix III. gives for each week and district, during each of the three lustra and the whole period comprehended in the 15 years 1881–95, the mean or aggregate values (as necessary) for the following elements:—(1) Number of days with Rain; (2) Rainfall in inches; (3) Accumulated Heat—above and below 42° Fahrenheit; and (4) Bright Sunshine in hours and per-centages of possible duration.

Appendix IV. gives for each week and district, during the three lustra and the whole period of the 15 years 1881–95, the Mean Temperature of the Air, derived from the observations made at the stations included in the Weekly Weather Report.

Hourly Means of Meteorological Observations.—The Volumes of Hourly Means for 1891 and 1892 have appeared and that for 1893 is in the press. These volumes give hourly means, or totals, of pressure, temperature, wind force, rain and sunshine for periods of five days, and for the months and year for the five self-recording observatories.

Hourly Means
of Meteoro-
logical Obser-
vations.

Observations at Stations of the Second Order.—The volume for 1891 is now issued, and that for 1892 is far advanced.

Publication of
observations.

As regards the detailed publication on Form A., the list of stations for 1892 is the same as that for 1891. With regard to the B. Stations (monthly means and summaries) the list has been decreased by two, viz.,

Priucetown, Dartmoor Newton Reigny, Penrith,
and increased by one,—

Tealby, Market Rasen,
making a net decrease of one station.

It should be mentioned that the volume for 1891 included in an Appendix the results for the following 12 stations for the 15 years, 1876–1890:—

Orkney.	Cheadle.	Carmarthen.
Durham.	Hillington.	Markree Castle.
Llandudno.	Uppingham.	Dublin (City).
Buxton.	Churchstoke.	Parsonstown, Birr Castle.

The information is presented in the form of *Monthly Means and Summaries* (15 Januarys giving the mean value for January and so on) on the International Form B.

B.—FOREIGN and COLONIAL STATIONS.

Foreign and
Colonial
Stations.

For a long time returns from various Foreign and Colonial Stations have been received at the Meteorological Office, and in previous Reports a list of such documents has been given in the Appendix which contains the list of Logs received.

During the year ending March 31st 1896, returns were received from 46 of these stations, as shown in Appendix XII., p. 90.

Most of these stations furnish observations taken twice daily, and the results are dealt with in the same way as those from Stations of the Second Order, as in Class 6 above. Continuous records of bright sunshine are received from Georgetown, British Guiana, and from Trinidad.

The results thus obtained are published from time to time when deemed of sufficient value. A second paper has been prepared in the Office on the climate of Mojanga on the N.W. coast of Madagascar and published in the Quarterly Journal of the Royal Meteorological Society.

Besides this the meteorological tables published in the official Blue Book for the island of Cyprus have been prepared in this Office.

At the present time the observations from Cape Juby on the N.W. coast of Africa, and Georgetown, Demerara, are being discussed.

PART IV.

MISCELLANEOUS.

Anemometer
Experiments.

Anemometer Experiments.—In the last Report of the Office some results were given of the indications of the pressure-tube anemometers erected on the roof of the Office in Victoria Street, and, in order to test more completely the merits of this new mode of wind measurement, the Council resolved to erect two of the instruments at two exposed points on the coast, where their indications might be compared with those of existing anemometers of the pattern known as Robinson's.

The stations selected were Holyhead and Scilly, and, accordingly in the course of the autumn a pressure-tube anemometer was erected at each (Note A., p. 24).

It has further been resolved to erect at Holyhead a pressure plate of special design, for comparison with the indications of the three other anemometers at the station, the Robinson, the bridled, and the pressure tube. It is hoped that interesting results may be secured.

Earth
Temperatures.

Measurement of Earth Temperature.—For the measurement of earth temperatures—especially at considerable depths—mercury

thermometers labour under some disadvantages. A long vertical glass or metal tube holding liquid, or a shaft up which a thermometer is pulled, are alike apt to affect the temperature of the surrounding soil. With a long tube thermometer a considerable volume of the contained liquid, especially when the readings are highest, is exposed to a temperature differing from that of the bulb; while a pull-up thermometer must be very sluggish to ensure its being unaffected by the operation of reading.

Earth
Temperature
Experiments.

Direct-reading iron-resistance thermometers, of the pattern devised by Professor Callendar, F.R.S., and Mr. E. H. Griffiths, F.R.S., have some obvious advantages. They can be laid horizontally in a hole under undisturbed soil, and read at a distance at any desired instant. The "leads" to the recording apparatus can be so laid under ground as greatly to reduce the risk of heat conduction. To test their trustworthiness, durability, and convenience for general use, two of these instruments have been laid at Kew Observatory—No. 1 at a depth of 4 feet, No. 2 at a depth of 2 feet. A standardized platinum-resistance thermometer of the ordinary type was laid alongside of No. 2, and, being read independently by means of the Kew resistance bridge and galvanometer, checks its accuracy. The thermometers were laid on Jan. 10th, under the immediate supervision of Mr. Griffiths.

Hourly Mean Values of Pressure and Temperature.—The mean hourly values of these elements for the seven observatories for each month of the 15 years 1869–1883, and for four of the observatories for the further period of seven years 1884–1890, have now been calculated, and are ready for publication.

Hourly Mean
Values.

Rainfall Means for the British Islands.—The Tables for Parts I. and II. of this publication have now been printed. Part I. contains the figures for the decade 1881–1890, for 492 stations, thus distributed:—

Rain Tables
for the British
Isles.

England and Wales	-	-	-	287
Scotland	-	-	-	151
Ireland	-	-	-	54

Of these stations several appeared in the earlier publication of the Office,* which gave the figures for the 15 years preceding 1881. There are, however, several stations included in the present issue, from which the records do not go back to 1866, or which did not appear in the former publication.

Part II. gives the figures for as many complete lustra (periods of five years), counting back from 1880 inclusive, as exist, for 157 such stations, thus distributed:—

England and Wales	-	-	-	42
Scotland	-	-	-	94
Ireland	-	-	-	21

* Rainfall Tables of the British Isles, 1866–80. 8vo. 1883.

Rain Tables
for the British
Isles.

Part III. gives the names of the authorities for the information, with references to the pages of the two volumes on which the monthly and annual values for each year are to be found together with the mean annual and monthly rainfall for the 10 years, 1881-90, for every station. References are also given to the pages in the 1883 publication in which the returns are published of the rain for 1866-80, for the stations not included in Part I. of the new publication.

Magnetic
Observations
at Valencia.

Magnetic Observations at Valencia.—At the request of certain Fellows of the Royal Society, the Council have agreed to allow Mr. Cullum, the superintendent of the observatory at Valencia, to record observations on terrestrial magnetism at that distant station.

LIBRARY, &c.

Library.

The library contains standard works on Meteorology and the allied Sciences, and is, besides, particularly rich in Transactions, Proceedings, Reports, and other Publications which give a large mass of Meteorological observational data from all parts of the world, extending over many years. It consists at present of about 13,500 volumes and pamphlets, exclusive of charts and MS. records of observations. The books and other documents are accessible to scientific men, for reference at the Office.

Appendix XIII., p. 93, contains a list of the additions to the library during the year, which have been catalogued upon cards, and are entered in the reference catalogues under (1) Authors, and (2) Subjects.

Appendix XV., p. 115, gives a list of the more important papers on scientific subjects which have appeared in the various reports issued by the Office since 1866.

Appendix XVI., p. 120, gives the usual catalogue of Office publications.

EXPENDITURE.

Financial.

Appendix XIV., p. 114, shows the total receipts and payments of the Council during the year ending 31st March 1896. The amount voted by Parliament was 15,300*l.*, as in the previous year, in addition to which extra receipts from various sources amounting to 768*l.* 15*s.* 4*d.* also became available.

The following abstract of expenditure shows the amount properly chargeable against the Parliamentary grant of the year in question, and its distribution under the various heads, together with the increase or decrease in 1895-96, as compared with the previous year :—

NET EXPENDITURE.	1894-95.	1895-96.	Increase.	Decrease.
GENERAL ADMINISTRATION:				
Payment of Council -	£ s. d. 987 10 0	£ s. d. 991 5 0	£ s. d. 3 15 0	£ s. d. —
Secretary -	800 0 0	800 0 0	—	—
Office -	891 6 9	904 10 9	13 4 0	—
Rent, fuel, and lighting -	717 2 2	703 15 6	—	13 6 8
Alterations to premises and contingencies -	291 8 10	340 13 5	49 4 7	—
Expenses incidental to International Meteorological Congress -	30 13 2	4 18 0	—	25 15 2
Pensions -	159 3 3	144 0 0	—	15 3 3
SPECIAL RESEARCHES -	792 9 11	826 9 0	43 19 1	—
LAND METEOROLOGY -	3,594 16 4	3,662 15 11	67 19 7	—
WEATHER INFORMATION -	3,705 11 10	3,785 9 9	79 17 11	—
INSPECTIONS -	436 16 5	519 4 0	82 7 7	—
OCEAN METEOROLOGY -	2,805 2 3	2,493 11 11	—	311 10 4
Total -	£ 15,212 0 11	15,186 13 3	340 7 9	365 15 5

In the year 1895-96 the sum of 1,514*l.* 12*s.* 5*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. STRACHEY,
Chairman.

NOTE A.

ANEMOMETER EXPERIMENTS.

In the course of the summer two self-recording pressure-tube anemometers, similar to those described in the Annual Report of the Office for 1893, were erected, as stated in the above, p. 20, one at St. Mary's, Scilly, and the other at Salt Island, Holyhead. Both of these instruments have been placed in excellent positions, where the wind is quite free from local obstruction, and, in each case, the vane is at a height of about 40 feet from the ground.

One important purpose which these anemometers will serve is that they will afford the means of making direct comparisons of their records with those of other self-recording anemometers, of different patterns, already erected near them.

At Holyhead such a comparison may be made with the "standard" pattern Robinson cup anemometer, which has been at work for many years upon the roof of the old lighthouse; and also with the more recently erected "bridled" anemometer, on Salt Island.

At Scilly there is a Robinson anemometer of smaller size than the "standard," the cups being only 5 inches in diameter, carried on 12-inch arms, whilst in the "standard" pattern the cups are 9 inches in diameter, and the arms 24 inches in length.

Several series of experiments, made by different investigators in this country and abroad, have made it clear that the factor, or the ratio of the speed of the wind to that of the cups, of the standard pattern is about 2·2, instead of 3; the latter being the value originally given by Dr. Robinson, and since used generally for instruments of all dimensions. But although it has long been known that the factor varied, both with the size of the cup, and the length of the arm employed, yet no reliable determination of it has hitherto been made for the particular type of instrument in use at Scilly.

The erection of the pressure-tube anemometer there affords an opportunity, therefore, of making good this want. Since the scale of the latter instrument was obtained with great care, and, as it is not difficult to give it a perfectly satisfactory exposure, a good deal of confidence may be felt in accepting it as a reliable standard for the purpose.

SCILLY.

The method employed in making the present comparison was to take the mean velocity for 60 consecutive minutes, as recorded by the cups of the Robinson instrument, and place it by the side of the mean for the same period as shown by the record of the pressure-tube, the latter value being obtained from the trace by estimation. In practice it has been found that this estimation can be made with a very close approach to accuracy, readings made by different observers, or by the same observer on subsequent

occasions, seldom differing by more than \pm one mile. The two sets of values were first sorted into five-mile groups, and then meaned and compared.

The results of this comparison may be summarised as follows:—

- (1.) The factor for Robinson anemometers having 5-inch cups, carried upon 12-inch arms, is not quite uniform with winds of all velocities.
- (2.) For velocities of between 10 and 25 miles per hour the factor very closely approximates to 3; with lighter winds it decreases rapidly, and with stronger winds it also decreases, but at a much less rapid rate, the rate diminishing as the velocity increases.

During the past winter there were no gales of exceptional strength, and the number of observations of greater velocity than 45 miles per hour is, at present, much too small to allow of any conclusion being drawn from them. The above deductions apply therefore only to wind velocities not exceeding the rate of 45 miles per hour, although from the course of the curve on the accompanying diagram, Fig. I., it seems very probable that they will be found to hold good for higher velocities also.

In deciding upon a factor for general use with an anemometer in which it varies, as in the pattern now under discussion, it is desirable to bear in mind the relative frequency of different wind-velocities, and to select a value which will best suit the range of velocity most generally experienced, applying a correction at other points of the scale, if it should be found necessary or desirable to do so. But too much weight must not be attached to the relatively large differences shown with very light winds, as such winds are often fitful in their character, and there is a tendency for the cups, after responding readily to a slight increase in the wind force, to maintain their motion after the impulse which originated it has passed away; the record which results, is, on the whole, too high, but the individual differences are somewhat irregular, although, at the same time, never large.

By far the larger number of observations of wind-force fall within the limits of 5 and 25 miles per hour, and the mean factor for this range of velocity is 2.89, or, taking only the narrower range of 10 to 20 miles per hour, it is 2.94; and this latter value appears to be the factor it would be most desirable to adopt.

But even if we continue to use the present factor (3), the actual differences from the pressure-tube are not really very large, and do not exceed 1 mile until after the rate of 25 miles per hour has been passed. It becomes a question, therefore, whether it would not be better to retain this factor (3) for the instruments already made, and to apply a correction to their records when they attain a rate exceeding 25 miles per hour.

By doing so it will be easier to deal with the large mass of data already tabulated, and to ensure uniformity in dealing with the records obtained from this form of instrument, of which three have been at work for the Office for some years, and, under all

the circumstances, this course appears to be the best to adopt, although subsequent instruments should, no doubt, be constructed upon the basis of 2.94 as the factor.

The data used for the comparison, and upon which these conclusions are based, are set out in Table I., and also graphically in the diagram Fig. 1.

SCILLY.

FIG. I.

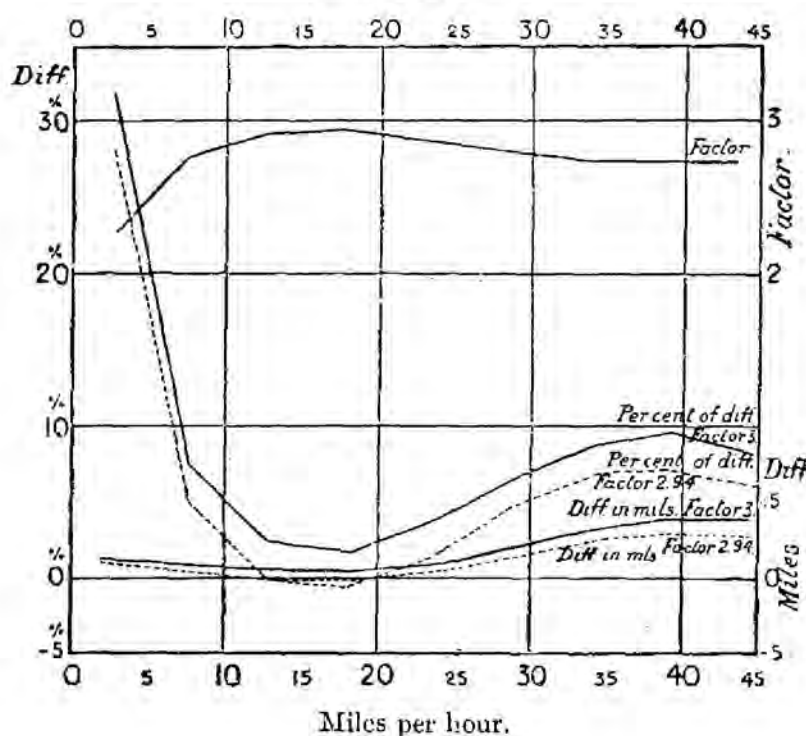


TABLE I.
COMPARISON of the ROBINSON CUP and DINES' PRESSURE-TUBE ANEMOMETERS at SCILLY.

Group.	Number of Observations used for Mean.	Mean Velocity by Pressure Tube.	Mean Distance traversed by Centre of Cups.	Velocity of Wind by Cups using Factor 3.	Difference between Velocity by Cups and Pressure Tube.	Per centage of Difference to Mean Velocity by Pressure Tube.	Factor required to make Cups agree with Pressure Tube.	Velocity of Wind by Cups using Factor 2.94.	Difference between Cup Velocity Factor 2.94 and Pressure Tube.	Per centage of Difference to Mean Velocity by Pressure Tube.
Miles.		Miles.	Miles.	Miles.	Miles (Cups—P. T.)			Miles.	Miles (Cups—P. T.)	
0 to 5	683	3.1	1.367	4.1	+1.0	32.0	2.268	4.0	+0.9	29.0
6—10	1055	8.0	2.867	8.6	+0.6	7.5	2.790	8.4	+0.4	5.0
11—15	1120	13.1	4.467	13.4	+0.3	2.3	2.933	13.1	0.0	0.0
16—20	1102	18.4	6.233	18.7	+0.3	1.6	2.952	18.3	-0.1	0.5
21—25	720	24.0	8.300	24.9	+0.9	3.8	2.892	24.4	+0.4	1.7
26—30	456	29.0	10.300	30.9	+1.9	6.6	2.816	30.3	+1.3	4.5
31—35	213	34.0	12.333	37.0	+3.0	8.8	2.757	36.3	+2.3	6.8
36—40	167	39.0	14.233	42.7	+3.7	9.5	2.740	41.8	+2.8	7.2
41—45	76	44.0	15.900	47.7	+3.7	8.4	2.767	46.7	+2.7	6.1

HOLYHEAD.

Bridled Anemometer.—Another comparison similar in character to that just described has been carried out between the records of the pressure-tube anemometer at Holyhead and those of the “bridled” anemometer, designed by Sir G. G. Stokes, F.R.S., the object being to test the accuracy of the scale-value of the latter instrument, and also the correctness with which the position of the zero of the scale was fixed upon the cylinder in 1894.*

These two instruments are placed side by side, advantage having been taken of the erection of the pressure-tube at the northern end of Salt Island in September 1895 to remove the bridled anemometer to the same spot, where they both occupy a perfectly unobstructed site.

Both of the anemometers are of the “pressure” type, as distinguished from “velocity,” their indications being translated into equivalent velocities through the medium of the formula derived by Mr. Dines from his Hersham experiments, to which reference has already been made. The records yielded by the two instruments are very similar in character, every variation in the wind force being indicated by both; their time-scales also are nearly alike, but in their scale-values they differ considerably, the ordinate of the pressure-tube record being only one-third that of the bridled.

In other respects, however, the two instruments are very dissimilar, the bridled being actuated by the pressure of the wind upon five cups, arranged spirally upon a spindle, which is turned against the action of a weight, the amount of twist given to the spindle being the measure of the wind-force, whilst in the case of the pressure-tube this measure is got from the height to which a float is raised by the action of the wind blowing into it.

For the purpose of this comparison both records were tabulated by estimating the mean hourly values from the traces, but it is probable that owing to the greater space covered by the bridled record the chance of error in estimating from it was rather greater than was the case in dealing with the record of the pressure-tube.

The first point to notice is that the maximum forces indicated by the bridled are always higher than those shown by the pressure-tube. The cause of this is probably two-fold: in the first place it is possible that the momentum of the moving parts of the bridled, under the influence of a sudden and violent gust of wind, may carry the pen too far, and thus cause it to register a maximum in excess of the truth; but in the second place, it is certain that the absolute maxima recorded by the pressure-tube are always liable to be less than the truth, owing to the fact that the float can only rise as it becomes filled with air, and as this process may occupy a few seconds, especially if the distance from the vane to the float

* See Appendix V, of Annual Report for 1894-5, pp. 62 *et seq.*

is great, or the connecting tube be of narrow bore, there is a possibility of the maximum strength of the gust passing away before the float has risen to the proper point. The exact proportion of the observed difference in the two records which is due to each of these causes is not yet known; but with a view to its determination the Council are about to set up, by the side of the two instruments, a maximum pressure plate, so arranged as to exclude the effect of momentum, and it is hoped that a comparison of the maxima recorded by the three instruments will enable the point to be decided.

The bridled anemometer was not intended to record low velocities, and owing partly to the large amount of friction to be overcome, and partly to the arrangement of the pulley-cords, it does not begin to record until the velocity of the wind exceeds the rate of 20 miles per hour. To guard against any error which might arise from this cause, when comparing the bridled and pressure-tube records, no observation was used unless the velocity of the wind was sufficiently above this limit as to ensure the instrument being in proper action.

Arranging the mean hourly values by each instrument in five-mile groups, as was done in the case of Scilly, and meaning each group, a very uniform difference is found to exist between the two; and assuming, as before, that the correct value is that given by the pressure-tube, it would appear that with the present scale-value and zero point, the indications of the bridled anemometer are always about 7 miles too high. It is most probable that this difference is entirely due to an error in the position of the zero point, used for setting the sheets upon the cylinder, and not to any error in the ordinate of the scale.

The reasons for coming to this conclusion are :—

- (1.) If the error were in the scale-value the difference between the two records would vary with the distance measured, or in other words with the force of the wind.
- (2.) The manner in which the scale-value was determined allows considerable confidence to be placed in the results obtained.
- (3.) In determining experimentally the position of the zero-point with different weights, considerable disagreement was occasionally found, and if the values got by the use of the heavier weights are alone used, and those yielded by the lighter weights are discarded, the position indicated will be practically the same as by the present comparison.

Adopting this new position and applying a constant correction to the zero on the scale used for measuring the curves, which can be done without at all altering the instrument, a very close agreement between the mean velocities by the two anemometers was at once brought about.

The results of the comparison of these two instruments may therefore be summarized thus :—

- (1.) The absolute maximum forces indicated by the bridled anemometer are higher than those indicated by the pressure-tube anemometer, and although no definite conclusion can be come to at present as to which of these maxima are nearest to the truth, it seems at least probable that those recorded by the bridled anemometer are more nearly correct than those of the pressure-tube.
- (2.) The uniform difference between the mean velocities yielded by the two instruments indicates an error in the position of the mark hitherto used as the zero of the scale of the bridled anemometer, but does not invalidate the scale-value found for the instrument.
- (3.) By applying a correction of 1·1 ins. to this point, the indications of the two instruments are found to agree throughout the scale.

ROBINSON ANEMOMETER.

In the Report for the last year* an account is given of a comparison which had been carried out between the records of the bridled anemometer and those of the Robinson cup anemometer, which for many years has been at work on the top of the lighthouse at the entrance to the Old Harbour of Holyhead.

Since the removal of the bridled instrument to a better site at the northern end of Salt Island, and the erection of the pressure-tube anemometer by its side, a second comparison has been made in which the pressure-tube records, instead of the bridled, have been used to compare with the Robinson, and the results yielded by this second comparison somewhat modify those obtained last year.

This is due, in the first place, to the error since discovered in the zero of the scale of the bridled anemometer, the effect of which was to make all the indications of that instrument too high; and in the second place to the fact that in its former site, on the edge of a low cliff, and with a less satisfactory exposure than it now possesses, the bridled anemometer was itself, to some extent, affected by local influences, although to a far less degree than was the Robinson instrument.

The vane of the pressure-tube anemometer occupies a perfectly open exposure in all directions, and being carried upon a slender iron mast 44 feet above the ground, it is absolutely free from any local deflection, and is, therefore, much better adapted to serve the purpose of a standard in making the comparison.

It will not be necessary to describe again the positions and surroundings of the instruments, as they are already given in detail in the Report for last year;† but the results which are now obtained are of considerable interest as showing the character and

* Report of the Meteorological Council 1895, note C., p. 29.

† See also a paper on "The exposure of anemometers" in the Quarterly Journal of the Royal Meteorological Society, vol. xxii., p. 237.

amount of error which may be produced by the imperfect exposure of an anemometer.

These are set out in the following Table II., in which is given, under each of eight points, and for different velocities, the mean difference between the pressure-tube and the cup instruments, after the indications of the latter had been corrected to the proper factor.

TABLE II.

Velocity limits under which Observations are Grouped.	No. of Observations.	Mean Velocity by		Difference in Miles. R.-P.T.	Per- cent. of Difference to Mean by P.T.	No. of Observations.	Mean Velocity by		Difference in Miles. R.-P.T.	Per- cent. of Difference to Mean by P.T.
		Robin- son.	P. Tube.				Robin- son.	P. Tube.		
	NORTH.					N.E.				
Miles. 11 to 25 -	198	17.5	15.7	+1.8	11.5	14.3	17.1	17.4	-0.3	1.7
26 „ 35 -	59	30.6	26.8	+3.8	14.2	6.1	29.6	28.9	+0.7	2.4
36 „ 45 -	6	37.7	32.5	+5.2	16.0	—	—	—	—	—
46 „ 55 -	1	47.0	41.0	+6.0	14.6	—	—	—	—	—
All Ve- locities }	264	21.0	18.7	+2.3	12.3	20.4	20.9	20.8	+0.1	0.5
	EAST.					S.E.				
Miles. 11 to 25 -	229	17.2	19.2	-2.0	10.4	73	16.9	16.1	+0.8	5.0
26 „ 35 -	56	30.1	33.8	-3.7	11.0	10	28.9	25.3	+3.6	14.2
36 „ 45 -	15	37.7	41.7	-4.0	9.6	7	40.0	35.7	+4.7	13.3
46 „ 55 -	—	—	—	—	—	—	—	—	—	—
All Ve- locities }	300	20.6	23.0	-2.4	10.4	89	20.0	18.6	+1.4	7.5
	SOUTH.					S.W.				
Miles. 11 to 25 -	394	18.2	16.3	+1.9	11.7	621	17.1	19.0	-1.9	10.0
26 „ 35 -	107	30.0	25.6	+4.4	17.2	99	29.3	30.1	-0.8	2.7
36 „ 45 -	17	38.8	32.8	+6.0	18.3	4	38.8	39.8	-1.0	2.5
46 „ 55 -	4	49.8	43.0	+6.8	15.8	—	—	—	—	—
All Ve- locities }	522	21.5	19.0	+2.5	13.2	724	18.9	20.6	-1.7	8.3
	WEST.					N.W.				
Miles. 11 to 25 -	464	16.7	22.0	-5.3	24.1	302	17.1	18.6	-1.5	8.1
26 „ 35 -	90	20.7	37.5	-7.8	20.8	122	30.2	31.6	-1.4	4.4
36 „ 45 -	13	37.1	44.5	-7.4	16.6	23	38.3	39.6	-1.3	3.3
46 „ 55 -	—	—	—	—	—	—	—	—	—	—
All Ve- locities }	567	19.3	25.0	-5.7	22.8	447	21.8	23.2	-1.4	6.0

From the figures it will be seen that, generally, the difference, irrespective of sign, increases with the velocity, and also that whilst with East, South-West, West, and North-West winds, the cups indicate *less* than the pressure-tube, with North, South-East and South winds they indicate *more*, but that with North-East winds the three instruments agree. Taking the mean of all velocities it will be found that the differences vary from a *defect* of 23 per cent., with West winds to an *excess* of 13 per cent. with South winds, a range of 36 per cent. In this table every available observation has been used, an equal distribution being made of those from intermediate points.

An unavoidable result of this distribution, however, is to modify to some extent the differences under some of the points, and therefore, another comparison was made, in which 40 observations of about the same velocity, and under each of 16 points have been used, but in which intermediate points have been excluded. The results are given in Table III., and also in Fig. II.

TABLE III.

MEAN DIFFERENCE between the ROBINSON and PRESSURE-TUBE ANEMOMETERS, shown by (about) FORTY OBSERVATIONS of VELOCITY between 11 and 25 miles, from each of Sixteen Points.

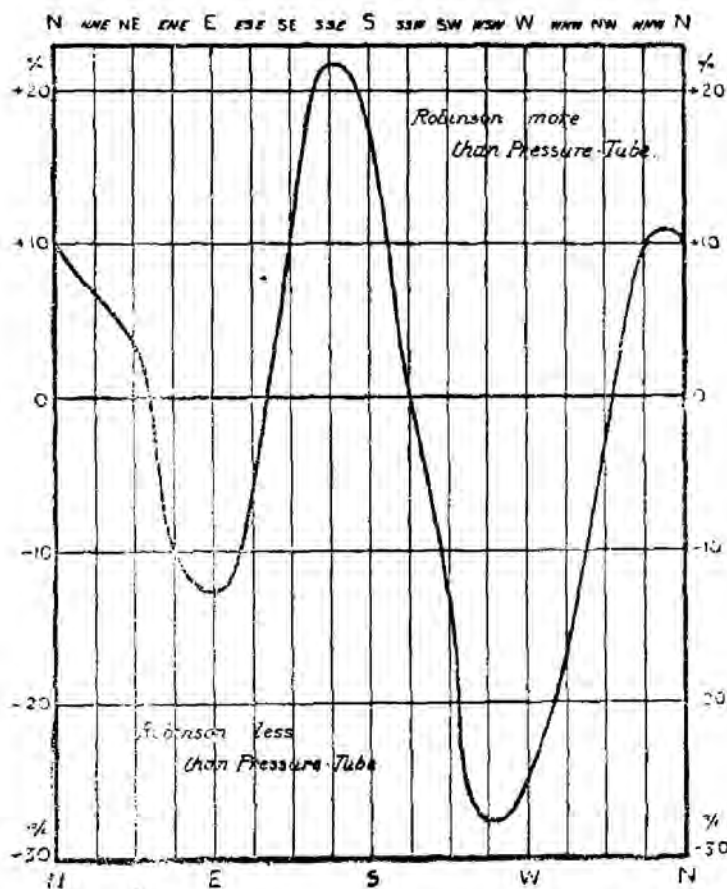
Direction of Wind.	Number of Observations.	Mean Velocity by		Difference in Miles (R.-P.T.).	Per-centage of Difference to Mean by P.-Tube.
		Robinson.	Pressure-Tube.		
North	40	18.2	16.5	+1.7	+10.3
N.N.E.	37*	15.4	14.4	+1.0	+6.9
N.E.	23*	19.2	18.5	+0.7	+3.8
E.N.E.	40	18.0	20.0	-2.0	-10.0
East	40	17.7	20.3	-2.6	-12.8
E.S.E.	21*	15.5	16.6	-1.1	-6.6
S.E.	13*	15.2	13.7	+1.5	+10.9
S.S.E.	18*	21.2	17.4	+3.8	+21.8
South	40	18.6	15.8	+2.8	+17.7
S.S.W.	40	16.5	16.4	+0.1	+0.6
S.W.	40	19.4	22.3	-2.9	-13.0
W.S.W.	40	17.5	24.2	-6.7	-27.7
West	40	16.6	22.2	-5.6	-25.2
W.N.W.	40	17.4	21.0	-3.6	-17.1
N.W.	40	18.4	19.0	-0.6	-3.2
N.N.W.	40	18.0	16.4	+1.6	+9.8

* In these cases so many as forty observations were not available.

Here a remarkably uniform distribution of the differences, both in sign and in amount, is shown as we proceed round the compass, the curve being very symmetrical, and exhibiting two maxima on each side of zero.

Starting with an excess of 10 per cent. with North winds, which is the first plus maximum, the difference diminishes to 4 per cent. at N.E.; it then changes into a defect, which increases to a first minus maximum, of 13 per cent., under East. Proceeding, the minus difference now decreases, and after passing E.S.E., its sign once more changes to plus, reaching 22 per cent. at S.S.E., which is the second and principal maximum under that sign. At S.S.W. the two records agree; then a minus difference is again shown, which quickly increases to 28 per cent. at W.S.W., which is the largest difference under any point. At West there is a defect of 25 per cent., which then decreases rapidly, and after passing N.W. the difference again changes its sign, and increases to plus 10 per cent. at N.N.W.

FIG. II.



The excess of the Robinson record over the pressure-tube with North winds is, no doubt, due to the wind being thrown up over the roof of the sheds, when it strikes their Northern side, which it will be remembered is closed, and presents an abrupt obstacle to the progress of the air from that quarter. With Southerly winds also, a similar action takes place, because although the sheds are open in that direction they become filled with compressed air, which is unable to escape at the back, and so reacts on the wind in much the same way as does the closed Northern side; in both cases the cups receive more than their proper amount of wind owing to the mingling of the deflected current with that which is proper to the level of the cups.

With Easterly and Westerly winds, however, the action of the sheds is very different. These winds blow in the direction of the length of the sheds and, as was pointed out in connexion with the previous comparison, the wind is now sucked into a huge conduit, and drawn down from the roof, with the result that the cups get less than their proper amount of wind. This effect is most marked with Westerly winds because it so happens that one large opening in that direction is almost immediately beneath the cups of the anemometer.

Owing partly to the weight of the standard size Robinson anemometer, and partly to the conditions imposed by its mechanism, it is not always easy to find for it an unexceptionable exposure, and one great advantage which the pressure-tube instrument possesses over any other, is the facility with which it can be placed in a satisfactory position, there being none of the shafting or gearing to provide for, which so often proves an insuperable difficulty in other cases.

R. H. CURTIS.

APPENDIX.

APPENDIX I.

LIST of CAPTAINS and OFFICERS who have sent in Logs classed as "Excellent" during the year ending March 31, 1896. The figures opposite to each show the total number of such Logs which they have returned to the Office during the period that they have been observing.

Name of Captain or Officer.	Number of "Ex- cellent" Logs.	Ship.
Alford, F. - - -	3	S.S. "Monarch."
Andersen, O. E. - - -	14	S.S. "Longhirst."
Angus, T. S. - - -	12	S.S. "Ballarat."
Atkinson, G. W. - - -	13	S.S. "Valetta."
Bolton, S. H. - - -	19	S.S. "El Dorado."
Bright, H. - - -	10	Barque "Beltana."
Campbell, J. - - -	11	"Balmoral."
Cheshire, G. H. - - -	5	S.S. "Aldgate."
Crotty, F. H. - - -	7	"Evesham Abbey."
Crowley, C. - - -	10	"Verajean."
Dart, L. C. - - -	15	Barque "Alcides."
De Horne, M. - - -	6	S.S. "Carthage."
Dulling, G. - - -	3	S.S. "Strathelyde."
Dupen, P. P. - - -	1	S.S. "Cabenda."
Dyke, H. W. - - -	12	Barque "General Roberts."
Elliott, Mr. C. - - -	6	S.S. "Wilcannia."
Elliott, W., R.N.R., F.R. Met. Soc.	12	S.S. "Clan Murray."
England, T. - - -	17	Barque "Glen Grant."
Exham, T. K., F.R.A.S.	18	S.S. "Elbe" S.S. "Esk," and S.S. "Trent."
Fraser, W. D. - - -	8	"Corolla."
Free, T., R.N.R. - - -	3	S.S. "Port Chalmers."
Gibson, J. H. - - -	2	S.S. "Wydale."
Glossop, Lieut. H. A. P., R.N.	3	H.M.S. "Rambler."
Goodrham, H. - - -	2	S.S. "Woolloomooloo."
Hepworth, M. W. C., R.N.R. -	14	S.S. "Port Melbourne."
Livett, H. W. - - -	1	S.S. "Ormuz."
Lobb, Staff-Comr. F. J., R.N. -	1	L.H. Tender "Richmond."
McKillop, R. - - -	1	"Salamis."
Millican, J. W. - - -	11	S.S. "Loughrigg Holme."
Milner, W. H. - - -	22	S.S. "Pará."
Milward, C. A., R.N.R. - - -	1	S.S. "Otarama."
Mitchell, J. - - -	4	Barque "Cape York."

Name of Captain or Officer.	Number of "Ex- cellent" Logs.	Ship.
Moignard, P. - - -	8	"Garsdale."
Mullan, F. C., F.R.G.S. - -	1	S.S. "Romney."
Murdoch, P. - - -	16	"Sierra Lucena."
Murray, A. - - -	3	Barque "Perseverance."
Nedden, H. zur - - -	3	S.S. "Madeline."
Payne, C. J. - - -	1	S.S. "Elton."
Peebles, R. - - -	18	S.S. "Breconshire."
Pentin, W. - - -	6	S.S. "Wilcannia."
Plunket, C. E. - - -	1	Barque "Hurunui."
Price, J. H. - - -	9	"Othello."
Renaut, W. - - -	1	"Timaru."
Richards, Comr. G. E., R.N. -	3	H.M.S. "Rambler."
Sargent, A. H. - - -	9	"Pleione."
Simpson, Alexander - - -	21	S.S. "Thermopylæ."
— Alexander - - -	25	S.S. "Traveller."
Spalding, T. F. - - -	8	S.S. "Australasian."
Thomas, H. G. - - -	3	S.S. "Yarrawonga."
Trott, S., F.R.Met.Soc. - -	30	S.S. "Minia."
Tuke, F. M. - - -	1	S.S. "Ormuz."
Tyson, J. - - -	3	S.S. "Arab."
Walker, H., R.N.R. - - -	20	S.S. "Etruria" and S.S. "Campania."
Willis, J. - - -	1	S.S. "Hardanger."
Wilson, J., R.N.R. - - -	13	S.S. "Ethiopia."
Worcester, W. D. G., R.N.R. -	2	S.S. "Victoria."

APPENDIX II.

LIST of DOCUMENTS received from SHIPS.

Captain's Name.	Ship.	Voyage.	Year.
¹ Alford, F. -	H.M.T.S. Monarch -	Off coast of British Isles	1894-95
Alsop, J. J. -	Barque Brussels -	Brisbane and Portland (Oregon) -	1895-96
Andersen, O. E. -	S.S. Longhirst -	New York, Tampico (Mexico) and Montreal.	1895
² " -	" -	Mediterranean Ports -	1895
³ Angus, T. S. -	S.S. Ballarat -	Sydney, viâ Suez -	1895
" -	" -	Australia, viâ Suez -	1895
⁴ Atkinson, G. W. -	S.S. Valetta -	Sydney, viâ Suez -	1894-95
⁵ " -	" -	" " " -	1895
⁶ " -	" -	" " " -	1895-96
Balfour, A. F., R.N. -	H.M.S. Penguin -	At New Georgia, Solomon Islands	1893-95
⁷ Barker, D. W., R.N.R. -	School Ship Worcester -	Off Greenhithe, Kent -	1895
Barr, J. -	S.S. Sarpedon -	Batavia, viâ Suez -	1892-93
⁸ Barr, John -	Falls of Foyers -	San Francisco and Portland (Or.)	1894-95
Barwise, — -	S.S. Telemachus -	China, viâ Suez -	1892-93
Batt, H. E. -	S.S. Pyrrhus -	" " -	1892-93
Beeching, Charles -	Barque Ellesmere -	Calcutta -	1894-95
⁹ Bell, C. H. -	S.S. Laconia -	Mediterranean Ports -	1894-95
¹⁰ " -	" -	Alexandria and Odessa -	1895-96
Bolton, S. H. -	S.S. El Dorado -	Continental Ports -	1895
¹¹ Brander, J. H. -	R.M.S. Thames -	East Coast of South America -	1895-96
Bright, H. -	Barque Beltana -	Adelaide -	1895-96.
¹² Brown, J. W. -	S.S. Lucigen -	Philadelphia -	1895
Burton, G. -	S.S. Rangatira -	New Zealand, viâ Cape Good Hope, and home, viâ Cape Horn.	1895
¹³ Cameron, J. G., R.N.R. -	R.M.S. Teutonic -	New York -	1894-95.
¹⁴ " -	" -	" -	1895
Campbell, James -	Balmoral -	New York and Calcutta -	1895
¹⁵ Chesshire, G. H. -	S.S. Aldgate -	New Orleans, Bremerhaven, and Buenos Ayres.	1894-95.
¹⁶ " -	" -	La Plata and New Orleans -	1895
Crotty, F. C. -	Evesham Abbey -	Madras, Calcutta, New York, Yokohama, San Francisco, Portland (Oregon).	1893-95.
Crowley, C. -	Verajean -	Home from Alexandria -	1895
Dart, L. C. -	Barque Alcides -	New York, China, and New York.	1894-95.
" -	" -	New York and Calcutta -	1895-96
¹⁷ Davies, J. A. -	S.S. Oanfa -	China and Japan, viâ Suez, and Odessa.	1895
¹⁸ " -	" -	China and Japan, viâ Suez -	1895-96
¹⁹ Davis, G. W. -	S.S. Alberta -	Bombay, viâ Suez -	1895
²⁰ " -	" -	Singapore viâ Cape of Good Hope, New Caledonia, Sydney, and home, viâ Suez.	1895-96
Day, Robert -	S.S. Deucalion -	Batavia, viâ Suez -	1892-93
²¹ De Horne, M. -	S.S. Carthage -	Bombay, viâ Suez -	1895
²² " -	" -	" " -	1895
²³ " -	" -	" " -	1896
" -	" -	" " -	1892
Dickens, E. G. -	S.S. Diomed -	China, viâ Suez -	1892
²⁴ Dickinson, L. R. -	R.M.S. Medway -	West Indies -	1894-95
²⁵ Dulling, George -	S.S. Strathclyde -	Bombay, viâ Suez -	1895
²⁶ " -	" -	Vladivostok, viâ Suez, China, Japan, and New York, viâ Suez.	1895-96
Dupen, P. P. -	S.S. Cabenda -	West Coast of Africa -	1895-96
Dyke, H. W. -	Barque General Roberts -	Port Phillip, Newcastle (N.S.W.), San Diego (Cal.), and Portland (Oregon).	1894-95

Captain's Name.	Ship.	Voyage.	Year.
27 Elliott, Wm., R.N.R.	S.S. Clan Murray	Chittagong, via Suez	1894-95
" "	"	Bombay, via Suez	1895
" "	"	Bombay and Madras, via Suez	1895
" "	"	India, via Suez	1895-96
England, Thomas	Barque Glen Grant	Apalachicola and St. Thomas (W.I.).	1894-95
" "	"	Pascagoula and Pensacola	1895
18 Exham, T. K.	R.M.S. Elbe	From Buenos Ayres to St. Vincent	1894
" "	R.M.S. Esk	To St. Thomas, W.I.	1894
" "	R.M.S. Trent	East Coast of South America	1894-95
" "	"	" "	1895
28 Ford, J. G.	Barque Lady Head	Moose, Hudson's Bay	1895
Fraser, W. D.	Corolla	New York, Yokohama, Port Townsend, Valparaiso, and Talcahuano.	1893-95
29 Free, Thomas, R.N.R.	S.S. Port Chalmers	Sydney, via Cape Good Hope, and home, via Suez.	1894-95
30 " "	"	" "	1895
Gibson, J. H.	S.S. Wydale	Port Royal (South Carolina), Pensacola, Newport News, and Antwerp.	1895
31 Goodrham, Henry	S.S. Woolloomooloo	Adelaide, via Cape, and home, via Suez.	1895
32 " "	"	Australia, via Cape	1895
Goodwin, J. H.	S.S. Hector	Batavia, via Suez	1892-93
Gracie, G. S.	Holyrood	Melbourne	1894-95
33 Grassau, John	Blackadder	Brisbane	1895-96
34 Griffin, E. J., R.N.R.	R.M.S. Moor	Cape Town	1894-95
34 " "	"	"	1895-96
Hannah, W. T.	S.S. Glaucus	Batavia, via Suez	1891-93
Heath, P. I.	S.S. Ajax	China, via Suez	1893
15 Hepworth, M. W. C., R.N.R.	S.S. Port Melbourne	Sydney, via Cape Town, and home, via Suez.	1895-96
35 Hilleot, C. H.	S.S. Britannia	Bombay, via Suez	1895-96
Hutchinson, J. W. P.	S.S. Stentor	Batavia, via Suez	1892-93
Jackson, M. H. F.	S.S. Telamon	China and New York, via Suez	1892-93
" T. S.	S.S. Palinurus	China, via Suez	1892
James, E. G.	Barque Pendragon	Cape Town, Newcastle (New South Wales), Valparaiso, and Pisagua	1893-95
36 " "	"	Pisagua	1895-96
37 Jones, J. H.	Andora	Callao, Taltal, New York, Sydney, and Noumea.	1893-95
Kerr, J. J.	S.S. Casapœdia	Yokohama, via Suez	1894-95
" "	"	East Coast of South America	1895-96
Larmer, G.	S.S. Scot	Cape Town	1895
Lawrie, G. M.	Eaton Hall	Vancouver and Tacoma	1894-95
Leigh, Thomas	S.S. Japan	From Hong Kong, via Suez	1895
38 Lindsay, Paull M.	Barque Elvira	Pernambuco and Delaware River	1895
39 Livett, H. W.	R.M.S. Ormuz	Australia, via Suez	1895
40 Lobb, Staff-Comr. F. J., R.N.	L.H. Tender Richmond	At Nassau, Bahamas	1895
Long, J. C.	S.S. Japan	Bombay and Singapore, via Suez	1894-95
41 McKilliam, R.	Salamis	Melbourne	1895-96
Macpherson, Patrick	Barque Bankville	Seychelles, Rangoon, Rio Janeiro, New Zealand.	1893-95
42 Mann, Robert	Barque Crown of Germany.	San Francisco and Melbourne	1893-95

Captain's Name.	Ship.	Voyage.	Year.
Martin, T. C.	Loch Tay	Melbourne	1894-95
7 Miller, A. T., R.N.	School Ship Conway	Off Rock Ferry, Cheshire	1895
43 Millican, J. W.	S.S. Loughrigg Holme	East Coast of North America and Mediterranean Ports.	1894-95
43 " "	" "	Newfoundland, &c.	1895
Milner, W. H.	R.M.S. Pará	West Indies	1895
44 " "	" "	" "	1895
45 " "	" "	" "	1895-96
46 Milward, C. A., R.N.R.	S.S. Otarama	New Zealand, via Cape of Good Hope, and home, via Cape Horn.	1895-96
Mitchell, George	S.S. California	New Orleans, Mediterranean Ports, and New York.	1894-95
" "	" "	New York and Naples	1895-96
Mitchell, John	Barque Cape York	Nagasaki, Vancouver, and home	1894-95
Moignard, Phillip	Garsdale	San Francisco	1893-95
Mullan, F. C., F.R.G.S.	S.S. Romney	To China, Japan, via Suez	1894-95
47 Murdoch, Peter	Sierra Lucena	Mauritius and Rangoon	1894-95
Murray, A.	Barque Perseverance	Hudson's Bay	1894-95
48 Nedden, H. zur	S.S. Madeline	Mediterranean Ports	1895
49 " "	" "	Charleston, S.C.	1895
50 " "	" "	Singapore, Moulmein, and Bremen, via Suez.	1895
Niles, W. H.	Ben Cruachan	Cape Town and Albany	1894
51 Payne, C. J.	S.S. Elton	Odessa, Wilmington, Rangoon, via Suez.	1894-95
52 " "	" "	Buenos Ayres	1895
53 Peebles, R.	S.S. Breconshire	China and Japan, via Suez, Singapore, Brisbane, and home, via Suez.	1895-96
54 Pentin, Walter	S.S. Wilcannia	New York, Cape Town, Sydney, and home, via Suez.	1895
55 " "	" "	Adelaide, via Cape, and home, via Suez.	1895
Plunket, C. E.	Barque Hurunui	Lyttelton	1894-95
Price, J. H.	Othello	Melbourne	1894-95
Pulford, J.	S.S. Patroclus	Batavia, via Suez	1892
Rawlings, E. S.	S.S. Ajax	China, via Suez	1892
56 Renaut, William	Timaru	Melbourne	1894-95
57 Richards, G. E., R.N.	H.M.S. Rambler	Madeira and off West Coast of Africa.	1894-95
57 " "	" "	Off West Coast of Africa and to Bermuda and Halifax.	1894-95
57 " "	" "	At Halifax and West Indies	1895
58 Rigaud, H. C.	R.M.S. Magdalena	East Coast of South America	1894-95
59 " "	" "	" "	1895
Riley, I.	S.S. Teucer	Hong Kong, via Suez	1892-93
15 Sargent, A. H.	Pleione	New Zealand	1894-95
60 Shanklin, J. W.	S.S. Circassia	New York	1894-95
61 " "	" "	" "	1895
61 " "	" "	" "	1895
Simpson, Alexander	S.S. Thermopylæ	Australia, via Cape Town	1894-95
" "	" "	Melbourne, via Cape Town	1895
62 " "	" "	" "	1895-96
Simpson, Alexander	Barquentine Traveller	Ivigtut	1895
63 Simpson, Lieut. and Comr. C. H., R.N.	H.M.S. Stork	At Malta	1894-95
63 " "	" "	In Mediterranean	1895
63 " "	" "	" "	1895
Smith, Alexander	Sophocles	Sydney	1894-95
64 Smyth, W. H.	S.S. Pretoria	Cape Town	1895

Captain's Name.	Ship.	Voyage.	Year.
Spalding, T. F.	S.S. Australasian	Melbourne, via Cape Town -	1894-95
⁵⁸ Tait, Henry -	S.S. Australia -	Bombay, via Suez -	1895
⁶⁶ " " -	" " -	" " -	1895-96
Tate, W. J. M.	Langstone	Wellington -	1894-95
⁶⁷ Thomas, H. G.	S.S. Yarrowonga	Adelaide, via Cape of Good Hope, and home, via Suez.	1895-96
⁶⁸ Thompson, W. B.	British Merchant	Melbourne, Newcastle (N.S.W.), Panama, and Portland (Oregon).	1894-95
Towell, William	S.S. Jason -	Batavia, via Suez -	1892-93
⁶⁹ Trott, Samuel	S.S. Minia -	Off East Coast of N. America -	1895
⁶⁹ " " -	" " -	In Boston Harbour, and at Halifax	1895
⁷⁰ Take, F. M.	R.M.S. Ormuz -	Sydney, via Suez -	1895
⁷⁰ " " -	" " -	" " -	1895-96
⁷¹ Tyson, John -	S.S. Arab -	Cape Town, &c. -	1895
⁷¹ " " -	" " -	Zanzibar, via Cape Town, &c. -	1895
⁷¹ " " -	S.S. Guelph -	Cape Town, &c. -	1895
⁷² " " -	" " -	" " -	1895-96
⁷³ Vaughan, James	Barque Sokoto	San Francisco -	1895
⁷⁴ Walker, Henry	S.S. Etruria -	New York -	1894-95
⁷⁵ " " -	S.S. Campania -	" " -	1895
Williams, D.	Barque Fleetwood	Mauritius -	1894
⁷⁶ Williams, John	Barque Elissa -	Demerara, Savannah, Monte Video, and Antwerp.	1894-95
⁷⁷ Williamson, J. C.	S.S. Argyll -	China, Japan, via Suez, and New York.	1894-95
⁷⁸ Willis, James	S.S. Hardanger -	Constantinople -	1895
⁷⁹ Wilson, John, R.N.R.	S.S. Ethiopia -	New York -	1895
⁸⁰ " " -	" " -	" " -	1895-96
Woods, R. R.	S.S. Japan -	Singapore to China and Japan	1895
⁸¹ Worcester, W. D. G., R.N.R.	S.S. Victoria -	Sydney, via Suez -	1895
⁸² " " -	" " -	Bombay, via Suez, and home, via Cape Town.	1895
⁸³ " " -	" " -	Bombay, via Suez, Cape Town, and home, via Suez.	1895-96

In cases distinguished by marginal numbers the Meteorological Registers were kept chiefly by Officers, as follows:—

- ¹ Kept by C. Hart, Chief Officer, A. Broadbridge, 2nd Officer, and F. Bourdeaux, 3rd Officer.
- ² Kept by Thomas Hornsby, 1st Mate.
- ³ Assisted by H. E. Kitcat, 2nd Officer, and S. S. Higgins, 6th Officer.
- ⁴ Assisted by Messrs. Keay and Tyers.
- ⁵ Assisted by Messrs. J. Borland, W. Cossey, and H. Tyers.
- ⁶ Assisted by Messrs. Cossey and Borland.
- ⁷ Kept by the Cadets.
- ⁸ Kept by F. Title, Chief Officer.
- ⁹ Kept by A. Hogg, 1st Mate, and other Officers.
- ¹⁰ Kept by Henry Evans, 2nd Officer.
- ¹¹ Kept by J. H. Bartlett and W. Anderson.
- ¹² Kept by F. A. White, 2nd Mate, assisted by A. P. Burdis, Mate.
- ¹³ Kept by J. K. Orton.
- ¹⁴ Kept by Evan J. Lace and Thomas Kidwell.
- ¹⁵ Assisted by Officers.
- ¹⁶ Kept by Frank Barnes, 2nd Mate.
- ¹⁷ Kept by F. W. Skeggs, 3rd Officer.
- ¹⁸ Kept by George A. Mardon, 3rd Officer.
- ¹⁹ Kept by Hector Adams and John Thom.
- ²⁰ Kept by Harold Davie, Chief Officer, and Thomas Younghusband, 2nd Officer.
- ²¹ Kept by T. C. E. Dayas, 5th Officer, C. F. Winthrop, 6th Officer, assisted by F. Murrell Wright, 5th Officer, and P. McBarnet, 4th Officer.
- ²² Kept by F. L. Miller, 5th Officer.

- ²³ Kept by A. H. Hignett, 6th Officer, and C. F. Winthrop, 5th Officer.
- ²⁴ Kept by L. G. Tebbs and other Officers.
- ²⁵ Kept by W. H. Comeck, 2nd Officer.
- ²⁶ Kept by C. C. Boase, 2nd Officer.
- ²⁷ Assisted by Messrs. Gamble and Mackenzie, 2nd and 3rd Officers.
- ²⁸ Assisted by Messrs. Gulland and Reid.
- ²⁹ Assisted by Walter Plugge, 1st Mate, Wm. Matthew, 2nd Mate, and Fred. Tonbridge, 3rd Mate.
- ³⁰ Assisted by Walter Plugge, 1st Mate, Fred. Tonbridge, 2nd Mate, and E. N. Lewer, 3rd Mate.
- ³¹ Kept by Gabriel Threiffall, 2nd Officer.
- ³² Kept by A. Rogers, 1st Officer, H. W. Read, 2nd Officer, and M. Rattey, 3rd Officer.
- ³³ Kept by W. M. Lloyd, 1st Mate, and F. Holdone, 2nd Mate.
- ³⁴ Kept by E. H. Neave, 4th Officer.
- ³⁵ Kept by R. H. Browne.
- ³⁶ Kept by R. Farren, 1st Officer, R. Taylor, 2nd Officer, and E. Green, 3rd Officer.
- ³⁷ Kept by Messrs. Nicholas and Innes.
- ³⁸ Kept by Wm. Johnstone.
- ³⁹ Kept by F. W. Kershaw, assisted by E. J. Tayler, 3rd Officer, and C. H. Bryant, 4th Officer.
- ⁴⁰ Kept by F. W. Holden, Chief Officer.
- ⁴¹ Assisted by W. J. Burge, 1st Officer, and A. E. J. Sneed, 2nd Officer.

- ⁴² Kept by John McIlgorm, Chief Officer.
- ⁴³ Assisted by S. I. Holm, and J. Eland.
- ⁴⁴ Kept by H. S. Smith, 5th Officer, and other Officers.
- ⁴⁵ Kept by Officers.
- ⁴⁶ Kept by C. M. Gibson, 4th Officer, assisted by N. E. Bower, 2nd Officer, and N. R. D. Cornwall, 3rd Officer.
- ⁴⁷ Assisted by F. H. O'Brien.
- ⁴⁸ Assisted by D. Jones, 2nd Mate.
- ⁴⁹ Assisted by Wm. Ferguson, 2nd Mate.
- ⁵⁰ Assisted by Wm. Divine, 1st Mate.
- ⁵¹ Kept by J. Sowerby.
- ⁵² Kept by J. Sowerby and F. Lant.
- ⁵³ Assisted by J. Heron, 1st Officer, and G. Elliott, 2nd Officer.
- ⁵⁴ Kept by Coulton Elliott, William Williams, and Walter James Hinks.
- ⁵⁵ Kept by Coulton Elliott and William Williams.
- ⁵⁶ Kept by Hugh W. Gray.
- ⁵⁷ Kept by Lieut. H. A. P. Glossop, R.N.
- ⁵⁸ Kept by B. G. M. Eldridge, 3rd Officer, R. A. Ellis, 4th Officer, Thos. McDougall, 5th Officer, and E. J. Miall, 5th Officer.
- ⁵⁹ Kept by E. J. Miall, 5th Officer.
- ⁶⁰ Kept by Mr. Beaton, 4th Officer.
- ⁶¹ Kept by Francis G. Main, 3rd Officer.
- ⁶² Assisted by W. Douglas, 1st Officer, J. Patterson, 2nd Officer, and H. Troubridge, 3rd Officer.
- ⁶³ Kept by Lieut. L. D. Penfold, R.N.
- ⁶⁴ Kept by G. Gilpin, 2nd Officer.
- ⁶⁵ Kept by R. Caldwell, 2nd Officer, and J. Lindsay, 3rd Officer.
- ⁶⁶ Ditto.
- ⁶⁷ Assisted by S. Pidgeon, 2nd Officer, L. Gibbs, 3rd Officer, and G. Woore, 4th Officer.
- ⁶⁸ Assisted by E. O. Hardwicke, Mate.
- ⁶⁹ Kept by W. G. Squares, Chief Officer.
- ⁷⁰ Kept by E. J. Tayler, assisted by F. W. Kershaw, 2nd Officer, and C. H. Bryant, 4th Officer.
- ⁷¹ Kept by G. R. P. Thwaites.
- ⁷² Kept by E. H. Neave, 3rd Officer.
- ⁷³ Kept by Thomas Auld and H. Sawyer.
- ⁷⁴ Kept by A. R. Mackay, R.N.E., and A. H. U. Smyth.
- ⁷⁵ Kept by A. H. U. Smyth and J. Harrold.
- ⁷⁶ Kept by F. W. Wilsden and Harold Fotherwill.
- ⁷⁷ Kept by W. E. Mitchell, 2nd Officer.
- ⁷⁸ Assisted by Jas. Harland, 1st Mate.
- ⁷⁹ Assisted by Wm. Cook, 3rd Officer.
- ⁸⁰ Assisted by James S. Noble, 3rd Officer.
- ⁸¹ Kept by J. Stuart Wilde, 2nd Officer, W. H. Sweney, 3rd Officer, and H. J. Rhoades, 4th Officer.
- ⁸² Kept by W. H. Sweney, 3rd Officer, C. E. Trelawney, 4th Officer, and D. F. Murray, 5th Officer.
- ⁸³ Kept by W. H. Sweney, 3rd Officer, D. F. Murray, R.N.R., 4th Officer, and J. Armstrong, R.N.R.

APPENDIX III.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.		Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
				Ordinary.	Max.	Min.	Screens.	
April 1st, 1895, afloat -	-	243	589	1,425	354	355	203	68
Issued since -	-	82	186	430	96	97	51	—
		325	775	1,855	450	452	254	68
Returned since -	-	93	174	441	78	76	29	14
		232	601	1,414	372	376	225	54
April 1st, 1896, afloat -	-	232	601	1,414	372	376	225	54

INSTRUMENTS supplied, &c. for use at Naval Stations.

April 1st, 1895, in use -	-	77	71	237	33	41	10	11
Issued since -	-	—	7	36	2	3	—	—
		77	78	273	35	44	10	11
Returned since -	-	—	4	29	1	1	—	—
		77	74	244	34	43	10	11
April 1st, 1896, in use -	-	77	74	244	34	43	10	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1896.

Afloat in Royal Navy -	-	232	601	1,414	372	376	225	54
In use at stations -	-	77	74	244	34	43	10	11
In store at M.O. -	-	69	172	172	76	92	33	50
" Chatham -	-	16	46	85	23	24	17	15
" Sheerness -	-	6	22	40	14	15	8	6
" Portsmouth -	-	22	54	146	50	53	27	9
" Devonport -	-	18	34	117	37	37	12	16
" Queenstown -	-	2	4	14	3	3	—	4
" Gibraltar -	-	1	3	9	3	3	—	4
" Malta -	-	12	18	47	7	8	3	6
" Bombay -	-	5	1	10	4	4	1	4
" Halifax -	-	3	4	22	5	4	2	7
" Bermuda -	-	6	6	20	6	8	2	4
" Jamaica -	-	2	3	27	2	2	1	3
" Cape of Good Hope -	-	3	7	16	4	4	3	4
" Trincomalee -	-	5	7	14	2	4	1	4
" Hong Kong -	-	13	12	24	10	13	3	21
" Coquimbo -	-	3	6	14	4	3	1	19
" Sydney -	-	4	6	25	9	3	1	11
" Esquimalt -	-	4	7	18	3	6	—	—
Total, April 1st, 1896 -	-	503	1,087	2,478	669	705	350	252
Lost, &c. since April 1st, 1895 -	-	—	5	266	35	20	18	5
Under repair April 1st, 1896 -	-	34	—	—	—	—	—	—

APPENDIX IV.

INSTRUMENTS supplied, &c. to Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1895, afloat -	105	—	618	—	1	96	326
Issued since -	81	—	478	—	—	67	265
	186	—	1,096	—	1	163	591
Returned since -	74	—	437	—	—	59	218
April 1st, 1896, afloat -	112	—	659	—	1	104	373

INSTRUMENTS at Stations, viz., Telegraph Offices, Observatories,
Fishing Villages, &c.

April 1st, 1895, in use -	290	2	272	58	74	58	13
Issued since -	19	1	50	6	4	3	7
	309	3	322	64	78	61	20
Returned since -	11	1	26	3	2	3	4
April 1st, 1896, in use -	298*	2	296	61	76	58	16

DISPOSITION of BOARD of TRADE INSTRUMENTS on April 1st, 1896.

In merchant ships -	112	—	659	—	1	104	373
In use at stations -	298	2	296	61	76	58	16
In store at M.O. -	33	3	132	19	26	39	116
At Liverpool Agency -	3	—	16	—	—	7	8
„ Aberdeen „ -	5	—	47	—	3	5	30
„ Glasgow „ -	6	—	33	—	—	3	23
„ Dundee „ -	6	—	33	—	—	8	21
„ Hull „ -	3	—	11	—	—	2	8
„ Cardiff „ -	3	—	23	—	—	1	17
„ Southampton „ -	2	—	13	—	—	5	19
Total, April 1st, 1896 -	471	5	1,263	80	106	232	631
Lost, &c. since April 1st, 1895	—	—	156	1	—	22	50
Under repair April 1st, 1896 -	22	—	9	—	—	—	1

* Of these barometers 208 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX V.

REPORT OF INSPECTION OF THE IRISH AND WELSH STATIONS, 1895.

Donaghadee, visited September 13th.—The instruments were all in good order. The rain-gauge is rather sheltered by the proximity of trees in the churchyard.

Lissan, visited September 14th.—The station is in good order. A new rain-gauge has been procured, which was much required.

Armagh, visited September 14th.—Everything here was in good order. The sunshine recorder has been moved so that the shadow of the anemometer shaft does not fall on it.

Colebrooke, visited September 16th.—The station calls for no remark; the observer may possibly be changed.

Londonderry, visited September 17th.—The observer was absent. The rain-gauge is much overshadowed by a thorn bush, but such defects are almost unavoidable in town gardens.

Malin Head, visited September 18th.—At this station a building is being erected for the coastguard look-out. This necessitates the removal of thermometer screen and rain-gauge, and I had to give instructions for the erection of a wall to enclose them and keep off cattle.

Edenfel, visited September 19th.—This station sends observations for the Weekly Weather Report. It was in good order.

Markree, visited September 20th.—This station was, as usual, in perfect order, Mr. Marth being a most careful observer.

Belmullet, visited September 23rd.—The only matter calling for remark here is that the wind vane does not move quite freely. It was made under the directions of the postal engineer, the instrument supplied by the Office having been blown away. I have given directions for more frequent oiling.

Currygrane, visited September 25th.—This station is not very satisfactory, the observer being careless.

Arley Cottage, visited September 26th.—This station was in very good order, Major Maxwell being very attentive to the observations.

Holyhead, visited September 28th.—The new observer, Chope, has the instruments in good order, but reads rather too hurriedly.

Dublin, Fitzwilliam Square, visited September 30th.—This station was, as usual, in perfect order, but the exposure is insufficient.

Dublin, Glasnevin, visited September 30th.—The instruments were in good order and observations well taken.

Mountjoy Observatory, visited October 1st.—This station calls for no remark; it was, as usual, quite satisfactory.

Killiney, visited October 1st.—This is a station reporting rain only. The gauge is on a lawn, with some trees about, but fairly well exposed.

Parsonstown, visited October 3rd.—This station was in good order; the two observers are very much more careful than their predecessors.

Killarney, visited October 4th.—This is a weekly weather report station. The instruments were in good order.

Valencia Observatory, visited October 5th.—I found the instruments in good order.

Roche's Point, visited October 7th.—This station was in good order.

Mount Trenchard, visited October 8th.—This is a weekly weather report station. The instruments were in good order.

Roxborough, Limerick, visited October 8th.—This is a new rain station. The gauge is on the lawn, well exposed.

St. David's, visited October 10th.—This station was, as usual, in perfect order.

St. Ann's Head, visited October 11th.—The instruments are in good order.

Cardiff, visited October 12th.—I visited the agency here, which had become disorganized since the death of the late agent. I hope it may now go on satisfactorily.

The only stations unvisited have been Kilkenny and Llandoverly.

The usual table of thermometer corrections is appended.

(Signed) ROBERT H. SCOTT.

THERMOMETER COMPARISONS, 1895.

Corrections to be applied to the readings :—

STATIONS.	Inspector's Standard corrected.	Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Min.	REMARKS.
Armagh . -	57·1	-0·1	-0·1	—	-0·9	-0·1	+0·5	
Belmullet -	57·6	-0·3	-0·4	-0·1	+0·1	-0·1	—	
Brookeborough	63·3	-0·3	-0·6	—	0·0	-0·3	—	
Donaghadee -	60·0	-0·2	-0·3	+0·1	0·0	+0·1	—	
Dublin (City) -	61·2	-0·5	-0·5	—	-0·9	-0·1	—	
Dublin (Glasnevin).	59·1	-0·4	-0·3	—	0·0	+0·8	+0·2	
Dublin (Phoenix Park).	59·7	-0·3	-0·3	—	-0·4	+0·7	+0·5	
Edenfel (Omagh).	57·0	—	—	-0·4*	+0·2	0·0	—	* Standard Therm.
Edgeworthstown.	61·4	-0·3	-0·4	—	+0·9	+0·3	+1·1	
Foynes . -	59·4	—	—	—	-0·2	+0·5	—	
Holyhead -	62·6	0·0	-0·1	+0·3	-0·2	+0·4	—	
Killarney -	50·0	-0·1	-0·2	—	-0·1	0·0	—	
Lissan . -	59·1	0·0	0·0	—	-0·1	+0·5	—	
Londonderry -	59·8	-0·2	-0·2	—	0·0	+0·4	—	
Malin Head -	59·8	-0·2	-0·2	—	0·0	+0·4	—	
Markree Castle	57·5	0·0	0·0	-0·1†	-0·4	+0·4	—	† Kew Stand., No. 518.
Mount Nugent	62·4	-0·1	-0·2	—	-0·1	0·0	+0·3	
Parsonstown .	53·1	-0·4	+0·2	—	+0·2	+0·3	—	Second Order Reports.
Parsonstown -	—	—	—	—	0·0	+0·2	—	Tel. reporting insts.
Roche's Point .	53·8	-0·4	-0·2	—	-0·1	+0·5	—	
St. David's -	53·3	-0·1	-0·1	—	+0·5	+0·1	+0·4	
St. Ann's Head	52·9	-0·2	+0·1	-0·1	0·0	-0·1	—	
Valencia -	54·8	-0·2	-0·3	—	-0·1	+0·8	—	

REPORT OF INSPECTION OF SCOTTISH STATIONS for the YEAR 1895.

BAROMETERS.

The barometers at the stations were compared with inspector's standard No. 690, which was in good order and correct during the inspection, as shown by a comparison with a standard barometer in Edinburgh previous to and also subsequent to the inspections. I have to report that the barometers specified in Table I. were found to be correct, allowance being made for known instrumental errors, and were correctly observed.

TABLE I.

STATIONS.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	REMARKS.
	Inches.	Inches.	Inches.	
Fort William	29·839	29·643	—	
Fort Augustus	29·978	29·980	—	
Stornoway	30·085	30·084	30·084	
Strathpeffer	29·720	29·720	—	
Dunrobin	30·018	30·018	—	
Wick	29·802	29·800	—	Check bar. 15 min. later in shop.
Nairn	30·138	30·137	30·138	
Aberdeen	29·704	29·706	29·704	
Braemar	28·784	28·782	—	
Dundee	29·711	29·710	—	
Machrihanish	·770	·768	—	
Ardrossan	·917	·916	—	
Glasgow	·643	·644	—	
Pinmore	·788	·790	—	
Marchmont	·104	·050	—	
Edinburgh	·110	·135	—	
Leith	·481	·482	29·482	
Ochertyre	29·509	29·500	—	

The minimum thermometers were very carefully examined, with the result that all of them were found in good order, with the single exception of the thermometer at Wick, which showed about 9° of the spirit lodged in the top of the tube. I was informed that separation took place only a few days prior to my visit, and that meanwhile 10° had been added to each reading in making up the daily telegraphic report.

TABLE II.
ERRORS of the THERMOMETERS at the STATIONS.

STATIONS.	Standard Ther- mometer. No. 4433.	Dry Bulb.	Wet Bulb.	Spare Ther- mometer.	Max. Ther- mometer.	Min. Ther- mometer.	Time in Water in Minutes.	Change of Tempera- ture.	REMARKS.
Fort William -	60°0	+0°2	+0°2	°	0°0	-0°1	180	°	B B on grass +0°1.
Do. Observatory	60°0	—	—	—	0°0	-0°7		+0°2	
Fort Augustus -	57°8	0°0	0°0	—	+0°1	-0°5	80	Uniform	
Stornoway -	65°2	+0°7	+0°6	—	-0°3	+0°1	120	+0°3	
Strathpeffer -	61°2	0°0	0°0	—	-0°1	-0°1	150	-0°4	B B on grass -0°6.
Dunrobin -	63°9	+0°1	+0°1	—	+0°2	-0°1	80	-0°3	
Wick -	60°3	+0°5	+0°5	—	0°0	0°0	65	+0°3	
Nairn -	59°3	+0°7	+0°8	+0°2	+0°2	-0°1	70	+0°2	
Aberdeen -	63°0	+0°4	+0°4	—	+0°3	+0°4	70	Uniform	
Braemar -	56°1	+0°5	+0°5	—	0°0	-0°3	160	+0°2	
Dundee -	60°1	-0°5	-0°5	—	+1°4	-0°2	70	Uniform	
Machrihanish -	61°4	0°0	+1°1	—	+0°2	0°0	180	+0°3	
Ardrossan -	60°0	+0°3	+0°3	—	-0°1	-0°1	80	+0°1	
Glasgow -	61°0	—	—	—	0°0	-0°1	85	Uniform	
Pinmore -	59°2	+0°1	-0°1	—	-0°2	0°0	95	Do.	
Marchmont -	61°7	0°0	0°0	—	+0°1	+0°1	100	+0°3	
Edinburgh -	51°2	+0°2	0°0	—	-0°1	0°0	90	Uniform	
Leith -	52°3	+0°4	+0°1	—	-0°1	-0°3	80	Do.	
Ochertyre -	52°0	+0°1	0°0	—	0°0	0°0	150	Do.	

HYGROMETERS.

The dry and wet bulbs were, as heretofore, read immediately on opening the screens, and the differences of the readings, with the apparent hygrometric conditions at the time, were noted, the result being in favour of much attention being given to keep the wet-bulb thermometers in good order at the various stations.

NOTES of INSPECTION of the STATIONS.

Fort William, August 13th, 1895.—All the instruments continue to be kept in excellent order, and much attention is given to punctuality, accuracy, and fulness of detail in making the observations.

Fort Augustus, August 14th.—The instruments are in excellent order, and much care and attention are manifested by Father Martin in making the observations.

Nairn, August 15th.—The posts of the thermometer screen were strengthened with strips of wood in spring, the work being neatly and strongly done. The instruments were all in very good order, and Miss Penny and her brother are very desirous to secure accuracy in the observations and daily reports.

Stornoway, August 17th.—The barograph was altered as requested, so that it read with the reporting barometer at 32° and sea level. As the screw of the vernier of the reporting barometer was very loose, instructions were given to take the readings from the check barometer instead. This could readily be done, as the same "card" suits both barometers. The spare thermometer was found broken a year ago, when the instruments were removed to the new station. As parts of the thermometer screen were quite rotten, it was necessary to order a new one at once. The vane, which is 50 feet high, is in charge of the Harbour Commissioners, of whom Mr. J. McKenzie is one. It is kept in very good order.

The observations are made with the greatest care and with much intelligence; and the assistant, who is one of Mr. McKenzie's clerks, makes the observations and prepares the daily telegraph report correctly and expertly.

Strathpeffer, August 19th.—The instruments are all good at this new station, and have been compared at Kew. They have been placed in the best positions obtainable. Both Dr. I. Tregelles Fox and his son, who assists, read the instruments and do the reductions expertly and correctly.

Dunrobin, August 20th.—The instruments are in good order, and the observations are made correctly and with intelligence. Owing to the growth of some shrubs, the monthly rain-gauge will be removed to such a distance as will leave it unaffected by the shrubs.

Wick, August 21st.—A new Stevenson screen was added lately. As the roof is getting badly warped, owing to the thinness of the painting, orders were given to have it well painted at once. Its position is in the same plot of ground, 5 yards north of the old one, the two positions being virtually the same. The minimum thermometer was found with about 9° of spirit lodged in the top of the tube. This, I was assured, took place only a few days prior to my visit, and that meanwhile 10° had been added to each reading.

Otherwise everything was in very good order, and the observations are made and reduced in a most satisfactory manner.

Lairg, August 22nd.—The observer was from home, and all the thermometers were found broken, except the minimum one. No observations have been received from this station for about a year; but steps are being taken that the observations be resumed.

Aberdeen, August 23rd.—Everything here is in excellent order, and the observations are made with correctness and ability.

As regards the lateness with which telegrams are sometimes received from this station at this season, I am informed that the cause of delay is occasioned by the temporary change of the telegraph clerks during the Aberdeen holiday season; and the great press of telegrams during the herring fishery season.

Braemar, August 24th.—The instruments and work of observing continue in the same state of efficiency as on previous inspections.

Dundee, August 26th.—The instruments are well kept and attended to; and much care and intelligence is manifested in observing.

Machrihanish, August 27th.—The object of this visit was to advise in establishing a new station at this place. The barometer is a B.T. instrument with Kew comparison. The thermometer screen is a Stevenson's, at present set on the lawn without supports, which will be added

when certain contemplated changes on the grounds have been carried out. The present thermometers are not good, but a complete new set is to be ordered. The rain-gauge is the M.O. pattern, which will be placed near the thermometers in the new arrangements. Mr. Franklin Adams understands the methods of placing and reading the instruments, and of reducing the observations.

Ardrossan, August 29th.—Mr. Mayes was from home at the time of my inspection. The instruments are in very good order, and the observations are carefully and correctly made by the assistant in charge.

Glasgow Observatory, August 29th.—In September 1894 the barometer was removed from the transit to the computing room. The new position is very good and the height is unchanged. The anemometer has been placed 8 feet clear above the summit of the dome, on an iron lattice stand similar to what is used for railway signals. Everything is in excellent order, and the observations are all that can be desired.

Pinmore, August 30th.—The instruments are in particularly good order, and the observations are made with intelligence and enthusiasm.

Marchmont, October 1st.—As the posts of the Stevenson screen are rotten where they meet the ground, new ones have been ordered. Otherwise all the instruments are in very good order, and the observations made with care and intelligence.

Edinburgh, October 4th.—Everything at this station is well managed and kept, and the observations leave nothing to be desired. The rainfall pressure, temperature, and moisture of the air and sunshine are also observed with self-recording instruments.

Leith, October 8th.—The instruments are all in good order, well attended to, and well observed by the two observers.

Ochertyre, October 10th.—All the instruments are in excellent order, and the observations leave nothing to be desired. A double and more extensive set of underground thermometers have been added at this station.

(Signed) ALEXANDER BUCHAN,
Inspector of Scottish Stations.

INSPECTION of the ENGLISH STATIONS.

SIR,

October 14th, 1895.

I BEG to submit the following reports of my inspection of the stations visited by me this year.

I am, &c.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

Scilly, August 27th.—The instruments generally were in good order, and the observer read them and prepared his telegrams correctly and quickly. I spent a good deal of time with him instructing him in the use of his self-registering aneroid, and I think his reports will show an improvement as regards the use of that instrument. The pen, however, is quite worn out, and a new one is badly needed; I mended the one in use as well as I could temporarily.

Newquay, September 3rd and 4th.—The sunshine recorder at this station has for some time past been badly attended to. I therefore tried to get for it another site, and to put it in charge of someone who would properly attend to it. For this purpose I called on the Mayor

of Truro, who is much interested in meteorology, and has a good deal of influence at Newquay, but he was absent from home. Eventually I arranged with Dr. Hardwick, F.R.Met.Soc., to take charge of it, and to place it on a site I selected close to its present position. Dr. Hardwick will, I am sure, attend to it well, but cannot take it over till October. In the meantime I readjusted the instrument in its present site, the wooden stand having decayed in places, and allowed the base to shift a little.

Plymouth, September 6th.—All the instruments here were in excellent order, and are well attended to by Mr. Prigg and his assistants. The barometer has recently been moved to the Hoe, adjacent to the other instruments, where it is placed in a very suitable room. I also visited the second rain-gauge, which is at Freedom Fields, in the northern part of the town, on high ground, and very well placed. The anemometer and the sea temperature observations, which the observer is trying to arrange for, are not commenced yet.

Prawle Point, September 7th.—The observer here had been changed since the last inspection, and I therefore went very carefully through all the routine of the work with him. He read the instruments fairly well, and, except as regards one small point, reduced the readings correctly. I found a misconception existed as to what was required for "extreme force." The thermometer screen badly needed repair, and I gave instructions for this to be done. The position of the rain-gauge was very unsatisfactory, and therefore I removed it to a better site lower down the hill. Generally there was a decided improvement shown over last year, and the observer appeared anxious to do his work satisfactorily.

Arlington Court, September 9th.—The instruments here were all in good order, and a great improvement was shown in the management of the wet-bulb.

Cirencester, September 10th.—Both Professor Ohm and the assistant who usually takes the observations were absent, but I found the instruments in good order, and the assistant I saw appeared to understand his work very well. Since last year the sunshine recorder has been secured by iron cramps.

Dursley, September 11th.—This is a rainfall station which had not previously been inspected. Unfortunately the observer was absent from home, and the groom, in whose charge the gauge was left, knew but very little about the matter. The gauge is not well placed, but I think a better site might easily be found for it, and from what I heard of Mr. Pinney I think he would readily adopt any suggestions made to him with a view to improving his observations.

Rochford, September 12.—This was another station which had not before been visited. The observer is very anxious to obtain more instruments, and to make his station one of the Second Order. At present he has only a rain-gauge and a self-registering aneroid, both in good order. I objected to the present site of the gauge in a kitchen garden, and it will be removed to a corner of the lawn, where it will have a better exposure.

Stokesay, September 13th.—Here the instruments were in fairly good condition, and the observations appear to be punctually and carefully made. A new thermometer screen is being made, and will soon be substituted for the dilapidated one hitherto used. The position of the

rain-gauge is not altogether good, because of the plants and fruit trees which surround it.

Churchstoke, September 13th.—This is a sunshine station which had not been inspected before. The station is an important one, because it is the only one we have to represent a very large district. I found the recorder very badly placed near the ground level, and throughout the year a great deal of early and late sunshine must be cut off by trees and by the house. There is a high tower at the western end of the house on which the instrument at one time stood: its position there would be excellent, and I think if application were made to Mr. Wright he would have it replaced there.

(Signed) R. H. CURTIS.

Meteorological Office,
October 16, 1895.

SIR,

I BEG to submit herewith the report of my inspection this year of various English stations.

I am, &c.

To

(Signed) JOHN A. CURTIS.

R. H. Scott, Esq., M.A., F.R.S.

TELEGRAPHIC REPORTING STATIONS.

North Shields, September 12th.—I found the instruments in good order at this station. They are well attended to, and the observations appear to be carefully made. The rain-gauge has been repaired lately, but this instrument is old and badly worn, and a new one will be required before very long.

Spurn Head, September 6th.—A new lighthouse has been built here, which was to be opened within a week of the day of my visit. This necessitated the removal of the barometers, and I selected a position for them in the new lighthouse. The new height will be 28 feet above mean sea level, as determined from the building plan, and I satisfied myself that the difference, 9 feet, between the old and the new positions, is approximately correct. Neither the thermometer screen nor the rain-gauge will need to be removed. The great difficulty at this station appears to be from the fine sand of which the Head is composed blowing at times into the screen and rain-gauge, and thus affecting the readings. I see no way, however, of overcoming this difficulty consistent with a proper exposure of the instruments. I found the observer, Mr. G. Freeman, to be a careful, intelligent man, and a good observer.

York, September 9th.—Owing mainly to the growth of trees, the position of the thermometer screen was adversely reported on last year, and permission having been obtained from the museum authorities, I this year had it moved to a new site, selected—in consultation with Mr. Platnauer, B.Sc., the Keeper of the Museum—in the North Garden. I also had the two rain-gauges removed to a site close to the screen, where the exposure is much more open than in the old position.

The new site is shown on the sketch plan attached to my notes on the inspection. I determined the difference in height between the two positions to be, approximately, 5 feet, and the height of the rim of the rain-gauge will therefore be, above mean sea level 57 feet, above ground 1 foot.

The first observations taken at the new position were those for 6 p.m., September 9th, 1895.

I found everything in good order at this station, but I discovered that Mr. Wright, the observer, was in the habit of taking the 6 p.m. observations very soon after 5.30 p.m., which is his time for leaving work.

York, Sunshine Recorder, Bootham, September 9th, 10th, and 14th.—I found this instrument out of proper adjustment, and in order to set it right I had to dismount it and reset it. This I did, levelling it by the slate base, and adjusting it correctly for latitude and meridian. I went again the next morning, when I found that the want of parallelism of the scorch was still very marked, and thinking this to be due to faulty level, I again dismounted the recorder, and again re-set it, levelling this time by the cusps of the bowl. I also attempted to fix the legs of the wooden stand to the roof with Portland cement, for while at work on the instrument I found a sensible change in the adjustment owing to the boy who was assisting me inadvertently knocking against one of the wire stays. September 14th.—I called again at York on my way from Newcastle to London, when I found from the cards taken off since my previous visit that the instrument was still not exactly adjusted. On making careful examination, I found that the glass sphere (which was cemented to the brass pillar) was not central in the bowl, but a tenth of an inch or more in error. To rectify this I should have had again to dismount the instrument, and, the sky being overcast, I feared that if I did so I should not be able, with the time at my disposal, to readjust it for latitude and meridian. I therefore made a slight change in level, in order, to some extent, to counteract the error in the centring, and I recommend that on the next inspection a new stand be procured, and the instrument accurately fixed in position on it.

STATIONS OF THE SECOND ORDER.

Belvoir Castle, August 31st.—The observer, Mr. W. H. Divers, unfortunately was from home on the day of my visit. I saw, however, Mr. Ross, the deputy observer, who is the foreman gardener, and a very intelligent man. The barometer being in Mr. Divers' house, which was locked up, could not be shown me, but I examined the other instruments in the usual way. The thermometer screen is one of the "Glaisher" pattern, is painted a dull slate colour, and has bare soil beneath it. I asked that grass might be laid down under it, and that the screen be painted white; this it was promised should be done. The outfit at this station is good, and the observations are, I believe, made with intelligence and care, though great precision is not attempted. Cloud-form and weather is not regularly observed at present, but I hope the station will improve in this respect.

Durham, September 11th.—Everything was in excellent order at this station, except that the rain-gauge was rather loose. Mr. Carpenter promised to have the defect remedied, but the gauge stands on a post, and it is difficult to fix it quite firmly. The force of the wind has hitherto been obtained from a small dial anemometer fixed on the north-west corner of the observatory, the indications of which are converted into force by Beaufort scale by the Table in the Instructions. The results thus given, are, I believe, always below the truth, and in view of this, and of the fact that the observations as at present conducted are attended with difficulty, especially at night time, and sometimes with

no little danger, I recommend that Mr. Carpenter be requested to give the force of the wind by estimation only in future.

Newcastle-on-Tyne, September 12th.—The equipment of this station is exceedingly good; the thermometers and rain-gauge are, however, exposed on a flat roof, 41 feet above the ground, and owing to the business arrangements the evening observations have to be taken at 6 p.m. instead of 9 p.m. Both these difficulties appear to be insuperable, but to meet, in some degree, the first, I suggested to Mr. Martin to try and arrange for a thermometer screen and rain-gauge to be set up in some allotment ground quite close to the station, for the purposes of comparison. This he promised to do.

The observations are most carefully taken by Mr. Robinson, one of Mr. Martin's trained assistants, and great interest is manifested in the work.

Fulbeck, near Grantham, September 2nd.—This has hitherto been a rainfall station simply, but the observer, Rev. Vere F. Willson, M.A., is about to obtain the outfit for a station of the second order, when he will be able to furnish us with complete observations at 9 a.m. and 9 p.m. I selected positions for the barometer and the thermometer screen; the rain-gauge is very well exposed at present on the edge of the lawn. The station is situated on the southern slope of the table-land known as Lincoln Heath, and is about 100, or perhaps 150 feet, below the top of the Heath. The station promises to be a very good one, and I recommend that it be accepted as one of the Second Order.

Seaham Harbour, September 11th.—Since the last inspection the thermometer screen has been moved to a new position then selected for it. The change is a great improvement, the old site having become overgrown with small trees and shrubs. On the day of my visit cabbages were growing under the screen. These I had removed, and it was promised that grass should be laid down instead. Mr. Leith is a very intelligent observer, who reads the instruments carefully and well, and takes a great interest in the work. His estimate of cloud and wind agreed with mine, as did also Mr. Aird's.

Tealby, September 4th.—I found the instruments at the station in good order. The rain-gauge has been lowered by about 2 feet, but the readings will not be adversely affected by the change. I roughly checked the height of the barometer from the B.M. on the church, and found it to be correct.

Uppingham, August 31st.—The thermometer screen was moved to a new position on January 1st, 1895. The exposure is now decidedly better than it was. I found everything in excellent order at this very well-managed station, but Mr. Mullins is somewhat concerned as to the continuance of the station in the—not improbable—event of his leaving Uppingham.

York, September 9th.—As explained in other report, I transferred the thermometer screen and rain-gauges to a new site, selected in consultation with Mr. Platnauer, B.Sc., in the North Garden. The new position is about 5 feet higher than the old one, and much better in every way. The rain-gauges are now placed at 1 foot above ground. The first observations at the new station were taken in the evening of September 9th. I found the instruments in good order at this station.

STATIONS OF THE THIRD ORDER.

Alnwick Castle, September 13th.—Mr. Willyams was in Scotland at the time of my visit. I saw, however, the clerk who usually takes the temperatures and always sends off the return to the Meteorological Office. I was assured there will be no difficulty in having supplied to the Office the temperatures from the Stevenson screen in the garden instead of, as at present, from the "Six" thermometer outside the library window.

The thermometers in the screen are very good instruments, but the rain-gauge is almost worn out.

Bawtry, Hesley Hall, September 3rd.—The maximum and minimum thermometers were in good order. Their errors are not large, but they are of opposite signs. As last year, I found the wet-bulb out of order, and though the observations from this instrument are not supplied to us, I remounted it and gave instructions for the future. The rain-gauge had a hole in its side, which I repaired, so that its indications may now be relied upon.

London, Stamford Hill, October 9th.—This station supplies rainfall values only. The gauge is exposed in a small garden, which is well open to the southward, but considerably sheltered to the northward by houses of about 35 feet to 40 feet in height. The gauge is a 5-inch bottle gauge, and the rim cannot be firmly fixed. The station is not all that can be desired, but in view of the fact that we get no other returns from North London, I think it should be continued.

Market Rasen, September 4th.—The rain-gauge was loose in the ground, owing principally to the top fitting very tightly, and requiring some force to remove it each day. This stiffness was due to an irregularity in shape, which I corrected as far as I could. I also wedged up the gauge, and left it quite firm, but it probably will work loose again before next inspection. A new measuring glass has been obtained.

Northallerton, September 10th.—The new position of the rain-gauge, which is that I selected last year, is very satisfactory, but I found the gauge sunk too far in the ground, and it was also out of level. Mr. Stead promised to have it raised at once to 1 foot above ground, and to take care it was properly levelled. The defect in the measuring glass mentioned last year has now been remedied by a correct scale on paper being pasted over the etched scale. I tested this and found it correct.

Skipton, September 7th.—This is a new station, not yet formally accepted. The observer, Mr. W. Ecroyd, has provided himself with an outfit of excellent instruments, which are well exposed, and I think likely to be well attended to. The station is at Marton House, about $4\frac{1}{2}$ miles south-west of Skipton, in a hilly country, but on nearly the highest ground in the neighbourhood. There are a good many trees about, but I do not think the observations will be much affected by them. I recommended the observer to change the position of the barometer, and this he promised to do. I also advised the removal of the small dial anemometer to the gable of the greenhouse and the erection on the same gable of a new wind vane, which Mr. Ecroyd has had prepared. At present, 9 p.m. observations cannot be supplied, but in spite of this fact I recommend that the station be accepted.

BAROMETER COMPARISONS, 1895.

STATIONS.	Inspector's Standard corrected (Adie, M.O. 590).	Reporting Barometer un- corrected.	Check Barometer un- corrected.	Reporting Barometer.		REMARKS
				Correction required to reduce to Inspector's Standard.	Correction hitherto used.	
Durham -	29.176	29.175	—	+0.001	—	New instrument will be obtained.
Fulbeck -	.780	.740	—	+0.040	—	
Newcastle - on Tyne.	.789	.788	—	+0.001	—	
North Shields -	.895	.880	29.885	+0.015	—	
Seaham -	.425	.436	—	-0.011	—	
Skipton -	29.485	29.484	—	+0.001	—	
Spurn Head -	30.208	30.180	30.196	+0.028	—	
Tealby -	29.881	29.868	—	+0.013	—	
Uppingham -	29.745	29.730	—	+0.015	—	
York -	30.008	30.004	30.004	+0.004	—	

THERMOMETER COMPARISONS, 1895.

Corrections to be applied to the following readings of—

STATIONS.	Standard corrected (Neg. B. T. 4992).	Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Glass Min.	REMARKS.
Alnwick Castle -	56.0	—	—	—	+0.5	+1.0	—	Sixes.
	57.8	-0.1	-0.2	—	0.0	+0.5	—	
Bawtry (Hesley Hall).	70.3	+0.3	-0.1	—	-0.3	+0.4	—	
Belvoir Castle -	60.1	+0.1	0.0	+0.3	+0.4	+0.2	+0.8	Spare ther. is min. No. 75122.
Durham -	58.3	-0.3	-0.3	—	-0.3	+0.5	+1.6*	*1° of separated spirit, which is allowed for.
Fulbeck -	62.6	—	—	—	+1.7	0.0	—	New ther. since obtained.
Newcastle - on Tyne.	59.8	0.0	0.0	—	+0.2	+0.5	—	
North Shields -	60.8	0.0	-0.1	—	-0.4	+0.6	—	
Seaham -	57.3	-0.7	-0.7	—	-0.1	+0.8	—	
Skipton -	—	—	—	—	—	—	—	New instruments with recent Kew certificates.
Spurn Head -	60.6	-0.2	-0.4	+0.3	+0.5	+0.6	—	Spare, No. 3836.
Tealby -	57.3	-0.1	-0.3	-0.3	-0.9	+0.2	—	
Uppingham -	64.9	0.0	-0.1	—	-0.2	-0.2	—	
York -	64.6	0.0	-0.1	—	0.0	+0.8	—	Maximum and minimum for Second Order return.
					+0.1	+1.0	—	Ditto for Tele- graphic Reports.

(Signed) JOHN A. CURTIS.

I have the honour to submit the following report of the stations inspected by me in the year 1895.

(Signed) W. CLEMENT LEY.

TELEGRAPHIC REPORTING STATIONS.

Jersey, May 20th.—I found the instruments at the station at St. Aubin's in fairly good order, with the exception of the wet-bulb, which was considerably crusted. A mast, from which water formerly dripped at times into the rain-gauge, had been removed. The observations are, I think, in the main, well maintained.

The sunshine recorder, at St. Heliers, appeared to require a small re-adjustment, about which I gave full instructions.

Hurst Castle, May 22nd.—The present observer had made occasional mistakes in barometric readings, and also in reductions. He read the barometers very correctly on the occasion of my visit, but his readings of the thermometers were somewhat rough. The rain-gauge having been moved nearer to the centre of the garden, has now a good exposure, and was firmly fixed. The wet-bulb was not quite clean. The Stevenson's screen had been repainted. The supports, however, had become weak and decayed, and I ordered new ones. Strong winds at this station may probably have been over-estimated, but the observer's estimate of light winds appeared to be correct.

Dungeness, May 27th.—The wet-bulb at this station was somewhat crusted, hard water having been employed for it. The screen required repainting, which I ordered. The instruments were correctly read by the light-keepers on the day of my visit, and I think that the manner in which the observations are taken at this station indicates improvement, although errors are still occasionally noticed. Mr. Batten, who is responsible for the reports, estimated the wind force as three, when it should, I consider, have been reported as two, during part of the time I was at the station.

Cambridge, May 30th.—The instruments were all in very good order, but the maximum thermometer reads high, and no correction is applied at the station. The wet-bulb was clean and well-mounted. The observations are, in my opinion, very carefully conducted.

North Foreland, June 14th.—The observer, Mr. Cox, had just left the station on leave on the day of my visit, and I was unable to obtain any information as to the check barometer, which was said to be at No. 1, Alexandra Road, Broadstairs, where I called. The deputy observer at the station set the vernier very much too low. I gave full instructions. There was some deposit of lime on the wet-bulb. The rain-gauge was not quite horizontal; this I rectified. No change has been made in any of the instruments, excepting in the maximum thermometer, 1645, which was new. There appears to have been some over-estimation of gales, particularly from the north; but I have no doubt that northerly winds are felt with somewhat exceptional violence at the station. The wet-bulb was properly mounted, and the reservoir had been placed near enough to the bulb. The thermometers were correctly read by Mr. H. Brown, the deputy.

STATIONS OF THE SECOND ORDER, WEEKLY WEATHER REPORTING STATIONS, &c.

Southampton, May 19th.—The returns from this station continue to be of very excellent quality. Mr. Cook had been ill just previously to

my visit, but the deputy observer had maintained the work satisfactorily. All the instruments were in excellent condition.

Parkstone (Bournemouth), inspected May 23rd.—All the instruments were in good order, and the observations are conducted, as usual, with much care and accuracy.

Eastbourne, May 24th.—The wet-bulb at this station was mounted with much too thick material. All the instruments were otherwise well kept, and all have an excellent exposure. The observer is a little uncertain in his readings of the instruments, and is somewhat self-confident and impatient of instruction.

St. Leonards, inspected May 25th.—The thermometers at this station were, as usual, by no means carefully attended to, the hygrometer being especially dirty, and the muslin not appearing to have been changed for a long period. The thermometer screen was extremely dirty, and in some need of repair. I think the attention bestowed on the instruments is very inadequate. The head gardener at the Gensing Gardens, who is deputy observer, read the thermometers pretty correctly, but he did not appear to have received sufficient instruction as to the care which should be devoted to them.

I found the sunshine recorder at the Hastings Waterworks to be out of level, which had, I think, led to the supposition that the longitude correction was wrong. Mr. Farnham, who attends to the instrument, was absent from home. I wrote to him, and enclosed his reply to the Meteorological Office.

Bramley (Guildford), visited May 29th.—The instruments at this station, most of which are those formerly employed at Chilworth, were in fair condition. The minimum, with the Kew correction, reads much too low; the observer had, however, been in the habit of applying a correction of $+1^{\circ} \cdot 1$ throughout the scale, which was, at 56° , rather too high a positive correction. The screen somewhat required repainting, which the observer promised should be done. The winds experienced at the station are decidedly, to a considerable extent, deflected by neighbouring hills. Care is evidently taken with the observations, and the station, in my opinion, promises to be a useful one.

Geldeston (Beccles), visited June 1st.—As usual, the observations at this station continue to be admirably taken, and the instruments were all in the most excellent order.

Epsom, inspected June 5th.—The observations at this station continued somewhat unsatisfactory, the returns not being very well entered, and the whole work being, apparently, somewhat roughly done. The barometer is now in a much better light than formerly, but it was not very accurately read by the boys who were in charge of the instrument. The wet-bulb was again very badly mounted, and the wrong kind of material had been employed for it. I gave full instructions, and have hopes that there will be improvement in the future. The grass minimum had as much as $2^{\circ} \cdot 8$ of alcohol detached, which had, strangely, escaped observation. This was restored, and orders given that the instrument should be frequently examined in future.

Chester, October 25th.—This is a new, and promises to be a very useful station. The observations are excellently taken and the return very well filled in. The equipment is very good. The observer, Rev. J. C. Mitchell, expressed his intention of adding a sunshine recorder, for which, however, the exposure will not, I think, be adequate.

Prestwich, October 27th.—The instruments, including the sunshine recorder, have now a most excellent exposure. The attendant in charge of them did not, however, read them with perfect accuracy, and made an error of $\cdot 05$ in his first reading of the barometer on the day of my visit. The rain-gauge was loose, but Dr. Clunn undertook to have it fixed in a block and its horizontality more carefully attended to. The weather is not very fully recorded, and the observers have no time for hygrometrical reductions, yet, on the whole, the observations appear to be fairly good, and there is no likelihood of any breach of continuity.

Manchester, visited October 28th.—The observations seem to have been carefully taken, with the exception of the hygrometrical observations, especially during frost, about which I gave full instructions. The wet-bulb was by no means clean. The barometrical and hygrometrical reductions are carried out by Mr. Ross, clerk to Dr. Niven, the medical officer of health, at the Town Hall, apparently correctly. Hitherto only 9 a.m. observations had been taken, but Dr. Niven expressed an opinion that the corporation would consent to pay for 9 p.m. observations a sum which I found Mr. Hazzlewood, the observer at Oldham Road, would accept for the work.

Some amount of sunshine is cut off from the Jordan's sunshine recorder by buildings when the sun is near the horizon, especially in the morning.

St. Helen's, visited October 26th and 28th.—The instruments at this station were all in good order, but the corporation had objected to laying down grass under the thermometer screen. Here, also, evening readings had not hitherto been taken, but Dr. Robertson, the medical officer of health, who undertakes the observations, was of opinion that the corporation would probably consent to make a grant for this work, which would be carried out by the deputy observer, who resides in the park where the instruments are kept. The barometrical reductions are made by a clerk at the Town Hall. There is every prospect of permanence in the observations taken at this place.

Heysham Hall (Morecambe), October 29th.—The instruments at this station were all in good order, and appear to be well attended to. A strip of turf, somewhat too narrow, had been laid down under the thermometer screen. There has been some doubt as to the exact level of this station. Levelling from a bench mark at no great distance, I to-day made out the altitude to be 80.5 feet above M.S.L., which pretty nearly agrees with the level as previously determined by aneroid comparisons made from the same bench mark, but does not quite agree with the level as deducible from the barometric returns sent in to the Meteorological Office. The observer has been, I believe, in the habit of reading the barometer too low. He did not, however, do so on the day of my visit, but he reads the instrument with no great amount of accuracy. No reductions are made at the station.

Gilerua (Maryport), inspected October 30th.—This is a new, and promises to be a useful station, if the observer will undertake 9 o'clock instead of 8 o'clock observations, which he seemed willing to do. The observing barometer is a very good one, the check barometer not reliable. There is a large outfit of thermometers, which were all in admirable condition, and were very accurately read by the observer. The wind-force was somewhat over-estimated by him on the day of my visit.

Hawes Junction, October 31st.—The minimum thermometer had $1^{\circ} \cdot 2$ of detached spirit in the upper end, which had escaped observation.

I restored this, and gave instructions that the instruments should be frequently examined. The other instruments at this high level station, which I had not for several years inspected, were found to be in good order. The observer set the vernier of the barometer $\cdot 006$ too low on the occasion of my visit. The observations appear to be, in the main, well kept up. The thermometer screen is 2.5 feet above the level of the old one, for which it was substituted two years ago.

Sheffield, inspected November 1st.—I found the thermometers at this station, where the atmosphere is extremely smoky, by no means clean, and the wet-bulb, for which rainwater had not been regularly employed, was much crusted. Mr. Howarth undertook that my orders on these points should be carried out. He further stated that application should be made to the Museum Council for a sunshine recorder, for which there is a very fair position. The evening readings are now taken by a night watchman.

Solihull (near Birmingham), November 2nd.—The instruments at this new station are good, but I found the observations to be at present taken in a somewhat perfunctory manner, and the observer in his first reading of the barometer made a large error. I gave full instructions, but I do not feel sure that the work will be conducted so as to be of much value.

At the stations inspected in May and June the standard barometer, 590, and the thermometers, 4992 and 4994, were employed by me for comparisons. At the stations inspected in the autumn an aneroid only, and the thermometers, 5030 and 5031, were used. The following table shows the discrepancies between the barometric readings of the different observers and those taken by myself, the corrections which were needed for the thermometers to reduce them to the standards employed, the condition of the hygrometers, and the general condition of each station :—

NAME OF STATION.	BAROMETERS.		Temperature of Water.	THERMOMETERS.							General Condition of Station.	
	Difference of Observer's from Inspector's Readings.			DEY BULB. Correction to reduce to Inspector's Standard.	WET BULB. Correction to reduce to Inspector's Standard.	Difference of Wet from Dry Bulb.	State of Hygro- meter.	MAXIMUM. Correction to reduce to Inspector's Standard.	MINIMUM. Correction to reduce to Inspector's Standard.	SPARE. Correction to reduce to Inspector's Standard.		
	Reporting Barometer.	Check Barometer.										
Bramley	-	° 002	°	56°	° -0.1	° -0.2	° +0.1	A	° -0.1	° +0.7	°	B
Cambridge	-	+ °001	-	61°	-0.4	-0.3	-0.1	A	-0.9	+0.2	-	A
Chester	-	+ °001	-	49°	+0.1	+0.1	0.0	A	-0.6	+0.5	-0.1	A
Dunghess	-	°000	- °002	53°	0.0	-0.1	+0.1	B	-0.1	-0.1	-	B
Eastbourne	-	+ °001	-	58°	-0.1	-0.2	+0.1	B	-0.1	0.0	-	B
Epsom	-	+ °004	-	60°	-0.2	0.0	-0.2	C	+0.1	+0.1	+0.1	C
Geldeston	-	+ °001	-	60°	-0.1	-0.2	+0.1	A	-0.4	+0.1	-0.2	A
Gilerux	-	- °001	- °005	44°	+0.1	+0.1	0.0	A	+0.3	+0.1	-0.2	A
Hawes Junction	-	- °006	-	40°	-0.2	-0.4	+0.2	A	-0.2	-0.2	-	B
Heysham Hall	-	+ °002	-	47°	-0.2	-0.1	-0.1	A	-0.2	-0.1	-0.1	B
Hurst Castle	-	- °001	°000	55°	-0.3	-0.2	-0.1	B	-0.3	-0.3	-	B
Jersey	-	- °002	°000	56°	-0.5	-0.5	0.0	B	-0.3	+0.1	-0.3	B
Manchester	-	+ °004	-	48°	0.0	0.0	0.0	B	-0.1	0.0	0.0	B
North Foreland	-	- °021	-	55°	-0.4	-0.1	-0.3	A	+0.7	0.0	-	B
Parkstone	-	- °002	- °001	65°	-0.2	-0.2	0.0	A	-0.4	+0.3	-	A
Prestwich	-	- °050	-	51°	-0.2	0.0	-0.2	A	0.0	-0.1	-0.3	B
St. Helens	-	+ °002	-	43°	+0.1	0.0	+0.1	A	0.0	0.0	-	B
St. Leonards	-	°000	-	61°	-0.5	-0.5	0.0	C	0.0	+0.1	-	C
Sheffield	-	+ °002	-	42°	-0.2	-0.3	+0.1	B	0.0	0.0	-	C
Solihull	-	- °020	-	53°	0.0	+0.1	-0.1	B	+0.1	0.0	-	A
Southampton	-	°000	-	57°	-0.1	-0.1	0.0	A	-0.6	+0.2	-	A
Yarmouth	-	- °002	- °002	64°	-0.5	0.0	+0.5	A	-0.4	+0.1	-	A

(Signed) W. CLEMENT LEY.

SIR,

October 14, 1895.

HEREWITH I beg to submit reports of my inspections of the anemometers at Scilly and Holyhead.

R. H. Scott, Esq., F.R.S.

I am, &c.
(Signed) R. H. CURTIS.

Scilly, August 20th–27th.—Robinson Anemometer.—I found this instrument in a fairly satisfactory state, and working well. I took it entirely to pieces, and cleaned it in every part. The brake-box had an insufficient supply of oil (asbestoline) in it, and what was there had thickened a good deal, and become unsuitable. I also found that the asbestoline had dried into a hard film over some portions of the instrument where it had been for some time undisturbed, and that on other portions it had become viscid and nearly useless as a lubricant. In re-filling the brake-box, and for lubricating the instrument generally, I now used a mixture of asbestoline and paraffine.

I drilled out a broken screw, and supplied two new screws to the cover of the box containing the reducing gear; and I had a great deal of old paint scraped off the outside of the instrument preparatory to its being repainted.

The clock had a great deal too much loose oil about it, and I cautioned the observer against using oil so freely to parts which needed but little or none. The clock was taken to pieces and cleaned, and when set up again worked very satisfactorily.

The silver pencils fitted last year have proved satisfactory.

Since the cleaning the instrument has, up to this date, continued to work very well.

Dines' Anemometer.—I erected one of these instruments by the side of the Robinson instrument, and placed the recording portion in the hut at the foot of the stone pillar on which the latter stands, after enlarging the hut for the purpose.

I placed the vane on the top of three lengths of iron "barrel," which had been used for a similar purpose at the Meteorological Office. The "barrel" was screwed together, and was secured by three iron struts fixed to the pillar and to some stout pieces of timber, and also by wire stays from near the top to blocks of granite firmly bedded in the ground. The soft-metal tubes were led down inside the barrel to protect them from damage.

The height of the vane above the ground is 32 ft. 6 in., and as the instrument stands on relatively high ground, the exposure is perfectly free and open in every direction.

I explained to the observer the construction of the instrument, and method of dealing with it. Since I left Scilly he has had some trouble in getting the pen to act properly, but he has been written to, and his subsequent traces show considerable improvement.

I should like to acknowledge the courtesy of T. A. Dorrien Smith, Esq., of Tresco, who kindly allowed me to take freely from an adjacent quarry any stone I required, and offered to assist me in any way he could.

Holyhead, September 16th–25th.—Robinson Anemometer.—This instrument had, as usual, been well looked after during the year, but on taking it to pieces I again noticed that the asbestoline had not proved very satisfactory. The whole of the external portion of the instrument was dismantled, and carefully examined and cleaned. One cup had become quite loose, and another was weak, so both were re-soldered and made secure.

The old recording apparatus was removed, and returned to the Meteorological Office, and a new one, which had been sent by Munro, together with new coupling rods, was substituted for it. As this new portion was somewhat smaller than the apparatus it superseded, some contriving was required to adapt it to the other portions. I found also that originally the recording apparatus had been placed centrally in the room, but not vertically under the shafts, and this involved shifting the stand on which it was placed.

The instrument was got into good adjustment, and up to this date it has continued to work satisfactorily. There is a small "kink" in one of the silver pencils, which I did not venture to interfere with, especially as I think it likely to become less marked after it has had a little wear. I had had the time pricker placed exactly two hours in front of the pencils, and this was found to greatly facilitate the placing of the sheets at starting.

I tested by compass the points used for setting the vane, and finding them not quite correct, I substituted others, which will be used in future.

I append some views of the lighthouse and pier on which this anemometer is erected (not reproduced); they show how the free exposure of the instrument is interfered with, and tend to make clear the points to which I referred in my memorandum on this subject submitted to the Council March 19th, 1895.

Bridled Anemometer.—The hut, upon the roof of which this instrument is placed, had been shifted to the extreme northern end of Salt Island, where it is erected upon a stone foundation about 3 feet above the ground level.

I examined every part of the instrument, and cleaned and lubricated it thoroughly. The wire cord substituted last year has been found to work very satisfactorily, and is a great improvement upon the hempen cord previously in use. After the instrument had been set up I again tested it for the zero of the scale, using the same method I adopted last year, but on this occasion loading the pulleys with the ordinary and also with the gale loads. I found that the pen needs a slight modification in order to prevent it from swinging out from the paper when moved quickly by sudden gusts of wind, by which the trace is broken, and the ink oftentimes jerked out of the pen. I took measurements for the purpose of having a new holder made, which should prevent this in future.

When re-erected the instrument worked very satisfactorily, and in its new position it should give very good results.

Dines' Anemometer.—This instrument I erected on galvanised iron barrel, as at Scilly, stepping it upon an iron pin fixed in a block of stone which was bedded in concrete at the north-west corner of the bridled anemometer hut; the barrel was kept about 3 feet away from the hut, so that it should be as far away as possible from the cups of the bridled instrument. The barrel was fixed by means of two rigid iron stays, gripping the lower lengths of the barrel and secured to the hut, and also by four wire stays from just below the head to the ground. The composition tubes were brought down inside the barrel, and between the barrel and the hut are protected by a wooden cover. The recording portion was placed upon a stand fixed to a corner of the hut. The height of the vane above the ground is 44 feet.

The construction and management of the instrument was thoroughly explained to Mr. Cotton, and to his assistant, who will have the immediate charge of it, and the curves subsequently received show it to be working very satisfactorily.

(Signed) R. H. CURTIS.

REPORTS ON INSPECTIONS OF OBSERVATORIES, &c.

Radcliffe Observatory, Oxford, visited September 26th.—All the instruments were found in good order and working satisfactorily.

Squeezes were taken of the self-recording and check rain-gauges, and are sent herewith.

A comparison at $63\frac{1}{2}^{\circ}$ F. with my Kew standard gave the following correction for the several thermometers specified:—

Dry-bulb standard, No. 576 (in thermograph screen)	—0·1
Wet-bulb „ No. 575 „ „	—0·15
Dry thermometer, B.T. 1710 (in Stevenson screen)	—0·2
Wet „ B.T. 1709 „ „	—0·15
Maximum thermometer, M.O. 356 - -	—0·5
Minimum „ M.O. 363 - -	0·0
Grass minimum thermometer, M.O. 70852 - -	+0·1

Kew Observatory.—The several instruments have been examined and cleaned as usual.

An attempt has been made to test the trustworthiness of the vane on the Robinson anemograph by comparison with a flag carried by a flagstaff on the Observatory roof. A large number of observations have been made, but hitherto without that accordance between the results necessary for the passing of any final judgment.

(Signed) CHARLES CHREE.

Kew Observatory, October 29th, 1895.

Yarmouth, July 20th–21st.—The anemometer here was found to be in good order, and apparently carefully attended to.

The weather at the time was wet and unsettled, and it was difficult to do very much outdoors, but I managed, during the intervals, to examine and clean most of the exterior parts of the instrument.

The direction fan-spindle seemed to be working a little stiffly; this was eased.

The orientation was tested before disturbing instrument, and again when it was re-started, and was satisfactory in each case, and the check lines will be found on anemograph curves 201 and 202.

North Shields, July 22nd–24th.—The instrument here was working well, and appeared to be sufficiently lubricated.

All parts were dismantled and overhauled, but examination failed to reveal any apparent cause for the peculiar velocity traces during the very severe cold of last winter, excepting that I found a little water had got into oil cup at top of shaft, the back nut having worked slightly loose, and, to prevent a recurrence, I had the nuts sealed with red lead.

Captain Harrison arranged to have the instrument oiled and oriented monthly, and to give special attention in very cold weather.

The orientation was examined both before and after dismantling anemometer, and was satisfactory. The check lines will be found on curves 204 and 205.

The “worm” on the direction fan-spindle is worn dangerously thin.

Alnwick Castle, July 25th–26th.—The defective direction-fan referred to in last year’s report was taken down immediately after my visit then, and a complete new set of fans, worm spindle, and bearings was fitted up on September 1st.

The working certainly seems improved, but owing to the length of shafting in use the direction must always be rather sluggish.

The usual examination, oiling, &c. was given, but the instrument generally was in good order.

I looked through a number of curves, and found that the copies sent to the Office are correct, as the velocity trace overlaps the printed scale on sheets both at top and bottom.

I failed to find anything apparently wrong with the edge of "pencil" which would account for the slight wobbling of trace, but I eased and lubricated the end of the shafting and gearing, and the traces may perhaps be better now.

A sheet showing the "orientation" is forwarded with this report.

Glasgow, July 27th-30th.—Barograph and Thermograph.—These instruments were in very fair order, but the clock escapements required cleaning and oiling, which was done, and the lenses and mirrors carefully wiped.

The muslins and threads on the wet-bulb thermometers were rather dirty, and it was promised that they should be changed more frequently.

The standard barometer has been shifted to a more favourable position near a good light in the computing room, and I was informed that full particulars had been sent to the Office.

Anemometer.—The new position of this instrument renders the work of examination, &c. somewhat difficult and risky, but with the aid of Dr. Becker's assistants I managed to dismount and thoroughly overhaul all parts.

The oil in the container in which the direction rollers work was very thick and dirty; all was removed, rollers and collar washed in paraffin, and the container refilled with new asbestos lubricant.

The orientation was tested before and after taking down instrument, and the sheet showing same accompanies this report.

Rain-gauge.—This was dismounted and cleaned, and a new clock line fitted, as the old one was nearly cut through at the barrel-eye. Instructions were given to revolve cylinder for a datum-line each day before starting a curve.

The thermometers were compared at 56° F. with Kew standard, No. 720, and the following corrections determined:—

Dry-bulb thermometer, No. 708	-	-	- 0 ^o ·1
Wet-bulb	"	" 711	- - 0·0
Maximum	"	" 58846	- - +0·1
Minimum	"	" 63942	- - -0·0
Attached thermometer (to barometer)—no number			-0·6
Grass minimum thermometer, No. 59003			- -0·1

The zero-lines values are not yet determined, but the figures on scales are—

Dry-bulb, M.O. 199	-	-	10° = 0·634 inch
Wet-bulb, M.O. 201	-	-	10° = 0·602 "
Barograph, M.O. 197	-	-	1 inch = 1·551 "

Fort William, August 1st-2nd.—Barograph and Thermograph.—These were in good order. The clocks were taken down, cleaned, and lubricated, and lenses and mirrors cleaned. The rain-gauge was also lubricated, &c., and instructions were given to trace a zero-line on curve each morning, by revolving cylinder, before starting.

Comparisons of the thermometer at 56° F. with Kew standard, No. 720, gave the following corrections:—

Dry-bulb thermometer, No. 671	-	-	- 0 ^o ·0
Wet-bulb	"	" 672	- - 0·2
Maximum	"	M.O. 1092	- - 0·0
Minimum	"	M.O. 1322	- - +0·5

The zero values of the thermograph are—

	Dry.	Wet.
Upper - - - - -	79·3	77·5
Lower - - - - -	16·0	17·4

The values on ivory scales are—

Dry-bulb - - - - -	10° = 0·670 inch.
Wet-bulb - - - - -	10° = 0·695 „
Barograph - - - - -	1 inch = 1·542 „

Mr. Omond is of opinion that a slightly different value for the wet-bulb zero-line would lead to closer agreement between the eye observations and the tabulated readings.

Deerness (Orkney), August 6th–7th.—I found the anemometer here in good condition, and evidently carefully attended to.

All parts of instrument were dismounted and thoroughly cleaned.

The oil was very clean and fluid.

The velocity pencil was marking considerably above the zero-line at commencement of curves. I was able to improve this, and the sheet sent with this report bears a series of traces made by revolving the velocity spiral at the beginning, middle, and end of the paper, and these traces will be found to run more within the range of the printed scale.

The orientation markings, which were satisfactory, are also on the same sheet.

Aberdeen, August 10th–13th.—The *Anemometer* here was in very fair order, but the opportunity was taken of a dry, calm day to thoroughly overhaul and clean it, and to replace the old oil (which was fairly clean) with fresh sperm.

Orientation was good, and the sheet showing the check traces is appended to this report.

Rain-gauge.—This instrument and its clock were cleaned, and instructions given for making a datum-line on each curve. An ash tree about 6–8 feet away, on the east side, is rapidly growing, and will soon shelter gauge.

Barograph and Thermograph.—These instruments were in a satisfactory condition, but the clock escapements were improved by cleaning and lubricating.

The thermometers in use were compared at 60° F. with Kew standard, No. 720, and the following found to be the corrections required:—

Dry bulb thermometer, No. 397	-	-	-0°·10
Wet-bulb „ „ 395	-	-	-0·65
Maximum, „ M.O. 1002	-	-	+0·10
Minimum, „ M.O. 89	-	-	+0·30

The “zero” values in use are—

	Upper.	Lower.
Dry-bulb - - - - -	81·4	23·0
Wet-bulb - - - - -	79·3	15·8

Values on ivory scales are—

Dry-bulb - - - - -	No value or number.
Wet-bulb - - - - -	10° = 0·700 inch. M.O. 184.
Barograph - - - - -	1 inch = 1·578 „

(Signed) E. G. CONSTABLE.

Kew Observatory,
October 28th, 1895.

I had the instrument taken down, and cleaned the external parts, and then added fresh oil to all the bearings. After remounting, the orientation was examined, and the observer instructed (through Colonel Kirkwood, R.E.) to orientate the instrument once a month, and forward the sheet to the Meteorological Office.

The clock was taken to pieces and cleaned, and the recording parts of the anemometer were examined, and all bearings oiled.

Valencia, October 10th-14th.—Here all the instruments were in good order.

The barograph and thermograph clocks were cleaned, as well as the lenses and condensers, and the position of the zero dots was changed to winter values. Some difficulty was experienced in getting the thermograph clock to go correctly after cleaning. After repeated trials, it was found that the bearing holes into which the pivots of the escapement fitted had become so worn that the escape wheel at intervals slipped a tooth, and in consequence the clock gained a good deal. This I had put right by a local watch maker, and at the same time had the position of the pallets slightly altered by means of a brass washer, which improved the beat of the clock.

The thermometers were compared with the Kew standard, No. 720, and the following corrections determined at 55° Fahr. :—

Dry standard, 399	-	-	-	-	-0.7
Wet „ 473	-	-	-	-	-0.4
Maximum, M.O. 1003	-	-	-	-	-0.1
Minimum, M.O. 2497	-	-	-	-	+0.1
Standard barometer, attached thermometer, 71062	-	-	-	-	-0.1
Barograph thermometer (no number)	-	-	-	-	-1.9

The rain-gauge clock was cleaned, and a slight adjustment made in the pendulum to correct the rate.

Mr. Cullum was asked to revolve the cylinder each morning so as to obtain a zero-line before starting the gauge.

"Squeezes" were taken of the self-recording and check-gauge funnels, and are forwarded herewith.

The anemometer was taken down, and the various parts cleaned, and fresh asbestos lubricant applied to all the bearings, although the lubricant was found in excellent condition on dismounting the instrument. As reported last year, the fans are a good deal corroded, and new ones will be required before long.

The orientation was duly tested, and found satisfactory.

Two old disused subsidiary scales are returned herewith—one for barograph and the other for dry thermograph tube—also the old attached thermometer and its scale, which were removed from the standard barometer in 1887, and replaced by a new thermometer graduated on the glass stem itself.

Armagh, October 16th-17th.—The anemograph here was found to be maintained in excellent order, the bearings of all parts being well oiled and in good condition.

I dismantled the external parts and examined the cup, arms, and fans, but these do not show any marked signs of wear. After cleaning and replenishing the bearings with fresh asbestos lubricant, the orientation was duly examined and found correct.

The clock was taken to pieces and cleaned, and the recording parts were also examined and oiled.

On examining the rain-gauge I found that the clock was in such excellent condition that it did not require any special cleaning.

"Squeezes" of both the self-recording and spare gauges were obtained, and Dr. Dreyer was asked to revolve the cylinder each morning so as to get a zero-line before starting the gauge.

Fleetwood, October 18th-19th.—At this station the anemometer was found working satisfactorily, the bearings of all parts being well oiled from time to time by Mr. Gaultier. The instrument was dismounted and cleaned, and fresh asbestos lubricant applied to all the bearings. The cups and stays were in good order, but several blades in both direction-fans had become loose, these were made quite fast by soldering before setting up again. I noticed that the lignum vitæ bearings, in which the spindle (carrying the direction-fans) runs, have become a good deal worn, and will have to be renewed next year.

The clock having quite recently been taken to pieces by a local watchmaker, in order to attach a new winding-cord, did not require any special attention, but the recording pencils and fittings were cleaned and oiled.

The orientation was tested and checked by compass, and found correct.

Stonyhurst, October 21st-22nd.—The barograph and thermograph were found in good order, and neither the clocks nor the lenses required cleaning. In accordance with instructions, I examined some of the number 1 photographic curves, and found that the intensity of trace varied considerably, and in consequence the number 2 curves were at times very faint. The assistant to the Rev. W. Sidgreaves informed me that a good deal of bother had been experienced during the last two or three months in regulating the lights, owing to alterations taking place at the gas works, but now that these were completed the flow of gas would be more regular, and no doubt the traces in future would be more uniform.

The thermometers were compared at 52° F. by means of Kew standard, 720, and the following corrections determined:—

Dry standard, 619	-	-	-	-	-	-	-	0.2
Wet „ 382	-	-	-	-	-	-	-	0.4
Maximum, M.O. 1525	-	-	-	-	-	-	-	0.0
Minimum, B.T. 501	-	-	-	-	-	-	-	0.3
Attached thermometer to the standard barometer, 696	-	-	-	-	-	-	-	0.8
Barograph thermometer, 539	-	-	-	-	-	-	-	0.4
Grass minimum, 81514	-	-	-	-	-	-	-	0.1

The anemometer having quite recently been dismounted and fresh oil applied to all the bearings, did not require special cleaning. I examined the orientation, and the paper containing the result is sent herewith. The rain-gauge was in good order, and "squeezes" of both the self-recording and spare funnels were taken, and the observer was instructed to revolve the cylinder each morning so as to obtain a zero-line before starting the instrument.

During my visit I made a comparison of the recently repaired standard Fortin barometer, No. 696, with the portable or station barometer, 875,

which has been in use at the observatory for several years past for the control observations. A detailed account of the comparison is appended to this report.

(Signed) T. W. BAKER.

NOTE ON THE COMPARISON OF THE BAROMETERS AT STONYHURST
OBSERVATORY AND AT KEW ; BY T. W. BAKER.

In accordance with instructions sent to Dr. Chree, on June 22nd and July 29th last, I was requested to make a careful comparison of the two barometers in use at Stonyhurst, with a view to determining the cause of the differences reported to exist at times between the two instruments. As, however, I had to inspect several stations in England and Ireland before reaching Stonyhurst, both Dr. Chree and myself thought carrying a Fortin standard barometer from Kew too great a risk, especially as I had to bring away the portable barometer from Stonyhurst; and considered that the best plan would be to compare the two barometers *in situ*, then bring away the portable one, and compare it direct with the Kew standard at the Kew Observatory.

This plan has been carried out, and the results are given in Tables I. and II.

In Table I. is exhibited a series of 15 readings, observed on October 21st and 22nd, with the Stonyhurst standard, No. 696 (recently repaired), and the portable barometer, No. 875, this latter instrument being the property of the Meteorological Council.

The readings taken have been duly corrected by applying the corrections in use at Stonyhurst, namely, $+0.007$ inch to the standard, No. 696, and $+0.014$ inch to the portable, No. 875. At the time of my visit very little variation was experienced in the height of the barometer; indeed, the mercury was almost uniformly level throughout, and it will be seen, on referring to the table, that the mean difference, irrespective of sign, between the two instruments amounted to $.0027$ inch, or, taking the signs into consideration, it only gives $.001$ inch, so that the two barometers at that time were in close agreement.

Table II. gives a comparison of the portable barometer, No. 875, with the Kew standard at the Kew Observatory, between October 29th and November 5th. During this period barometric pressure varied a good deal, and a series of five rising and five falling readings were observed. The large variation of $.016$ inch in the mean differences between the two instruments when the mercury is rising and falling is, doubtless, mainly due to the fact that the portable barometer has a somewhat contracted tube. I am, therefore, of opinion that this will in a great degree account for the differences found at Stonyhurst Observatory, and goes to show that a portable barometer with a contracted tube is not a suitable instrument to employ in standardizing the barograph curves.

The mean correction now found here, viz., $+0.019$ inch, is not widely different from the correction $+0.014$ inch used at Stonyhurst. In an instrument of this class the mean correction found, it is almost needless to remark, must depend to some extent on the rate at which barometric changes happen to take place during the period of observation.

Kew Observatory,
November 6th, 1895.

TABLE I.

The following OBSERVATIONS were taken at STONYHURST by Messrs. RONCHETTI and BURNS (Assistants at Stonyhurst Observatory) and Mr. BAKER on October 21st and October 22nd, 1895.

Date 1895.	Standard Barometer, No. 636.			Portable Barometer, No. 875.			Differ- ence. Standard minus Portable.	Observer.
	Reading.	Temp.	Reading corrected for Index Error.	Reading.	Temp.	Reading corrected for Index Error.		
Oct. 21, 12.40	29.673	65.4	29.680	29.664	66.0	29.678	+ .002	T. W. B.
" 12.42	.673	65.5	.680	.668	65.6	.682	- .002	J. Burns.
" 12.48	.670	65.0	.677	.660	65.7	.674	+ .003	J. Ronchetti.
" 1.10	.660	66.0	.637	.657	66.0	.671	- .004	T. W. B.
" 1.20	.660	66.0	.667	.652	66.0	.666	+ .001	T. W. B.
" 1.30	.658	66.0	.665	.650	66.3	.664	+ .001	T. W. B.
" 3.0	.652	65.0	.659	.645	65.6	.659	.000	J. Burns.
" 3.2	.649	65.2	.656	.644	65.7	.658	- .002	T. W. B.
" 3.20	.643	65.8	.650	.642	66.0	.656	- .006	T. W. B.
" 4.54	.648	65.3	.655	.636	66.2	.650	+ .005	J. Ronchetti.
" 4.56	.644	65.5	.651	.638	66.2	.652	- .001	J. Burns.
" 4.58	.642	66.1	.649	.639	66.3	.653	- .004	T. W. B.
Oct. 22, 10.0 a.m.	.594	64.6	.601	.592	65.4	.606	- .005	J. Burns.
	.592	65.3	.599	.586	66.0	.600	- .001	T. W. B.
	29.592	65.8	29.599	29.588	66.2	29.602	- .003	J. Ronchetti.
Means	-	65.5	-	-	65.9	-	-	
Correction to ther.	-	-0.8	-	-	-1.3	-	- .001	
Mean Temp.	-	64.7	-	-	64.6	-	.0027	irrespective of sign.

The correction to barometer 636, as supplied by the Meteorological Office = + .007.
The correction to barometer 875, as supplied by the Meteorological Office = + .014.

TABLE II.

COMPARISON of the PORTABLE or STATION BAROMETER, No. 875, with the KEW STANDARD BAROMETER, at KEW OBSERVATORY. The Readings were taken by Mr. J. FOSTER and Mr. BAKER.

Date.	Mercury + rising - falling.	Kew Standard.			Portable Barometer, 875.		
		Reading.	Temp.	Reading corrected for Index Error.	Reading.	Temp.	Difference.
October 29 -	+	29·862	49·7	29·838	29·842	51·9	—·026
	+	·919	54·8	·925	·898	56·7	—·027
	+	29·934	55·1	29·940	29·910	57·4	—·030
" 30 -	—	30·128	54·5	30·134	30·124	56·6	—·010
" 31 -	+	·020	56·7	·026	29·996	58·5	—·031
November 2 -	—	·274	55·1	·280	30·270	55·6	—·010
	—	·254	56·3	·260	·248	56·7	—·012
	—	30·236	57·4	30·242	30·232	57·5	—·010
" 4 -	—	29·787	52·2	29·793	29·780	53·6	—·013
" 5 -	+	·588	57·7	·594	·573	59·0	—·021
		Mean Temp.	55·0		Correc- tion to ther.	56·4 —1·3 55·1	+·019 correction.

Index correction to Kew Standard - - - +·008 inch.
 Mean correction to Portable Barometer, No. 875, mercury rising = +·027 "
 " " " " " falling = +·011 "

APPENDIX VI.

METHOD OF DEALING WITH TELEGRAPHIC WEATHER
INTELLIGENCE.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change. Full details will be found in Appendix X. to the Report for 1891.

DAILY WEATHER REPORT.

The Office receives, when the telegraphic communications are perfect, sixty reports each morning, eighteen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years.

The change made in the Daily Weather Report during 1894, by the insertion of Reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 per annum ;
 by book post £1 "

An early issue of MS. copies of the observations and remarks is supplied to some applicants at the rate of 2*l.* 10*s.* per annum, and the supply can be extended. Arrangements can also be made for the supply of charts drawn from the 8*h.* a.m. or 6*h.* p.m. observations, such as appear in the "Times."

WEEKLY WEATHER REPORT.

The Weekly Weather Report, which has appeared since February 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday. It is published regularly on Thursdays and is illustrated by three maps for each day. These, like the Daily Reports, show the outline of the land and sea in blue, but the information in black. The maps show (1) for 8 a.m., the temperature, weather, and sea disturbance; and (2) for 8 a.m. and 6 p.m., the distribution of pressure and the winds, over, and on the coasts of, Europe. The information on the first and second pages of each report consists of observations of Temperature and Rainfall made at 77 stations, the individual values for which are given on the second page of the Report, and of Sunshine records taken at 50 stations.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means of estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day-degrees*; a Day-degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F. :—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply :—

Conditions of Temperature.	To obtain the daily Accumulated Temperature	
	Above 42° F.	Below 42° F.
If the minimum is <i>above</i> 42° F. or <i>equal</i> to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is <i>below</i> 42° F., but the mean for the day is <i>above</i> 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is <i>below</i> 42° F., but the maximum is <i>above</i> 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is <i>below</i> 42° F., or <i>equal</i> to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the *average daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given above, in Rules 2 and 3, is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures,—for 32° F., 0·4; for 52° F., 0·33; for 62° F., 0·25.

A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

In addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given in Appendix XI., p. 84.

An early copy of the MS. of the report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on that evening; the printed copies of the complete report are ready for sale on Thursday afternoon.

Appendices, &c. to the Weekly Weather Reports.

Two Appendices, I. and II., have appeared, similar to those for recent years, and the Monthly Summary Supplement gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine

of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow, hail, thunder &c., &c. occurred, and the number of days on which the wind blew from the eight principal points of the compass.

ISSUE OF FORECASTS.

REMARKS on the actual state of the weather, and FORECASTS *for not more than one day in advance*, are prepared at the Meteorological Office as under :—

*On Week Days.**

- (1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations (see page 12).
- (2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of forecasts is supplied to a few newspapers and a copy is exhibited regularly at the door of the Meteorological Office. During the Hay Harvest these forecasts are telegraphed to about 28 well-known agriculturists, to be made known in their neighbourhoods (see p. 13).
- (3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

The forecasts are made for the following districts :—



0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND COUNTIES.
5. ENGLAND, SOUTH (and English Channel).
6. SCOTLAND, WEST (with Isle of Man).
7. ENGLAND, N.W. (with North Wales).
8. ENGLAND, S.W. (with South Wales).
9. IRELAND, NORTH.
10. IRELAND, SOUTH.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies, or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them can be supplied.

* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9h. 45m. a.m. and 3h. p.m. The information can be easily read from the street.

FORECASTS FOR SUBSCRIBERS.—Any person can be supplied with a copy of the 11 a.m. Forecasts, once on each week day,* on payment of a subscription of ten shillings per annum, or 2s. 6d. per official quarter, or any part thereof, *in addition to the cost of transmission*; the charges will therefore be, by *letter post*, 9s., by *book post*, 5s. 9d., per quarter.

The forecasts for any one of the districts and for any of the hours mentioned above can be forwarded by telegraph daily, on payment of 3d. per day for any definite period, in addition to the cost of telegraphy.

FORECASTS FOR CLUBS.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

FORECASTS FOR HAY AND CORN HARVESTS, OR FOR PUBLIC USE.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2s. 6d. being charged for an official quarter or any part thereof, in addition to the cost of the telegrams.

EXHIBITION OF TELEGRAPHIC FORECASTS AT LOCAL POST OFFICES.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

INQUIRIES AS TO THE WEATHER.

INQUIRIES PERSONALLY OR BY MESSENGER.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district, and with the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

INQUIRIES BY LETTER.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

INQUIRIES BY TELEGRAPH.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in any district of the United Kingdom by payment of a fee of one shilling *in addition to the cost of a telegram and reply to any post office*. The telegram containing the inquiry must be addressed as follows :

To

WEATHER,

LONDON.

* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

The payment for the reply should be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on some future specified day.

CHECKING OF FORECASTS and STORM WARNINGS.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1895 will be found on pp. 12 and 15.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Lighthouse Boards the original log-books from some of the most exposed light-ships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

APPENDIX VII.

**REPORT ON THE COMPARISON OF THE FORECASTS ISSUED AT 8h. 30m. p.m.
WITH THE WEATHER SUBSEQUENTLY EXPERIENCED, for the 12
Months, April 1895 to March 1896. The results are for the
United Kingdom as a whole.**

The letters used have the following signification :—

a = complete success.

b = partial (more than half) success.

c = partial failure.

d = total failure.

The checking has been conducted on the same system as that employed in previous years, i.e., each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the per-centage of success in "Wind," the second in "Weather," and the third the average of the other two.

The Summary for the various districts is given at page 12.

Months.		Per-centages.			
		Wind.	Weather.	Average.	a + b.
April	a b c d	52 22 17 9	60 28 8 4	56 25 13 6	81
May	a b c d	67 15 13 5	62 19 13 6	65 17 13 5	82
June	a b c d	61 18 18 3	69 20 6 5	65 19 12 4	84
July	a b c d	47 23 15 15	60 29 7 4	53 26 11 10	79
August	a b c d	49 30 15 6	59 23 13 5	54 27 14 5	81
September	a b c d	59 19 15 7	63 21 7 4	64 20 11 5	84
October	a b c d	40 31 22 7	54 23 15 8	47 27 19 7	74
November	a b c d	45 27 22 6	59 29 8 4	52 28 15 5	80
December	a b c d	52 24 18 6	57 26 8 9	55 25 13 7	80
January	a b c d	51 27 14 8	57 30 7 6	54 29 10 7	83
February	a b c d	47 28 15 10	57 28 7 8	52 28 11 9	80
March	a b c d	29 35 27 9	48 35 11 6	39 35 19 7	74
The entire year	a b c d	50 25 18 7	59 26 9 6	55 25 14 6	80

APPENDIX VIII.

STORM SIGNAL STATIONS.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations at which the signals are hoisted:—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, N.E.	IRELAND, S.W.	ENGLAND, S.W.	ENGLAND, N.E.
Lerwick.	Tuskar L.H.	Scilly.	Berwick - on
Fair Isle L.H.	New Ross.	St. Sennen.	Tweed.
Scalloway.	Dunmore East.	Newlyn, West.	Cullercoats.
Dunrossness.	Dungarvan.	Penzance.	Tynemouth.
Stromness.	Minehead L.H.	The Lizard.	South Shields.
Kirkwall.	Youghal.	Falmouth.	Souter Point L.H.
Cantick Head L.H.	Queenstown.	Pendennis.	Sunderland.
Holborn Head.	Cork.	Mevagissey.	Hartlepool.
Dunnet Head.	Passage.	Plymouth.	Middlesborough.
Wick.	Kinsale.	Devonport.	Redcar.
Tarbet Ness L.H.	Do. (Old Head).	Prawle Point.	Flamborough Hd.
Avoch.	Galley Head L.H.	Teignmouth.	Whithy.
Inverness.	Castletownshend.	Exmouth.	Filey.
Nairn.	Brow Head.		Bridlington.
Burghead.	Tralee.		Hull.
Lossiemouth.	Limerick.		Goole.
Buckie.	Loophead L.H.		Grimsby.
Port Knockie.	Galway.		Boston.
Cullen.			
Portsoy.	IRELAND, N.W.		
Banff.	Tory Island L.H.		
Fraserburgh.	Rathmullan.		
Peterhead.	Malin Head.		
Aberdeen.	Portrush.		
Girdleness L.H.	Port Ballintrae.		

(Continued

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Howth.	Gorey "	Sheringham.
Broughty Ferry.	Kingstown.	Weymouth.	Cromer.
Dundee.	Pt. of Ayre (I. of M.)	Anvil Point L.H.	Yarmouth.
St. Andrews.	Ramsey "	Poole.	Southwold.
Anstruther.	Douglas "	Southampton.	Orford Ness L.H.
Pittenweem.	Castletown "	Hamble.	Ipswich.
Buckhaven.	Silloth.	Yarmouth.	Harwich.
Wemyss, West.	Maryport.	Cowes.	Gunfleet L.V.
Burntisland.	Workington.	Ryde.	
Grangemouth.	Whitehaven.	St. Catherine's Pt.	
Bo'ness.	Barrow.	Portsmouth.	
Granton.	Morecambe.	Littlehampton.	
Newhaven.	Fleetwood.	Brighton.	
Leith.	Blackpool.	Newhaven.	
Fisherrow.	Lytham.		
Dunbar.	Southport.		
Cockburnspath.	Liverpool.		
St. Abb's Head.	Runcorn.		
Eyemouth.	Connah's Quay.	ENGLAND, S.E.	
	Penmaenmawr.	Eastbourne.	
	Port Penrhyn.	Hastings.	
	Port Dinorwic.	Rye.	
	Caernarvon.	Sandgate.	
	South Stack L.H.	Folkestone.	
	Holyhead.	Dover.	
	Point Lynas L.H.	Ramsgate.	
		North Foreland.	
	ST. GEORGE'S	Margate.	
	CHANNEL.	Faversham.	
SCOTLAND, N.W.	Aberystwyth.	Sheerness.	
Portnaguran.	Milford.	Chatham.	
Stornoway.			
Port of Ness.	BRISTOL CHANNEL.		
Stourhead L.H.	Pembrey.		
C. Wrath L.H.	Llanelly.		
	Swansea.		
	Briton Ferry		
	Porthcawl.		
	Nash L.H.		
	Penarth.		
SCOTLAND, W.	Cardiff.		
Glasgow.	Do. (Bute Dock).		
Greenock.	Do. (Barry Dock).		
Rothsay.	Newport.		
Campbelton.	Weston-super-Mare.		
Mull of Cantire	Burnham.		
L.H.	Bridgewater.		
Girvan.	Lundy Island.		
Ballantrae.	Ilfracombe.		
Corsewall Point	Bull Point L.H.		
L.H.	Barnstaple.		
Mull of Galloway	Appledore.		
L.H.	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	St. Ives.		

APPENDIX IX.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Roseheart, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kileredane, Kilonan, Galway, Spiddal, Cleggan, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoco, Burton Port, Kincaslugh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portree, Armadale (Isle of Skye), Isle of Soay, Plockton, Shildaig, Gruinard, Ullapool, East Mey, Gills, Stroma (2).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness.

APPENDIX X.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE BRITISH ISLES.

These stations are of seven classes, as stated on page 17.

I.—*Observatories continuously observing all the Meteorological Elements.*

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves. Returns from observatories.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (a) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (b) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element. The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The curves and tabulations are eventually bound and stored in the Office. Examination of returns.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time and occasionally the engraving of new scales for measuring the curves. Results of examination and report to Council.

METHOD OF DEALING WITH THE NUMERICAL RESULTS FROM THE SELF-RECORDING OBSERVATORIES.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record. General supervision of observatory work.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council." The volume for 1893 is almost ready for issue, and that for the year 1894 is also in the press. See p. 19. Interpolations.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

The anemograms received from Alnwick Castle, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office, and the sheets bound up in volumes. Besides special inquiries on legal and other points that from time to time arise, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the Office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barograph Stations at which the Atmospheric Pressure is continuously recorded.*

These stations are for the most part either telegraphic reporting stations or stations of the second order. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to inform the observers as to the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily records of sunshine which are now received from 48 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and after their receipt has been acknowledged, they are duly stamped and dated and then stored in the Office.

Weekly totals.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VI., and for those stations which are also Stations of the Second Order the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society.

V.—*Telegraphic Reporting Stations.*

These are 30 in number, and the particulars as to the observations taken at them, and the methods adopted in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888-89, and in Appendix VI. to the present volume.

VI.—*Land Stations.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. In that year there was only one station, but by 1871 the number had increased to 15, and five years later to 49, including 14 stations belonging to the Royal Meteorological Society, copies of the returns from which were sent to the Office under a special arrangement with the Society.

At the end of March 1896 the total number of stations was 132, including 14 belonging to the Royal Meteorological Society and 17 belonging to the Scottish Meteorological Society.

The Stations of the Second Order are distributed as follows: 37 in England, 2 in Wales, 22 in Scotland, and 12 in Ireland.

The methods followed with regard to the examination and publishing of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet-bulb is shown, the international forms A and B being modified accordingly.

The volume for 1892 contains returns from 70 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

When an application for the adoption of a new station is received, a New stations. schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northern coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 59 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 29 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

INSPECTION.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

LIST OF STATIONS.

In Appendix XI., page 84, is given a complete list of the stations supplying information to the Office.

APPENDIX XI.

LIST of STATIONS in the BRITISH ISLANDS from which INFORMATION has been received at the METEOROLOGICAL OFFICE during the year ending March 31st, 1896.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "R" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters as follows:—

A. *Observatories*.—Continuous record of pressure, temperature, wind, sunshine and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather.

B. *Anemograph Stations*.—Continuous record of the direction and velocity (or force) of the wind.

C. *Barograph Stations*.—Continuous record of pressure.

D. *Second Order Stations*.—Regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry-bulb and wet-bulb), wind, cloud, and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.

E. *Second Order Stations*.—Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m., each day as above.

F. *Climatological Stations*.—The maximum and minimum temperature and the rainfall for each day, with remarks on the weather. This information is sent to the Meteorological Office each week for use in the "Weekly Weather Report."

G. *Third Order Stations*.—Observations of the same kind as at Second Order Stations, but either:—

- (a) less full.
- (b) taken only once daily.
- (c) taken at irregular hours.

R. *Rainfall Stations*.—Daily observations of the amount of rainfall, with remarks on the weather.

S. *Sunshine Stations*.—Continuous record of bright sunshine.

T. *Telegraphic Stations*.—Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maxima and minima of temperature, the daily rainfall, and, where possible, the sea-disturbance at 8 a.m. each day and the daily amount of bright sunshine. This information is sent to the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and, as required, for use in the "Weekly Weather Report."

W. *Sea-temperature*.—Daily observations of the temperature of the sea water.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied.
Aberdeen Observatory	57° 10' N.	2° 6' W.	46	Prof. C. Niven	A. T. C.
" Cove Bay	57° 9'	2° 5'	—	Coastguard	W.
Alnwick Castle	55° 25'	1° 43'	210	Humphry Wiliams, for the Duke of Northumberland.	B. F.
Ardrossan, Ayrshire	55° 38'	4° 50'	15	J. W. Mayes	T.
Arley Cottage (Mount Nugent).	53° 50'	7° 18'	262	Maj. Somerset H. Maxwell.	D. S.
Arlington Court, Barn- stable.	51° 8'	3° 59'	013	W. Stewart, for Lady Chichester.	F.
Armagh Observatory	54° 21'	6° 39'	196	J. L. E. Dreyer	B. D. F. S.
Arran, North, Galway	53° 6'	9° 40'	—	Coastguard	G. W.
Aysgarth Vicarage, Yorks.	54° 18'	1° 53'	646	Rev. F. W. Stow	D.
Bahama Bank Lightship	54° 20'	4° 13'	—	Light-keepers	W.
Ballantrae, Ayrshire	55° 6'	5° 0'	—	Coastguard	W.
Ballydonegan, Co. Cork	51° 38'	10° 3'	—	"	W.
Ballyglass, Co. Mayo	54° 17'	9° 52'	—	"	W.
Baltimore, Co. Cork	51° 28'	9° 22'	—	"	G.
Bantry	51° 41'	9° 27'	—	R. Brennar	E.
Belmullet, Co. Mayo	54° 13'	9° 59'	40	Miss M. J. Tolan	T.
Belvoir Castle, Grantham	52° 54'	0° 47'	259	W. H. Divers	D.
Ben Nevis	56° 48'	5° 0'	4,406	R. T. Omond, for Directors Ben Ne- vis Observatory.	A.
Bennington, Herts.	51° 54'	0° 5'	407	Rev. J. D. Parker	E.
Berkhamsted	51° 46'	0° 34'	400	E. Mawley	E.
Bidston Observatory, Liver- pool.	53° 24'	3° 4'	188	W. E. Plummer	D. T.
Birr Castle, Parsonstown	53° 6'	7° 55'	175	O. Boeddicker, for Earl of Rosse.	D. S. T.
Blackpool	53° 48'	3° 3'	31	A. J. Anderson	F. S.
Blacksod Point, Co. Mayo	54° 6'	10° 4'	—	Coastguard	W.
Bolton, Chadwick Museum	53° 35'	2° 27'	389	W. W. Midgley	G.
Bournemouth	50° 43'	1° 53'	—	Messrs. Primavesi for Town Council.	S.
Braemar	57° 0'	3° 24'	1,111	J. Aitken	D. F. S.
Bramley, Surrey	51° 11'	0° 33'	143	J. Bartlett	D.
Bray, Co. Wicklow	53° 12'	6° 6'	—	Coastguard	G.
Brighton	50° 49'	0° 8'	—	A. Newsholme	S.
Bristol	51° 23'	2° 35'	92	J. Harvey Jones	F.
Broadford (Hurdlestown), Co. Clare.	52° 48'	8° 38'	157	Maj. W. O. Bentley, R.A.	R.
Burnmouth, Ayton, Berwick	55° 51'	2° 4'	—	Coastguard	W.
Burntisland	56° 4'	3° 14'	—	"	W.
Buxton	53° 14'	1° 54'	987	E. J. Sykes	E.
Caernarvon Bay Lightship	53° 6'	4° 45'	—	Light-keepers	W.
Cambridge	52° 13'	0° 6' E.	88	Miss A. Walker	T. S.
Cardigan Bay Lightship	52° 25'	5° 1' W.	—	Light-keepers	W.
Cargen	55° 2'	3° 37'	72	P. Dudgeon (the late) and A. Peacock.	E.
Carrigallen, Co. Leitrim	53° 58'	7° 38'	7350	Mrs. J. Godley	R.
Castletownshend, Co. Cork	51° 32'	9° 11'	—	Coastguard	G.
Chatham	51° 23'	0° 32' E.	136	The Instructor in Surveying.	G.
Cheadle	52° 58'	1° 57' W.	646	J. C. Phillips	E. F.
Cheltenham	51° 54'	2° 3'	184	R. Tyrer	E.
Chester	53° 12'	2° 54'	59	Rev. J. Cairns Mitchell.	D.
Churchill, Oxon	51° 56'	1° 34'	7450	Giles Edmonds	R.
Churchstoke	52° 31'	3° 6'	538	P. Wright	D. F. S.
Cirencester	51° 43'	1° 57'	446	Prof. Ohm	F. S.
Cleggan, Co. Galway	53° 33'	10° 8'	—	Coastguard	W.
Colebrooke Park, Brooke- borough, Co. Fermanagh.	54° 21'	7° 22'	271	M. Ferguson, for Sir A. D. Brooke, Bt.	D. F.
Colwyn Bay	53° 17'	3° 43'	—	R. E. Lord	S.
Coningbeg Lightship	52° 2'	6° 40'	—	Light-keepers	W.
Cooper's Hill, Egham	51° 26'	0° 34'	279	Prof. H. McLeod	G.
Cromarty	57° 41'	4° 0'	—	Coastguard	W.
Cronkbourne (Douglas), Isle of Man.	54° 10'	4° 29'	137	A. W. Moore	D. F. S.
Crookhaven	51° 23'	9° 43'	—	Coastguard	G.
Crosshaven	51° 48'	8° 18'	—	"	G.
Cuckfield, Sussex	51° 1'	0° 9'	389	John Howe	R.
Calloompton	50° 51'	3° 23'	202	T. Turner	F. S.
Currygrane (Edgeworths- town), Co. Longford.	53° 45'	7° 39'	267	J. M. Wilson	D. F.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied.
Dannt's Rock Lightship -	61 43 N.	8 16 W.	—	Light-keepers -	W.
Deerness, Orkney Islands -	58 56 "	2 45 "	169	M. Spence -	B. D. S.
Donaghadee -	54 38 "	5 32 "	26	T. MacGowan -	T.
Doneraile, Co. Cork -	52 13 "	8 24 "	—	Captain Evans -	R.
Dover, Waterworks -	51 7 "	1 18 E.	198	H. E. Stilgoe -	R.
Dublin, Botanic Gardens, Glasnevin.	53 23 "	6 16 W.	67	F. W. Moore -	D.
" City -	53 20 "	6 15 "	47	J. W. Moore -	D. F.
" Mountjoy Obs., Phoenix Park.	53 22 "	6 21 "	155	Lt.-Col. Kirkwood, R.E.	B. D. S.
Duddington -	52 36 "	0 32 "	152	Fred Coventry -	R.
Dundee -	56 28 "	2 56 "	160	J. Carnochan -	D.
Dunfanaghy (Sheephaven) -	55 11 "	7 58 "	—	Coastguard -	W.
Dungeness -	50 55 "	0 59 E.	26	W. Batton -	T.
Dunrobin Castle -	57 59 "	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.
Durham -	54 46 "	1 35 "	336	H. J. Carpenter -	D. F. S.
Dursley (Farnley), Glos. -	51 41 "	2 21 "	—	R. W. Pinney -	R.
Eastbourne -	50 46 "	0 17 E.	38	R. Sheward -	D. S.
East Goodwin Lightship -	51 13 "	1 36 "	—	Light-keepers -	W.
Edinburgh -	55 57 "	3 12 W.	253	R. C. Mossman -	D. S.
English and Welsh Grounds Lightship.	51 27 "	3 0 "	—	Light-keepers -	W.
Ennis, Co. Clare -	52 51 "	8 59 "	18	P. L. K. Dobbin -	R.
" Roslevan -	52 51 "	8 59 "	40	Mrs. J. W. Scott -	R.
Epsom, R. Med. College -	51 20 "	0 14 "	294	W. T. N. Spivey -	D.
Falmouth -	50 9 "	5 4 "	167	E. Kitto -	A. F.
Fleetwood -	53 56 "	3 1 "	—	M. S. Gaultier -	B.
Forquardenny, Perth -	56 21 "	3 29 "	175	C. L. Wood -	C.
Fort Augustus -	57 8 "	4 40 "	68	Rev. M. Wall -	E. F. S.
Fort William -	56 48 "	5 6 "	32	R. T. Omond, for Directors, Ben Nevis Observatory.	A. F.
Foynes, Co. Limerick -	52 37 "	9 7 "	108	Lord Monteagle -	F.
Fredville (Dover) -	51 7 "	1 18 E.	173	H. W. Plumtre -	R.
Fulbeck, Lincolnshire -	53 3 "	0 37 W.	? 180	Rev. Vere F. Willson	D.
Geldeston, Beccles -	52 28 "	1 31 E.	37	E. T. Dowson -	D. F. S.
Gilerux (Maryport) -	54 44 "	3 23 W.	261	J. Monkhouse -	D.
Glasgow -	55 53 "	4 18 "	180	Prof. L. Becker -	A. D. F.
Glen carron -	57 30 "	5 14 "	439	D. D. Munro -	E. F.
Glenlea -	55 5 "	4 12 "	203	W. Melville -	E. F.
Gordon Castle -	57 37 "	3 5 "	101	J. Webster (for the Duke of Richmond and Gordon, K.G.).	E.
Gorleston, Suffolk -	52 35 "	1 43 E.	—	R. J. C. Day -	G.
Guernsey (St. Peter's) -	49 32 "	2 32 W.	—	F. E. Carey -	S.
Harpندن, Herts. -	51 49 "	0 20 "	419	T. Wilson -	G.
Haslar Hospital, Hants -	50 47 "	1 7 "	—	T. Rogers -	G.
Hawes Junction -	54 19 "	2 18 "	1135	W. H. Bunce -	G.
Hesley Hall (Bawtry) -	53 26 "	1 2 "	65	B. I. Whitaker -	F.
Hereford -	52 5 "	2 45 "	274	T. A. Chapman -	F.
Heysham Hall, Lancashire -	54 3 "	2 54 "	95	S. Lomas, for Miss L. Grafton.	D.
Hillington -	52 48 "	0 33 E.	88	Rev. H. E. B. Ffolkes	D. F. S.
Holyhead, Harbour Office -	53 18 "	4 39 W.	57	F. M. Cotton -	B. W.
" Sailors' Home -	53 18 "	4 39 "	48	T. Choze -	T.
Hurst Castle -	50 42 "	1 33 "	12	E. T. Tremble -	T.
Kearsney Abbey, Dover -	51 8 "	1 17 E.	? 100	C. W. Curtis -	R.
Ketton, Stamford -	52 38 "	0 32 W.	—	F. Coventry -	F. G.
" " The Holmes -	52 38 "	0 32 "	—	—	R.
" " Colly Weston -	52 37 "	0 31 "	270	Miss A. Tasker -	R.
Kew Observatory -	51 28 "	0 19 "	18	C. Chree -	A.
Kilcredane, Co. Clare -	52 35 "	9 47 "	—	Coastguard -	W.
Kilkenny -	52 39 "	7 14 "	212	H. Carlton, for the Marquis of Or- monde.	C. F.
Killarney -	52 4 "	9 30 "	86	Ven. Archdeacon Wynne.	E. F.
Killeney (Cloneevin), Co. Dublin.	53 16 "	6 7 "	—	R. O'Brien Furlong	R.
Kirkwall -	58 59 "	2 57 "	—	Coastguard -	W.
Kish Bank Lightship -	53 19 "	5 55 "	—	Light-keepers -	W.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied.
Ladylaw (Hawick) -	55° 28' N.	2° 47' W.	439	W. R. Wilson	C. D.
Lamlash, Isle of Arran, Scotland.	55° 32' "	5° 8' "	—	Coastguard	W.
Laudale, Argyleshire	56° 41' "	5° 41' "	14	A. Fletcher, for T. H. G. Newton.	D. F.
§ Lednathie	56° 45' "	3° 7' "	719	W. Morrison (for Stormonth Dar- ling).	E.
Leith -	55° 58' "	3° 10' "	20	T. Richardson	T.
Leman and Ower Lightship	53° 8' "	2° 2' E.	—	Light-keepers	W.
Lerwick	60° 9' "	1° 8' W.	—	Coastguard	W.
Limerick	52° 39' "	8° 36' "	—	A. W. Shaw	R.
Liscannor, Co. Clare	52° 56' "	9° 23' "	—	Coastguard	W.
§ Lissan, Co. Tyrone	54° 41' "	6° 45' "	305	Sir N. Staples, Bt.	E.
Llandinam, Montgomery	52° 29' "	3° 26' "	496	Edward Davies	R.
Llandovery	51° 59' "	3° 48' "	217	J. Watkins	F.
§ Llandudno	53° 21' "	3° 50' "	88	J. Nicol	E. F.
"	53° 21' "	3° 51' "	20	J. McMaster	S.
London, Brixton	51° 29' "	0° 7' "	77	F. Gaster	T.
" City	51° 32' "	0° 5' "	80	Messrs. de la Rue	S.
" Pall Mall	51° 32' "	0° 8' "	—	Athenæum Club	C.
" Stamford Hill	51° 36' "	0° 5' "	75	Rev. J. S. St. John	R.
" Westminster	51° 31' "	0° 8' "	76	The Staff of the Met. Office.	B.
" Westminster Training College.	51° 31' "	0° 8' "	—	H. A. Reatchlous	S.
Londonderry	55° 0' "	7° 19' "	67	J. Conroy	D. F.
Loughborough	52° 47' "	1° 12' "	169	W. Berridge	T.
Lowestoft	52° 29' "	1° 44' E.	—	J. Moore	G.
Machrihanish	55° 25' "	5° 44' W.	16	J. Franklin-Adams	G.
Malin Head, Co. Donegal	55° 23' "	7° 24' "	230	J. Williams	T. C.
Manchester	53° 29' "	2° 13' "	190	J. Niven	G. S.
§ Marchmont	55° 44' "	2° 25' "	498	J. A. Wood	E. F. S.
§ Margate	51° 24' "	1° 24' E.	83	J. Stokes	D. S.
Markree Castle, Co. Sligo	54° 11' "	8° 27' W.	122	A. Marth, for Col. Cooper.	D. F. S.
Minard, Co. Kerry	52° 7' "	10° 8' "	—	Coastguard	W.
Morpeth	55° 11' "	1° 40' "	—	Captain H. Terry	C.
Nairn	57° 36' "	3° 52' "	84	Miss Penny	T.
Newcastle-on-Tyne	54° 58' "	1° 37' "	152	N. H. Martin	G. S.
Newarp Lightship	52° 45' "	1° 53' E.	—	Light-keepers	W.
Newport, Monmouth	51° 35' "	3° 0' W.	—	T. W. Houghton	R.
Newquay, Cornwall	50° 25' "	5° 4' "	250	J. Pearce	S.
"	50° 25' "	5° 5' "	—	Coastguard	W.
Northallerton	54° 20' "	1° 26' "	130	W. Stead	R.
North Foreland	51° 23' "	1° 27' E.	115	A. Cox	T.
North-West Lightship, Liverpool.	53° 31' "	3° 31' W.	—	Light-keepers	W.
§ Ochertyre	56° 23' "	3° 53' "	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.
Omagh (Edenfel)	54° 36' "	7° 19' "	300	Col. Buchanan	F.
Oswaldkirk, Yorks.	54° 12' "	1° 3' "	—	R. Thompson	S.
Outer Dowsing Lightship	53° 27' "	1° 5' E.	—	Light-keepers	W.
Owers Lightship	50° 39' "	0° 41' W.	—	"	W.
Oxford	51° 46' "	1° 16' "	208	W. Wickham, for E. J. Stone.	T. S.
Parkstone, Dorset	50° 43' "	1° 56' "	197	R. H. Barnes	D.
Penbedw, Mold	53° 12' "	3° 11' "	650	H. W. Buddicom	C.
Pennant Bay, Aberdour	57° 40' "	2° 16' "	—	Coastguard	W.
§ Pinmore, Girvan	55° 12' "	4° 49' "	187	P. Donald, for Capt. Hamilton.	E.
Plymouth, The Hoe	50° 22' "	4° 8' "	116	H. Victor Prigg	D. F. S.
" Freedom Fields	50° 24' "	4° 8' "	207	"	R.
§ Poltalloch	56° 8' "	5° 30' "	132	J. Russell, for Lord Malcolm.	E.
Portrush	55° 13' "	6° 40' "	—	Coastguard	W.
Prawle Point	50° 12' "	3° 43' "	332	M. Holmes	T.
Prestwich	53° 32' "	2° 17' "	294	T. R. H. Clunn	D. F. S.
Roche's Point, Co. Cork	51° 47' "	8° 19' "	42	W. Kennedy	T.
Rochford, Tenbury	52° 18' "	2° 36' "	316	Rev. John Tomson	R. C.
§ Rosewell	55° 51' "	3° 7' "	690	R. W. D. Cameron	E.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Informa- tion supplied.
Rothamsted - - -	51 48 N.	0 22 W.	368	Sir J. B. Lawes and Sir J. H. Gilbert.	F. S.
5 Rothesay - - -	55 50 "	5 4 "	115	J. Kay - - -	E.
44 Rounton, Yorkshire - -	54 24 "	1 18 "	249	Sir I. L. Bell, Bart.	E.
44 Rousdon, Devon - - -	50 42 "	3 0 "	523	C. E. Peek - - -	E.
Roxborough, Co. Limerick	52 35 "	8 36 "	—	A. W. Shaw - - -	R.
Royal Sovereign Light- ship.	50 43 "	0 27 E.	—	Light-keepers - -	W.
Rugby - - - - -	52 22 "	1 15 W.	379	E. Kitchener - -	G.
St. Ann's Head, Pembroke	51 41 "	5 11 "	150	H. T. Knott - - -	T. S. W.
St. Aubin's, Jersey - - -	49 12 "	2 11 "	25	J. Fisher - - -	T.
St. David's, Pembrokeshire	51 53 "	5 16 "	215	W. P. Probert - -	D.
St. Helen's, Lancashire - -	53 28 "	2 45 "	151	J. Robertson - -	G.
St. Heliers, Jersey - - -	49 11 "	2 6 "	—	Signal Officer, Fort Regent.	S.
St. Leonards - - - - -	50 51 "	0 33 E.	129	H. Colborne - - -	D. F. S.
Salcombe, Devon - - - -	50 14 "	3 46 W.	—	Coastguard - - -	W.
Sandgate, Kent - - - - -	51 4 "	1 9 E.	56	A. Robert Bowles -	R.
44 Scarborough - - - - -	54 17 "	0 23 W.	150	H. G. H. Monk and E. W. Ellerbeck.	D. F.
- - - - -	54 17 "	0 23 "	—	Coastguard - - -	W.
Schull - - - - -	51 32 "	9 32 "	—	- - - - -	G.
Scilly Islands, St. Mary's	49 56 "	6 18 "	80	A. Hicks - - -	B.S.T.W.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	O.
Seafeld, Miltown Malbay	52 48 "	9 30 "	—	Coastguard - - -	W.
Co. Clare.	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Seaham Harbour - - - - -	54 50 "	1 19 "	148	G. H. Aird - - -	D.
Sedburgh - - - - -	54 19 "	2 32 "	400	A. P. Burra - - -	R.
Seven Stones Lightship - -	50 4 "	6 5 "	—	Light-keepers - -	W.
Shambles Lightship - - -	50 31 "	2 20 "	—	- - - - -	W.
Sheffield - - - - -	53 23 "	1 29 "	420	E. Howarth - - -	D.
Shields, North - - - - -	55 0 "	1 27 "	97	J. W. Irvine - - -	T.
Shields, North, High Light- house.	55 0 "	1 27 "	—	Captain Harrison -	B.
Shipwash Lightship - - -	52 2 "	1 38 E.	—	Light-keepers - -	W.
Skipton - - - - -	53 58 "	2 9 W.	567	W. Ecroyd - - -	G.
Solihull (Birmingham) - -	52 28 "	1 48 "	459	B. Boothroyd - - -	F.
Solway Lightship - - - -	54 48 "	3 32 "	—	Light-keepers - -	W.
Southampton - - - - -	50 55 "	1 24 "	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D.F.S.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Southport - - - - -	53 39 "	2 59 "	—	J. Baxendell - - -	S.
South Rock Lightship - - -	51 25 "	5 22 "	—	Light-keepers - -	W.
Spidall, Co. Galway - - -	53 15 "	9 17 "	—	Coastguard - - -	G.
Spurn Head - - - - -	53 34 "	0 7 E.	19	G. Freeman - - -	T.
Spurn Lightship - - - - -	53 34 "	0 13 "	—	Light-keepers - -	W.
Stokesay, Craven Arms - -	52 26 "	2 52 W.	370	Miss M. A. Digges La Touche.	D.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Stonyhurst College - - -	53 51 "	2 28 "	375	Rev. W. Sidgreaves	A.D.F.
Stornoway - - - - -	58 11 "	6 22 "	28	J. Mackenzie - -	T.S.C.
- - - - -	58 11 "	6 22 "	—	Coastguard - - -	W.
44 Stowell, Sherborne, Dorset.	50 57 "	2 31 "	376	Rev. H. J. Poole -	F.
Stranraer - - - - -	54 54 "	5 2 "	—	Coastguard - - -	G.
44 Strathfield Turgiss, Hants	51 20 "	1 0 "	195	The late Rev. C. H. Griffith.	F.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Strathpeffer-Spa, N.B. - -	57 34 "	4 34 "	253	J. Tregelles Fox -	D. S.
Sumburgh Head (Dunross- ness).	59 51 "	1 17 "	126	Rev. W. Brand - -	T. C.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Sunderland - - - - -	54 54 "	1 23 "	—	Coastguard - - -	W.
Sutton Coldfield - - - - -	52 34 "	1 49 "	392	C. F. Marston - -	S.
Symbister, Shetlands - - -	60 14 "	1 25 "	—	J. S. Nicolson - -	G.
Syston, Leicester - - - -	52 43 "	1 5 "	178	S. K. Daniels - - -	R.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Tealby, Lincolnshire - - -	53 24 "	0 16 "	251	Rev. S. Lewin - - -	D.
Teelin, Co. Donegal - - -	54 38 "	8 39 "	—	Coastguard - - -	W.
Tenby - - - - -	51 41 "	4 42 "	79	J. E. Gower - - -	S.
Thurcaston, Leicester - -	52 42 "	1 10 "	253	Rev. T. A. Preston -	S.
Torquay - - - - -	50 28 "	3 31 "	—	A. Chandler - - -	S.
Totland Bay, Isle of Wight	50 41 "	1 33 "	84	J. Dover - - -	G.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Union Hall, Co. Cork - - -	51 33 "	9 8 "	—	Coastguard - - -	G.
Uppingham - - - - -	52 35 "	0 44 "	484	Rev. G. H. Mullins	D.
Uzon (Montrose) - - - -	56 40 "	2 28 "	—	Coastguard - - -	W.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Valencia Observatory, Ca- hirciveen.	51 56 "	10 15 "	30	J. E. Callum - - -	A. T. C.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
" Island, Glanleam	51 56 "	10 20 "	—	Miss E. FitzGerald	R.
" Knightstown - - - - -	51 55 "	10 20 "	—	Coastguard - - -	G.
- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
44 Wakefield - - - - -	53 41 "	1 36 "	96	H. Clarke - - -	E.
Waterford - - - - -	52 66 "	7 7 "	—	Harbour Authorities	C.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Infor- mation supplied.
Westbourne, Sussex	50 52 N.	0 55 W.	—	Rev. L. B. Birkett.	S.
Westray, Orkney	59 17 "	3 0 "	—	J. Hewison	G.
Wick	58 27 "	3 6 "	80	J. Sinclair	T.
"	58 27 "	3 6 "	—	Coastguard	W.
\$ Wolfelee	55 23 "	2 39 "	587	W. Cockburn	D.
Workop	53 18 "	1 8 "	—	H. Mellish	S.
Yarmouth	52 37 "	1 43 E.	10	G. T. Watson	B.T.C.
" Isle of Wight	50 42 "	1 29 W.	—	Coastguard	G.
Ynis-y-bro, Newport	51 38 "	3 3 "	115	D. Morgan	R.
York, Boothgate	53 57 "	1 5 "	—	J. E. Clark	S.
" The Museum	53 57 "	1 5 "	51	H. M. Platnauer	D. T.

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda	Meteorological Office, Stock- holm.	†The Helder	Bureau Central Météorologique, Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu)	
Karlstad	Meteorological Institute, Christiania.	Lorient (Ile de Groix)	
Bodo		*†Rochefort (Ile d' Aix)	
†Christiansund		†Biarritz	
*†Skudesuaes		†Paris	
Færder	Meteorological Institute, Copenhagen.	Belfort	
†The Scaw		Lyons	
Fanø		Nice	
Cuxhaven		Perpignan	
	Deutsche See- warte, Ham- burg.	Berlin	Cent. Met. Inst. of Germany.
		Wiesbaden	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada)	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m., and those with a dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.
The Helder does not send reports at 6 p.m. on Sundays.

APPENDIX XII.

List of Documents received from FOREIGN LAND STATIONS during the year ending March 31st, 1896.

Place.	Observer.	Nature of Observations.
Abaco (Bahamas)	T. R. Thompson, Sen., Lightkeeper	Lighthouse Register, 1895, January to December.
Aburi (Gold Coast)	W. Crowther, H. Eyre, C. H. Humphries, and W. Murray.	Two observations daily, 1894, January to December; 1895, January to December.
Accra "	J. F. Easmon, M.D., W. R. Henderson, W. A. Murray, and J. Gordon-Smith.	Two observations daily, 1894, January to December; 1895, January to December.
Ada "	C. Macmaster	Two observations daily, 1895, October to December.
Antigua	Francis Watts	" " " March to December; 1896, January, February.
Axim (Gold Coast)	T. C. Johnson	" " " October to December.
Bahamas	-	Reports on the hurricane at Abaco, Bimini, and Grand Bahama, on October 21 to 22, 1895.
Barbados	J. R. Bovell	Monthly summary of two observations daily, 1895, January to December; 1896, January, February.
Beyrout (Lee Observatory)	R. H. West, M.A.	Two observations daily, 1895, March to December; 1896, January, February.
Breaksea Island (King George's Sound).	J. Tattersall	Lighthouse Register, 1894, July to December.
Cape Coast Castle (Gold Coast)	S. H. R. V. R. de Groot	Daily rainfall, 1895, October to December.
Cape Juby (N.W. Africa)	L. S. Carter	Two observations daily, 1895, March to May.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper	Lighthouse Register, 1895, January to December.
Cape Spartel (Tangier)	E. C. Hathaway, Lloyd's Signalman.	Two observations daily, 1895, March to December; 1896, January, February.
Cay Lobos (Bahamas)	Lightkeeper	Lighthouse Register, 1895, January to December.
Cay Sal (Bahamas)	J. T. Farrington, Lightkeeper	" " 1894, July to December; 1895, January to June.
Famagusta (Cyprus)	G. Eliades	Two observations daily, 1895, January to December.

LIST OF DOCUMENTS—continued.

Place.	Observer.	Nature of Observations.
Rarotonga -	J. Seard -	Two observations daily, 1894, December.
St. Helena -	H. S. Hands -	One observation daily, 1895, January to December; 1896, January.
" -	" -	Continuous record of wind (direction and velocity), 1895, January to December; 1896, January, February.
St. Kitts (Basseterre) -	E. A. Hancock, F.C.S. -	Two observations daily, 1895, January to November.
St. Lucia (Morne Fortuné) -	" -	Monthly summary of observations for 1894.
Sierra Leone -	G. A. Coker, Medical Clerk -	Two observations daily, 1895, August to December; 1896, January to February.
Sombrero -	J. A. Richardson and A. L. Richardson. -	Lighthouse Register, 1895, April to September.
Suva (Fiji) -	J. D. W. Vaughan, F.R.Met. Soc., F.R.G.S. -	One observation daily, 1895, January to December; 1896, January, February.
Teneriffe (Sitio de Cullen) -	A. F. Perry -	Two observations daily, 1895, February to December; 1896, January, February.
" " -	" -	Continuous record of pressure, 1895, February to December; 1896, January.
" " -	" -	" " temperature, 1895, February to July, October to December; 1896, January.
Tobago -	Quinten H. Spicer -	Two observations daily, 1895, October to December; 1896, January.
Tonga (New Hebrides) -	A. Cronstedt -	" " " January to December; " "
Trinidad -	J. H. Hart, Supt. Botanic Gardens -	" " " February to December.
" -	" " -	Daily record of sunshine, 1895, March to December; 1896, January.
Watling Island (Bahamas) -	T. R. Thompson, jun., Lightkeeper -	Lighthouse Register, 1895, January to December.
Zomba, British Central Africa -	John McClounie -	Two observations daily, 1895, January to April.

APPENDIX XIII.

ACCESSIONS TO THE LIBRARY DURING THE YEAR ENDING
31ST MARCH 1896.

Adelaide Observatory.—Meteorological observations made at the Adelaide observatory, and other places in South Australia and the northern territory, during the years 1891–93, under the direction of Sir C. Todd. 3 vols. sm. f°. Adelaide, 1894–96.

[—] Rainfall in South Australia and the northern territory during 1893; with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1895.

Akassa.—Klima an der Niger-Mündung. sm. f°. (*Meteor. Zeitschr.*, 1896, März, p. 102.)

Åkerblom, P.—Sur la distribution, à Vienne et à Thorshavn, des éléments météorologiques autour des minima et des maxima barométriques. Communiquée le 14 Nov. 1894. 8°. Stockholm, 1895. (*K. Svenska Vet.-Akad. Handl.*, xx., Afd. i., No. 3.)

[**Algiers, Service Météorologique du Gouvernement Général de l'Algérie.**]—Bulletin météorologique de l'Algérie. 1895, Jan. 1–Dec. 31. sm. f°. Sheets.

Algué, J.—Baguios ó tifones de 1894. See MANILA, OBSERVATORIO METEOROLÓGICO.

[**Allahabad, Meteorological Office.**]—Brief sketch of the meteorology of the North-Western Provinces and Oudh and adjacent parts of Rajputana and the Panjab, 1894. sm. f°. s.l.e.a.

Allingham, W.—Fast passages and best routes. Read before the Shipmasters' Society, 21 Nov. 1895. 8°. London, 1895.

— Ocean meteorology. Read before the Shipmasters' Society. 8°. London, 1891.

American Meteorological Journal.—A monthly review of meteorology. Vol. xi., 1894–95. la. 8°. Boston, s.a.

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap.—Tijdschrift. Tweede serie. Deel xii. 2 vols. 8°. Leiden, 1895.

* || **Andrews, Thomas.**—On the constitution and properties of ozone. Read June 21, 1855. la. 4°. (*Phil. Trans.*, 1856, p. 1.)

Antigua, Government Laboratory.—Meteorological register for 1895. f°. Dated, Antigua, 1896.

Aratus.—A literal translation of the astronomy and meteorology of Aratus.
See PRINCE, C. L.

* **Arbuthnot, J.**—An essay concerning the effects of air on human bodies. 8°. London, 1751.

|| * **Assmann, R.**—Der Einfluss der Gebirge auf das Klima von Mitteldeutschland. la. 8°. Stuttgart, 1886. (*Forschungen zur deutschen Landes- und Volkskunde*, I., 6, p. 311.)

Åstrand, J. J.—Ny Seismometer. 4°. Bergen, 1895.

|| **Augustin, F.**—Météorologická pozorování z rozhledny na Petrině v Praze roku 1894. la. 8°. V. Praze, 1894. (*Věstn. Česk. Akad. Frant. Josef.*)

|| — Resultate der meteorologischen Beobachtungen auf der Petrinwarte in Prag. la. 8°. Prag, 1894. (*Sitzungs. k. böhm. Gesellsch. Wissensch., math.-naturw. Cl.*, 1894, No. xli.)

Azambuja, G. A. de.—Anuario do Estado do Rio Grande do Sul., 1896. Anno. xii. sm. 8°. Porto Alegre, 1895.

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked || are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

Baltimore, Maryland State Weather Service.—Monthly report, iv., 1894–95. 4°. s.l.e.a.

Bangalore, Mysore Government Meteorological Department.—Report on rainfall registration in Mysore for 1894, by J. Cook. la. 4°. Bangalore, 1895.

Barker, D. Wilson.—Clouds and weather: a study for navigators. 8°. London, 1895.

Bathurst, Gambia.—Comparative rainfall, Colony of the Gambia, 1890–94, 1891–95, and meteorological observations, 1894, 1895. sm. f°. Sheets.

|| **Bayard, F. C.**—A comparison between the Jordan and the Campbell-Stokes sunshine recorders. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xvi., 1890, p. 20.)

|| ——— English climatology, 1881–90. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xviii., 1892, p. 213.)

Bayard, F. C., and Marriott, W.—The frost of January and February 1895 over the British Isles. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xxi., 1895, p. 141.)

Bebber, W. J. van.—Das Sturmwarnungswesen an der deutschen Küste und Vorschläge zur Verbesserung desselben. Vortrag, gehalten in der Naturf.-Versammlung zu Lübeck im Sept. 1895. la. 8°. (*Ann. Hydr. mar. Meteor.*, 1895, Sept.)

* ——— Hygienische Meteorologie. la. 8°. Stuttgart, 1895.

|| ——— Der Wetterdienst an der Deutschen Seewarte. la. 8°. (*Ann. Hydr. mar. Meteor.*, 1895, Okt.)

Belize, Public Hospital.—Meteorological observations, 1894, May–Dec.; 1895, Jan.–Dec. sm. f°. Sheets.

——— **St. Joseph's Observatory.**—Summary of meteorological observations. 1895, Jan.–Dec. 4°. Sheets. (*The Angelus, Belize*, 1895–96.)

* **Bergh, A.**—An essay on the causes of distant alternate periodic inundations over the low lands of each hemisphere . . . to which is subjoined a table connecting the two sister sciences of astronomy and geology. 8°. London, s.a.

Berlin, Königlich Preussisches Meteorologisches Institut.—Bericht des Internationalen Meteorologischen Comité's und der Internationalen Commission für Wolkenforschung.

See UPSALA.

——— Bericht über die Thätigkeit . . . im Jahre 1894 von W. von Bezold. la. 8°. Berlin, 1895.

——— Ergebnisse der Gewitter-Beobachtungen, 1891. la. 4°. Berlin, 1895.

——— Ergebnisse der meteorologischen Beobachtungen in Potsdam. 1893, 1894. 2 vols. la. 4°. Berlin, 1895.

——— Ergebnisse der Niederschlags-Beobachtungen im Jahre 1893. la. 4°. Berlin, 1895.

——— Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts. Ergebnisse der Beobachtungen an den Stationen II. und III. Ordnung im Jahre 1891, zugleich Deutsches meteorologisches Jahrbuch. Beobachtungssystem des Königreichs Preussen und benachbarter Staaten. la. 4°. Berlin, 1895.

|| ——— Witterung nach den Beobachtungen des königlichen meteorologischen Instituts. 1895, Jan.–Dec. la. 4°. (*Statist. Korresp.*)

* **Berndt, G.**—Der Föhn. Ein Beitrag zur orographischen Meteorologie und comparativen Klimatologie. Zweite, wohlfeile Ausgabe. 8°. Göttingen, 1896.

* **Black, W. G.**—Meteorology, seaside, English Channel—winter. Read, Feb. 1893. 8°. (*Trans. R. Scott. Soc. Arts*, xiii., p. 325.)

Bombay, Government Observatory.—Magnetical and meteorological observations made at the Government Observatory, Bombay, in the year 1894, under the direction of C. Chambers and F. Chambers. f°. Bombay, 1895.

(———) Report on the condition and proceedings of the Government Observatory, Colábu, for the year which ended with the 31st March 1895. f°. s.l.e.a.

[——— **Meteorological Office.**] — Brief sketch of the meteorology of the Bombay Presidency in 1894–95. f°. s.l.e.a.

|| [**Boston, Mass., Weather Bureau.**]—[Annual summary] of the New England Weather Service for the year 1894. la. 4°. (*Ann. Astr. Obs. Harvard Coll.*, xli., No. 3, p. 63.)

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APPENDIX XIV.

ACCOUNT OF RECEIPTS AND PAYMENTS for the year ending 31st March 1896.

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
Balance from year 1894-95 -	1,442	10 11	ADMINISTRATION:		
Parliamentary Vote -	15,300	0 0	Payment of Council -	991	5 0
Repayment of expenses charged under—			Secretary -	800	0 0
(1.) Incidental expenses -	8	7 0	Salaries and wages -	904	10 9
(2.) Observatories -	25	13 2	Rent, fuel, and lighting	719	13 4
	34	0 2	Incidental and contingent expenses -	218	11 10
SUPPLY OF INFORMATION:			Furniture and fittings	134	14 0
Daily Weather Charts and Forecasts -	270	17 5	Expenses incidental to International Meteorological Congress -	4	18 0
6 p.m. Charts -	25	0 0	Pensions -	144	0 0
Reports for Press Agencies, &c. -	126	2 0			3,917 12 11
Telegrams sent abroad -	201	2 7	SPECIAL RESEARCHES:		
	623	2 0	Salaries and other charges -	-	946 6 3
SALE OF INSTRUMENTS, &c.:			LAND METEOROLOGY:		
Royal Navy account -	2	2 11	Observatories and stations, including remuneration of observers -	2,262	1 9
Mercantile Marine account -	21	1 10	Salaries:—Discussion and reduction of observations, &c. -	1,432	11 3
M.O. (Stations) account -	26	10 9			3,694 13 0
	49	15 6	WEATHER INFORMATION AND FORECASTS:		
Repayment of Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. -	56	16 8	Telegraphic reports and storm warnings, remuneration of observers, &c. -	2,562	11 6
Commission charged on work done for Colonies, &c. -	5	1 0	Salaries:—Preparation and issue of reports and forecasts -	1,885	15 3
					4,448 6 9
			INSPECTIONS:		
			Salaries and travelling expenses -	-	519 4 0
			OCEAN METEOROLOGY:		
			Salaries:—Discussion and reduction of observations -	1,588	16 4
			Expenses incidental to the supply of instruments:—		
			Proportion for care and issue of instruments -	200	0 0
			Royal Navy -	669	16 6
			Mercantile Marine -	278	2 7
			Distant island and coast stations -	12	9 4
					2,749 4 9
			Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. -	-	63 15 8
			BALANCE:		
			Cash at Bank -	1,113	13 11
			„ at Office -	58	9 0
					1,172 2 11
£ 17,511	6	3	£ 17,511	6	3

In the year 1895-96 the sum of 1,514*l.* 14*s.* 5*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

APPENDIX XV.

LIST OF THE PRINCIPAL PAPERS PRINTED IN VARIOUS REPORTS
ISSUED BY THE OFFICE FROM THE YEAR 1866.

I.—DAILY WEATHER REPORT.

Year.	Page.	—
1891 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year—derived from Observations made at 8 a.m. daily during the 20 Years 1871–90.
1891	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 20 Years 1871–90.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year—derived from Observations extending over the 20 Years 1871–90.
„	6	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 25 Years 1866–90.

II.—WEEKLY WEATHER REPORT.

Year.	Page.	—
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Week of the Year.
1889	[1]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the Twenty-four Years 1866 to 1889. [Contains Separate Yearly Values from the year 1866.]
1891	VI.–VII.	Table I.—Showing for the Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the Twenty Years 1871–90.
„	VIII.	Table II.—Showing for the Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the Twenty-five Years 1866–90.
„	IX.	Table III.—Showing, for each Month and the Whole Year, for certain Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Numbers of Hours of Bright Sunshine, together with the Percentages of the Possible Duration, in each instance, derived from Records extending over the Ten Years 1881–90.
1895	[1]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the Thirty Years, 1866 to 1895. [For Separate Yearly Values for 1866–89, see 1889 [1–9].]
„	[17]	Table I.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.

Year.	Page.	
1895	[23]	Table II.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean Aggregate Amounts of Rainfall, from the beginning of the Year to the end of each week in the Year.
"	[27]	Table III.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean Aggregate Values for Accumulated Heat above 42° F., from the beginning of the Year to the end of each week in the Year.
"	[32]	Table IV.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean aggregate Values for Accumulated Heat below 42° F., from the beginning of the Year to the end of each week in the Year.
"	[37]	Table V.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean Aggregate Numbers of Hours of Bright Sunshine from the beginning of the Year to the end of each week in the Year.
"	[42]	Table VI.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean Per-centages of the possible amount of Bright Sunshine, from the beginning of the Year to the end of each week in the Year.
"	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881-95, the Mean Temperature of the Air, for each Week in the Year.

III.—MONTHLY WEATHER REPORT.

Year.	Page.	
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
"	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
"	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
"	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—QUARTERLY WEATHER REPORT.

Year.	Page.	
1869	43	Factors for Calculation of Gradients.
"	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
"	[7]	Mean Barometrical Pressure at Telegraphic Reporting Stations, 1866-70.

Year.	Page.	—
1870	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the <i>Astronomische Nachrichten</i> , 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863-68.
"	[59]	Constants for the Determination of the Monthly March of Atmospheric Pressure, &c. at the Seven Observatories for 1869-70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813-72. By G. Dines, F.M.S., [with diagram].
1874	[26]	On the Winds at Liverpool, by W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order, [1875].
"	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871-75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
"	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
"	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871-80. By R. H. Scott, F.R.S. [5 plates.]
"	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881, by G. M. Whipple, Superintendent.
"	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876-80. By F. C. Bayard, L.L.M., F.R. Met. Soc. [5 plates.]

V.—REPORT of the METEOROLOGICAL COMMITTEE of the ROYAL SOCIETY.

Year.	Page.	—
1867	27	A Description of the Self-Recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom [with plates].
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
"	32	On the Principle of the Pantagraph, designed by F. Galton.
"	36	Description of a Self-Recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
"	31	Description of the Pantagraph, designed by Mr. Galton.
1871	24	" Trace Computer, designed by Mr. Galton.

Year.	Page.	
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1873	26	Summary of the General Course of Action taken at the Meteorological Congress at Vienna in 1873.
1874	33	The International Maritime Conference.
1876-77	31	Index of the Information existing in the Office for the entire Ocean [with charts].

VA.—REPORT of the METEOROLOGICAL COUNCIL.

Year.	Page.	
1877-78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879-80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
"	32	Description of the Card Supporter for Sunshine Recorders adopted at the Meteorological Office, by Prof. Stokes.
"	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by Mr. W. N. Shaw.
"	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880-81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
"	27	Report on Fogs. [W. J. Russell.]
"	28	" " Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
"	33	Preliminary Report on the Photo-Nephograph. [W. de W. Abney.]
1881-82	25	On Fogs. [W. J. Russell.]
"	25	Preliminary Report on Hygrometry. [W. N. Shaw.]
"	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882-83	27	On the Results obtained by the use of the Harmonic Analyser.
1884-85	22	Note on Work done with the Harmonic Analyser.
1885-86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886-87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871-85].
"	23	Report on Occasional Telegrams received from Ben Nevis. [F. Gaster.]
"	24	Report on the Daily Weather Messages received from the United States (via Paris) during the three months January to March 1887. [F. Gaster.]
1887-88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F.R.S., Secretary.
"	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888-89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
"	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889-90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [See also Report, 1868.]

Year.	Page.	—
1889-90	36	Note on Experiments on Pressure of Wind made by Mr. W. H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser at the Meteorological Office.
1890-91	22	On Mr. Dines's Anemometer Experiments.
1891-92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892-93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1893-94	20	Report on the Performance of the Pressure-Tube Anemometer on the Roof of the Meteorological Office, by Mr. R. H. Curtis.
1894-95	22	Report to the Council of the University Extension College at Reading on Hay Harvest Forecasts during the Hay Harvest of 1894, by H. N. Dickson.
„	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by R. H. Curtis.

VI.—HOURLY READINGS of the SELF-RECORDING INSTRUMENTS of the OBSERVATORIES in connexion with the METEOROLOGICAL OFFICE.

Year.	Page.	—
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—HOURLY MEANS of the READINGS obtained from the SELF-RECORDING INSTRUMENTS at the FIVE OBSERVATORIES under the METEOROLOGICAL COUNCIL.

Year.	Page.	—
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten years 1881-90, for Seven Observatories.

VIII.—METEOROLOGICAL OBSERVATIONS at STATIONS of the SECOND ORDER.

Year.	Page.	—
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876-1890.

APPENDIX XVI.

LIST OF PUBLICATIONS issued under the Authority
of the Meteorological Council.

OFFICIAL.

- No. 1. Report of the Meteorological Committee for 1867. 1*s*.
2. Instructions for Meteorological Telegraphy. New Edition, 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6*d*.
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2*s*. 6*d*.
5. Report of the Meteorological Committee for 1868. 5*d*.
6. Report of the Meteorological Committee for 1869. 10*d*.
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5*s*. each.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5*s*. each.
10. Report of the Meteorological Committee for 1870. 10*d*.
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2*s*. 6*d*.
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2*s*. 6*d*.
13. A Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. With Book of Charts, 5*s*.
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s*. each.
15. Report of the Meteorological Committee for 1871. 10*d*.
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5*s*. each.
17. Report of the Meteorological Committee for 1872. 1*s*.
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2*s*.
19. Quarterly Weather Report for 1873.—Parts I. to IV. 5*s*. each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N. Long. 20°—30° W., and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20*s*.
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1873. 1*s*.
22. Report of the Meteorological Committee for 1873. 4*d*.
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2*s*.
24. Instructions in the Use of Meteorological Instruments. [Reprinted 1892.] (New edition in course of preparation.) 2*s*. 6*d*.
25. Quarterly Weather Report for 1874.—Parts I., II., and IV., 5*s*. each. Part III., 5*s*. 9*d*.

- No. 26. Report of the Meteorological Committee for 1874. 6*d*.
 27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 24*s*.
 28. Contribution to the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger*. 1*s*.
 29. Report of the Meteorological Committee for 1875. 4*d*.
 30. Quarterly Weather Report for 1875.—Parts I.—IV. 5*s*. each.
 31. Report of the Meteorological Committee for 1876–7. 3*s*. 5*d*.
 32. The Meteorology of the North Atlantic during August 1873, with 31 Synoptic Charts. With Book of Charts. 15*s*.
 33. Quarterly Weather Report for 1876 (New Series).—Part I., 6*s*.; Parts II., III., and IV., 5*s*. each.
 *33A. Meteorological Observations at Stations of the Second Order for the year 1876.
 33B. Meteorological Observations at Stations of the Second Order for the year 1877.
 34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I.: Part I., 2*s*.; Part II., 10*s*.; Part III., 6*s*.; Part IV., 5*s*.; Part V., 6*s*.
 35. Report of the Meteorological Council for 1877–8. 1*s*.
 36. Report of the Proceedings of the Second International Meteorological Congress at Rome, 1879. 1*s*. 6*d*.
 37. Report on the Meteorology of Kerguelen Island. By Rev. S. J. Perry, S.J., F.R.S. 3*s*.
 38. Report of the Meteorological Council for 1878–9. 5*d*.
 39. Meteorological Observations at Stations of the Second Order for the year 1878. 20*s*.
 40. Aids to the Study and Forecast of Weather, by W. Clement Ley, M.A. 1*s*.
 41. Report of the Meteorological Council for 1879–80. 1*s*.
 42. Report of the Meteorological Council for 1880–81. 1*s*. 2*d*.
 43. Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Charts, 25*s*.; Remarks, 7*s*.
 44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long. 10° and 40° E., by Capt. H. Toynbee, F.R.A.S. 7*s*. 6*d*.
 45. Meteorological Observations at Stations of the Second Order for the year 1879. 20*s*.
 46. Report on the Storm of October 13–14, 1881. By Robert H. Scott, F.R.S. 1*s*. 6*d*.
 47. Rainfall Tables of the British Isles for 1866–80. Compiled by G. J. Symons, F.R.S. 7*s*. 6*d*.
 48. Report of the Meteorological Council for 1881–2. 1*s*.
 49. Quarterly Weather Report for 1879. (New Series.) Parts I., II., and III., 6*s*. each; Part IV., 5*s*. 6*d*. Appendices and Plates. 27*s*.
 50. Quarterly Weather Report for 1880. (New Series.) Parts I. and II., 6*s*. each; Part III., 4*s*.; Part IV., 6*s*. Appendices and Plates. 28*s*.

* The Observations at Stations of the Second Order for the years 1873–1875 will be found in the Quarterly Weather Reports for the respective years.

LIST OF PUBLICATIONS—continued.

- No. 51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10s. 6d. Parts II., III., and IV., 21s. each.
52. Quarterly Weather Report for 1877. (New Series.) Part I., 10s.; Part II., 5s.; Part III., 4s. 6d.; Part IV., 6s. Appendices and Plates. 27s.
53. Meteorological Atlas of the British Isles. 5s. 6d.
54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20s. each; Part III., 22s. 6d.; Part IV., 26s.
55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6s. each. Appendices and Plates. 28s.
56. Sunshine Records of the United Kingdom for 1881. 4s.
57. Meteorological Observations at Stations of the Second Order for the year 1880. 34s. 6d.
58. Report of the Meteorological Council for 1882-3. 10½d.
59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21s.
60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition.) 2s.
61. A Barometer Manual for the Use of Seamen. (Second edition.) 1s. 3d.
62. Monthly Weather Reports for 1884. Jan., Feb., March, May—Nov., 1s. 6d. each. April (with 2 Appendices), 2s. 6d. Dec., 1s. 9d.
63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1883. Parts I., II., and III., 21s. each; Part IV., 30s.
64. Report of the Meteorological Council for 1883-4. 1s. 2d.
65. Monthly Weather Reports for 1885. Jan. to Dec., 1s. 6d. each.
66. Meteorological Observations at Stations of the Second Order for the year 1881. 35s.
67. Report of the Meteorological Council for 1884-5. 4s. 4d.
68. Monthly Weather Reports for 1886. Jan. to Dec., 1s. 6d. each.
69. Meteorological Observations at Stations of the Second Order for the year 1882. 35s.
70. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1884. Part I., 12s.; Part II., 10s.; Part III., 10s. 6d.; Part IV., 15s.
71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17s. each.
72. Report of the Meteorological Council for 1885-86. 8d.
73. Meteorological Observations at Stations of the Second Order for the year 1883. 30s.
74. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11s. each; Part III., 10s. 6d. Part IV., 12s.

* For the years 1874-1880 the Hourly Readings were issued in lithographed form. Price 20s. per annum.

- No. 75. Report of the Meteorological Council for 1886-87. 8*d*.
76. Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s*. 6*d*. Supplementary Chart, 6*d*.
- *77. Monthly Weather Reports for 1887. January to April, 1*s*. 6*d*. each. May to December, in wrapper, 12*s*.
78. Meteorological Observations at Stations of the Second Order for the year 1884. 32*s*.
79. Report of the Meteorological Council for 1887-88. 1*s*.
80. Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s*.
81. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s*. 6*d*. each. Part IV., 12*s*. 6*d*.
82. Meteorological Observations at Stations of the Second Order for the year 1885. 31*s*.
83. Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852-1886. 23*s*.
84. Report of the Meteorological Council for 1888-89. 5½*d*.
- †85. Weekly Weather Report for the year 1888. Vol. V. Second Series. 4*d*. per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 21*s*. 2*d*.
86. Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d*. per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s*.
87. Weekly Weather Report for the year 1890. Vol. VII. Third Series. (For Price, &c., see No. 86.)
88. Meteorological Observations at Stations of the Second Order for the year 1886. 25*s*.
89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886-88. By the late W. Reid, M.D. 8*s*. 6*d*.
90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s*.
91. Report of the Meteorological Council for 1889-90. 7½*d*.
92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s*.
93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s*.
94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s*.
95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s*.
96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. (For Price, &c., see No. 86.)

* Publication continued after this year as a Supplement to the Weekly Weather Report.

† The publication of the Weekly Weather Report began in February 1878, Annual subscription, 1878-1883, 12*s*. 6*d*.; 1884-1887, 21*s*. 2*d*.

LIST OF PUBLICATIONS—continued.

- No. 97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20s.
98. Ten Years Sunshine in the British Isles, 1881-90. 2s.
99. Report of the Meteorological Council for 1890-91. 5½d.
100. Weekly Weather Report for the year 1892. Vol. IX., Third Series. (For Price, &c., see No. 86.)
101. Meteorological Observations at Stations of the Second Order for the year 1888. 22s.
102. Report of the International Meteorological Conference at Munich in 1891. 1s. 6d.
103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15s.
104. Report of the Meteorological Council for 1891-92. 6d.
105. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1890. 20s.
106. Meteorological Charts of the Red Sea. 21s.
107. Weekly Weather Report for the year 1893. Vol. X., Third Series. (For Price, &c., see No. 86.)
108. Meteorological Observations at Stations of the Second Order for the year 1889. 34s.
109. Report of the Meteorological Council for 1892-93. 8d.
110. Meteorological Observations at Stations of the Second Order for the year 1890. 34s.
111. Weekly Weather Report for the year 1894. Vol. XI., Third Series. (For Price, &c., see No. 86.)
112. Report of the Meteorological Council for 1893-94. 7½d.
113. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1891. 32s. 6d.
114. Rainfall Tables of the British Isles for 1881-90. (In the Press.)
115. Report of the International Meteorological Committee. Upsala, 1894. 1s.
116. Weekly Weather Report for the year 1895. Vol. XII., Third Series. (For Price, &c., see No. 86.)
117. Meteorological Observations at Stations of the Second Order for the year 1891. 30s.
118. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1892. 21s.
119. Report of the Meteorological Council for 1894-95. 8½d.
120. Meteorological Observations at Stations of the Second Order for the year 1892. 27s.
121. Weekly Weather Report for the year 1896. Vol. XIII., Third Series. (For Price, &c., see No. 86.)
122. Report of the Meteorological Council for 1895-96.
123. Meteorological Charts for the district between the Cape of Good Hope and New Zealand. (In the Press.)
124. Monthly Current Charts for the Indian Ocean, from Information collated and prepared in the Meteorological Office. Published by the Admiralty. 7s.

NON-OFFICIAL.

- No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d*.
 2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s*.
 3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s*.
 4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d*.
 5. On the Winds, &c. of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d*.
 6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1*s*.
 7. Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. [Out of Print.]
 8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6*d*.
 9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. 1*s*. 6*d*.
 10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August 1875.—By Capt. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. 1*s*. 6*d*.
 11. Report of the Permanent Committee of the First International Congress at Vienna for 1876. With Supplement. 2*s*.
 12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s*.
 13. Report of the Permanent Committee of the First International Congress at Vienna for 1878. 6*d*.
 14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1*s*.
 15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s*. 6*d*.
 16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s*.
 17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September 1888. 4*d*.
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