

Appendix F.

REPORT OF THE DIRECTOR OF THE ROYAL OBSERVATORY, HONGKONG, FOR THE YEAR 1924.

I.—GROUNDS AND BUILDINGS

The grounds were kept in order by the Botanical and Forestry Department with the assistance of the Observatory coolies.

Underground Chamber for Seismograph and Clocks.—As the scale value of the thermograph supplied by Messrs. Short and Mason was too small for satisfactory registration of the minute changes of temperature in the Underground Chamber, magnifying levers were constructed and fitted by Mr. Evans. In October, after several trials, with levers of various dimensions, counterpoised and uncounterpoised, and the introduction of a buzzer, he succeeded in obtaining satisfactory registration with a scale value of 0.6 inch to 1° (C). The buzzer is fixed on a brass frame screwed to the supports of the dry and wet bulb thermometers. It is operated for 1 sec. every minute. Such high magnification is only feasible in conjunction with a buzzer, or other device for overcoming the combined effects of inertia and friction.

The records are standardized by 4-hourly readings of dry and wet bulb thermometers, graduated to 0°·1 (C) and read to 0°·01 (C) by estimation. They show that the diurnal inequality of temperature in the Underground Chamber is small, but greater than indicated by the thermograph in its original condition.

In the following table the mean temperature of the air and humidity, at 4-hourly intervals, for November and December, 1923, are compared with the corresponding figures for 1924 :—

Month and Year		Temperature of air in Underground Chamber.						
		0.	4h.	8h.	Noon.	16h.	20h.	Range.
Nov.	1923	75·28	75·23	75·24	75·25	75·27	75·23	0·05
	1924	76·23	76·23	76·23	76·15	76·25	76·32	0·17
Dec.	1923	72·72	72·64	72·63	72·66	72·68	72·68	0·09
	1924	72·93	72·82	72·86	72·90	72·88	72·95	0·13

Month and Year		Relative Humidity in Underground Chamber.						
		0h.	4h.	8h.	Noon.	16h.	20h.	Range.
Nov.	1923	80·6	80·2	80·0	78·1	78·0	78·8	2·6
	1924	66·8	66·3	64·7	63·8	64·7	66·3	3·0
Dec.	1923	73·5	73·5	73·0	72·9	71·7	72·2	1·8
	1924	60·9	60·8	60·3	58·7	59·5	60·4	2·2

In the following table the mean monthly temperature and humidity in the Underground Chamber are compared with the temperature and humidity in the open air. As the air in the Underground Chamber is always still, humidity tables for calm air have been computed and used for obtaining the relative humidity from the readings of these dry and wet bulb thermometers.

Mean Monthly Temperature and Relative Humidity in the Underground Chamber and in the Open Air, during the year 1924.

Month 1924.	In Underground Chamber.		In Open Air.		Excess of Underground Chamber over Open Air.	
	Temperature	Relative Humidity	Temperature	Relative Humidity	Temperature	Relative Humidity
	°	%	°	%	°	%
January, ...	70·6	76	62·4	81	+ 8·2	- 5
February,...	69·1	79	60·3	86	+ 8·8	- 7
March,.....	68·7	79	62·5	79	+ 6·2	0
April,	70·4	88	69·3	85	+ 1·1	+ 3
May,	74·5	95	79·6	82	- 5·1	+ 13
June,	77·0	94	80·5	83	- 3·5	+ 11
July,.....	79·7	94	81·7	83	- 2·0	+ 11
August. ...	80·5	92	81·9	82	- 1·4	+ 10
September,.	80·6	89	82·2	78	- 1·6	+ 11
October, ...	79·1	81	76·5	71	+ 2·6	+ 10
November,..	76·3	65	68·2	57	+ 8·1	+ 8
December,..	72·9	60	61·9	61	+ 11·0	- 1
Range.....	11·9	35	21·9	29	...	...

It will be seen that while the range of temperature in the Underground Chamber is only a little more than half the range in

the Open Air, the range of relative humidity is actually greater. It is hoped however that the excessive dampness during the summer months may be reduced by a heating element which has recently been installed along the outside of the inner wall at a height of $1\frac{1}{2}$ feet from the floor. It is to be controlled by a thermostat, but the instrument sent out was found to be unsatisfactory so has been sent back to the makers for alterations.

Beginning with 1925, February 1st, the records have been standardized only by eye observations on entering and leaving the room for the purpose of changing the seismograph sheets.

II.—METEOROLOGICAL INSTRUMENTS.

Barometers.—The Marvin compensated syphon barometer has worked satisfactorily.

The station barometer No. 1323 and the large Casella barometer were compared with the Observatory Standard on May 19th.

Beckley Anemograph.—This instrument was oiled and the orientation of the vane checked once a month.

Dines-Baxendell Anemograph.—The bearings of the vane were oiled and its orientation checked once a month. The spindle of the float was cleaned and oiled once a week.

The Mean monthly results of comparisons with the records of the Beckley Anemograph from 1910-1923 are given in the following table, together with the results for 1924 :—

Factor for converting the actual run of the Beckley Anemograph cups to velocities recorded by the Dines Pressure Tube Anemograph.

Month.	Factor ($\text{Dines} \div \frac{\text{Beckley}}{3}$).	
	Mean 1910-1923.	1924.
January,	1.96	1.64
February,	2.01	1.57
March,	2.05	1.79
April,	2.07	1.70
May,	2.16	2.13
June,	2.07	2.22
July,	2.18	2.49
August,	2.11	2.60
September,	2.12	2.46
October,	2.05	2.18
November,	1.96	2.15
December,	1.92	1.94
Year	2.06	2.07

The Annual Values are given below.—

<i>Year.</i>	<i>Factor.</i>	<i>Year.</i>	<i>Factor.</i>
1910	2.25	1918	2.06
1911	2.27	1919	1.97
1912	2.42	1920	1.72
1913	2.39	1921	1.74
1914	2.22	1922	1.81
1915	2.11	1923	1.67
1916	2.30	1924	2.07
1917	1.95		

The figures may be grouped into three periods; 1910—1916, 1917—1919 and 1920—1923. The means for these periods are 2.27, 1.99 and 1.73.

No explanation of these relatively large variations can be given. The instrument is carefully tended, and calibrated once a year.

As an instance of the baffling behaviour of this instrument it may be mentioned that in January and February the factor showed a distinct variation with velocity, whereas in August and December although large variations occur they appear to be independent of the velocity.

The scale value of the direction apparatus was halved on August 15th, to obviate loss of register owing to the pen travelling off the sheet in variable winds.

Thermometers.—All thermometers in use are compared with Kew Standard No. 647 in winter and summer.

Richard Thermograph.—A buzzer, operated each minute, was fitted to the thermometer frames on April 2nd, but the base lines laid down on the thermograms from the hourly observations of rotating thermometers still show large irregularities except on dull days, with a small range of temperature.

III.—METEOROLOGICAL OBSERVATIONS AT THE OBSERVATORY.

Automatic records of the temperature of the air and evaporation were obtained with a Richard dry and wet bulb thermograph, and of the direction and velocity of the wind with a Beckley and a Dines-Baxendell Anemograph, modified as described in the report for 1912. The amount of rain is recorded automatically by a Nakamura pluviograph, the amount of sunshine by two Campbell-Stokes universal sunshine recorders, and the relative humidity of the air by a small Richard hair hygograph. Eye observations of

barometric pressure, temperature of the air and of evaporation and the amount of cloud are made at each hour of Hongkong Standard time. The character and direction of the motion of the clouds are observed every three hours. Daily readings are taken of self-registering maximum and minimum thermometers.

Principal features of the Weather.—The principal features of the weather in 1924 were :—

- (a) Absence of typhoons.
- (b) Heavy rain in May, June, July and August.
- (c) A heat wave from August 28 to September 10.

Barometric pressure was considerably below normal in February, particularly from the 6th to the 10th and from the 18th to the 23rd. It was moderately above in March and moderately below in April, gradually regaining normal by August. It was moderately above normal in September and November. The mean pressure for the year at station level was $29.830^{\text{ins.}}$ as against $29.828^{\text{ins.}}$ in 1923 and $29.842^{\text{ins.}}$ for the past 41 years. The highest pressure was $30.314^{\text{ins.}}$ on November 24 as against $30.311^{\text{ins.}}$ in 1923 and $30.509^{\text{ins.}}$ for the past 41 years. The lowest pressure was $29.365^{\text{ins.}}$ on July 15, as against $28.590^{\text{ins.}}$ in 1923, the lowest on record.

The temperature of the air was moderately above normal in January, February, May and September, and slightly below in March, April, June, November and December. The mean temperature for the year was $72^{\circ}.3$ as against $72^{\circ}.5$ in 1923 and $71^{\circ}.9$ for the past 41 years. The highest temperature was $93^{\circ}.2$ on September 7, as against $92^{\circ}.9$ in 1923 and $97^{\circ}.0$ for the past 41 years. The lowest temperature was $47^{\circ}.5$ on January 1 as against $45^{\circ}.7$ in 1923 and $32^{\circ}.0$ for the past 41 years. The heat wave from August 28 to September 10 was exceptional. The mean temperature for September 7, $87^{\circ}.5$ was the highest on record for any month and the maximum on this day, $93^{\circ}.2$, has only been exceeded in September on two occasions, namely on September 6, 1895, when it was $94^{\circ}.0$ and on September 17, 1892, when it was $93^{\circ}.9$. The night of September 7-8, was the hottest on record for any month, the minimum being $84^{\circ}.3$. The next hottest was 1915, August 7-8, when the minimum temperature was $83^{\circ}.7$.

The rainfall was moderately above normal in February and October and considerably above normal in May, June and July. It was moderately below normal in March, August and September. No rain fell from 5 a.m. on October 18 to 5 p.m. on December 3. The total for the year was 98·57^{ins.} as against 106·74^{ins.} in 1923 and 85·13^{ins.} for the past 41 years. The greatest fall in one civil day was 6·60^{ins.} on June 23 as against 20·495^{ins.} for the past 41 years and the greatest in one hour was 1·74^{ins.} between 12·30 p.m. and 1·30 p.m. on May 22, as against 3·480^{ins.} for the past 41 years.

The wind velocity was normal in January and November, moderately above normal in June and slightly to moderately above normal in the other months. The mean velocity for the year was 11·7 m.p.h. as against 12·2 m.p.h. in 1923, and 12·6 m.p.h. for the past 41 years. The maximum velocity for one hour, as recorded by the Beckley Anemograph, was 46 miles at midnight and 2 a.m. on October 4 and 5 respectively as against 106 miles in 1923, and 108 miles for the past 41 years. The maximum squall velocity as recorded by the Dines-Baxendell Anemograph, was at the rate of 69 m.p.h. at 1·55 a.m. on October 5, as against 130 m.p.h. in 1923, the highest on record.

Rainfall at Four Stations.—In the following table the monthly rainfall for the year 1924 at the Observatory is compared with the fall at the Police Station, Tai Po; the Botanical Gardens; and the Matilda Hospital, Mount Kellet:—

Month.	Observatory (Kowloon).	Police Station (Tai-po).	Botanical Gardens (Hongkong).	Matilda Hospital (Hongkong).
	<i>inches.</i>	<i>inches.</i>	<i>inches.</i>	<i>inches.</i>
January,	1·080	1·44	1·59	1·48
February, ...	4·510	8·02	4·50	3·80
March,	0·180	1·82	0·26	0·23
April,	6·215	5·23	4·89	4·20
May,	16·875	11·24	15·97	15·20
June,	23·140	24·86	25·05	23·47
July,	19·675	15·43	18·24	18·31
August,	10·655	9·50	14·29	13·05
September,...	6·440	5·55	10·28	10·01
October,	9·090	12·22	9·70	13·58
November, ...	.....	.....	.....	.....
December, ...	0·710	1·05	0·74	0·95
Year....	98·570	96·36	105·51	104·28

Floods.—The heaviest rainfall occurred at the Observatory as follows :—

Period.				Amount.	Duration.	Greatest fall in 1 hour.	
d.	b.	d.	h.	inches.	hours.	inches.	Time.
May ...15	1 to	May 16	3	3.49	12	0.74	May 15 4
May ...21	10 to	May 24	13	9.90	28	1.74	May 22 13
June ...11	21 to	June 13	23	3.74	34	0.77	June 12 6
June ...18	13 to	June 24	12	13.14	59	0.90	June 19 16
July ...12	4 to	July 17	10	6.75	19	1.20	July 15 13
July ...19	11 to	July 28	13	9.21	52	0.69	July 25 13
Aug. ... 8	11 to	Aug. 12	22	5.79	33	1.08	Aug. 12 18
Sept. ...30	23 to	Oct 6	9	8.57	37	1.20	Oct. 5 9

Serious floods and landslides were caused by these heavy rains.

Typhoons.—The tracks of 14 typhoons and 21 of the principal depressions which occurred in the Far East in 1924 are given in two plates in the Monthly Meteorological Bulletin for December, 1924.

Hongkong was not visited by a typhoon during the year. The greatest squall velocity as recorded by the Dines Anemograph was at the rate of 69 m.p.h. at 1.55 a.m. on October 5, when a typhoon was 300 miles S.W. of Hongkong. The typhoons of July 10-17, August 2-6 and August 8-22 followed abnormal tracks, the first and last named making complete loops.

IV.—PUBLICATIONS.

Daily Weather Report and Map.—A weather map of the Far East for 6 a.m. of the 120th meridian, and the Daily Weather Report (containing meteorological observations, usually at 6h. and 14h. from about 40 stations in China, Indo-China, Japan, the Philippines and Borneo) and Daily Weather Forecasts for Hongkong to Gap Rock, the Formosa Channel, the south coast of China between Hongkong and Lamocks, and between Hongkong and Hainan, were issued as in former years. Copies of the map were exhibited on notice boards at the Hongkong Ferry Pier, and the Harbour Office. One copy was sent daily to the Institute of Engineers and Shipbuilders, one to the Director of the Meteorological Observatory, Macao, one to the Diocesan Boys School, and one to the Central British School (since October 28). Copies of the Daily Weather Report were sent every week to the Hydrographic Office, Bangkok.

A lithographic machine for lithographing the weather map was received from Messrs. Ullmer & Co. on April 23, and set up in a special room on April 26-28.

Since July 3, the Map has been distributed to all subscribers to the "Daily Bulletin" and since July 14 the morning weather report has been printed on the back of the Map.

Since November 10 the Map has also been exhibited at the Kowloon Ferry Wharf.

The Weather Report and Forecast is telegraphed daily to the Cape d'Aguilar Wireless Station in time for distribution at 1 p.m. It is broadcast again at 5 p.m.

An evening Weather Report and Forecast, based upon the 2 p.m. observations from about 30 stations, has been issued since 1923, June 1. It is broadcast by the Cape d'Aguilar at 8 p.m., and since December 15 has been repeated at midnight.

Monthly Meteorological Bulletin.—The monthly Meteorological Bulletin, which includes the Daily Weather Report, was published as usual, and distributed to the principal observatories and scientific institutions in different parts of the world.

Monthly Seismological Bulletin.—The publication of a monthly seismological bulletin, giving particulars of earthquakes recorded by the Milne-Shaw seismograph, was continued throughout the year, and distributed to the principal seismological Observatories.

Miscellaneous Returns.—A monthly abstract of observations made at the Observatory is published in the Government Gazette, and monthly and yearly results are published in the Blue Book in the form suggested by the London Meteorological Office for the British Colonies. The monthly departures from normal of the barometric pressure at four China Coast Ports are communicated to the Commonwealth Meteorologist, Melbourne, in connection with long range weather forecasts. Monthly meteorological returns are forwarded to the Meteorological Magazine, and annual returns to the Stock Exchange Official Intelligence, the Colonial Office List and Whitaker's Almanack. Particulars of the calendar, eclipses, times of sunrise and sunset &c. are communicated to the "Directory and Chronicle" and the "Hongkong Dollar Directory".

V.—WEATHER TELEGRAMS, FORECASTS AND STORM WARNINGS.

Daily Weather Telegrams.—Additional observations at 11h. and 17h., Hongkong Standard time, have been received regularly from Phu-lien since January 5, from Tonrane and Cape St. James since February 1, from Shanghai and Gutzlaff since April 1. A similar service from Amoy is expected shortly. Observations from Hankow have been promised, but have not yet been received owing to the disturbed state of China.

Occasionally belated weather telegrams are received from South China, but as a rule the observations from these districts are posted in batches to Hongkong, as are those from Central China.

Extra Weather Telegrams.—The following stations send extra weather telegrams at half rate during typhoons, on receipt of certain code words from Hongkong:—Amoy, Canton, Macao, Phulien, Sharp Peak, and Taihoku. The Director of the Philippines Weather Bureau also sends extra telegrams, at his discretion, from Aparri or some other station nearer the typhoon centre. The extra 9 p.m. telegram from Swatow, kindly sanctioned by the Chinese Telegraph Administration during the typhoon season, was seldom received.

Weather Telegrams by Radio.—The following table gives the monthly number of ships from which radio meteorological messages have been received, and the number of messages received (each arrival and departure is counted separately):—

Month.	<i>British (including H.M. Ships).</i>		<i>Other National- ities.</i>		<i>Total.</i>		
	No. of ships.	No. of messages.	No. of ships.	No. of messages.	No. of ships.	No. of messages.	
January,	12	21	36	64	48	85	
February,	16	45	37	66	53	111	
March,	22	46	38	60	60	106	
April,	20	33	22	36	42	69	
May,	26	53	30	53	56	106	
June,	48	85	61	94	109	179	
July,	130	317	113	205	243	522	
August,	108	272	124	255	232	527	
September,	80	211	102	193	182	404	
October,	87	250	117	255	204	505	
November,	50	153	78	181	128	334	
December,	66	217	94	205	160	422	
Totals {	1924,	665	...	852	...	1517	...
	1923,	196	...	431	...	627	...
	1922,	280	...	369	...	649	...
	1921,	121	...	145	...	266	...
	1920,	64	...	76	...	140	...

Beginning with April 25 all radio weather reports from ships were broadcast at 8 a.m. and 4 p.m., but as the Manila Authorities were unable to pick up the messages the practice was discontinued on 11th October.

The question of regular observations from ships by wireless telegraphy was taken up vigorously by the Chamber of Commerce, with the gratifying result indicated by the above table.

There is still room for improvement however. A Notice to Mariners giving particulars of what information is required is handed to masters of vessels by the Harbour Department. Copies are also sent to the shipping companies for distribution to their Captains. Supplies are also sent to the Master Attendant, Singapore, who has kindly consented to furnish copies to north bound ships.

An attempt is being made to standardize the form in which weather telegrams are sent out from ships. It is hoped that this will make the work less onerous and also diminish the risk of error.

Results of Weather Forecasts.—The results of comparison of the daily weather forecasts with the weather subsequently experienced are given below, with the results of the previous five years:—

Year.	Complete Success.	Partial Success.	Partial Failure.	Total Failure.
	%	%	%	%
1919	71	27	2	0
1920	64	30	5	1
1921	65	30	5	0
1922	67	30	3	0
1923	66	30	3	1
1924	71	24	5	0

The forecast comprises wind direction, wind force, and weather. Complete success means correct in three elements. Partial success means correct in only two elements. Partial failure means correct in only one element. Total failure means correct in no element.

The method of analysis is described in the 1918 Report.

Special forecasts were issued to Majors MacClaren and Zanni in connection with their world flights.

Storm Warnings.—The symbols of the China Seas Storm Signal Code are displayed on Kowloon Signal Hill.

The following Ports are warned by a telegraphic adaptation of the code:—Sharp Peak, Swatow, Amoy, Santuao, Macao, Canton, Wuchow, Phulien, Taihoku, Manila, Labuan, and Singapore. 194 storm warnings were sent in 1924, 186 were received from Manila, and 65 from Zikawei. 14 were received from Phulien, via Quang Chau Wan Radio Station.

The Day Signals of the Local Code are displayed at the following stations:—

Royal Observatory	Harbour Office
H. M. S. Tamar	Green Island
Gough Hill	Hongkong & Kowloon, Wharf & Godown Co., Kowloon.
Standard Oil Co., Lai-Chi-Kok	Field Officer's Quarters, Lyemun.

The Night Signals are displayed, at sunset, at the following stations:—

Royal Observatory	H. M. S. Tamar
Harbour Office	Gough Hill
Railway Station	

They have the same signification as the day signals.

A translation of both Day and Night Signals is displayed at the General Post Office and at the Upper Tram Station.

When local signals are displayed in the Harbour a Cone is exhibited at the following stations:—

Gap Rock	Stanley	Sau Ki Wan	Sha Tau Kok
Waglan	Aberdeen	Sai Kung	Tai Po

In the following table is given the number of hours the local signal were hoisted in each of the years 1920-1924:—

Year.	Red Signals.	Black Signals.	Bombs.
	Number of hours hoisted.		Number of times fired.
1920	107	156	...
1921	94	121	...
1922	181	154	...
1923	181	252	2
1924	186	85	...

The figures in the above table include the number of hours that night signals, corresponding to the day signals, were hoisted.

The red signal indicates that a depression exists which may possibly cause a gale at Hongkong within 24 hours. The black signals indicate that a gale is expected at Hongkong.

Three bombs fired at intervals of 10 seconds indicate that wind of typhoon force is anticipated.

VI.—METEOROLOGICAL OBSERVATIONS FROM SHIPS, TREATY PORTS, &C.

Logs Received.—In addition to meteorological registers kept at about 40 stations in China, meteorological logs were received from 190 ships operating in the Far East. These logs, representing 7,222 days' observations, have been utilised for verifying typhoon tracks. The corresponding figures for the year 1923 were 178 and 7,139.

Comparison of Barometers.—The corrections to ships' barometers are usually obtained by comparing their readings while at Hongkong with those of the Observatory Standard. Occasionally ship captains bring their barometers to the Observatory to be compared with the Observatory Standard.

VII.—MAGNETIC OBSERVATIONS.

Horizontal force, declination, and dip are observed once a month. In the dip observations 4 needles are used in rotation, the result for each month being the mean of determinations with two needles.

In the following table are given the annual values of the magnetic elements in 1924, as derived from observations made in the new magnetic hut with magnetometer Elliott 83 and dip circle Dover 71 :—

Declination (west)	-	-	-	-	0.23 .8
Dip (north)	-	-	-	-	30.42 .8
Horizontal Force (C.G.S. unit)	-	-	-	-	0.37294
Vertical Force (C.G.S. unit)	-	-	-	-	0.22155
Total Force (C.G.S. unit)	-	-	-	-	0.43378

The vibration and declination observations were made with vibration magnet No. 55, and the deflections with deflection magnet No. 55 in unifilar Elliott No. 83.

Magnet No. 83 which was damaged in 1923, was repaired in England and used on return for declination observations in the New Territory, made with a view to selecting a site for a new Magnetic Observatory. Observations were made in the vicinity of Fanling and Castle Peak on eight occasions. No evidence of serious local magnetic attraction is shown at either site. The site must be accessible, as the photographic sheets of the magnetograph must be changed daily and absolute observations of Horizontal

Force, Dip and Declination must be made by one of the European staff at least once a week. The site must not only be free from any local magnetic attraction but must be safeguarded from possible building encroachment in the future.

VIII.—TIME SERVICE.

Time Ball.—The Time Ball on Kowloon Signal Hill is dropped at 10 a.m. and 4 p.m., daily, except on Saturdays when it is dropped at 10 a.m. and 1 p.m., and on Sundays and Holidays when it is dropped at 10 a.m. only (120th Meridian Time).

The Ball is hoisted half mast at the 55th minute and full mast at the 57th minute. If the ball fails to drop at the correct time it is lowered at 5 minutes past the hour and the ordinary routine repeated at the following hour, if possible.

The flag system was in use from May 12 to 21, during repairs to the timeball apparatus.

Time Signals are also given at night by means of three white lamps mounted vertically on the Observatory radio mast. Until November 30, the lamps were extinguished momentarily at the even seconds, except at the 2nd, 28th, 50th, 52nd and 54th of each minute, from 8h. 56m. 0s. to 9h. 0m. 0s. p.m. From December 1st, the Manila system was in operation wherein the lights are extinguished every second, from 8h. 55m. to 9h. 0m. p.m., except at the 28th, 29th, 54th, 56th, 57th, 58th and 59th seconds. The 9 p.m. signals were repeated at midnight on December 31st, the last flash indicating the close of the year 1924. The hours refer to Hongkong Standard Time (8 hours East of Greenwich).

The Time Ball was dropped successfully 649 times. There were three failures; on May 22nd, at 4 p.m., June 26th at 4 p.m. and December 18th at 10 a.m., one being caused by electrical defects, the remainder being due to negligence of the computer in charge at the tower. The ball was dropped successfully at the subsequent hour on each occasion. It was not raised on October 4th at 1 p.m. owing to high winds.

In the following table is given the number of times different errors occurred in the years 1923 and 1924.

Error.	Number of Times.	
	1923	1924
0·3 sec. or less	604	530
0·4 "	29	44
0·5 "	12	37
0·6 "	7	23
0·7 "	4	10
0·8 "	...	5
0·9 "	2	...

The mean probable error of the time ball in each month for the past five years is given in the following table:—

Month.	Probable Error of the Time Ball.				
	1920	1921	1922	1923	1924
January,	±0'17	±0'25	±0'10	±0'16	±0'26
February,	'30	'13	'15	'14	'13
March,	'21	'44	'12	'11	'17
April,	'15	'27	'20	'18	'27
May,	'17	'16	'10	'13	'23
June,	'13	'17	'11	'21	'27
July,	'22	'10	'14	'12	'21
August,	'11	'10	'10	'28	'16
September,	'24	'20	'15	'24	'13
October,	'15	'10	'10	'15	'18
November,	'19	'10	'17	'21	'14
December,	'13	'11	'10	'13	'12
Means,	±0'18	±0'18	±0'13	±0'17	±0'19

Time Signals by Radio-Telegraphy.—In addition to the time signals given by the Time Ball, and on the radio mast, signals are sent at 10h. and 21h. by radio telegraphy *via* Stonecutters. Particulars of the programme are given in Government Notifications No. 359 of 13.6.24. and No. 637 of 14.11.24.

Radio Receiving Set.—The radio receiving set was removed to the old telescope house upon the west lawn on April 30 and operated since that date by the Public Works Department. The telephone lines are extended to the clock room so that time signals may be observed as before with the added advantage of expert tuning.

242 comparisons were obtained with the Manila Observatory *via* Cavite. The mean result makes Manila 0.88 sec. fast on Hongkong. It should be noted, however, that the comparisons fall into two distinct groups as follows.—

	No. of Comparisons.	Mean Result.
		Secs.
January to April (inclusive)	100	Manila 1.20 fast on H.K.
May to December (inclusive)	142	Manila 0.67 fast on H.K.

No change has been made in the time service routine at this Observatory. The actual change appears to have occurred on or about April 25th, 5 days before the transfer of the receiving set to fresh quarters.

Between September 3 and November 1, 13 comparisons were obtained with Bordeaux, by means of observed coincidences of the Dent Sidereal clock with the rhythmic beats emitted by Bordeaux. The results are in close agreement, and, assuming the correctness of the Bordeaux signal, the E. longitude of Hongkong would appear to be 0.56^{sec} too great. A similar investigation of 26 comparisons with Tokio makes the Hongkong longitude E. 0.59^{sec} too great, although the agreement of the observations leaves much to be desired, no doubt owing to the nature of the Tokio signals (a dash of 1 second duration at the termination of each minute.)

Transit Instrument.—Observations for time were made chronographically by the Chinese computers, and were supplemented by eye and ear observations of the sun's limbs, circumpolar, and other stars made by the Chief Assistant for the purpose of checking the computers' observations, and determining the errors of the instrument.

The number of observations in the years 1923 and 1924 were as follows :—

	1923	1924
Transits,	1424	1447
Level determination,	787	864
Azimuth,	52	69
Collimation,	20	66

The renovated Troughton and Simms transit instrument was received from England on March 31 and brought into regular use on April 9. There are two eye ends—one arranged for automatic registration, on the chronograph, of each revolution of the micrometer head as a travelling wire crosses the field, and one for ordinary manual signals by a tapper key. The latter has not been in use to date as the former is easily adaptable to observing by either method. Observations made by means of the travelling wire were made until August 18, since when the tapper has been used as formerly; the Chinese staff not acquiring the necessary dexterity in the manipulation of the travelling wire. It is proposed to make a further trial with the travelling wire micrometer when the Chinese staff have had more experience with the instrument.

The $2\frac{1}{2}$ non-reversible transit by Dolland, kindly loaned by the Singapore Government was returned early in April.

Clocks.—The performance of the Standard Sidereal Clock (Dent 39741) has been characterised by a steady increase in the losing rate since April. It varied from -0.70^{sec} on April 2 (Bar. 29.54 Temp. 72.8) to $+0.31^{\text{sec}}$ on December 17 (Bar. 30.10 Temp. 65.0). This approximates to its performance during the last two years.

In the following table is given the excess of the observed error of Dent No. 39741 over the computed error during cloudy periods in 1924 :—

Date 1924.		Interval without observations.	Excess of observed over computed error.
			<i>secs.</i>
January	16	2 days	— 0·09
"	28	9 "	— 0·50
February	1	3 "	— 0·37
"	9	5 "	+ 0·38
"	19	9 "	— 0·08
"	26	6 "	— 0·03
March	3	2 "	— 0·07
"	9	2 "	+ 0·10
"	21	11 "	— 0·24
"	25	3 "	— 0·03
April	10	14 "	— 0·37
"	13	2 "	— 0·32
"	19	5 "	+ 0·27
"	29	4 "	+ 0·40
May	4	4 "	+ 0·77
"	8	3 "	+ 0·10
"	17	4 "	+ 0·98
"	24	2 "	+ 0·66
"	31	3 "	+ 0·10
June	24	15 "	+ 0·32
July	16	4 "	+ 0·46
"	22	3 "	+ 0·02
"	25	2 "	— 0·23
August	9	5 "	+ 0·02
"	25	2 "	+ 0·25
September	13	3 "	— 0·13
"	17	2 "	— 0·20
October	6	3 "	+ 0·31
"	12	3 "	— 0·24
November	23	2 "	+ 0·40
December	7	4 "	+ 0·37

The new Sidereal clock (Cottingham and Mercer No. 507) was received on December 12. It is of the Cottingham type and was constructed by Mr. Thomas Mercer of St. Albans. The pendulum and movement are enclosed in an hermetically sealed case in which the pressure of the air can be regulated as desired. Driving power is supplied by a gravity arm remounted electrically every 36 seconds. At the termination of the year 1924, adjustments were in progress. It is hoped to bring the clock into regular use early in 1925, and to take the opportunity of thoroughly overhauling Dent No. 39741.

The Mean Time clock (Dent No. 39740) was in use until November 30, for dropping the Time Ball, maintaining the electric time service in the Observatory, and sending hourly signals to the Railway, the Post Office, the Telephone Co., and the Eastern Extension Telegraph Co. The clock is corrected daily before 10 a.m. and before 4 p.m. by the electric regulating apparatus. The daily rate of the pendulum is kept below 0.5^{sec} by the addition or removal of weights.

Since December 1, Mean Time clock (Leroy No. 1350) has been used for the above purpose. This clock was received on September 23, and operates the time service through two dials with half second pendulums which it effectually drives and synchronises by means of an electric impulse each second. It also actuates an apparatus for emitting Radio time signals in accordance with the new International System (See Government Notification No. 637 of 14.11.24).

The Brock clock was mounted in the seismograph underground room on January 10, for use in connection with the seismograph.

Chronometer Dent No. 40917 is on loan to Stonecutters Radio Station, and Dent No. 40912 is on loan to the P.W.D. Radio Station at the Observatory.

Batteries, Power Supply, &c.—The necessary current for the Time Service has been supplied by accumulator batteries, charged as found necessary from the alternating mains of the China Light and Power Co. Ltd., by a rotary converter. The Tungar rectifier and 3 Delco Cells are on loan to the P.W.D. radio station at the Observatory.

IX.—MISCELLANEOUS.

Seismograph.—149 earthquakes were recorded during the year by the Milne-Shaw Seismograph, as against 141 in 1923. The seismograms have been forwarded to the President of the Seismological Committee, Oxford. A slight earthquake shock was felt at 10.45 p.m. on January 10.

Upper Air Research.—49 flights with pilot balloons were made during the year. The results of the observations have been sent to the *Commission International pour l'exploration de la haute atmosphere*, Kristiania.

Flying Officers Martin and Isaacs of H.M.S. Pegasus visited the Observatory on December 1 and 12 and kindly furnished copies of temperature observations made during four flights over Hongkong. The results are shown graphically on two charts appended to this Report.

Peak Anemograph.—The Anemograph at the Peak Signal Station was repaired by the Public Works Department and brought into use again on January 14.

Transit of Mercury.—On May 8 the sun rose with Mercury on its disc. Passing clouds were prevalent throughout the morning. From transient views of the sun from 1.30 p.m. the estimated time of external contact at egress was 1h. 36m. 16s., as compared with the computed time of 1h. 38m. 5s.

Visit to other Observatories.—In May and June, the Director visited the Observatories at Shanghai, Peking and Kobe.

The Director of the Peking Observatory very kindly promised to send twice daily to the Hongkong Observatory weather telegrams from Taiying, Kalgan, Shanghai-Kwang and Newchang. They have since been received sporadically in batches. They would be an invaluable addition to the Chefoo observations if received in time for the Daily Weather Maps.

The Director of the Kobe Observatory was asked to consider the possibility of adopting the Hongkong code for the daily weather telegrams, by which pressure, temperature, humidity, wind direction and force, and weather, can be transmitted by means of 6 letters, whereas the code used by the Japanese Authorities gives only pressure and wind direction and force, by means of 4 letters.

Negotiations on this subject, and also on the subject of observations from the Loochoos and Ishigakijima at additional hours are still pending.

The question of an uniform procedure on the matter of wireless time signals was discussed with the Directors of the Kobe and Shanghai Observatories. It is desirable that its probable error should be signalled immediately after the time signal, and also that the exact error should be circulated later. It is also desirable to know whether the signal sent is based on a computed clock correction or in cases of cloudy weather, for instance, a clock error obtained from wireless time signals from other Observatories.

Arrangements were made with the Director of the Shanghai Observatory for the exchange of typhoon warnings and for observations at additional hours from Shanghai, Gutzlaff, Hankow, and Amoy.

The question of a wireless station on the Pratas Shoal was discussed with the Inspector General of Maritime Customs and the Coast Inspector. There are hopes of its early erection by the Chinese Customs.

Visitors.—22 boys of the Diocesan School visited the Observatory on January 24. 20 boy scouts on July 29, a like number from the Chinese Y.M.C.A. on October 4 and 25 boys from St. Stephen's College on November 1.

Staff.—No change occurred in the European Staff during the year. Mr. C. W. Jeffries acted as Director of the Observatory during the absence of Mr. T. F. Claxton from May 19 to June 23 and Mr. B. D. Evans acted as Chief Assistant.

Chan Lai Man, IVth class Telegraphist-Computer resigned on August 9.

Chan Ying Yau and Lok Kwai Man were appointed Vth class Telegraphist-Computers, on October 1.

Expenditure.—The annual expenditure on the Observatory for the past ten years is as follows :—

Year.	Total Expenditure.	Increase.		Decrease.	
	\$ c.	\$	c.	\$	c.
1915	23,233.12	.....		2,165.19	
1916	21,977.78	.....		1,255.34	
1917	26,890.50	4,192.72		.....
1918	20,028.24	.....		6,862.26	
1919	23,450.57	3,422.33		.....
1920	25,965.66	2,515.09		.....
1921	32,700.51	6,734.85		.....
1922	38,350.10	5,649.59		.....
1923	38,522.58	172.48		.....
1924	52,638.49	14,115.91		.....

Acknowledgements.—Acknowledgements are here made to the Directors of Weather Services in the Far East, and the Chinese Maritime Customs authorities, for daily observations and extra observations during typhoon weather, to the Telegraph Companies for transmitting the observations free of charge, to the Commanders of vessels who have furnished meteorological observations by post and by radio telegraphy, to the Directors of the various Observatories and Institutions, and private persons, who have presented their publications to the Library, and to the Observatory staff for the efficient manner in which they have carried out their respective duties.

T. F. CLAXTON,

1925, February 20.

Director.

BARB READINGS TAKEN DURING RESEARCH FLIGHT AT HONGKONG ON 26TH NOVEMBER, 1924.

