

DUPLICATE

UDC 551.582(411.2)

METEOROLOGICAL OFFICE

CLIMATOLOGICAL MEMORANDUM

No. 71

THE CLIMATE OF ORKNEY

by

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ORGS UKMO C

National Meteorological Library

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Climatological Services (Met.O.3)

January 1974

met096

FOREWORD

The Meteorological Office at 26 Palmerston Place, Edinburgh, EH12 5AN and the Glasgow Weather Centre at 118 Waterloo Street, Glasgow, G2 7DN, receive an ever increasing number of requests from all sections of the community, especially from members of the building and construction industries, for information about the past weather at places in Scotland.

It is not yet possible to issue precise long range weather forecasts and one can only plan or design on the basis of past experience i.e. by consulting recorded facts and statistics of the type contained in this memorandum, but from these one can at least set limits and assess the probabilities.

This memorandum on the climate of Orkney is similar in general content to the previously published Meteorological Office memoranda on Edinburgh, Glasgow, Aberdeen, the Coastal Region of the Moray Firth, West Lothian, the Ayr-Kilmarnock-Irvine Region of Ayrshire and the Tayside Region. It includes certain data which will be of particular interest at the tendering or design stages of a building contract. For example, building contractors will be interested in the figures showing the probable amount of working time during which outdoor work may be hampered or have to cease because of rainfall, low temperature and high winds. Similarly, engineers concerned with the design and efficiency of heating and air conditioning installations will wish to consult the detailed statistics of temperature and relative humidity. Advice is also given on maximum windspeeds for the calculation of wind loading on buildings, glass specifications etc. Statistics of rainfall amounts and intensities have been included for the guidance of drainage engineers concerned with the design of sewers and culverts etc and there are many other facts and figures which will be of interest to architects and engineers. It is hoped that the information contained in this memorandum will also be of interest to students and the general reader.

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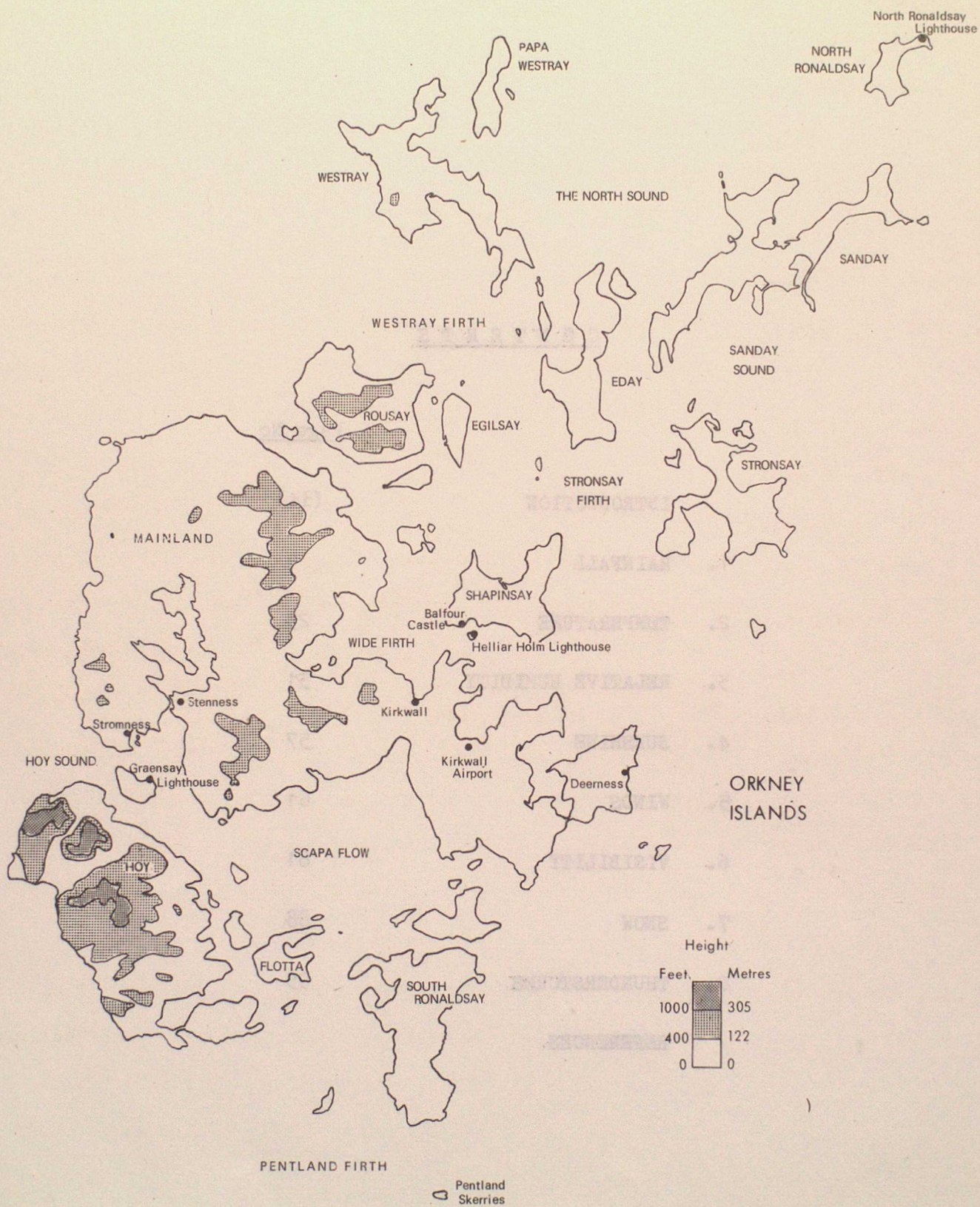
December 1973

Acknowledgements

The authors are indebted to colleagues at the Meteorological Office HQ at Bracknell in Berkshire and also to the Senior Meteorological Officer at Kirkwall Airport, Orkney, for helpful comments on the draft manuscript of this memorandum.

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SCALE: 6 MILES ~ 1 INCH

The Climate of Orkney

by J A Plant* and A Dunsire*

Introduction

Except for Shetland, the islands of Orkney form the most northerly county of Scotland and at high water there are about 70 separate islands in the archipelago.

Kirkwall, the county town of Orkney lies on the largest island called Mainland. The terrain in Mainland to the east and south of Kirkwall is mainly low-lying but the terrain to the west and north of the county town is distinctly undulating with numerous low hills rising to 200 to 260 metres.

To the south of Mainland lie the islands of Hoy and South Ronaldsay and numerous smaller isles. Hoy forms the highland region of the Orkney group of islands with a hilly terrain, steep sided valleys and with sea cliffs on the west coast reaching a maximum height of over 335 metres. The highest point of Hoy, and of Orkney, is Ward Hill - altitude 477 metres. In contrast, the neighbouring island of South Ronaldsay to the east is comparatively low-lying but there are one or two low hills reaching 95 to 120 metres. Between Hoy and South Ronaldsay there are several smaller islands and together the southern island group of Orkney forms a sheltering arc of land to the west, south and east enclosing the well known "inland" sea area of Scapa Flow which features so prominently in the naval history of the first World War.

To the north of Mainland lie the North Isles of Orkney, the largest of which are Westray, North Ronaldsay, Eday, Sanday, Rousay, Stronsay and Shapinsay. With the exception of Rousay which is hilly, the terrain in the North Isles is generally flat and low-lying and parts of these Isles are very much subject to destructive sea spray and blown sand. Unlike the islands to the south of Mainland which are grouped around the relatively sheltered sea area of Scapa Flow, the North Isles are separated by broad firths and sounds through which

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fierce tides run with their turbulence accentuated by the rocky sea floor.

Mainland lies as far north as Stockholm in Sweden but the archipelago as a whole is very much penetrated by the moderating influence of the sea and in spite of its northerly latitude, Orkney has a remarkably equable climate with no great extremes of heat or cold. On the debit side, however, Orkney has a high frequency of gales and strong winds. Moreover, the generally flat smooth moorland relief of the islands and the almost total absence of woodland means that there is very little natural shelter from the wind.

Very few climatological records are available from Orkney. Indeed, the only detailed sets of records for recent years are those from the Meteorological Office weather station at Kirkwall Airport where observations began in February 1950. Kirkwall Airport lies about 3 miles to the southeast of Kirkwall near the Point of Grimsetter.

Some brief records of temperature, rainfall and sunshine duration are available from Stenness where a cooperating climatological station was established in June 1961. Stenness lies in the western part of Mainland about 3 miles northeast of Stromness near the sea exit of the Loch of Stenness.

Records of temperature are also available from the lighthouse on the remote windswept islet of Sule Skerry which is the most westerly island in the Orkney group. The Sule Skerry records date from July 1952 onwards and consist mainly of once-daily readings of maximum and minimum temperature. Measurements of amounts of rainfall have also been made at Sule Skerry but these are invalidated by the very large number of occasions on which sea spray is collected in the raingauge.

In addition to the records from Kirkwall, Stenness and Sule Skerry, records of measurements of amounts of rainfall are available from Balfour Castle and Helliar Holm Lighthouse on Shapinsay and also from the lighthouses on North Ronaldsay and Graemsay.

It is unfortunate that Kirkwall Airport is the only wind recording station in Orkney because there are many locations in the Orkney group of islands which are much more exposed to the wind than Kirkwall Airport. For example, parts of the northern islands of Orkney, the western coastal strips of Mainland and Hoy, Sule Skerry and possibly parts of Ronaldsay almost certainly have a higher frequency of strong winds and gales than Kirkwall Airport. There is the further point that in Orkney, many of the hills, knolls and ridges rise very abruptly from the general level of the surrounding terrain and the wind speeds experienced in these exposed upland sites are likely to be considerably higher than at Kirkwall Airport.

The separate aspects of the climate of Orkney are discussed in more detail in the following paragraphs under the headings of Rainfall, Temperature, Relative Humidity, Sunshine, Winds, Visibility, Snow and Thunderstorms.

1. Rainfall

It can be seen from the rainfall map at Fig 1 that the annual average rainfall over most of the Orkney archipelago ranges from 35 to 40 inches (890 to 1020 mm) but increases to more than 40 inches over the hills of Rousay, Mainland and Hoy.

Monthly and annual averages of rainfall for rainfall measuring stations in Orkney are given in Table 1. The averages quoted for Balfour Castle and Helliar Holm are actual averages over the 35 years from 1916 to 1950 (the standard period for averages of rainfall in current use in the British Isles) while the remaining averages have been estimated from shorter term or broken periods of records.

Monthly and annual totals of rainfall recorded at Kirkwall Airport during the 22 years from 1951 to 1972 are given in Table 1A.

Monthly and annual durations of measurable rainfall in hours recorded at Kirkwall Airport during the 22 years from 1951 to 1972 are given in Table 1B. It can be seen from Table 1B that the annual average duration of rainfall at Kirkwall Airport is 820 hours. This compares with an annual average duration of 597 hours at Edinburgh Airport and 772 hours at Glasgow Airport.

The number of days with rain at Kirkwall Airport during the 22 years from 1951 to 1972 are given in Table 1C.

Cumulative frequencies of daily rainfall at Kirkwall Airport which show the total number of days in 20 years with specified amounts of rain (i.e. the number of days in 20 years with 1 millimetre or more, 5 mm or more, 10 mm or more etc) are given in Table 1D.

Maximum daily rainfalls recorded at Kirkwall Airport are given in Table 1E.

Intense falls of rain in short periods of time

Examination of rainfall records reveals that the intensity is always changing and that within any period of rain, a shorter period will always be found where the intensity is greater than that of the whole. Usually, the most intense falls of short duration are associated with thunderstorms or thundery activity. Orkney does experience intense falls of short duration but since the

frequency of thunderstorms in this region is less than in the upland parts of Scotland and the more thundery areas in central and southwest Scotland, it is reasonable to suppose that the probability of an intense fall of rain in a short period of time is less than in these more thundery areas. Parts of central and southern England have two to three times as many thunderstorms and therefore the probability of an intense rainfall of short duration in the area under consideration is much less than in those areas.

Table 1F gives the number of days in each year from 1947 to 1971 with specified amounts of rain falling in specified times at the Meteorological Office at Kirkwall Airport. The total number of days over the whole period of 25 years is shown at the foot of the Table. Kirkwall Airport is the only location in Orkney for which statistics of this type are available. However, it is by no means certain whether the intensities of rainfall recorded at Kirkwall Airport during the years from 1947 to 1971 are typical of the intensities experienced at other locations in Orkney.

There are very few long period records of rainfall intensities for places in Scotland and therefore drainage engineers make fairly wide use of the Bilham formula⁽¹⁾ for obtaining probabilities of intense falls of rain in short periods of time. Following a recent investigation by D J Holland⁽²⁾ it has become necessary to modify the frequencies obtained from Bilham's formula in respect of intensities greater than 1.25 inches per hour and the figures given in the upper table of Table 1G which refer to falls with durations of 2 hours or less, are based on Bilham's formula modified where necessary by Holland. However, it can be seen from Table 1H which compares the estimated frequencies obtained from the modified Bilham formula with observed frequencies obtained from the Kirkwall records, that for durations up to about 2 hours, the frequencies obtained from the modified Bilham formula appear to be much too high when related to Kirkwall.

Experience suggests that for durations up to about 2 hours, the frequencies obtained from the modified Bilham formula could be halved when applied to locations in Orkney i.e. a return period of "5 years" obtained from the upper table

of Table 1G would become "10 years". Alternatively, for durations up to 2 hours, a 20 per cent reduction could be made to the amounts quoted in the upper table of Table 1G to relate the intensities calculated from the modified Bilham formula to locations in Orkney.

The reader will notice from Table 1H that for rainfalls with durations in excess of 4 hours, the observed frequencies at Kirkwall Airport are much nearer to the frequencies estimated from the Bilham formula. Investigation has shown⁽³⁾ that there is a link between annual average rainfall and the more prolonged falls with durations of 4 to 8 hours or more and over the wetter parts of Orkney, the frequencies of falls with duration of 4 to 8 hours or more are almost certainly higher than the frequencies recorded at Kirkwall Airport.

So far, the data discussed refer to rainfall at a point, but areal rainfall is required for most design purposes. Because of the variability of intense rain in space and time, the areal rainfall for a given duration and return period is, in general, smaller than the corresponding point rainfall. To obtain areal rainfall, the point rainfall should be multiplied by the appropriate factor in the lower table of Table 1G. These factors were derived from a formula by D J Holland, assuming a roughly circular area and a roughly equal contribution to the drainage system from all parts of the area. The formula is based on results from an experimental raingauge network at Cardington near Bedford⁽⁴⁾. Advice on how to apply these factors to the more difficult cases can usually be given by the Meteorological Office or the Transport and Road Research Laboratory of the Ministry of Transport.

Rain as a factor interrupting outdoor work

Table 1I gives the total number of days per month during the 10 years from 1963 to 1972 on which 0.1 millimetres (0.004 inches) or more of rain fell at Kirkwall Airport during the working part of the day i.e. between 0700 and 1700 hours Greenwich Mean Time (8 am and 6 pm British Summer Time). Table 1I also gives for the same 10 year period, the total number of hours per month between 0700 and 1700 hours GMT with a total of 0.1 millimetres or more of rain falling

within the hour. Days and hours with only a few spots of rain amounting to less than 0.05 millimetres have not been included in Table 1I but otherwise this Table includes all occasions of "measurable" rain i.e. all occasions of 'slight', 'moderate' or 'heavy' rain.

There is practically no experimental evidence on the subject of rain as a factor affecting outdoor work but it is thought that a rate of rainfall of 0.5 mm/hr or more is a reasonable figure to adopt in assessing how rain might interfere with building operations. This rate of 0.5 mm/hr corresponds to the lower limit of the Meteorological Office classification of "moderate" rainfall i.e. rain falling fast enough to form puddles rapidly. Thus, occasions with rain falling at a rate of 0.5 mm/hr or more can be thought of more simply as occasions with "moderate" or "heavy" rain.

Table 1J gives the total duration in hours and tenths of rain falling at a rate of 0.5 mm/hr or more between the hours of 0700 and 1700 GMT during the 10 years from 1963 to 1972. However, the actual amount of working time lost in a day because of rain will seldom keep in step with the duration of moderate or heavy rain on that day. For example, if moderate or heavy rain fell continuously for a period of say 30 minutes during part of the working day, the working time lost from the cessation to the resumption of work would almost certainly be considerably more than 30 minutes. It should also be borne in mind that, more often than not, a period of "moderate" or "heavy" rain is preceded or followed by a period of "slight" rain.

Thus, it should be realised, that in the majority of cases, the duration figures quoted in Table 1J underestimate, perhaps grossly underestimate, the probable amount of time which would be lost on outdoor work. However, the duration figures in Table 1J are useful in that they serve as an indication of the extreme lower limit of the working time likely to be lost because of rain.

A more satisfactory alternative to the figures in Table 1J are figures which show the number of hours during which moderate or heavy rain fell for some time

during the hour. Table 1K provides this type of information and comprises the total number of days per month over the 10 years from 1963 to 1972 on which moderate or heavy rain fell at some time during the working day from 0700 to 1700 hours GMT. Similarly, this Table also gives the total number of "hours" per month between 0700 and 1700 hours GMT in which moderate or heavy rain fell at some time during the hour. The figures in Table 1K may overestimate the actual time lost on outdoor work because of rain although there is little doubt that these figures will provide a safer and perhaps more realistic guide for planning or tendering purposes than the figures giving the actual durations of moderate or heavy rain.

Perhaps it should be stressed that while the figures in Tables 1I, 1J and 1K provide a guide to the duration of rainfall during the working part of the day, the figures do not provide a guide to the duration of the effects of the rain. For example, a localised heavy downpour of rain of short duration could flood a building site (especially at the excavation or earth-moving stage) bringing work to a standstill for several days, but such a downpour might contribute a value of say only one or two extra hours with moderate or heavy rain. Clearly, a heavy downpour of rain falling outside the 10 hour period from 0700 to 1700 hours could bring about a similar stoppage.

The Meteorological Office at Kirkwall Airport is the only location in Orkney for which it is possible to provide the types of data contained in Tables 1I, 1J and 1K. However, it is considered that the figures in these Tables should give a reasonably good guide to Orkney as a whole.

When consulting Tables 1I to 1K it should be borne in mind that the figures relate to a 7-day working week and not to a 5-day working week.

A table for converting amounts of rainfall in millimetres into amounts in inches is given at Table 1L.

TABLE 1

Monthly and annual averages of rainfall in millimetres (with equivalent values in inches) for long term rainfall measuring stations in Orkney
(35 years from 1916 to 1950)

Station	Altitude (metres)	Nat Grid Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Balfour Castle, Shapinsay	15	HY 476165	mm 91 inch 3.59	69 2.70	59 2.32	55 2.16	41 1.60	42 1.66	54 2.13	61 2.41	78 3.09	98 3.87	97 3.80	100 3.94	845 33.27
Helliar Holm Lighthouse, Shapinsay	11	HY 483151	mm 95 inch 3.73	70 2.77	60 2.35	58 2.28	44 1.72	46 1.81	59 2.33	65 2.55	84 3.30	102 4.01	99 3.90	101 3.98	883 34.73

Monthly and annual averages of rainfall in millimetres (with equivalent values in inches) estimated for short term rainfall measuring stations in Orkney
(35 years from 1916 to 1950)

Station	Altitude (metres)	Nat Grid Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
North Ronaldsay Lighthouse	7	HY 784559	mm 100 inch 3.94	73 2.87	65 2.55	59 2.34	41 1.63	47 1.84	59 2.34	68 2.66	85 3.33	102 4.00	101 3.97	101 3.97	901 35.44
Stenness, Mainland	23	HY 298112	mm 108 inch 4.27	78 3.05	67 2.65	66 2.61	50 1.98	52 2.06	69 2.73	79 3.09	96 3.76	115 4.51	113 4.44	113 4.44	1006 39.59
Kirkwall Airport, Mainland	26	HY 483076	mm 108 inch 4.25	80 3.15	68 2.68	66 2.60	49 1.93	52 2.04	67 2.64	73 2.87	95 3.74	115 4.53	112 4.41	115 4.53	1000 39.37
Graemsay Low Lighthouse	12	HY 246065	mm 110 inch 4.31	79 3.12	70 2.75	69 2.71	54 2.13	54 2.13	73 2.88	82 3.24	99 3.90	119 4.69	117 4.61	117 4.61	1043 41.08

TABLE 1A

Monthly and annual totals of rainfall in millimetres recorded at
Kirkwall Airport
 (22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>millimetres</u>													
1951	88	95	96	86	5	28	82	99	37	55	193	136	1000
1952	93	65	102	31	63	76	42	169	91	103	103	94	1032
1953	108	64	48	64	61	41	67	73	94	60	140	74	894
1954	67	91	68	42	63	112	61	52	117	204	169	149	1195
1955	97	95	56	38	51	20	6	33	126	129	49	197	897
1956	163	43	55	32	53	70	93	73	70	103	91	163	1009
1957	115	66	113	43	49	58	84	118	88	132	86	150	1102
1958	147	113	67	34	89	19	54	61	30	119	56	141	930
1959	141	33	38	61	46	63	58	43	32	139	143	119	916
1960	80	88	41	70	30	72	32	49	54	83	93	97	789
1961	85	76	80	58	42	65	55	60	115	104	107	69	916
1962	113	115	88	51	58	63	36	194	66	74	121	143	1122
1963	39	22	70	47	77	61	26	108	77	72	159	41	799
1964	49	64	41	53	45	71	65	138	125	60	107	119	937
1965	122	40	37	56	65	51	51	92	129	91	85	122	941
1966	108	89	111	18	80	65	86	83	72	144	117	222	1195
1967	83	93	156	82	57	51	63	108	100	153	106	142	1194
1968	106	59	106	81	42	75	60	59	35	147	55	70	895
1969	145	76	53	58	55	52	60	64	127	91	123	139	1043
1970	80	106	86	53	39	23	77	74	89	236	183	51	1097
1971	103	59	94	29	66	37	42	48	69	115	132	92	886
1972	87	70	32	55	43	75	41	58	35	43	144	58	741
22 year average 1951-1972	101	74	74	52	54	57	56	84	81	112	116	118	979

TABLE 1B

Monthly and annual durations of measurable* rain in hours at
Kirkwall Airport
 (22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
(hours)													
1951	88	118	98	66	7	36	86	77	33	44	155	123	931
1952	72	50	97	36	67	77	33	109	85	64	96	92	878
1953	137	78	42	50	58	60	58	37	74	57	106	70	827
1954	74	107	76	32	64	93	67	64	84	154	120	103	1038
1955	73	89	60	60	38	32	7	19	67	121	42	115	723
1956	125	33	50	36	58	64	74	75	36	99	96	126	872
1957	83	51	109	52	43	77	64	78	89	94	94	127	961
1958	124	112	62	45	66	21	52	62	30	79	38	79	770
1959	100	32	45	74	46	55	73	42	29	88	110	126	820
1960	68	72	62	72	42	41	33	44	46	71	77	70	698
1961	62	57	79	54	23	87	56	55	63	72	89	51	748
1962	87	99	89	43	62	62	14	105	54	49	146	81	891
1963	31	25	73	48	100	44	29	81	58	62	150	67	768
1964	38	51	62	45	36	63	63	109	83	56	70	72	748
1965	97	27	36	51	61	53	46	70	105	59	81	91	777
1966	97	76	89	22	83	96	72	51	76	86	92	128	968
1967	63	79	103	67	44	37	53	60	53	91	71	150	871
1968	74	53	77	53	69	45	39	42	22	132	31	62	699
1969	116	55	76	44	63	45	41	59	79	105	71	93	847
1970	101	86	81	31	25	23	81	55	72	106	155	41	857
1971	82	45	87	30	47	41	36	28	70	68	101	79	714
1972	58	51	40	67	29	76	36	44	34	50	91	47	623
22 year average													
1951-1972	84	66	72	49	51	56	51	62	61	82	95	91	820

*The autographic rain recording instrument does not register the duration of very small amounts of rain, drizzle, snow etc. e.g. occasions with only a "few spots" of rain.

TABLE 1C

Number of days with rain* at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	<u>days</u>												
1951	23	25	24	24	3	12	19	22	18	15	25	29	239
1952	24	21	17	13	17	25	20	20	23	23	27	27	257
1953	25	20	13	22	19	14	19	20	19	16	25	22	234
1954	25	25	18	15	13	21	19	16	25	28	27	27	259
1955	23	23	20	18	20	10	6	15	20	28	24	29	236
1956	29	21	13	17	24	19	17	21	16	23	23	30	253
1957	24	20	19	19	15	19	18	15	24	26	18	24	241
1958	26	27	14	17	19	10	15	20	13	24	15	23	223
1959	26	12	16	22	14	14	18	19	10	17	24	27	219
1960	21	24	16	20	11	15	14	21	17	21	25	25	230
1961	26	20	24	20	12	22	18	22	21	23	23	21	252
1962	27	22	23	14	22	19	15	23	24	20	26	24	259
1963	18	12	22	20	23	13	14	21	22	20	27	19	231
1964	16	15	9	24	14	18	25	23	23	18	22	27	234
1965	29	19	15	17	17	18	18	23	18	13	21	29	237
1966	23	22	25	11	19	16	23	16	24	27	24	31	261
1967	24	21	28	19	16	16	23	20	17	30	26	29	269
1968	29	15	23	14	16	14	13	15	10	24	17	21	211
1969	26	21	21	20	20	12	21	19	18	24	27	24	253
1970	25	24	28	23	16	8	23	14	22	25	29	25	262
1971	27	17	24	13	15	15	14	15	18	23	26	25	232
1972	25	20	15	17	12	22	15	18	15	14	30	20	223
22 year average 1951-1972	25	20	19	18	16	16	18	19	19	22	24	25	241

*Number of days on which 0.2 millimetres or more of rainfall was collected in the raingauge during the 24 hours between 0900 hours Greenwich Mean Time on one day and 0900 hours GMT on the next day.

TABLE 1D

Cumulative frequencies of daily rainfall amounts in millimetres recorded
at Kirkwall Airport
(20 years from 1951 to 1970)

Daily totals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
50 mm or more													0
40 mm or more								3	1	1		1	6
25 mm or more	2	1	1	1		1	2	9	3	8	3	5	36
20 mm or more	4	1	5	2	2	4	4	12	6	12	14	6	72
15 mm or more	11	4	12	2	6	8	5	22	19	26	23	17	155
10 mm or more	47	36	33	14	14	28	24	48	38	64	58	55	459
5 mm or more	144	107	111	62	76	76	81	103	119	165	161	188	1393
1 mm or more	393	296	287	255	229	216	236	282	280	352	376	417	3619
0.2 mm or more	489	409	388	369	330	315	358	385	384	445	475	513	4860
Less than 0.2 mm*	131	156	232	231	290	285	262	235	216	175	125	107	2445
Total number of days in 20 years	620	565	620	600	620	600	620	620	600	620	600	620	7305

*Including days with no rain.

Example: In the 20 Januarys during the years from 1951 to 1970, there was a total of 47 days with 24 hour rainfall amounts of 10 mm or more.

Note: The above frequency table has been calculated from records of the 24 hour measurements (from 0900 hours Greenwich Mean Time on one day to 0900 hours GMT on the next day) made during the 20 years period from 1951 to 1970. The rainfall measured at 0900 hours GMT is credited to the previous day.
When the raingauge contains solid precipitation in the form of hail or snow, the contents are melted by warming to give the equivalent amount of rainwater.

TABLE 1E

Maximum daily rainfalls in millimetres recorded at Kirkwall Airport
during the period from February 1950 to December 1972

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum daily* fall	32.2	31.8	25.7	27.4	23.9	28.7	32.5	43.7	43.8	47.8	27.1	44.3
Year of occurrence	1959	1957	1957	1968	1957	1954	1956	1962	1965	1970	1956	1955

*24 hours from 0900 hours GMT on one day to 0900 hours GMT on the next day.

Example: The maximum daily fall of 31.8 mm which occurred in February 1957 is the highest daily fall recorded at Kirkwall Airport in any February during the years from 1950 to 1972

TABLE 1F

Intensities of rainfall recorded at Kirkwall Airport, Orkney - 25 years from 1947 to 1971
(Kirkwall (Hatston) Airport from 1947 to 1949 and Kirkwall (Grimsetter) Airport from 1950 to 1971)

Number of days with specified amounts of rain falling in specified times

Year	Amount of 5 mm (0.2 inch) falling within				Amount of 10 mm (0.4 inch) falling within				Amount of 15 mm (0.6 inch) falling within				Amount of 20 mm (0.8 inch) falling within				Amount of 25 mm (1.0 inch) falling within						
	5 mins	10 mins	15 mins		5 mins	15 mins	30 mins	1 hr	15 mins	30 mins	1 hr	2 hrs	4 hrs	30 mins	1 hr	2 hrs	4 hrs	8 hrs	1 hr	2 hrs	4 hrs	8 hrs	16 hrs
1971	0	0	0		0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1
1970	0	0	0		0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	4
1969	0	0	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1968	0	0	1		0	0	0	2	0	0	0	0	1	0	0	0	0	2	0	0	0	2	2
1967	0	0	0		0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	1	1
1966	0	0	0		0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	4
1965	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1964	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4
1963	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1962	0	1	1		0	0	0	1	0	0	0	1	2	0	0	0	0	2	0	0	0	1	1
1961	0	1	1		0	0	1	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
1960	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1959	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1958	0	0	0		0	0	0	0	0	0	0	2	5	0	0	0	0	1	4	0	0	1	5
1957	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
1956	0	0	0		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1954	-	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1953	-	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1952	-	-	-		0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	0
1951	-	-	-		0	0	0	0	0	0	0	2	2	0	0	0	0	1	1	0	0	1	0
1950	-	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1949	-	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1948	-	-	-		0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	1
1947	-	-	-		0	0	1	1	0	0	1	1	1	0	0	0	1	2	1	0	0	1	1
Total	0	2	5	8	0	0	2	4	0	0	1	4	29	0	0	1	4	30	0	0	1	12	32
Number of years of record	16	16	16	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

TABLE 1G

Maximum rainfall in millimetres from modified Bilham formula

<u>Duration</u> <u>(minutes)</u>	<u>Return Period (years)</u>						
	<u>1 day</u> <u>per</u> <u>Annum</u>	<u>1 day</u> <u>per</u> <u>2 yrs</u>	<u>1 day</u> <u>per</u> <u>5 yrs</u>	<u>1 day</u> <u>per</u> <u>10 yrs</u>	<u>1 day</u> <u>per</u> <u>20 yrs</u>	<u>1 day</u> <u>per</u> <u>50 yrs</u>	<u>1 day</u> <u>per</u> <u>100 yrs</u>
2 minutes or less	2.3	2.8	3.6	4.1	4.8	5.6	6.1
4 " " "	3.8	4.6	5.8	6.9	7.9	9.1	10.2
6 " " "	4.6	5.8	7.6	8.9	10.2	12.2	13.7
8 " " "	5.3	6.9	8.9	10.4	12.2	14.7	16.5
10 " " "	6.1	7.6	9.9	11.9	14.0	16.8	19.1
15 " " "	7.1	9.1	12.2	14.7	17.3	21.1	24.4
20 " " "	7.9	10.2	13.7	16.8	20.1	24.6	28.5
25 " " "	8.6	10.9	14.7	18.3	22.1	27.7	32.3
30 " " "	9.1	11.7	15.7	19.6	23.9	30.0	35.3
40 " " "	10.2	12.7	17.3	21.6	26.7	34.0	40.4
50 " " "	10.9	13.7	18.5	23.1	28.7	37.1	44.5
60 " " "	11.7	14.7	19.8	24.4	30.2	39.6	47.7
90 " " "	13.2	16.8	22.3	27.7	34.3	45.2	55.4
120 " " "	14.7	18.3	24.4	30.2	37.3	49.3	60.5

Example: The maximum rainfall in 60 minutes or less on one day in
50 years = 39.6 millimetres

Factors for converting point rainfalls into areal rainfalls

<u>Area</u> <u>(acres)</u>	<u>(Equivalent</u> <u>area in</u> <u>square</u> <u>kilometres)</u>	<u>Duration (minutes)</u>						
		<u>2 mins</u>	<u>6 mins</u>	<u>10 mins</u>	<u>15 mins</u>	<u>30 mins</u>	<u>60 mins</u>	<u>120 mins</u>
100	0.40	0.94	0.95	0.96	-	-	-	-
150	0.61	0.92	0.94	0.95	0.95	0.96	-	-
200	0.81	0.91	0.93	0.94	0.94	0.95	0.95	0.96
300	1.21	0.89	0.91	0.92	0.93	0.94	0.94	0.95
500	2.02	0.86	0.89	0.90	0.91	0.92	0.92	0.93
700	2.83	0.83	0.87	0.88	0.89	0.90	0.91	0.92
1000	4.05	0.80	0.85	0.86	0.87	0.88	0.89	0.90
1500	6.07	0.75	0.81	0.83	0.84	0.86	0.87	0.88
2000	8.09	-	-	0.80	0.82	0.83	0.85	0.86
3000	12.14	-	-	-	0.78	0.80	0.82	0.83
5000	20.23	-	-	-	-	0.74	0.76	0.77
7000	28.33	-	-	-	-	-	0.72	0.73

TABLE 1H

Comparison of observed and estimated intensities of rainfall at
Kirkwall Airport, Orkney

Number of days in 10 years with specified amounts of rain falling in specified times

	A.	B.	C.	D.
	<u>Observed</u> <u>Frequency</u> (number of days in 10 years)	<u>Estimated</u> <u>Frequency</u> (number of days in 10 years)	<u>Observed Fre-</u> <u>quency as</u> <u>Percentage of</u> <u>Estimated</u> <u>Frequency</u>	<u>Period of</u> <u>Record used</u> <u>for Calcula-</u> <u>tion of A.</u> (years)
<u>Amount of 5 millimetres (0.2 inches) falling within:</u>				
5 minutes or less	0.0	5.5*	0%	16
10 minutes or less	1.3	14.9	9%	16
15 minutes or less	3.1	22.3	14%	16
<u>Amount of 10 millimetres (0.4 inches) falling within:</u>				
5 minutes or less	0.0	0.3*	0%	25
15 minutes or less	0.0	3.5*	0%	25
30 minutes or less	0.8	7.3	11%	25
60 minutes or less	3.2	14.6	22%	25
<u>Amount of 15 millimetres (0.6 inches) falling within:</u>				
15 minutes or less	0.0	0.9*	0%	25
30 minutes or less	0.0	2.2	0%	25
1 hour or less	0.4	4.4	9%	25
2 hours or less	1.6	8.8	18%	25
4 hours or less	11.6	17.6	66%	25
<u>Amount of 20 millimetres (0.8 inches) falling within:</u>				
30 minutes or less	0.0	0.8*	0%	25
1 hour or less	0.0	1.8	0%	25
2 hours or less	0.4	3.6	11%	25
4 hours or less	1.6	7.2	22%	25
8 hours or less	12.0	14.4	83%	25
<u>Amount of 25 millimetres (1.0 inches) falling within:</u>				
1 hour or less	0.0	0.9	0%	25
2 hours or less	0.0	1.8	0%	25
4 hours or less	0.4	3.6	11%	25
8 hours or less	4.8	7.2	67%	25
16 hours or less	12.8	14.4	89%	25

Notes

- The observed frequencies in Column 'A' above were calculated from intensities of rainfall recorded at Kirkwall Airport during the period of years shown in Column 'D'.
- The estimated frequencies in Column 'B' above were obtained from Bilham's formula:

$$n = \frac{1.25t}{(r + 0.1)^{3.55}}$$
where: n = frequency (number of days in 10 years)
 t = duration in hours
 r = rainfall in inches

But the following modification due to D J Holland for intensities greater than 1.25 inches per hour was used to estimate the frequencies marked with an asterisk:

$$n = \frac{r \exp. (1 - \frac{0.8r}{t})}{(r + 0.1)^{3.55}}$$

TABLE 11

Number of days with 0.1 millimetres or more of rain falling at some time during the 10 hour period between 0700 and 1700 hours Greenwich Mean Time (0800 and 1800 hours British Summer Time) at Kirkwall Airport (10 years from 1963 to 1972)

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year Total</u>
<u>Number of days</u>													
1963	15	9	15	15	18	8	11	13	16	16	19	15	170
1964	12	12	7	19	9	15	14	13	19	14	20	20	174
1965	23	12	11	13	9	13	12	15	15	10	17	24	174
1966	17	15	22	8	14	9	18	13	17	23	21	27	204
1967	23	17	23	11	12	11	14	11	13	25	22	23	205
1968	20	12	17	11	12	10	8	10	5	21	16	17	159
1969	22	15	15	17	16	8	11	16	15	20	20	18	193
1970	17	19	22	17	13	6	14	10	18	20	24	21	201
1971	19	13	17	10	11	10	11	12	10	22	21	22	178
1972	21	15	12	13	9	15	8	13	8	8	22	15	159
10 year mean	18.9	13.9	16.1	13.4	12.3	10.5	12.1	12.6	13.6	17.9	20.2	20.2	181.7

Number of hours during the 10 hour period between 0700 and 1700 hours Greenwich Mean Time with 0.1 millimetres or more of rain falling at some time during the hour at Kirkwall Airport (10 years from 1963 to 1972)

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year Total</u>
<u>Number of hours</u>													
1963	38	22	60	41	66	27	23	54	55	56	104	53	599
1964	42	40	33	45	24	50	43	60	73	52	66	69	597
1965	72	39	24	40	36	39	37	51	53	44	74	90	599
1966	64	56	83	19	49	32	45	46	49	66	94	131	734
1967	80	53	92	41	35	31	26	47	49	92	82	102	730
1968	87	29	68	53	31	28	31	27	22	79	44	79	578
1969	77	59	47	49	48	25	29	42	53	69	99	78	675
1970	68	61	72	40	22	14	47	25	67	100	99	74	689
1971	58	42	53	24	31	34	26	27	31	73	105	83	587
1972	63	39	24	42	24	47	27	47	28	30	99	34	504
10 year mean	64.9	44.0	55.6	39.4	36.6	32.7	33.4	42.6	48.0	66.1	86.6	79.3	629.2

10 year mean
expressed as
percentage of
total working
time

21% 16% 18% 13% 12% 11% 11% 14% 16% 21% 29% 26% 17%

TABLE 1J

Total duration in hours and tenths of rain falling at a rate of 0.5 millimetres or more per hour between the hours of 0700 and 1700 hours Greenwich Mean Time (0800 and 1800 hours British Summer Time) during the 10 years from 1963 to 1972 at Kirkwall Airport

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year Total</u>
<u>Total duration in hours and tenths</u>													
1963	11.9	7.6	28.1	18.6	33.4	15.6	8.7	29.5	23.8	20.4	54.9	16.0	268.5
1964	13.5	11.2	15.4	13.6	9.3	20.9	13.2	38.5	36.4	17.5	26.0	19.5	235.0
1965	31.1	10.8	6.2	13.0	16.9	16.3	10.3	19.0	26.1	19.1	28.9	29.5	227.2
1966	27.4	34.8	35.5	7.8	21.4	8.8	16.6	19.2	20.0	22.5	31.0	43.4	288.4
1967	28.1	21.4	29.6	16.8	13.0	11.6	8.9	28.6	19.5	34.0	19.1	39.1	269.7
1968	29.7	7.9	28.2	21.1	6.1	18.0	15.8	12.4	9.8	43.4	15.7	24.6	232.7
1969	28.9	19.1	18.5	15.5	19.8	8.3	12.7	15.0	21.0	25.9	34.7	38.4	257.8
1970	26.1	18.3	21.4	9.3	8.6	7.5	25.6	12.5	27.7	49.6	55.2	15.3	277.1
1971	24.5	13.0	24.8	5.2	18.0	12.8	10.9	10.4	13.7	29.3	29.5	29.5	221.6
1972	22.2	14.6	9.6	19.3	11.0	18.5	6.4	19.6	6.0	14.0	31.7	16.5	189.4
10 year mean	24.3	15.9	21.7	14.0	15.7	13.8	12.9	20.5	20.4	27.6	32.7	27.2	246.7
10 year mean expressed as percentage of total working time	8%	6%	7%	5%	5%	5%	4%	7%	7%	9%	11%	9%	7%

TABLE 1K

Number of days with rain falling at a rate of 0.5 millimetres or more per hour at some time between the hours of 0700 and 1700 hours Greenwich Mean Time (0800 and 1800 hours British Summer Time) during the 10 years from 1963 to 1972 at Kirkwall Airport

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year Total</u>
<u>Number of days</u>													
1963	15	9	14	15	15	8	10	14	16	16	19	10	161
1964	12	12	6	19	9	13	14	13	19	13	20	20	170
1965	21	11	9	13	9	10	12	14	12	10	15	24	160
1966	17	13	22	5	14	5	19	13	14	23	20	27	192
1967	23	16	22	11	11	11	14	11	12	25	22	22	200
1968	20	11	17	11	8	8	6	9	4	19	16	15	144
1969	22	15	15	15	16	8	12	13	15	18	19	18	186
1970	16	17	20	17	13	6	14	9	18	20	22	21	193
1971	17	13	17	7	11	10	9	12	7	21	19	18	161
1972	21	15	10	13	9	15	7	13	7	8	22	14	154
10 year mean	18.4	13.2	15.2	12.6	11.5	9.4	11.7	12.1	12.4	17.3	19.4	18.9	172.1

Number of hours with rain falling at some time during the hour at a rate of 0.5 millimetres or more per hour between the hours of 0700 and 1700 hours Greenwich Mean Time (0800 and 1800 hours British Summer Time) during the 10 years from 1963 to 1972 at Kirkwall Airport

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year Total</u>
<u>Number of hours</u>													
1963	34	19	48	38	43	22	20	49	53	51	83	26	486
1964	39	33	19	42	24	38	39	49	66	44	62	62	517
1965	58	37	18	35	30	25	33	47	42	42	54	78	499
1966	49	49	80	13	42	10	38	40	34	58	81	126	620
1967	78	46	87	35	33	30	22	45	43	86	79	81	665
1968	83	22	66	49	14	23	22	25	19	61	43	61	488
1969	70	52	34	42	39	21	30	29	51	46	94	72	580
1970	47	54	58	38	20	12	41	21	59	97	77	69	593
1971	49	38	43	20	31	28	21	24	23	68	84	62	491
1972	56	37	18	34	22	38	20	44	26	22	93	30	440
10 year mean	56.3	38.7	47.1	34.6	29.8	24.7	28.6	37.3	41.6	57.5	75.0	66.7	537.9

10 year mean expressed as percentage of total working time

18%	14%	15%	12%	10%	8%	9%	12%	14%	19%	25%	22%	15%
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TABLE 1L

TABLE FOR CONVERTING AMOUNTS OF RAINFALL IN MILLIMETRES TO INCHES

<u>mm</u>	<u>inch</u>	<u>mm</u>	<u>inch</u>	<u>mm</u>	<u>inch</u>
.1	.004	10	.394	100	3.937
.2	.008	15	.591	200	7.874
.3	.012	20	.787	300	11.811
.4	.016	25	.984	400	15.748
.5	.020	30	1.181	500	19.685
.6	.024	35	1.378	600	23.622
.7	.028	40	1.575	700	27.559
.8	.031	45	1.772	800	31.496
.9	.035	50	1.969	900	35.433
				1000	39.370

1	.039	55	2.165
2	.079	60	2.362
3	.118	65	2.559
4	.157	70	2.756
5	.197	75	2.953
6	.236	80	3.150
7	.276	85	3.346
8	.315	90	3.543
9	.354	95	3.740
10	.394	100	3.937

2. Temperature

Owing to the moderating influence of the sea, Orkney has a relatively small daily range of temperature with rather low maximum temperatures during the day and high minimum temperatures during the night.

Although the summers are cool, Orkney has remarkably mild winters, especially when its northerly latitude is taken into account. For example, during the months of December to February, the average daily maximum temperature at Kirkwall Airport is similar to the average daily maximum temperature at Edinburgh and Glasgow Airports and about half to one degree Centigrade lower than at London Airport. On the other hand, the average daily minimum temperature in the months of December to February is not as low at Kirkwall as it is in Edinburgh, Glasgow and London. However, when considering the temperature regime in Orkney it is important to bear in mind that the islands have a high frequency of gales and strong winds and that the generally high level of windiness often creates the feeling that temperatures are much lower than they actually are.

Monthly and annual means of daily maximum, minimum and mean temperature at Kirkwall Airport are given in Tables 2, 2A and 2B.

Absolute maximum and minimum temperatures at Kirkwall Airport are given in Tables 2C and 2D.

Monthly and annual means of daily maximum, minimum and mean temperature at Sule Skerry are given in Tables 2E, 2F and 2G.

Absolute maximum and minimum temperatures at Sule Skerry are given in Tables 2H and 2I.

Monthly and annual means of daily maximum temperature and absolute maximum temperatures at Stenness are given in Table 2J.

Monthly and annual means of daily minimum temperature and absolute minimum temperatures at Stenness are given in Table 2K.

Averages and extremes of dry bulb temperature at 3-hourly intervals at Kirkwall Airport are given in Table 2L.

Percentage frequencies of occurrence of dry bulb temperatures at Kirkwall Airport are given in Table 2M.

Averages and extremes of wet bulb temperature at 3-hourly intervals at Kirkwall Airport are given in Table 2N.

Percentage frequencies of occurrence of wet bulb temperatures at Kirkwall Airport are given in Table 2O.

The number of days with air frost at Kirkwall, Sule Skerry and Stenness are given in Tables 2P, 2Q and 2R.

The average and extreme dates of the first and last air frosts are given in Table 2S.

When studying the statistics of temperature for Sule Skerry, perhaps it should be borne in mind that this tiny remote island lies about $33\frac{1}{2}$ miles north-east of Cape Wrath. There is no grass on the island but about one third of the total acreage of 35 acres is covered with a light mossy peaty soil which is blown about very easily and which is riddled with holes made by the thousands of puffins which nest on the island. The soil surface is interspersed with coarse scrub and strewn with loose rocks and the main vegetation is a small fern-like plant which grows to a height of 4 or 5 inches but which dies completely in winter leaving the ground bare. The remaining two thirds of the island's surface consists of a very irregular rock formation. The sea is only a few yards from the thermometer screen and in many respects the Sule Skerry records of temperature are more typical of temperatures recorded aboard a ship than at a land station in Scotland. On the other hand, some of the absolute minimum temperatures which have been reported from Sule Skerry in winter are surprisingly low and the reason for this is not fully understood. One obvious difficulty in assessing the validity of temperatures reported from Sule Skerry is that no records are available from a comparable site within reasonable distance.

The absolute minimum temperatures reported from Stenness are also surprisingly low. The thermometer screen at Stenness lies in the bottom corner of a sloping pasture enclosed by a rough stone dyke. The ground slopes from south to north, down to the Loch of Stenness about $\frac{1}{2}$ mile to the North. It is thought that the unusually low minimum temperatures recorded during the winter months

TABLE 2

Monthly and annual means of daily maximum temperature in degrees Centigrade
at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
degrees Centigrade													
1951	5.0	5.3	5.5	7.3	10.8	13.4	15.1	15.3	14.6	12.0	9.2	6.5	10.0
1952	4.2	5.5	7.3	10.8	11.8	12.2	15.1	14.4	11.1	9.7	6.1	5.8	9.5
1953	6.6	6.9	9.4	8.4	11.7	14.1	15.3	16.3	14.6	12.1	9.4	7.8	11.1
1954	5.8	4.7	6.7	9.8	11.7	13.3	14.4	14.4	12.8	10.6	7.8	6.6	9.9
1955	3.9	2.9	5.6	10.9	10.2	14.2	17.8	16.7	15.1	10.3	9.6	5.3	10.2
1956	4.4	4.9	6.8	8.4	12.6	12.5	14.7	13.3	13.9	10.7	8.6	7.1	9.8
1957	6.8	5.9	8.8	10.2	10.9	13.8	13.7	14.1	12.3	11.2	8.4	6.2	10.2
1958	5.1	4.3	4.4	8.6	10.7	13.8	15.1	14.9	15.6	12.2	9.6	6.1	10.0
1959	3.7	7.3	8.4	10.1	11.9	14.4	16.3	16.3	15.7	12.8	8.8	6.7	11.1
1960	5.5	5.3	6.8	9.9	13.6	15.2	15.8	15.2	14.2	10.8	8.4	5.7	10.6
1961	5.4	7.3	9.5	9.3	11.4	13.7	14.0	15.5	14.7	11.8	7.6	4.7	10.4
1962	6.1	6.3	4.7	8.6	9.8	14.1	13.8	14.1	12.7	11.7	7.3	5.7	9.6
1963	3.7	4.1	7.3	9.2	11.0	14.0	14.5	14.2	13.4	11.1	7.5	5.9	9.7
1964	7.3	6.5	6.7	9.9	12.0	13.4	14.3	13.5	12.8	10.9	8.7	5.2	10.1
1965	5.1	6.3	6.5	9.7	10.0	13.9	13.0	14.6	13.2	11.8	5.9	4.6	9.5
1966	4.7	4.9	7.4	8.2	11.7	14.8	14.8	14.8	13.8	10.8	6.8	5.4	9.8
1967	5.7	6.8	7.4	8.7	10.7	14.0	16.0	15.2	14.3	10.6	8.2	6.0	10.3
1968	4.9	4.4	7.1	9.1	9.4	14.1	14.5	15.4	14.1	11.4	7.7	6.0	9.8
1969	6.4	2.9	5.1	8.4	10.2	15.1	15.9	16.2	13.6	12.5	5.5	5.4	9.8
1970	4.8	4.1	5.5	8.4	11.8	16.0	13.8	15.9	13.6	10.6	7.2	6.4	9.8
1971	6.1	7.3	7.3	9.5	13.0	12.4	15.1	15.0	14.1	11.9	7.6	8.5	10.7
1972	5.4	6.2	7.9	9.6	11.6	13.3	15.7	14.4	12.7	11.9	7.6	6.8	10.3
22 year average 1951-1972	5.3	5.5	6.9	9.2	11.3	13.9	14.9	15.0	13.8	11.3	7.9	6.1	10.1

TABLE 2A

Monthly and annual means of daily minimum temperature in degrees Centigrade
at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
degrees Centigrade													
1951	1.4	1.5	0.9	1.8	4.8	6.6	9.7	9.7	9.0	7.8	5.3	3.0	5.1
1952	0.4	1.6	2.8	4.1	6.9	6.6	9.6	9.7	6.7	5.4	2.0	2.3	4.8
1953	3.3	2.7	3.1	1.9	6.1	8.8	9.7	10.1	10.1	8.0	5.9	4.7	6.2
1954	2.7	1.1	2.5	3.3	6.4	8.1	9.2	9.7	6.9	6.2	4.4	3.1	5.3
1955	0.4	-1.1	1.7	3.9	4.0	7.1	9.9	10.7	9.7	5.8	6.1	1.9	5.0
1956	0.8	0.2	2.2	1.8	6.1	6.6	9.3	8.2	9.2	6.6	5.2	4.1	5.0
1957	3.2	1.5	4.2	4.0	5.2	7.3	9.8	9.9	8.2	6.6	5.0	2.7	5.6
1958	1.1	0.3	0.4	2.8	4.1	7.5	9.6	9.9	10.6	8.0	5.4	3.0	5.2
1959	-0.4	2.6	3.6	4.1	6.2	8.2	10.7	10.8	9.0	8.6	4.8	3.3	5.9
1960	2.1	0.8	3.5	4.8	6.6	9.3	9.6	9.6	8.6	7.9	4.4	2.2	5.8
1961	1.9	3.1	4.4	3.6	5.5	8.1	9.6	9.4	9.0	7.9	3.5	0.9	5.6
1962	2.6	1.5	0.4	2.4	5.4	7.8	8.7	8.7	8.0	7.8	3.8	2.2	4.9
1963	0.1	-0.2	2.9	3.9	5.1	8.7	8.7	9.4	8.5	6.9	4.3	2.6	5.1
1964	3.8	3.1	2.9	4.4	7.0	7.7	9.0	8.7	7.5	6.2	4.5	1.9	5.6
1965	1.6	3.3	1.1	3.1	5.6	8.3	7.9	9.3	8.8	7.7	1.8	1.2	5.0
1966	2.0	1.1	2.7	1.9	5.2	9.3	9.2	9.1	9.4	6.5	3.2	1.6	5.1
1967	2.2	3.2	2.6	3.1	5.3	7.8	9.9	10.0	9.7	5.7	4.4	2.5	5.5
1968	1.6	0.1	2.5	2.9	3.8	7.8	9.1	9.6	9.1	7.8	4.5	2.9	5.1
1969	3.1	-1.2	0.6	2.9	5.3	8.3	10.0	11.2	8.2	8.2	1.1	2.5	5.0
1970	1.8	-0.1	0.9	2.2	6.0	8.6	8.8	10.4	8.7	6.1	3.4	3.0	5.0
1971	3.3	3.3	2.7	3.7	6.6	6.9	9.3	9.6	9.2	6.7	3.5	5.1	5.8
1972	2.9	2.3	2.9	4.0	6.2	7.1	9.6	9.1	7.2	7.3	4.0	3.6	5.5
22 year average 1951-1972	1.9	1.4	2.3	3.2	5.6	7.8	9.4	9.7	8.7	7.1	4.1	2.7	5.3.

TABLE 2B

Monthly and annual means of daily mean temperature in degrees Centigrade at
Kirkwall Airport
 (22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1951	3.2	3.4	3.2	4.6	7.8	10.1	12.4	12.5	11.8	9.9	7.3	4.7	7.6
1952	2.3	3.5	5.1	7.5	9.3	9.4	12.3	12.1	8.9	7.6	4.1	4.1	7.2
1953	4.9	4.8	6.3	5.2	8.9	11.4	12.5	13.2	12.3	10.1	7.6	6.3	8.6
1954	4.3	2.9	4.6	6.6	9.1	10.7	11.8	12.1	9.8	8.4	6.1	4.8	7.6
1955	2.2	0.9	3.6	7.4	7.1	10.6	13.8	13.7	12.4	8.1	7.8	3.6	7.6
1956	2.6	2.6	4.5	5.1	9.3	9.6	12.0	10.7	11.5	8.6	6.9	5.6	7.4
1957	5.0	3.7	6.5	7.1	8.1	10.6	11.7	12.0	10.3	8.8	6.7	4.5	7.9
1958	3.1	2.3	2.4	5.7	7.4	10.6	12.3	12.4	13.1	10.1	7.5	4.5	7.6
1959	1.7	4.9	6.0	7.1	9.1	11.3	13.5	13.6	12.4	10.7	6.8	5.1	8.5
1960	3.8	3.1	5.2	7.4	10.1	12.3	12.7	12.4	11.4	9.4	6.4	3.9	8.2
1961	3.7	5.2	6.9	6.5	8.5	10.9	11.8	12.5	11.9	9.9	5.5	2.8	8.0
1962	4.3	3.9	2.5	5.5	7.6	10.9	11.3	11.4	10.3	9.7	5.5	3.9	7.3
1963	1.9	1.9	5.1	6.5	8.1	11.3	11.6	11.8	10.9	9.0	5.9	4.3	7.4
1964	5.5	4.8	4.8	7.1	9.5	10.5	11.7	11.1	10.1	8.5	6.6	3.5	7.9
1965	3.3	4.8	3.8	6.4	7.8	11.1	10.5	11.9	11.0	9.7	3.9	2.9	7.3
1966	3.3	3.0	5.1	5.1	8.5	12.1	12.0	11.9	11.6	8.7	5.0	3.5	7.5
1967	3.9	5.0	5.0	5.9	8.0	10.9	12.9	12.6	12.0	8.1	6.3	4.3	7.9
1968	3.3	2.3	4.8	6.0	6.6	10.9	11.8	12.5	11.6	9.6	6.1	4.5	7.5
1969	4.7	0.9	2.9	5.7	7.7	11.7	12.9	13.7	10.9	10.3	3.3	3.9	7.4
1970	3.3	2.0	3.2	5.3	8.9	12.3	11.3	13.1	11.1	8.3	5.3	4.7	7.4
1971	4.7	5.3	5.0	6.9	9.8	9.7	12.2	12.3	11.7	9.3	5.5	6.8	8.3
1972	4.1	4.3	5.4	6.8	8.9	10.2	12.7	11.7	9.9	9.6	5.8	5.2	7.9
22 year average 1951-1972	3.6	3.4	4.6	6.2	8.5	10.9	12.2	12.3	11.2	9.2	6.0	4.4	7.7

TABLE 2C

Monthly and annual maximum temperatures in degrees Centigrade recorded at
Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1951	7.8	8.3	8.9	11.7	17.8	18.3	20.0	20.0	18.9	16.1	11.1	12.2	20.0
1952	10.6	10.0	11.7	17.2	16.1	17.2	20.6	17.8	14.4	11.7	10.6	8.9	20.6
1953	10.0	13.9	16.7	12.2	16.1	23.3	18.9	20.6	23.3	16.7	12.8	11.1	23.3
1954	9.4	8.3	11.1	12.8	17.8	18.9	17.2	20.6	18.9	15.6	9.4	11.1	20.6
1955	10.0	7.2	9.4	14.4	16.7	17.8	23.9	22.2	19.4	18.3	12.2	12.2	23.9
1956	11.1	8.9	11.7	12.8	17.8	17.2	17.8	15.6	17.8	15.0	11.1	10.6	17.8
1957	11.1	8.9	12.8	13.3	16.1	21.1	19.4	17.2	16.7	16.1	11.1	10.6	21.1
1958	9.4	8.9	8.9	14.4	17.2	22.8	20.6	18.9	19.4	14.4	12.8	9.4	22.8
1959	8.3	12.8	13.9	14.4	16.7	18.3	18.9	21.7	20.0	19.4	13.9	10.0	21.7
1960	9.4	10.0	10.6	13.3	18.9	20.6	18.3	19.4	17.8	13.9	11.7	10.0	20.6
1961	8.3	11.7	17.8	13.3	13.9	18.3	17.8	20.5	19.9	14.6	10.9	9.4	20.5
1962	9.6	10.6	7.5	13.1	13.4	21.0	17.5	17.0	18.5	15.6	11.4	9.9	21.0
1963	7.5	6.5	10.2	13.9	14.4	18.3	20.3	19.5	18.0	13.6	10.6	10.9	20.3
1964	11.0	9.5	9.8	13.8	14.5	18.0	18.6	19.0	17.5	14.4	12.4	9.9	19.0
1965	9.5	8.5	13.8	13.0	13.8	17.6	17.0	18.0	16.3	14.0	11.7	8.0	18.0
1966	7.9	9.1	10.9	14.6	18.3	19.0	18.0	17.9	17.3	15.0	9.1	10.8	19.0
1967	9.1	9.6	11.0	12.4	15.6	17.8	20.0	20.3	17.0	14.6	11.4	10.8	20.3
1968	10.0	8.9	10.3	16.0	13.4	17.6	20.3	19.0	17.0	16.7	11.5	9.5	20.3
1969	10.2	7.1	8.7	14.0	15.5	20.2	20.4	19.4	17.5	15.4	9.3	9.0	20.4
1970	7.1	7.2	9.2	15.0	15.7	20.2	19.8	22.0	16.2	14.6	10.4	10.2	22.0
1971	12.1	10.2	10.7	13.0	16.4	17.7	22.8	19.7	21.5	17.6	13.8	12.5	22.8
1972	8.6	8.7	12.2	11.6	15.9	16.0	22.4	18.3	16.7	16.4	13.5	10.7	22.4
22 year average 1951-1972	9.5	9.3	11.3	13.7	16.0	19.0	19.6	19.3	18.2	15.4	11.5	10.3	20.8
22 year extreme	12.1	13.9	17.8	17.2	18.9	23.3	23.9	22.2	23.3	19.4	13.9	12.5	23.9

TABLE 2D

Monthly and annual minimum temperatures in degrees Centigrade recorded at
Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1951	-2.2	-2.8	-4.4	-2.2	-0.6	1.7	2.8	6.7	4.4	0.0	0.0	-1.7	-4.4
1952	-6.1	-3.9	-2.2	0.6	2.2	1.7	6.1	4.4	1.7	1.1	-3.3	-2.2	-6.1
1953	-2.2	-4.4	-1.1	-2.2	1.1	4.4	6.7	6.1	6.1	1.7	1.1	1.1	-4.4
1954	-2.8	-4.4	-3.9	-0.6	1.7	3.3	5.0	4.4	0.6	1.7	1.1	-1.1	-4.4
1955	-7.8	-6.7	-2.8	0.0	0.0	1.7	6.7	6.1	6.1	-0.6	0.0	-6.1	-7.8
1956	-5.6	-6.1	-2.2	-2.2	-0.6	2.2	5.6	3.9	6.1	1.7	0.0	0.6	-6.1
1957	-2.2	-2.2	-1.7	0.6	0.0	1.7	7.2	6.1	3.9	1.1	0.6	-2.2	-2.2
1958	-7.8	-5.0	-5.6	-2.8	1.7	1.7	5.0	5.0	6.7	2.8	0.0	-2.2	-7.8
1959	-7.8	-2.8	0.6	0.0	0.0	3.3	6.1	6.7	4.4	2.8	0.0	0.0	-7.8
1960	-2.8	-6.1	-1.7	0.6	0.6	5.6	4.4	5.6	4.4	5.0	0.6	-1.7	-6.1
1961	-1.7	-2.2	-2.8	-1.7	1.1	2.8	6.1	6.1	6.8	3.0	0.3	-7.6	-7.6
1962	-0.3	-1.8	-4.7	-1.5	-0.1	1.0	5.5	5.1	4.2	0.7	-2.7	-2.8	-4.7
1963	-3.9	-3.9	-1.4	-0.9	1.9	5.6	3.4	4.6	4.3	3.4	-0.7	-2.0	-3.9
1964	0.5	-1.5	-0.1	-1.0	3.9	3.5	5.2	3.7	1.8	0.9	-1.4	-3.4	-3.4
1965	-3.9	-2.4	-5.4	-0.4	0.0	5.6	5.0	6.0	4.7	3.3	-4.2	-2.3	-5.4
1966	-1.5	-4.2	-3.3	-3.0	2.0	6.0	6.0	6.0	4.5	0.4	-0.6	-1.8	-4.2
1967	-1.8	0.3	-0.6	-1.6	-1.0	4.0	5.5	6.0	4.9	0.4	-0.6	-3.0	-3.0
1968	-4.7	-4.0	-0.5	-4.9	-2.1	4.2	5.0	4.7	3.9	3.0	0.7	-3.0	-4.9
1969	-3.5	-7.0	-4.0	-1.0	0.9	2.5	7.6	4.7	3.1	2.5	-3.3	-1.7	-7.0
1970	-3.9	-4.6	-4.8	-2.1	2.1	4.9	6.0	5.5	5.0	-0.4	-0.4	-2.2	-4.8
1971	-1.5	-2.2	-1.5	-1.5	1.5	2.6	4.3	4.9	3.1	-1.0	-5.5	0.2	-5.5
1972	-3.0	-0.3	-1.0	0.7	4.0	3.0	6.5	4.2	2.3	2.8	-1.0	-0.5	-3.0
22 year average 1951-1972	-3.5	-3.6	-2.5	-1.2	0.9	3.3	5.5	5.3	4.2	1.7	-0.9	-2.1	-5.2
22 year extreme	-7.8	-7.0	-5.6	-4.9	-2.1	1.0	2.8	3.7	0.6	-1.0	-5.5	-7.6	-7.8

TABLE 2E

Monthly and annual means of daily maximum temperature in degrees Centigrade
at Sule Skerry
(20 years from 1953 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
degrees Centigrade													
1953	8.0	7.4	8.6	7.8	-	-	14.8	15.3	14.1	12.2	9.9	9.6	-
1954	7.4	6.1	7.4	9.3	10.9	11.4	13.7	13.7	11.8	10.1	8.6	8.0	9.9
1955	5.6	4.3	5.6	8.0	7.7	12.9	15.6	16.4	14.5	10.8	10.7	6.9	9.9
1956	6.4	5.7	7.4	8.3	10.7	11.8	12.5	13.2	13.3	10.7	9.5	8.5	9.8
1957	7.8	6.1	8.0	9.4	9.7	11.9	13.3	13.7	12.2	11.2	9.1	7.7	10.0
1958	6.1	5.4	4.2	7.5	9.2	12.1	14.2	14.5	15.1	12.1	10.2	7.2	9.8
1959	4.7	7.7	8.1	9.1	10.9	12.9	14.3	15.2	14.6	12.9	9.7	7.9	10.7
1960	6.7	6.0	7.1	9.1	11.6	14.0	15.1	14.8	13.8	11.1	9.2	7.4	10.5
1961	6.4	7.6	8.6	8.7	10.8	12.4	13.0	14.2	13.7	11.6	8.7	6.0	10.1
1962	7.3	6.7	5.1	8.1	9.6	12.5	13.1	13.5	12.3	11.6	8.2	7.4	9.6
1963	5.0	4.9	7.5	8.1	9.8	13.0	13.8	13.4	12.6	11.2	8.2	7.1	9.5
1964	8.1	7.2	7.0	9.0	10.7	12.2	13.0	12.7	12.2	11.0	9.5	6.8	9.9
1965	6.3	6.8	6.4	8.7	9.6	12.5	13.0	13.7	12.4	11.9	7.1	5.9	9.5
1966	6.1	5.6	7.1	7.4	10.4	-	14.5	14.6	13.0	11.1	8.0	7.0	-
1967	6.6	7.3	7.4	8.3	10.1	13.1	14.3	14.3	13.8	10.6	9.1	7.0	10.2
1968	6.3	5.3	7.4	8.3	9.0	12.7	14.2	15.3	14.0	11.7	8.8	7.4	10.0
1969	7.1	4.4	5.8	8.5	9.6	13.5	14.5	15.3	13.1	12.5	6.8	7.2	9.9
1970	6.3	5.6	5.8	7.6	10.3	14.6	13.1	14.3	13.3	11.0	8.6	7.9	9.9
1971	7.6	7.8	7.9	9.3	12.1	12.2	14.4	14.6	14.1	12.1	9.2	9.5	10.9
1972	7.1	6.5	7.6	8.9	11.0	12.2	14.3	13.8	12.3	12.0	8.4	8.4	10.2
20 year average 1953-1972	6.7	6.2	7.0	8.5	10.2	12.7	13.9	14.3	13.3	11.5	8.9	7.5	10.0

TABLE 2F

Monthly and annual means of daily minimum temperature in degrees Centigrade
at Sule Skerry
(20 years from 1953 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1953	4.9	4.7	5.7	4.0	7.0	9.3	10.9	11.5	11.2	9.2	8.3	6.9	7.8
1954	4.1	2.8	4.1	5.3	6.9	8.6	9.9	10.3	9.2	7.8	6.1	5.1	6.7
1955	2.9	1.6	3.1	5.6	5.2	7.8	10.1	11.2	9.7	6.0	7.3	2.8	6.1
1956	1.6	2.0	3.2	3.5	6.4	7.0	9.5	8.8	9.2	7.1	6.2	4.8	5.8
1957	4.8	3.5	5.3	5.5	6.3	7.9	9.8	10.4	8.7	8.1	6.7	4.6	6.8
1958	3.6	0.6	1.1	4.6	5.7	8.4	10.4	11.2	11.9	9.4	7.8	5.1	6.7
1959	2.1	4.9	5.5	5.7	7.4	9.0	11.1	11.6	10.9	10.2	7.3	5.4	7.6
1960	4.2	3.2	4.6	6.1	7.7	9.6	10.6	11.2	10.3	8.9	6.9	4.7	7.3
1961	4.0	5.3	6.0	5.5	7.4	9.1	10.4	10.9	10.7	9.1	6.0	3.6	7.3
1962	4.6	3.8	2.1	4.5	6.4	8.7	9.7	9.9	9.5	9.4	5.7	4.6	6.6
1963	2.7	2.1	4.6	4.9	6.0	9.2	10.0	10.2	9.7	8.4	5.9	4.8	6.5
1964	6.0	4.9	4.8	5.9	7.5	8.5	9.9	9.4	9.3	7.9	6.8	3.7	7.1
1965	3.5	4.5	3.2	5.1	6.4	8.7	8.8	9.9	9.5	9.3	4.3	3.6	6.4
1966	3.9	3.2	4.2	3.8	6.6	9.8	10.6	11.0	10.8	8.4	5.1	4.0	6.8
1967	4.7	5.0	4.2	5.2	6.3	9.0	10.5	10.9	10.8	7.4	5.7	3.8	7.0
1968	3.6	2.5	3.6	3.7	4.5	8.3	9.9	10.5	10.3	8.9	5.7	4.2	6.3
1969	4.7	1.2	2.6	4.3	5.1	8.4	9.8	11.4	9.2	9.2	3.3	4.6	6.1
1970	4.4	2.7	1.9	2.0	6.4	9.7	9.4	10.7	10.1	8.4	5.4	4.8	6.3
1971	4.8	5.1	4.3	5.1	7.6	7.7	9.9	10.6	10.4	8.5	4.6	6.1	7.1
1972	3.6	4.0	4.5	5.5	7.1	8.2	9.9	10.1	9.0	8.6	5.3	5.4	6.8
20 year average 1953-1972	3.9	3.4	3.9	4.8	6.5	8.7	10.1	10.6	10.0	8.5	6.0	4.6	6.8

TABLE 2G

Monthly and annual means of daily mean temperature in degrees Centigrade
 at Sule Skerry
 (20 years from 1953 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1953	6.4	6.1	7.2	5.9	-	-	12.8	13.4	12.6	10.7	9.1	8.2	-
1954	5.7	4.5	5.7	7.3	8.9	10.1	11.8	12.0	10.5	8.9	7.4	6.6	8.3
1955	4.3	2.9	4.3	6.8	6.4	10.4	12.8	13.8	12.1	8.4	8.9	4.9	8.0
1956	4.0	3.8	5.3	5.9	8.6	9.4	11.0	11.1	11.3	8.9	7.8	6.7	7.8
1957	6.3	4.8	6.7	7.4	8.1	9.9	11.6	12.1	10.4	9.6	7.9	6.1	8.4
1958	4.8	3.0	2.6	6.1	7.4	10.3	12.3	12.8	13.5	10.7	9.1	6.2	8.2
1959	3.4	6.3	6.8	7.4	9.2	10.9	12.7	13.4	12.7	11.6	8.5	6.7	9.1
1960	5.5	4.6	5.8	7.6	9.6	11.8	12.8	12.9	12.1	10.1	8.1	6.1	8.9
1961	5.2	6.5	7.3	7.1	9.1	10.7	11.7	12.5	12.2	10.3	7.3	4.8	8.7
1962	5.9	5.3	3.6	6.3	8.0	10.6	11.4	11.7	10.9	10.5	6.9	6.0	8.1
1963	3.9	3.5	6.1	6.5	7.9	11.1	11.9	11.8	11.1	9.8	7.1	5.9	8.0
1964	7.1	6.1	5.9	7.5	9.1	10.3	11.5	11.1	10.7	9.5	8.1	5.3	8.5
1965	4.9	5.7	4.8	6.9	8.0	10.6	10.9	11.8	10.9	10.6	5.7	4.7	7.9
1966	5.0	4.4	5.7	5.6	8.5	-	12.5	12.8	11.9	9.7	6.5	5.5	-
1967	5.7	6.1	5.8	6.7	8.2	11.1	12.4	12.6	12.3	9.0	7.4	5.4	8.6
1968	4.9	3.9	5.5	6.0	6.7	10.5	12.1	12.9	12.1	10.3	7.3	5.8	8.1
1969	5.9	2.8	4.2	6.4	7.3	10.9	12.1	13.3	11.1	10.9	5.1	5.9	8.0
1970	5.3	4.1	3.9	4.8	8.3	12.1	11.3	12.5	11.7	9.7	7.0	6.3	8.1
1971	6.2	6.5	6.1	7.2	9.9	9.9	12.1	12.6	12.3	10.3	6.9	7.8	9.0
1972	5.3	5.3	6.1	7.2	9.1	10.2	12.1	11.9	10.7	10.3	6.9	6.9	8.5
20 year average 1953-1972	5.3	4.8	5.5	6.6	8.3	10.6	12.0	12.5	11.7	10.0	7.5	6.1	8.3

TABLE 2H

Monthly and annual maximum temperatures in degrees Centigrade
at Sule Skerry from July 1952 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1952	-	-	-	-	-	-	16.7	15.6	13.3	11.7	10.6	10.6	-
1953	10.0	11.1	11.1	11.7	-	-	17.2	17.8	17.2	14.4	11.7	11.7	-
1954	10.6	10.0	11.1	10.6	13.9	16.1	15.6	15.6	15.0	12.8	10.6	11.7	16.1
1955	10.6	7.8	7.8	10.0	10.6	15.6	18.3	21.1	17.2	15.6	13.9	11.7	21.1
1956	10.0	8.3	10.6	12.2	12.8	15.0	15.0	14.4	15.0	12.8	11.7	11.1	15.0
1957	11.1	8.9	10.6	11.7	15.0	17.2	16.7	16.7	15.0	14.4	11.1	10.6	17.2
1958	10.6	9.4	8.3	10.0	11.1	16.1	16.7	17.8	17.2	14.4	12.8	10.6	17.8
1959	8.9	11.1	10.6	11.7	13.9	15.6	16.7	20.6	18.3	16.7	13.9	11.1	20.6
1960	10.0	9.4	10.0	11.7	14.4	17.2	17.2	16.7	16.7	13.3	12.2	10.0	17.2
1961	9.0	10.5	12.0	11.0	12.5	16.0	14.5	20.5	16.0	15.0	12.5	12.0	20.5
1962	9.5	10.5	8.0	11.0	11.5	16.0	15.5	15.5	15.5	14.5	11.5	10.5	16.0
1963	8.0	10.0	9.5	10.5	12.5	15.0	20.5	17.8	15.0	14.0	10.7	10.8	20.5
1964	11.0	9.2	9.6	12.2	12.5	14.7	15.5	15.0	16.2	13.5	11.8	10.3	16.2
1965	9.0	8.5	11.1	11.1	12.8	14.5	15.3	15.7	15.0	13.6	11.7	9.5	15.7
1966	10.5	8.6	9.3	10.6	13.6	-	16.0	16.5	15.2	14.0	10.5	10.3	-
1967	9.1	9.1	10.0	10.2	13.5	16.6	17.5	17.3	15.6	13.4	12.8	10.6	17.5
1968	9.4	8.0	9.6	12.9	12.6	14.9	17.7	17.9	16.7	14.0	11.8	10.5	17.9
1969	10.0	8.4	8.8	13.8	12.9	16.9	18.6	18.2	15.9	16.0	9.8	9.4	18.6
1970	9.1	8.2	8.5	10.2	13.7	18.0	19.1	17.0	15.7	13.7	15.4	11.4	19.1
1971	13.0	9.8	9.8	13.3	14.0	15.3	19.4	16.8	19.0	15.6	13.4	12.0	19.4
1972	9.8	8.6	9.7	10.8	14.2	15.5	17.3	16.4	14.4	14.7	12.7	11.8	17.3
average	10.0	9.3	9.8	11.4	13.1	15.9	17.0	17.2	16.0	14.2	12.1	10.9	18.0
extreme	13.0	11.1	12.0	13.8	15.0	18.0	20.5	21.1	19.0	16.7	15.4	12.0	21.1

TABLE 21

Monthly and annual minimum temperatures in degrees Centigrade
at Sule Skerry from July 1952 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1952	-	-	-	-	-	-	7.8	8.9	3.9	5.0	-1.1	-1.7	-
1953	2.2	0.0	1.1	0.6	5.0	5.0	8.9	9.4	8.9	5.6	5.0	3.3	0.0
1954	0.0	-1.7	-2.8	2.2	2.2	7.2	7.2	7.2	5.6	3.3	2.2	1.1	-2.8
1955	-4.4	-1.7	-1.1	2.2	1.7	5.0	8.9	8.3	6.1	1.1	1.7	-1.7	-4.4
1956	-2.8	-3.3	0.0	0.6	2.8	4.4	7.8	6.7	7.2	2.2	1.1	1.7	-3.3
1957	1.1	0.6	1.7	0.6	2.2	4.4	7.2	8.3	4.4	5.6	3.3	-0.6	-0.6
1958	-2.8	-3.9	-5.6	1.7	3.3	4.4	7.2	8.9	8.9	4.4	3.9	1.7	-5.6
1959	-2.8	1.1	0.0	2.8	2.8	5.0	8.9	8.3	7.8	5.0	3.3	2.8	-2.8
1960	-1.1	-2.8	-1.1	3.3	3.3	7.8	8.3	7.8	8.3	6.1	3.9	1.7	-2.8
1961	1.1	1.1	0.0	-1.0	3.5	7.0	8.5	8.5	8.0	5.0	2.0	-8.0	-8.0
1962	0.0	-0.5	-1.5	1.0	3.0	5.5	8.0	7.5	7.0	1.5	-1.0	-0.5	-1.5
1963	-1.0	-1.5	3.0	-0.5	3.0	8.0	6.5	7.5	7.0	5.5	0.5	-1.3	-1.5
1964	1.9	0.1	2.5	2.7	5.2	3.5	7.5	7.0	5.2	1.6	2.0	-1.5	-1.5
1965	-0.2	-1.5	-1.0	1.6	2.5	6.6	7.0	7.7	7.0	7.0	-1.2	-0.8	-1.5
1966	1.1	0.0	-0.7	-2.2	3.7	7.7	8.8	8.5	8.2	4.2	0.5	-0.5	-2.2
1967	0.0	2.2	0.0	0.0	0.4	7.2	8.4	7.9	9.1	0.5	0.9	-2.5	-2.5
1968	-3.3	-1.2	0.1	-5.0	-0.5	7.3	7.8	7.4	6.9	1.7	1.0	-2.4	-5.0
1969	-0.3	-6.3	-2.6	1.4	2.3	5.8	7.9	8.0	4.4	4.1	-2.4	0.1	-6.3
1970	-1.4	-0.8	-4.4	-3.7	4.2	6.7	7.9	9.0	7.8	4.0	0.2	0.7	-4.4
1971	-0.8	0.2	0.5	0.2	3.6	5.3	5.3	8.0	6.9	1.7	-3.7	3.0	-3.7
1972	-1.6	1.2	0.6	2.7	5.7	6.7	7.1	7.8	5.4	4.4	1.2	0.4	-1.6
average	-0.8	-0.9	-0.6	0.5	3.0	6.0	7.8	8.0	6.9	3.8	1.1	-0.2	-3.1
extreme	-4.4	-6.3	-5.6	-5.0	-0.5	3.5	5.3	6.7	3.9	0.5	-3.7	-8.0	-8.0

TABLE 2J

Monthly and annual means of daily maximum temperature in degrees Centigrade
at Stenness, Orkney from June 1961 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1961	-	-	-	-	-	14.1	14.4	15.9	15.2	11.9	7.8	5.1	-
1962	6.7	6.8	4.9	9.2	10.5	14.8	14.2	14.6	13.3	12.0	7.3	6.2	10.0
1963	3.2	3.9	7.7	9.8	11.6	14.9	15.5	14.9	13.9	11.4	7.7	5.7	10.0
1964	7.7	6.9	6.8	10.6	12.9	14.1	14.7	13.8	13.4	11.3	8.9	5.8	10.6
1965	5.3	6.3	7.0	10.1	10.7	14.6	13.7	14.8	13.6	11.9	5.9	4.6	9.9
1966	4.9	4.9	7.7	8.6	12.4	15.7	15.6	15.2	13.9	11.0	7.0	5.9	10.2
1967	5.8	7.1	7.9	9.3	11.2	14.9	16.6	15.8	14.7	10.7	8.6	6.6	10.8
1968	5.4	4.7	7.5	9.6	10.2	15.1	15.1	16.4	14.4	11.7	7.8	6.2	10.3
1969	6.7	3.3	5.4	9.1	10.9	15.9	16.1	16.6	13.9	13.2	5.8	5.8	10.2
1970	5.4	4.3	5.4	8.7	12.6	16.9	14.3	16.5	14.1	10.9	7.6	6.8	10.3
1971	6.7	7.6	7.8	9.7	13.7	12.8	16.3	15.9	14.9	12.2	8.0	8.8	11.2
1972	5.8	6.5	8.3	10.0	12.4	13.8	16.7	14.9	13.0	12.3	7.9	7.6	10.8
Mean	5.8	5.7	6.9	9.5	11.7	14.8	15.3	15.4	14.0	11.7	7.5	6.3	10.4

Absolute maximum temperatures in degrees Centigrade at Stenness, Orkney,
in each month and year from June 1961 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1961	-	-	-	-	-	19.4	17.2	20.6	20.6	15.6	10.6	10.0	-
1962	10.6	9.4	7.8	14.4	14.4	21.1	18.3	17.8	18.9	16.1	11.7	10.6	21.1
1963	7.2	6.7	11.1	13.9	16.1	20.6	21.7	21.1	18.3	13.9	10.6	11.7	21.7
1964	10.6	10.6	10.0	15.6	16.1	18.9	18.3	20.0	19.4	15.0	12.2	10.0	20.0
1965	9.4	8.3	13.9	12.8	15.0	18.3	19.4	17.8	16.1	14.4	12.8	7.8	19.4
1966	8.9	9.4	11.1	15.0	16.7	19.4	18.9	17.8	16.7	15.6	10.0	11.1	19.4
1967	8.9	10.0	11.1	12.2	15.0	20.6	20.6	21.1	17.8	14.4	11.1	11.1	21.1
1968	10.6	8.9	11.7	17.2	16.7	18.9	19.4	20.6	17.2	17.2	11.1	8.9	20.6
1969	10.0	7.8	8.3	15.0	15.6	23.3	21.7	20.0	17.8	16.7	8.9	9.4	23.3
1970	9.4	7.2	9.4	15.0	15.6	22.2	21.1	22.2	17.8	15.0	10.6	11.7	22.2
1971	12.2	10.2	10.3	12.6	16.8	18.1	23.2	21.4	22.1	17.8	15.3	12.8	23.2
1972	9.0	9.4	13.7	12.3	16.2	16.8	26.5	18.8	15.6	18.0	13.6	12.8	26.5
Mean	9.7	8.9	10.8	14.2	15.8	19.8	20.5	19.9	18.2	15.8	11.5	10.7	21.7
Extreme	12.2	10.6	13.9	17.2	16.8	23.3	26.5	22.2	22.1	18.0	15.3	12.8	26.5

TABLE 2K

Monthly and annual means of daily minimum temperature in degrees Centigrade at Stenness, Orkney from June 1961 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1961	-	-	-	-	-	7.9	9.8	10.0	9.2	7.9	2.9	0.3	-
1962	2.2	1.6	-0.6	2.3	5.5	8.2	8.8	8.7	8.5	7.6	3.3	1.4	4.8
1963	-2.1	-1.1	3.0	3.7	5.2	8.8	9.0	9.3	8.7	6.8	3.3	1.7	4.7
1964	3.4	2.7	2.6	4.2	6.8	7.2	9.2	8.6	7.8	6.2	4.6	1.2	5.4
1965	1.1	2.7	1.1	3.3	5.9	7.8	7.9	9.7	8.8	7.6	1.2	0.6	4.8
1966	1.6	0.3	2.8	1.4	5.8	9.7	9.5	9.2	9.7	6.7	2.4	1.4	5.0
1967	2.1	2.9	2.2	3.1	5.1	8.1	9.5	10.0	9.8	5.7	4.1	2.0	5.4
1968	0.6	-0.9	2.3	3.3	3.8	8.3	8.7	9.1	8.6	7.7	3.9	1.9	4.8
1969	2.7	-2.0	0.2	3.1	5.2	8.3	9.9	11.3	7.9	8.2	0.6	2.2	4.8
1970	1.5	-1.0	0.5	1.9	6.3	8.8	8.8	10.6	8.7	6.1	2.7	2.2	4.8
1971	2.9	3.2	1.9	3.1	6.7	6.7	9.2	9.2	9.2	6.6	3.3	4.3	5.5
1972	2.4	2.2	3.0	3.8	6.2	6.8	9.6	9.3	7.2	7.4	3.6	3.3	5.4
Mean	1.7	1.0	1.7	3.0	5.7	8.1	9.2	9.6	8.7	7.0	3.0	1.9	5.0

Absolute minimum temperatures in degrees Centigrade at Stenness, Orkney in each month and year from June 1961 to December 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
<u>degrees Centigrade</u>													
1961	-	-	-	-	-	1.7	6.7	6.7	6.1	3.3	-1.1	-9.4	-
1962	-1.7	-1.7	-6.7	-2.2	0.6	3.3	3.3	5.6	5.6	0.0	-3.3	-6.7	-6.7
1963	-12.8	-5.6	-0.6	-2.2	2.8	5.6	3.9	2.8	5.0	3.3	-1.7	-3.3	-12.8
1964	-1.1	-2.2	-1.7	-3.3	2.8	1.1	4.4	5.0	2.2	0.6	-1.7	-3.9	-3.9
1965	-6.1	-2.2	-5.0	-1.7	0.6	0.6	4.4	5.6	5.6	1.7	-7.2	-3.3	-7.2
1966	-3.3	-6.7	-2.8	-5.0	2.8	6.7	6.1	5.6	5.6	1.1	-1.1	-3.9	-6.7
1967	-1.7	0.0	-0.6	-2.8	-2.8	5.6	3.3	5.6	4.4	1.1	-0.6	-3.3	-3.3
1968	-6.1	-8.9	-1.1	-4.4	-1.7	5.6	1.7	2.8	2.2	2.2	-0.6	-2.8	-8.9
1969	-2.2	-11.1	-7.2	-2.8	1.1	1.1	6.7	2.8	1.1	2.8	-3.3	-2.2	-11.1
1970	-6.1	-6.7	-8.3	-2.8	0.0	3.3	6.7	7.2	2.2	-0.6	-2.8	-0.6	-8.3
1971	-1.6	-3.6	-3.8	-1.1	1.1	3.4	2.6	1.8	3.3	0.4	-2.8	-0.6	-3.8
1972	-3.5	-1.5	-0.4	-0.2	2.8	0.9	6.0	1.7	3.2	1.8	-3.1	-2.3	-3.5
Mean	-4.2	-4.6	-3.5	-2.6	0.9	3.2	4.7	4.4	3.9	1.5	-2.4	-3.5	-6.9
Extreme	-12.8	-11.1	-8.3	-5.0	-2.8	0.6	1.7	1.7	1.1	-0.6	-7.2	-9.4	-12.8

TABLE 2L

Averages and extremes of dry bulb temperature in degrees Centigrade
at 0000 hours, 0300 hours, 0600 hours, 0900 hours, 1200 hours,
1500 hours, 1800 hours and 2100 hours GMT at Kirkwall Airport
(15 years from 1957 to 1971)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
<u>Dry bulb temperature</u>													
<u>At 0000 hours GMT</u>													
Average	3.7	3.2	3.9	4.8	6.7	9.2	10.4	10.9	10.3	8.8	5.5	4.3	6.8
Absolute Maximum	10.9	9.1	12.2	9.5	11.1	13.3	15.3	15.0	14.5	13.8	12.0	11.1	15.3
Absolute Minimum	-6.1	-4.4	-3.9	-3.1	-0.1	1.5	4.9	5.1	4.2	0.7	-3.1	-7.1	-7.1
<u>At 0300 hours GMT</u>													
Average	3.7	3.1	3.7	4.6	6.6	9.0	10.2	10.8	10.2	8.7	5.5	4.3	6.7
Absolute Maximum	11.9	10.0	12.8	9.9	11.1	12.9	15.0	15.2	15.0	14.6	12.0	11.0	15.2
Absolute Minimum	-3.3	-5.6	-4.4	-4.0	0.0	2.8	4.1	5.0	3.4	0.1	-3.0	-6.6	-6.6
<u>At 0600 hours GMT</u>													
Average	3.6	3.0	3.6	4.9	7.5	10.2	11.1	11.2	10.2	8.7	5.5	4.2	7.0
Absolute Maximum	11.1	9.4	9.9	10.2	11.7	15.0	15.6	15.6	14.4	14.3	12.4	10.5	15.6
Absolute Minimum	-3.0	-5.5	-4.4	-3.2	0.5	5.1	7.2	6.0	2.7	-0.1	-2.0	-6.0	-6.0
<u>At 0900 hours GMT</u>													
Average	3.6	3.4	4.7	6.8	9.0	11.7	12.4	12.7	11.8	9.5	5.8	4.2	8.0
Absolute Maximum	11.3	9.4	11.1	12.5	15.6	20.0	19.6	18.8	16.5	15.0	13.5	10.8	20.0
Absolute Minimum	-3.0	-5.0	-2.2	-1.7	1.7	6.4	8.5	8.5	5.5	1.8	-2.2	-6.4	-6.4
<u>At 1200 hours GMT</u>													
Average	4.5	4.7	5.9	8.0	10.0	12.8	13.4	13.7	12.8	10.6	6.9	5.0	9.0
Absolute Maximum	10.8	10.6	16.9	15.0	16.7	21.7	22.4	21.0	21.3	17.8	13.3	10.6	22.4
Absolute Minimum	-2.8	-4.0	-1.1	0.2	3.6	7.8	8.5	6.6	5.9	2.5	-0.9	-1.4	-4.0
<u>At 1500 hours GMT</u>													
Average	4.3	4.7	5.8	8.0	9.9	12.9	13.5	13.9	12.8	10.4	6.4	4.6	9.0
Absolute Maximum	10.8	11.1	13.9	14.0	17.8	20.6	20.6	21.1	20.8	18.9	12.0	10.5	21.1
Absolute Minimum	-5.6	-4.0	-1.6	0.0	3.8	7.8	9.0	8.3	6.0	3.5	-0.8	-1.8	-5.6
<u>At 1800 hours GMT</u>													
Average	3.7	3.5	4.7	6.8	9.0	11.8	12.7	12.9	11.4	9.1	5.8	4.4	8.0
Absolute Maximum	10.5	9.5	10.6	12.1	16.1	17.8	18.0	17.2	16.4	15.4	11.7	10.4	18.0
Absolute Minimum	-3.9	-4.0	-2.8	0.0	3.3	4.5	8.8	8.5	5.0	1.2	-2.2	-6.6	-6.6
<u>At 2100 hours GMT</u>													
Average	3.7	3.4	4.0	5.3	7.4	10.3	11.2	11.3	10.4	8.8	5.6	4.3	7.2
Absolute Maximum	11.4	9.2	10.0	11.0	11.7	14.8	16.0	17.2	14.6	15.0	12.6	11.0	17.2
Absolute Minimum	-6.1	-3.9	-3.3	-1.9	1.6	4.4	7.2	6.5	4.2	0.6	-3.0	-3.0	-6.1

TABLE 2M

Percentage number of occasions with dry bulb temperatures at or below certain limits at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 hours GMT calculated from readings made at Kirkwall Airport during the 15 years from 1957 to 1971

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	16°C 960.8°F) or below	20°C (68.0°F) or below
January		%	%	%	%	%	%
	0000	8	58	97	100	100	100
	0300	9	56	97	100	100	100
	0600	8	57	97	100	100	100
	0900	7	57	96	100	100	100
	1200	4	42	95	100	100	100
	1500	6	45	94	100	100	100
	1800	10	54	97	100	100	100
	2100	9	55	96	100	100	100
February	0000	14	63	97	100	100	100
	0300	16	64	98	100	100	100
	0600	14	65	98	100	100	100
	0900	13	60	97	100	100	100
	1200	5	39	90	100	100	100
	1500	6	41	91	100	100	100
	1800	13	59	97	100	100	100
	2100	13	61	97	100	100	100
March	0000	7	52	96	100	100	100
	0300	8	53	96	100	100	100
	0600	9	55	96	100	100	100
	0900	5	38	93	100	100	100
	1200	2	24	81	99	100	100
	1500	2	24	81	99	100	100
	1800	5	38	73	100	100	100
	2100	6	50	96	100	100	100
April	0000	4	39	93	100	100	100
	0300	5	41	94	100	100	100
	0600	4	35	93	100	100	100
	0900	1	12	71	99	100	100
	1200	0	6	51	94	100	100
	1500	0	6	50	94	100	100
	1800	0	12	67	100	100	100
	2100	2	30	88	100	100	100

TABLE 2M (Contd)

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	18°C (60.8°F) or below	20°C (68.0°F) or below
		%	%	%	%	%	%
May	0000	0	12	73	100	100	100
	0300	0	11	76	100	100	100
	0600	0	5	61	100	100	100
	0900	0	2	33	92	100	100
	1200	0	1	20	80	98	100
	1500	0	0	20	81	99	100
	1800	0	1	33	94	100	100
	2100	0	7	61	100	100	100
June	0000	0	2	24	96	100	100
	0300	0	1	27	98	100	100
	0600	0	0	9	89	100	100
	0900	0	0	2	62	97	100
	1200	0	0	1	43	89	100
	1500	0	0	0	40	89	100
	1800	0	0	1	60	97	100
	2100	0	0	30	87	100	100
July	0000	0	0	9	83	100	100
	0300	0	0	11	86	100	100
	0600	0	0	1	76	100	100
	0900	0	0	0	47	96	100
	1200	0	0	0	28	88	99
	1500	0	0	0	25	86	100
	1800	0	0	0	41	95	100
	2100	0	0	2	69	100	100
August	0000	0	0	8	74	100	100
	0300	0	0	6	75	100	100
	0600	0	0	3	71	100	100
	0900	0	0	0	35	96	100
	1200	0	0	1	17	87	100
	1500	0	0	0	16	87	100
	1800	0	0	0	32	96	100
	2100	0	0	3	68	100	100

TABLE 2M (Contd)

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	18°C (60.8°F) or below	20°C (68.0°F) or below
		%	%	%	%	%	%
September	0000	0	0	14	79	100	100
	0300	0	0	15	83	100	100
	0600	0	0	15	82	100	100
	0900	0	0	3	56	99	100
	1200	0	0	1	35	94	100
	1500	0	0	2	35	93	100
	1800	0	0	6	64	99	100
	2100	0	0	14	77	100	100
October	0000	0	4	36	93	100	100
	0300	0	4	37	93	100	100
	0600	0	4	36	95	100	100
	0900	0	2	24	88	100	100
	1200	0	0	12	72	99	100
	1500	0	1	16	78	99	100
	1800	0	3	31	93	100	100
	2100	0	5	37	91	100	100
November	0000	2	32	78	100	100	100
	0300	2	32	79	100	100	100
	0600	1	34	79	100	100	100
	0900	2	29	80	99	100	100
	1200	1	15	65	99	100	100
	1500	1	19	71	100	100	100
	1800	2	27	79	100	100	100
	2100	2	29	77	100	100	100
December	0000	7	46	92	100	100	100
	0300	6	47	92	100	100	100
	0600	6	47	93	100	100	100
	0900	6	49	93	100	100	100
	1200	3	35	90	100	100	100
	1500	4	39	91	100	100	100
	1800	5	44	92	100	100	100
	2100	5	47	92	100	100	100

Example: At 0600 hours GMT in December during the 15 years from 1957 to 1971, air temperatures were at or below 4 degrees centigrade (39.2°F) on 47 per cent of occasions.

TABLE 2N

Averages and extremes of wet bulb temperature in degrees Centigrade
 at 0000 hours, 0300 hours, 0600 hours, 0900 hours, 1200 hours,
 1500 hours, 1800 hours and 2100 hours GMT at Kirkwall Airport
 (15 years from 1957 to 1971)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
<u>At 0000 hours GMT</u>	<u>Wet bulb temperature</u>												
Average	3.0	2.5	3.1	4.1	6.1	8.6	9.8	10.4	9.7	8.1	4.7	3.5	6.1
Absolute maximum	9.8	9.0	10.6	8.8	10.6	12.8	13.9	15.0	13.9	13.5	11.7	10.4	15.0
Absolute minimum	-7.2	-5.5	-4.4	-3.2	-0.6	1.0	4.0	4.0	3.1	0.0	-4.0	-8.1	-8.1
<u>At 0300 hours GMT</u>													
Average	3.0	2.3	3.0	4.0	6.0	8.5	9.7	10.2	9.6	8.0	4.8	3.5	6.1
Absolute maximum	10.6	9.4	10.6	9.3	10.6	12.8	14.4	15.0	14.3	14.0	11.1	10.4	15.0
Absolute minimum	-3.9	-6.1	-4.4	-4.1	-0.6	2.2	3.5	4.2	2.5	-0.7	-3.4	-7.4	-7.4
<u>At 0600 hours GMT</u>													
Average	2.9	2.2	2.9	4.2	6.7	9.4	10.4	10.6	9.6	7.9	4.7	3.4	6.3
Absolute maximum	10.0	9.0	9.1	8.9	10.6	13.9	14.4	15.0	14.0	13.6	11.5	10.2	15.0
Absolute minimum	-3.9	-6.2	-5.2	-3.5	-0.2	2.7	6.2	5.0	2.0	-0.8	-2.6	-7.0	-7.0
<u>At 0900 hours GMT</u>													
Average	2.9	2.5	3.8	5.5	7.6	10.2	11.1	11.6	10.7	8.6	4.9	3.4	6.9
Absolute maximum	10.2	8.3	9.6	10.2	12.8	17.2	17.4	16.8	15.0	14.0	11.8	10.4	17.4
Absolute minimum	-4.0	-5.0	-2.7	-2.0	1.0	3.7	7.1	6.9	4.0	0.5	-2.9	-7.1	-7.1
<u>At 1200 hours GMT</u>													
Average	3.6	3.6	4.5	6.2	8.2	10.8	11.6	12.1	11.2	9.3	5.8	4.0	7.6
Absolute maximum	9.8	9.4	12.8	11.6	13.9	16.7	18.0	18.2	16.6	15.6	12.6	10.3	18.2
Absolute minimum	-3.0	-4.1	-2.8	-1.2	1.4	5.0	7.5	6.0	5.0	1.5	-1.4	-2.8	-4.1
<u>At 1500 hours GMT</u>													
Average	3.5	3.5	4.5	6.2	8.1	10.9	11.6	12.2	11.2	9.1	5.5	3.7	7.5
Absolute maximum	10.0	9.4	12.0	11.1	14.4	16.7	17.1	18.3	16.1	16.1	11.4	10.0	18.3
Absolute minimum	-6.7	-4.1	-2.0	-0.3	1.4	5.5	7.0	7.3	5.0	0.9	-2.0	-3.5	-6.7
<u>At 1800 hours GMT</u>													
Average	3.0	2.7	3.7	5.5	7.5	10.2	11.2	11.6	10.4	8.3	4.9	3.5	6.9
Absolute maximum	9.5	8.9	9.4	10.0	13.9	15.0	16.1	15.9	15.0	14.0	11.1	10.0	16.1
Absolute minimum	-4.4	-4.6	-3.8	-1.0	1.4	4.0	7.1	7.3	4.0	0.6	-2.6	-7.1	-7.1
<u>At 2100 hours GMT</u>													
Average	3.0	2.5	3.2	4.5	6.5	9.4	10.4	10.7	9.7	8.0	4.8	3.5	6.4
Absolute maximum	10.1	9.0	9.0	8.9	11.7	13.9	14.7	15.0	13.6	14.8	12.1	10.6	15.0
Absolute minimum	-7.2	-4.4	-3.9	-2.5	0.6	3.3	6.0	5.4	3.1	-0.1	-4.0	-3.8	-7.2

TABLE 20

Percentage number of occasions with wet bulb temperatures at or below certain limits at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 hours GMT calculated from readings made at Kirkwall Airport during the 15 years from 1957 to 1971

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	16°C (60.8°F) or below	20°C (68.0°F) or below
		%	%	%	%	%	%
January	0000	12	65	98	100	100	100
	0300	14	65	98	100	100	100
	0600	13	65	98	100	100	100
	0900	13	66	98	100	100	100
	1200	9	55	97	100	100	100
	1500	11	57	97	100	100	100
	1800	15	64	99	100	100	100
	2100	14	65	98	100	100	100
February	0000	24	70	99	100	100	100
	0300	24	70	99	100	100	100
	0600	25	71	99	100	100	100
	0900	21	68	99	100	100	100
	1200	12	56	96	100	100	100
	1500	13	57	97	100	100	100
	1800	20	65	99	100	100	100
	2100	23	66	99	100	100	100
March	0000	15	63	98	100	100	100
	0300	14	64	98	100	100	100
	0600	15	64	99	100	100	100
	0900	10	53	97	100	100	100
	1200	6	42	92	100	100	100
	1500	7	41	93	100	100	100
	1800	10	53	97	100	100	100
	2100	13	62	99	100	100	100
April	0000	8	49	97	100	100	100
	0300	8	51	97	100	100	100
	0600	8	47	97	100	100	100
	0900	3	28	87	100	100	100
	1200	1	21	77	100	100	100
	1500	1	21	77	100	100	100
	1800	1	28	85	100	100	100
	2100	6	41	94	100	100	100

TABLE 20 (contd)

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	16°C (60.8°F) or below	20°C (68.0°F) or below
		%	%	%	%	%	%
May	0000	1	18	83	100	100	100
	0300	1	19	85	100	100	100
	0600	0	10	72	100	100	100
	0900	0	6	56	99	100	100
	1200	0	5	43	97	100	100
	1500	0	4	46	97	100	100
	1800	0	7	56	99	100	100
	2100	0	13	78	100	100	100
June	0000	0	3	33	98	100	100
	0300	0	3	37	99	100	100
	0600	0	0	22	96	100	100
	0900	0	0	13	81	99	100
	1200	0	0	9	74	99	100
	1500	0	0	8	72	99	100
	1800	0	0	11	84	100	100
	2100	0	0	19	95	100	100
July	0000	0	0	18	88	100	100
	0300	0	0	19	91	100	100
	0600	0	0	8	85	100	100
	0900	0	0	3	71	99	100
	1200	0	0	1	61	99	100
	1500	0	0	1	61	99	100
	1800	0	0	3	68	100	100
	2100	0	0	11	84	100	100
August	0000	0	0	13	80	100	100
	0300	0	0	14	82	100	100
	0600	0	0	8	79	100	100
	0900	0	0	2	60	100	100
	1200	0	0	1	49	97	100
	1500	0	0	1	49	98	100
	1800	0	0	2	61	100	100
	2100	0	0	8	79	100	100

TABLE 20 (Contd)

Month	Hour GMT	0°C (32.0°F) or below	4°C (39.2°F) or below	8°C (46.4°F) or below	12°C (53.6°F) or below	16°C (60.8°F) or below	20°C (68.0°F) or below
		%	%	%	%	%	%
September	0000	0	2	23	88	100	100
	0300	0	1	24	90	100	100
	0600	0	1	23	89	100	100
	0900	0	0	10	73	100	100
	1200	0	0	8	62	99	100
	1500	0	0	8	64	100	100
	1800	0	0	13	79	100	100
	2100	0	0	22	87	100	100
October	0000	0	8	49	96	100	100
	0300	1	7	51	97	100	100
	0600	0	7	50	96	100	100
	0900	0	4	39	95	100	100
	1200	0	3	29	88	100	100
	1500	0	3	33	90	100	100
	1800	0	6	46	96	100	100
	2100	0	8	49	95	100	100
November	0000	5	45	85	100	100	100
	0300	4	41	85	100	100	100
	0600	5	44	86	100	100	100
	0900	4	39	85	100	100	100
	1200	2	28	79	100	100	100
	1500	3	30	81	100	100	100
	1800	5	39	84	100	100	100
	2100	5	41	84	100	100	100
December	0000	10	62	95	100	100	100
	0300	11	62	95	100	100	100
	0600	11	62	96	100	100	100
	0900	12	63	96	100	100	100
	1200	7	48	94	100	100	100
	1500	8	55	95	100	100	100
	1800	11	59	95	100	100	100
	2100	11	61	95	100	100	100

Example:- At 0600 hours GMT in December during the 15 years from 1957 to 1971, wet bulb temperatures were at or below 4 degrees Centigrade (39.2°F) on 62 per cent of occasions.

TABLE 2P

Number of days with air frost*(i.e. days with minimum air temperature below 0.0°C at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Days													
1951	7	10	13	6	2	0	0	0	0	1	1	7	47
1952	17	12	3	0	0	0	0	0	0	0	7	6	45
1953	8	7	3	9	0	0	0	0	0	0	0	0	27
1954	4	10	8	2	0	0	0	0	0	0	0	5	29
1955	11	21	8	2	1	0	0	0	0	2	1	10	56
1956	16	15	6	10	1	0	0	0	0	0	1	0	49
1957	2	9	1	0	1	0	0	0	0	0	0	6	19
1958	15	15	15	5	0	0	0	0	0	0	2	5	57
1959	20	7	0	1	1	0	0	0	0	0	2	1	32
1960	7	14	2	0	0	0	0	0	0	0	0	5	28
1961	5	5	4	6	0	0	0	0	0	0	0	16	36
1962	2	7	13	9	1	0	0	0	0	0	7	7	46
1963	15	15	1	2	0	0	0	0	0	0	2	6	41
1964	0	3	2	2	0	0	0	0	0	0	1	7	15
1965	6	4	11	1	0	0	0	0	0	0	14	14	50
1966	5	14	7	11	0	0	0	0	0	0	2	8	47
1967	6	0	1	5	2	0	0	0	0	0	1	8	23
1968	10	16	4	8	2	0	0	0	0	0	0	6	46
1969	5	19	15	2	0	0	0	0	0	0	9	4	54
1970	9	15	11	4	0	0	0	0	0	1	1	3	44
1971	2	3	2	1	0	0	0	0	0	2	5	0	15
1972	4	1	3	0	0	0	0	0	0	0	2	1	11
22 year mean 1951-1972	8.0	10.1	6.0	3.9	0.5	0.0	0.0	0.0	0.0	0.3	2.6	5.7	37.1

* Since 1st January 1963, a day with air frost has been defined as a day on which the minimum air temperature falls to below 0.0°C. However, before this date, a day with air frost was defined as a day on which the minimum air temperature fell to 0.0°C or below.

TABLE 2Q

Number of days with air frost*(i.e. days with minimum air temperature below 0.0°C) at Sule Skerry
(20 years from 1953 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	<u>days</u>												
1953	0	1	0	0	0	0	0	0	0	0	0	0	1
1954	1	4	2	0	0	0	0	0	0	0	0	0	7
1955	7	7	4	0	0	0	0	0	0	0	0	8	26
1956	12	6	2	0	0	0	0	0	0	0	0	0	20
1957	0	0	0	0	0	0	0	0	0	0	0	2	2
1958	7	17	12	0	0	0	0	0	0	0	0	0	36
1959	9	0	2	0	0	0	0	0	0	0	0	0	11
1960	1	7	1	0	0	0	0	0	0	0	0	0	9
1961	0	0	1	1	0	0	0	0	0	0	0	7	9
1962	1	2	10	0	0	0	0	0	0	0	2	2	17
1963	1	1	0	1	0	0	0	0	0	0	0	1	4
1964	0	0	0	0	0	0	0	0	0	0	0	2	2
1965	1	1	3	0	0	0	0	0	0	0	2	2	9
1966	0	0	3	2	0	0	0	0	0	0	0	1	6
1967	0	0	0	0	0	0	0	0	0	0	0	4	4
1968	3	2	0	7	1	0	0	0	0	0	0	5	18
1969	1	10	4	0	0	0	0	0	0	0	2	0	17
1970	1	5	6	5	0	0	0	0	0	0	0	0	17
1971	1	0	0	0	0	0	0	0	0	0	4	0	5
1972	2	0	0	0	0	0	0	0	0	0	0	0	2
20 year mean 1953-1972	2.4	3.1	2.5	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.7	11.1

* Since 1st January 1963, a day with air frost has been defined as a day on which the minimum air temperature falls to below 0.0°C. However, before this date, a day with air frost was defined as a day on which the minimum air temperature fell to 0.0°C or below.

TABLE 2R

Number of days with air frost*(i.e. days with minimum air temperature
below 0.0°C) at Stenness
(11 years from 1962 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	<u>days</u>												
1962	3	7	14	6	0	0	0	0	0	1	9	8	48
1963	17	14	1	3	0	0	0	0	0	0	8	7	50
1964	3	3	4	1	0	0	0	0	0	0	2	9	22
1965	11	3	10	2	0	0	0	0	0	0	10	12	48
1966	5	14	7	10	0	0	0	0	0	0	3	5	44
1967	6	0	4	4	2	0	0	0	0	0	1	12	29
1968	12	17	4	9	4	0	0	0	0	0	1	5	52
1969	5	19	11	2	0	0	0	0	0	0	9	5	51
1970	10	15	10	8	0	0	0	0	0	1	2	4	50
1971	3	2	7	4	0	0	0	0	0	0	7	2	25
1972	4	3	1	1	0	0	0	0	0	0	2	2	13
11 year mean 1962-1972	7.2	8.8	6.6	4.6	0.5	0.0	0.0	0.0	0.0	0.2	4.9	6.5	39.3

* Since 1st January 1963, a day with air frost has been defined as a day on which the minimum air temperature falls to below 0.0°C . However, before this date, a day with air frost was defined as a day on which the minimum air temperature fell to 0.0°C or below.

TABLE 2S

Average and extreme dates of first and last frosts at Kirkwall Airport and

Stenness

	<u>Average date of first</u>	<u>Average date of last</u>
	<u>air frost</u>	<u>air frost</u>
Kirkwall Airport	20 November	23 April
Stenness	15 November	21 April

	<u>Earliest date of</u>	<u>Latest date of last</u>
	<u>first air frost</u>	<u>air frost</u>
Kirkwall Airport	13 October	30 May
Stenness	27 October	14 May

NOTES

1. The average and extreme dates of the first and last frosts given above have been calculated from 22 years of records (1951 to 1972) in the case of Kirkwall Airport and 10 years of records (1963 to 1972) in the case of Stenness.
2. During the 10 years from 1963 to 1972 the earliest date of the first air frost at Sule Skerry was 9 November while the latest date of the last air frost was 8 May. Owing to the very low frequency of air frosts at Sule Skerry and the large variation from year to year in the dates of occurrence, it is not possible to calculate valid average dates of first and last air frosts.

TABLE 2T

Table for Converting Degrees Centigrade to Degrees Fahrenheit

	<u>°C</u>	<u>°F</u>		<u>°C</u>	<u>°F</u>		<u>°C</u>	<u>°F</u>
minus	15	5.0		0	32.0		15	59.0
minus	14	6.8		1	33.8		16	60.8
minus	13	8.6		2	35.6		17	62.6
minus	12	10.4		3	37.4		18	64.4
minus	11	12.2		4	39.2		19	66.2
minus	10	14.0		5	41.0		20	68.0
minus	9	15.8		6	42.8		21	69.8
minus	8	17.6		7	44.6		22	71.6
minus	7	19.4		8	46.4		23	73.4
minus	6	21.2		9	48.2		24	75.2
minus	5	23.0		10	50.0		25	77.0
minus	4	24.8		11	51.8		26	78.8
minus	3	26.6		12	53.6		27	80.6
minus	2	28.4		13	55.4		28	82.4
minus	1	30.2		14	57.2		29	84.2

3. Relative humidity

In Orkney, as elsewhere in the British Isles, the relative humidity reaches 90 per cent or thereabouts on most nights of the year. As a rule, the highest values of relative humidity occur in association with the lowest air temperature of the day i.e. usually around dawn, while the lowest values of relative humidity occur in association with the highest air temperature of the day i.e. usually in the middle of the afternoon. The main departures from this general rule occur in misty or foggy weather or when rain is falling.

It should be noted that it is normal practice at climatological stations to obtain values of relative humidity from simultaneous readings of dry and wet bulb thermometers exposed outdoors inside a ventilated thermometer screen at a height of 4 feet above ground level. Values so obtained may be very different from those prevailing indoors which are influenced by heating, ventilation and other factors.

The meteorological office at Kirkwall Airport is the only weather station in the Orkney group of islands for which detailed records of dry and wet bulb temperatures are available and all the statistics of relative humidity and wet bulb temperature included in this memorandum have been calculated from the records for Kirkwall Airport. From the planning or design point of view, the Kirkwall figures should give a reasonably good guide to Orkney as a whole although significant differences in temperature and relative humidity could exist from place to place at a particular time of day depending on the local weather conditions prevailing at the time. For example, the onset of a sea breeze could lead to a sharp fall in temperature coinciding with a marked rise in relative humidity particularly on a warm day in the summer.

Monthly averages and extremes of relative humidity at 0000 hours, 0300 hours, 0600 hours, 0900 hours, 1200 hours, 1500 hours, 1800 hours and 2100 hours GMT are given in Table 3.

The percentage frequency of occurrence of relative humidities within stated limits are given in Table 3A.

Note: Averages and extremes of dry and wet bulb temperature are given in the previous section of this memorandum in Tables 2L and 2N.

Percentage frequencies of occurrence of dry and wet bulb temperatures within certain limits are also given in the previous section of this memorandum in Tables 2M and 2O.

TABLE 3

Averages and extremes of relative humidity per cent at 0000 hours,
0300 hours, 0600 hours, 0900 hours, 1200 hours, 1500 hours,
1800 hours and 2100 hours GMT at Kirkwall Airport
(15 years from 1957 to 1971)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	%	%	%	%	%	%	%	%	%	%	%	%	%
<u>Relative Humidity</u>													
<u>At 0000 hours GMT</u>													
Average	87	87	87	89	91	92	92	93	92	90	87	87	89
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	54	51	56	55	56	64	71	70	65	62	60	54	51
<u>At 0300 hours GMT</u>													
Average	88	87	87	89	91	93	93	93	92	90	87	87	90
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	58	60	51	58	60	71	71	68	62	57	47	57	47
<u>At 0600 hours GMT</u>													
Average	88	86	87	89	89	89	91	93	92	90	87	86	89
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	59	54	57	55	54	62	69	71	56	58	49	51	49
<u>At 0900 hours GMT</u>													
Average	88	86	85	81	82	83	84	87	87	88	87	86	85
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	53	56	47	49	50	52	61	59	62	62	47	60	47
<u>At 1200 hours GMT</u>													
Average	86	82	79	75	77	77	80	82	81	83	84	85	81
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	54	52	48	45	46	50	57	53	54	48	46	46	45
<u>At 1500 hours GMT</u>													
Average	86	81	79	75	77	77	79	81	81	84	85	86	81
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	52	46	36	45	43	40	51	50	52	52	55	54	36
<u>At 1800 hours GMT</u>													
Average	87	86	84	81	81	81	82	86	88	88	87	86	85
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	53	58	50	49	54	35	57	54	67	60	53	49	35
<u>At 2100 hours GMT</u>													
Average	88	86	86	87	88	88	89	92	91	89	87	86	88
Absolute maximum	100	100	100	100	100	100	100	100	100	100	100	100	100
Absolute minimum	63	51	52	53	62	64	64	71	65	48	59	55	48

TABLE 3A

Percentage frequency of occurrence of relative humidities at or within
stated limits at 0000 hours, 0300 hours, 0600 hours, 0900 hours,
1200 hours, 1500 hours, 1800 hours and 2100 hours at
Kirkwall Airport
(15 years 1957 to 1971)

Month	Hour	Relative humidity											
		Less than 20%	20- 29%	30- 39%	40- 49%	50- 59%	60- 69%	70- 79%	80- 89%	90- 94%	95- 98%	99%	100%
Jan	0000	0.0	0.0	0.0	0.0	0.2	5.0	12.0	35.0	26.0	18.3	2.2	1.3
	0300	0.0	0.0	0.0	0.0	0.2	3.0	12.5	35.1	30.3	14.6	2.4	1.9
	0600	0.0	0.0	0.0	0.0	0.6	4.3	10.8	30.4	29.9	18.9	4.7	0.4
	0900	0.0	0.0	0.0	0.0	0.2	3.4	12.1	32.9	31.0	16.1	3.0	1.3
	1200	0.0	0.0	0.0	0.0	1.3	3.9	20.4	32.9	24.5	14.0	2.6	0.4
	1500	0.0	0.0	0.0	0.0	0.4	4.5	16.1	36.8	26.9	12.1	2.6	0.6
	1800	0.0	0.0	0.0	0.0	0.6	3.7	11.6	34.2	31.6	15.1	1.9	1.3
	2100	0.0	0.0	0.0	0.0	0.0	4.1	11.4	34.8	28.4	17.4	2.4	1.5
Feb	0000	0.0	0.0	0.0	0.0	0.7	4.0	14.0	34.3	29.8	11.3	4.5	1.4
	0300	0.0	0.0	0.0	0.0	0.0	5.2	14.0	32.0	29.4	14.7	2.8	1.9
	0600	0.0	0.0	0.0	0.0	1.4	4.0	15.4	35.9	24.8	13.5	3.8	1.2
	0900	0.0	0.0	0.0	0.0	1.2	5.7	14.4	37.6	26.2	11.6	2.1	1.2
	1200	0.0	0.0	0.0	0.0	3.1	11.1	22.9	35.9	16.8	7.6	1.9	0.7
	1500	0.0	0.0	0.0	0.2	1.4	12.3	26.0	36.9	14.7	6.4	0.9	1.2
	1800	0.0	0.0	0.0	0.0	0.2	5.4	16.8	39.0	26.7	9.0	1.7	1.2
	2100	0.0	0.0	0.0	0.0	1.2	5.0	18.0	32.0	26.7	12.3	2.4	2.4
Mar	0000	0.0	0.0	0.0	0.0	1.3	4.9	14.8	31.0	30.8	14.0	2.8	0.4
	0300	0.0	0.0	0.0	0.0	0.9	4.1	13.1	33.3	27.5	15.7	4.1	1.3
	0600	0.0	0.0	0.0	0.0	1.1	5.1	9.5	33.3	31.0	15.7	3.4	0.9
	0900	0.0	0.0	0.0	0.2	1.5	6.9	16.6	32.4	25.8	12.5	3.2	0.9
	1200	0.0	0.0	0.0	0.4	5.6	17.4	24.1	30.1	13.6	6.9	1.7	0.2
	1500	0.0	0.0	0.2	0.6	5.6	17.4	24.1	27.2	15.7	7.3	1.7	0.2
	1800	0.0	0.0	0.0	0.0	1.5	9.2	17.6	36.2	23.7	9.5	1.7	0.6
	2100	0.0	0.0	0.0	0.0	1.1	7.5	13.5	32.0	29.5	13.6	2.4	0.4
Apr	0000	0.0	0.0	0.0	0.0	0.4	2.9	10.2	31.3	31.6	16.2	4.7	2.7
	0300	0.0	0.0	0.0	0.0	0.7	3.1	7.3	30.7	30.9	18.9	5.3	3.1
	0600	0.0	0.0	0.0	0.0	0.4	3.3	7.6	30.9	31.5	18.7	4.9	2.7
	0900	0.0	0.0	0.0	0.2	3.6	12.5	25.3	31.1	17.4	5.1	2.4	2.4
	1200	0.0	0.0	0.0	2.7	8.5	26.2	27.1	20.0	8.2	5.1	1.8	0.4
	1500	0.0	0.0	0.0	1.8	10.9	21.8	29.8	21.4	7.5	5.1	0.4	1.3
	1800	0.0	0.0	0.0	0.2	4.9	11.5	26.2	34.9	13.6	5.8	1.6	1.3
	2100	0.0	0.0	0.0	0.0	0.9	5.3	9.1	35.6	30.2	15.8	1.3	1.8

TABLE 3A (Contd)

Month	Hour	Relative humidity											
		Less than 20%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-94%	95-98%	99%	100%
May	0000	0.0	0.0	0.0	0.0	0.6	1.3	6.7	24.9	32.7	23.0	5.4	5.4
	0300	0.0	0.0	0.0	0.0	0.0	1.7	6.7	23.7	29.0	25.6	6.2	7.1
	0600	0.0	0.0	0.0	0.0	0.2	3.0	9.5	30.3	28.8	17.2	5.2	5.8
	0900	0.0	0.0	0.0	0.0	1.9	12.1	29.2	27.8	12.9	9.0	3.7	3.4
	1200	0.0	0.0	0.0	1.7	4.7	21.9	29.7	22.4	10.8	6.2	1.1	1.5
	1500	0.0	0.0	0.0	0.6	5.6	25.6	23.4	24.8	11.0	7.3	1.3	0.4
	1800	0.0	0.0	0.0	0.0	1.9	15.3	26.2	30.8	14.6	8.0	2.1	1.1
	2100	0.0	0.0	0.0	0.0	0.0	3.0	11.8	34.9	28.8	14.8	4.1	2.6
Jun	0000	0.0	0.0	0.0	0.0	0.0	0.2	6.3	22.2	28.4	27.6	8.2	7.1
	0300	0.0	0.0	0.0	0.0	0.0	0.0	3.6	22.0	26.2	27.1	9.8	11.3
	0600	0.0	0.0	0.0	0.0	0.0	1.8	11.1	30.0	21.3	22.2	7.1	6.5
	0900	0.0	0.0	0.0	0.0	1.1	12.0	25.6	31.5	13.8	10.0	3.6	2.4
	1200	0.0	0.0	0.0	0.0	5.8	21.8	32.0	22.9	10.4	5.1	1.3	0.7
	1500	0.0	0.0	0.0	0.7	5.8	23.6	28.2	24.9	10.2	5.3	0.2	1.1
	1800	0.0	0.0	0.2	0.0	1.6	14.6	26.4	34.0	13.6	8.0	1.6	0.0
	2100	0.0	0.0	0.0	0.0	0.0	1.3	12.9	36.2	27.1	14.2	5.6	2.7
Jul	0000	0.0	0.0	0.0	0.0	0.0	0.0	1.5	24.7	34.4	27.6	7.3	4.5
	0300	0.0	0.0	0.0	0.0	0.0	0.0	1.7	20.2	37.0	25.8	8.6	6.7
	0600	0.0	0.0	0.0	0.0	0.0	0.4	4.1	31.6	29.7	22.4	7.1	4.7
	0900	0.0	0.0	0.0	0.0	0.0	4.7	29.0	35.1	13.8	10.3	4.3	2.8
	1200	0.0	0.0	0.0	0.0	1.9	17.9	31.4	27.6	10.3	7.3	3.0	0.6
	1500	0.0	0.0	0.0	0.0	2.2	20.4	31.8	27.1	11.0	5.6	1.3	0.6
	1800	0.0	0.0	0.0	0.0	0.2	7.8	32.9	34.6	12.5	8.8	1.7	1.5
	2100	0.0	0.0	0.0	0.0	0.0	0.4	6.9	41.3	28.3	15.7	3.7	3.7
Aug	0000	0.0	0.0	0.0	0.0	0.0	0.0	3.2	16.6	29.6	35.7	8.0	6.9
	0300	0.0	0.0	0.0	0.0	0.0	0.2	3.0	18.3	28.4	31.2	10.7	8.2
	0600	0.0	0.0	0.0	0.0	0.0	0.0	3.2	19.1	28.6	31.4	9.7	8.0
	0900	0.0	0.0	0.0	0.0	0.2	3.9	15.5	35.9	18.3	17.4	5.4	3.4
	1200	0.0	0.0	0.0	0.0	1.9	11.4	27.5	30.5	15.3	9.5	2.6	1.3
	1500	0.0	0.0	0.0	0.0	1.9	14.9	28.0	30.7	11.8	8.2	2.4	2.1
	1800	0.0	0.0	0.0	0.0	0.2	3.6	20.7	36.8	21.5	12.7	3.0	1.5
	2100	0.0	0.0	0.0	0.0	0.0	0.0	3.0	27.3	30.6	29.7	4.7	4.7

TABLE 3A (Contd)

Month	Hour	Relative humidity											
		Less than 20%	20- 29%	30- 39%	40- 49%	50- 59%	60- 69%	70- 79%	80- 89%	90- 94%	95- 98%	99%	100%
Sep	0000	0.0	0.0	0.0	0.0	0.0	0.4	3.8	25.8	29.8	30.2	7.1	2.9
	0300	0.0	0.0	0.0	0.0	0.0	0.9	3.1	24.2	31.4	26.4	9.3	4.7
	0600	0.0	0.0	0.0	0.0	0.2	0.2	5.1	24.0	28.2	26.9	10.7	4.7
	0900	0.0	0.0	0.0	0.0	0.0	3.3	16.9	35.1	22.4	14.7	5.4	2.2
	1200	0.0	0.0	0.0	0.0	1.6	13.3	28.2	32.0	12.5	8.7	2.4	1.3
	1500	0.0	0.0	0.0	0.0	1.6	14.0	30.8	28.9	11.8	10.2	1.8	0.9
	1800	0.0	0.0	0.0	0.0	0.0	1.1	14.7	40.4	25.3	13.6	2.7	2.2
	2100	0.0	0.0	0.0	0.0	0.0	0.7	7.1	24.2	38.4	21.6	5.8	2.2
Oct	0000	0.0	0.0	0.0	0.0	0.0	1.7	8.0	32.7	29.7	21.0	4.1	2.8
	0300	0.0	0.0	0.0	0.0	0.2	1.1	7.7	30.7	31.8	20.9	5.0	2.6
	0600	0.0	0.0	0.0	0.0	0.2	1.3	8.4	29.8	29.2	22.8	5.4	2.9
	0900	0.0	0.0	0.0	0.0	0.0	1.1	12.5	36.1	30.1	14.6	2.8	2.8
	1200	0.0	0.0	0.0	0.4	0.9	6.3	25.6	39.3	15.1	9.3	2.2	0.9
	1500	0.0	0.0	0.0	0.0	1.5	6.7	23.4	37.0	18.3	9.4	2.4	1.3
	1800	0.0	0.0	0.0	0.0	0.0	1.9	12.5	34.6	26.7	18.7	3.9	1.7
	2100	0.0	0.0	0.0	0.2	0.0	1.3	9.0	35.1	28.4	20.0	4.1	1.9
Nov	0000	0.0	0.0	0.0	0.0	0.0	6.7	12.0	33.6	28.4	13.5	5.1	0.7
	0300	0.0	0.0	0.0	0.2	0.4	5.1	11.5	33.4	30.0	13.6	3.8	2.0
	0600	0.0	0.0	0.0	0.2	1.3	4.7	9.8	33.3	29.8	16.2	2.7	2.0
	0900	0.0	0.0	0.0	0.2	0.9	4.9	12.4	32.7	30.2	14.0	3.1	1.6
	1200	0.0	0.0	0.0	0.2	1.6	6.9	18.4	40.4	20.2	8.5	2.7	1.1
	1500	0.0	0.0	0.0	0.0	1.3	6.5	17.1	39.1	23.3	9.1	2.0	1.6
	1800	0.0	0.0	0.0	0.0	0.2	6.2	12.7	33.3	29.4	12.2	4.0	2.0
	2100	0.0	0.0	0.0	0.0	0.2	4.2	15.1	33.2	29.3	13.1	2.9	2.0
Dec	0000	0.0	0.0	0.0	0.0	0.4	5.4	9.7	40.0	32.3	10.3	1.9	0.0
	0300	0.0	0.0	0.0	0.0	0.9	4.5	12.2	37.0	31.2	11.6	2.4	0.2
	0600	0.0	0.0	0.0	0.0	0.4	6.0	16.6	33.4	29.7	10.7	2.6	0.6
	0900	0.0	0.0	0.0	0.0	0.0	5.6	17.2	34.2	28.4	12.5	1.7	0.4
	1200	0.0	0.0	0.0	0.2	1.5	8.0	14.8	40.9	23.0	10.8	0.6	0.2
	1500	0.0	0.0	0.0	0.0	1.1	4.1	16.1	38.7	28.6	9.7	1.3	0.4
	1800	0.0	0.0	0.0	0.2	0.4	5.4	13.2	34.9	28.2	14.9	1.9	0.9
	2100	0.0	0.0	0.0	0.0	0.9	4.3	13.8	36.1	30.1	11.8	2.1	0.9

Example: At 0600 hours GMT in January, relative humidities of between 80 and 89 per cent occurred on 30.4 per cent of occasions.

4. Sunshine

The only locations in the Orkney group of islands equipped with instruments which register the duration of sunshine are Kirkwall Airport and Stenness. The monthly and annual durations of sunshine recorded at these two locations are given in Tables 4 and 4A.

Orkney has less sunshine than the main centres of population on the Scottish mainland but on the other hand, Orkney has more daylight during the months of April to September than places further to the south. For example, at midsummer there is daylight at Kirkwall throughout almost the whole of the 24 hours.

The path of the sun across the sky depends on the latitude and the time of year. Figure 2 is a solar chart for Orkney (latitude 59 degrees North) which shows the altitude and azimuth of the sun at various times of day, for the solstices, equinoxes and for certain intermediate dates. The times on the chart are in Local Apparent Time i.e. the time registered by a sundial. At Kirkwall, the combined corrections for longitude and equation of time necessary to convert from Local Apparent Time to Greenwich Mean Time range from about minus 5 minutes to plus 27 minutes - see Table X, Appendix V to the 3rd Edition of "The Observer's Handbook" - HMSO.

For a given site, the various obstructions can be plotted on the chart and their effect in cutting off the sun's radiation can then be evaluated. For example, it can be seen from Figure 2 that at 10.30 am LAT on 23 August the sun is at an altitude of 40 degrees with an azimuth of 150 degrees. It can also be seen that on 22 December, the maximum altitude of the sun is $7\frac{1}{2}$ degrees at 12 noon. Thus, in midwinter, there would be no direct sunshine at any place at latitude 59 degrees North with a hill to the south whose top subtended an angle of $7\frac{1}{2}$ degrees or more.

TABLE 4

Monthly and annual durations of bright sunshine in hours recorded at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	(hours)												
1951	44.1	54.1	97.0	160.2	214.0	174.4	115.7	133.2	144.1	80.7	36.4	37.6	1291.5
1952	44.5	51.0	114.3	174.3	104.7	116.8	128.2	91.4	95.2	79.9	55.3	29.0	1084.6
1953	24.7	79.7	142.4	174.3	125.1	130.7	124.0	141.7	95.9	83.9	33.0	29.2	1184.6
1954	18.2	65.0	77.4	201.1	149.7	113.1	136.9	103.5	126.4	77.0	38.2	23.0	1129.5
1955	28.1	79.1	99.8	193.4	214.7	248.6	200.9	139.1	119.9	72.5	30.0	25.7	1451.8
1956	28.4	56.0	94.8	178.5	173.3	156.9	143.3	124.3	78.6	76.5	25.2	14.9	1150.7
1957	40.1	81.8	71.8	186.1	182.3	203.6	73.0	110.5	120.7	69.6	33.0	43.8	1216.3
1958	25.3	61.0	95.1	145.1	207.8	154.6	161.1	116.6	144.8	90.9	55.9	17.5	1275.7
1959	50.7	66.1	102.2	144.1	154.7	219.1	126.5	116.1	146.2	96.1	54.0	23.0	1298.8
1960	43.3	88.0	59.9	111.8	210.9	167.4	197.8	130.5	130.6	71.3	42.8	44.7	1299.0
1961	31.8	62.9	90.3	125.6	169.9	152.4	69.7	149.3	131.0	89.3	50.8	20.0	1143.0
1962	39.9	61.2	123.8	209.1	103.7	148.9	100.2	165.5	85.7	70.7	35.7	21.9	1166.3
1963	43.0	74.3	103.7	139.7	169.5	139.9	153.9	98.8	114.5	60.1	34.0	23.6	1155.0
1964	34.1	47.7	80.6	130.2	125.1	152.8	131.0	95.3	100.7	80.4	33.9	25.0	1036.8
1965	42.2	21.2	115.1	161.1	92.7	118.0	139.4	128.0	69.1	79.7	38.3	22.6	1027.4
1966	16.9	61.1	84.9	142.1	192.2	121.0	146.4	141.7	62.1	62.1	27.5	13.2	1071.2
1967	22.9	49.1	99.5	144.1	155.2	205.7	149.2	89.9	72.3	74.1	20.2	15.6	1097.8
1968	36.8	95.6	69.9	147.7	155.1	123.5	142.7	157.3	93.6	40.3	30.2	19.2	1111.9
1969	23.5	49.0	104.9	116.7	81.9	236.9	151.6	133.6	79.6	68.0	46.7	22.1	1114.5
1970	18.0	68.7	88.4	193.3	112.1	254.3	98.9	104.8	94.5	65.5	35.9	20.2	1154.6
1971	12.6	62.0	98.2	134.1	213.8	151.5	147.7	131.9	109.1	109.5	24.4	12.6	1207.4
1972	26.4	50.0	112.1	131.8	146.9	175.2	183.6	129.9	104.0	107.0	31.0	36.5	1234.4
22 year average 1951-1972	31.6	62.9	96.6	156.6	157.1	166.6	137.4	124.2	105.4	77.5	36.9	24.6	1177.4
Daily mean duration over 22 years 1951-1972	1.02	2.22	3.12	5.22	5.07	5.55	4.43	4.01	3.51	2.50	1.23	0.79	3.22

TABLE 4A

Monthly and annual durations of bright sunshine in hours recorded at Stenness
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	(hours)												
1963	36.0	72.7	108.0	148.9	175.9	155.1	162.2	101.2	98.8	60.7	33.3	21.9	1174.7
1964	30.4	48.8	78.0	123.9	136.4	150.8	130.5	92.7	103.3	91.1	35.3	20.1	1041.3
1965	46.7	21.8	127.0	158.3	97.4	151.3	140.1	125.8	68.5	92.0	30.5	18.3	1077.7
1966	14.8	63.6	84.3	154.6	202.7	140.9	168.1	153.9	55.4	56.7	37.7	10.7	1143.4
1967	20.0	48.0	94.0	131.4	154.5	214.0	161.1	104.1	82.8	71.8	19.4	13.2	1114.3
1968	36.1	84.5	71.2	154.4	172.5	164.2	149.6	180.9	99.1	39.1	42.8	24.5	1218.9
1969	21.7	55.1	108.0	125.2	98.6	236.1	168.7	139.9	84.1	66.1	43.5	22.0	1169.0
1970	28.5	68.3	84.6	173.0	118.7	265.0	111.4	110.4	112.0	62.5	34.8	21.1	1190.3
1971	12.5	55.5	99.6	135.0	218.9	144.5	162.1	127.9	115.6	100.3	22.8	7.4	1202.1
1972	24.9	53.4	107.0	141.5	166.2	171.9	197.3	124.9	91.9	115.4	26.7	37.4	1258.5
10 year average 1963-1972	27.2	57.2	96.2	144.6	154.2	179.4	155.1	126.2	91.1	75.6	32.7	19.7	1159.2
Daily mean duration over 10 years 1963-1972	0.88	2.02	3.10	4.82	4.97	5.98	5.00	4.07	3.04	2.44	1.09	0.63	3.17

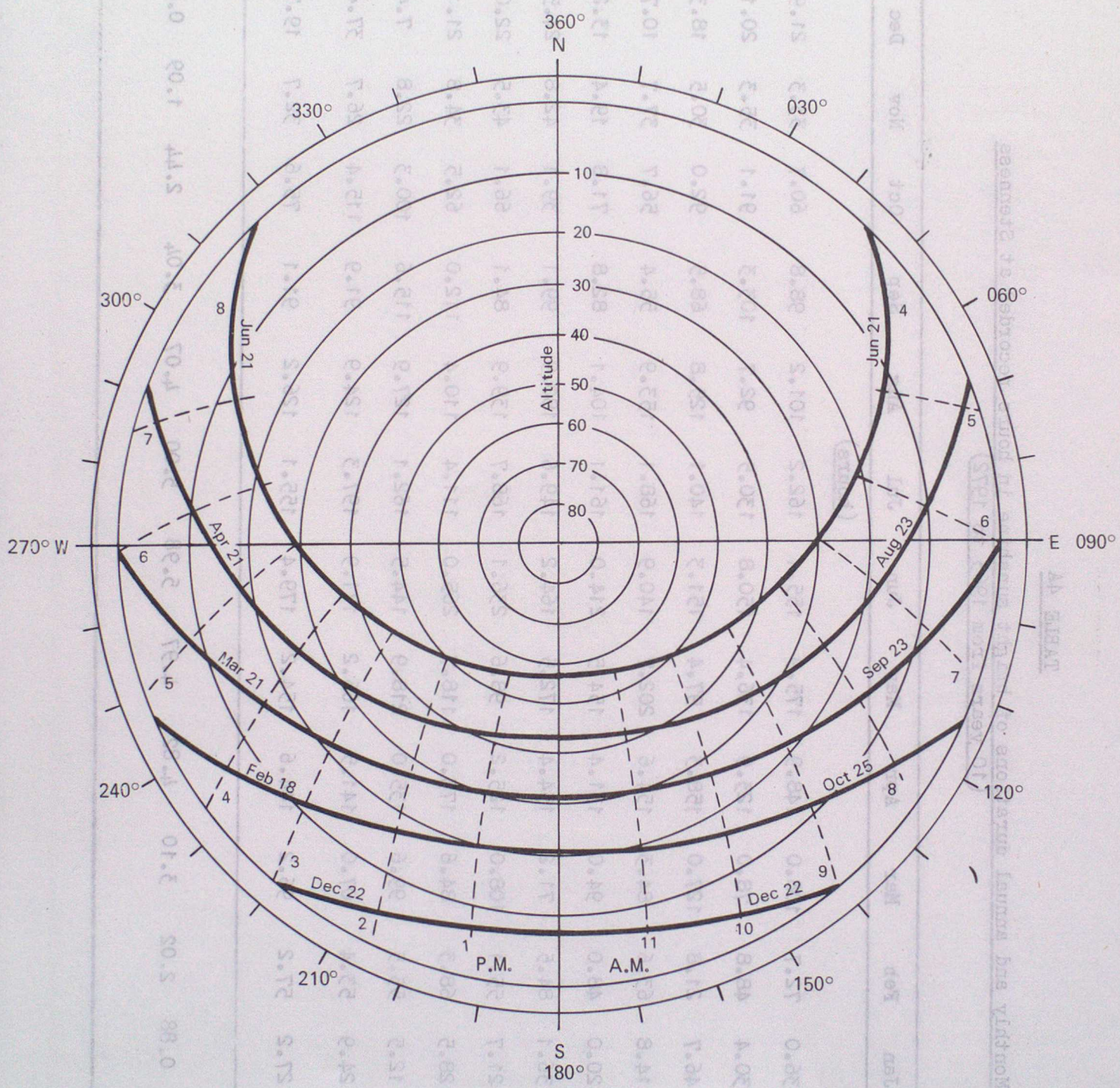


Fig 2. SOLAR CHART FOR Latitude 59°N

5. Wind

The high frequency of gales and strong winds is perhaps the most noteworthy feature of the climate of the Orkney group of islands.

Frequency tables of wind direction and speed in the average month and year which have been calculated from recordings made by the anemograph at Kirkwall Airport are given in Tables 5 and 5A.

It can be seen from Table 5 that in the average year, wind directions are fairly evenly distributed around the compass with the highest frequencies occurring from the quadrant between south and west. On the other hand it is interesting to note from the monthly figures in Table 5A that there is a marked increase in the frequency of easterly winds in the spring and early summer, particularly in the month of May when, on average, south-easterly winds are more frequent than winds from any other direction.

With regard to speeds, it can be seen from Table 5 that high winds can be experienced from any point of the compass but that in the 10 years from 1963 to 1972, the highest hourly mean speeds were recorded from the sector between south-west and west.

Highest wind speeds recorded at Kirkwall Airport

The anemograph records available from the present site of Kirkwall Airport near Grimsetter date back to 1st July 1957 and the highest wind speeds recorded at the Airport up to 31 December 1972 are:-

Highest hourly mean wind speed (i.e. the highest speed averaged over the 60 minutes between hours)

= 68 mph (30 m/sec) from direction 230 degrees (southwest) during the hour ending at 1700 hours Greenwich Mean Time on 27 January 1961.

Highest gust

= 136 mph (61 m/sec) from direction 330 degrees (northwest by north) at 0915 hours Greenwich Mean Time on 7 February 1969.

The hourly mean speed of 68 mph recorded at Kirkwall Airport on 27 January 1961 has been exceeded at several locations in the United Kingdom although the gust of 136 mph recorded on 7 February 1969 is the highest gust ever recorded at a

low-level wind recording station in the United Kingdom. As mentioned earlier in this memorandum, Kirkwall Airport is the only wind recording station in the Orkney group of islands and there is a similar paucity of wind recording stations in Shetland and in Scotland as a whole. Moreover, most of the wind records which do exist are only available for relatively short periods of years. Consequently, it is most difficult to assess the frequency of a gust of 136 mph in Orkney with any great confidence. However, the available evidence suggests that at Kirkwall Airport, a gust of 136 mph should be expected to occur once in about 200 years.⁽⁷⁾

A statistical treatment of the highest hourly mean wind speeds and highest gusts recorded at Kirkwall Airport in each year from 1957 to 1971 inclusive (but excluding the "huge" gust of 136 mph recorded in February 1969) yields the following results:

Maximum hourly mean wind speeds at 10 metres above the ground likely to be exceeded only once in the stated number of years

	<u>10 years</u>	<u>20 years</u>	<u>50 years</u>	<u>100 years</u>	<u>120 years</u>
Metres per second	30	32	34	36	37
Miles per hour	67	72	76	81	83

Maximum gust speeds at 10 metres above the ground likely to be exceeded only once in the stated number of years

	<u>10 years</u>	<u>20 years</u>	<u>50 years</u>	<u>100 years</u>	<u>120 years</u>
Metres per second	48	51	55	58	59
Miles per hour	107	114	123	130	132

While the maximum hourly mean wind speed likely to be exceeded on the average only once in, say, 50 years, is often referred to as the "1 in 50 years" hourly mean speed, it is actually that speed which is likely to be exceeded with a probability of $0.02 = 1/50$ (or a 2 per cent probability) in any one year. Similarly the "1 in 100 year" hourly mean speed or gust speed is that speed likely to be exceeded with a probability of $0.01 = 1/100$ (or a 1 per cent probability) in any one year.

Estimation of maximum wind speeds for the calculation of wind loadings on buildings and structures

The recommended procedures for the calculation of wind loadings on buildings are explained in "Wind Loads" - CP 3 - Chapter V - Part 2: 1972 of the British Standard Code of Practice.

It can be seen from the Code of Practice that the first step in the assessment of wind load is to estimate the value of the maximum 3-second gust speed likely to be exceeded on the average only once in 50 years at a height of 10 metres above the ground in open level country in the locality of the structure. A map* of these basic design maximum 3-second gust speeds is provided in the Code of Practice and it can be seen from the map that in the Orkney group of islands, the basic 3-second gust speed is between 54 and 55 metres per second. Having established the value of the maximum 3-second gust speed at a particular site, it is then necessary to adjust this basic speed by using two factors (S_1 and S_2) which depend on the actual site and the nature and size of the building.

* The map of basic design maximum 3-second gust speeds published in the Code of Practice CP 3 Chapter V - Part 2: 1972 has now (December 1973) been superseded by a revised map based on more up to date information. The revised map is included in the recently-published Climatological Memorandum No 50A "Extreme wind speeds over the United Kingdom for periods ending 1971" (7). In some parts of the United Kingdom, there are significant differences between the revised map and the map published in the Code of Practice but in the Orkney group of islands, the basic 3-second gust speed remains between 54 and 55 metres per second.

Topography factor - S_1

This factor, described more fully in the Code, takes account of the effect of topography on the exposure of the site. The topography factor for Kirkwall, Stromness and all villages and hamlets in the Orkney group of islands will be 1.0. However a topography factor of between 1.05 and 1.10 would, for example, be appropriate for structures to be erected near the tops of low hills which rise abruptly from the general level of the terrain by about 100 metres or more.

Ground roughness, building size and height above ground factor - S_2

It is also necessary to adjust the basic maximum gust speed by the S_2 factor which combines the effects of ground roughness, building size and the variation of wind speed with height. The ground roughness is dependent on the number and size of obstacles on the surface and may be described as "smooth" in open level country, "moderate" in country with windbreaks and scattered houses, "rough" in woods, towns or the outskirts of cities and "very rough" in the centre of large cities. Broadly speaking, it is a measure of the power of these obstacles to slow down the wind in the layers near the ground. However, before combining the S_2 factor with the basic gust speed, it should be realised that it takes a little time for the slowing-down process to take effect and that in the region under consideration, the transition from built-up area to open country is very abrupt, considerably more abrupt, for example, than in cities like London, Glasgow and Birmingham. Consequently, there is little doubt that strong winds on the outskirts of the towns and villages in the Orkney group of islands are able to bring something like their full effect into the built-up areas.

The reader will notice from Table 3, page 11 of the Code of Practice that the S_2 factors for height and surface roughness have been classified under four categories of terrain numbered 1 to 4. However, because of the very "open" nature of the terrain in the Orkney group of islands, it is considered that the S_2 factors for small towns, outskirts of large cities and city centres (viz category 3 and 4 factors) are not applicable to any location in Orkney and, in

general, it is thought that places in the archipelago are more closely related to the height and surface roughness factors quoted in category 1, although category 2 factors would be appropriate for the parts of Kirkwall in which the existing buildings are closely packed together.

The reader may wish to note that advice on design wind speeds, topographical effects etc, can be given for a specific site and that if there are any unusual features of local topography, exposure, or of the structure itself, advice on the appropriate gust speed and factors to be used should be sought from the Meteorological Office at 26 Palmerston Place, Edinburgh EH12 5AN, quoting the National Grid Reference of the site in question.

Terms used by the Meteorological Office for describing the wind strength

<u>Term</u>	<u>Average speed near the ground</u>	
Calm	Less than 1 mph	(less than 0.3 m/sec)
Light	1 to 12 mph	(0.3 to 5.4 m/sec)
Moderate	13 to 18 mph	(5.5 to 7.9 m/sec)
Fresh	19 to 24 mph	(8.0 to 10.7 m/sec)
Strong	25 to 38 mph	(10.8 to 17.1 m/sec)
Gale	39 to 46 mph	(17.2 to 20.7 m/sec)
Severe Gale	Over 46 mph	(over 20.7 m/sec)

The speeds quoted above would be considerably exceeded in gusts. For example, in a gale, gusts of over 50 mph are common and may exceed 100 mph at exposed places in a severe gale. A gale warning is issued when the gusts are expected to reach 50 mph or more, even if the average speed may be rather less than the limit of 39 mph shown in the above table.

The actual number of days with gales at Kirkwall Airport during each month and year during the 20 years from 1953 to 1972 are given in table 5B. At Kirkwall Airport, gales have blown from all points of the compass but the most frequent and severe gales have occurred from the sector between southwest through west to due north. Although less frequent than from westerly directions, strong winds and gales from easterly directions are by no means uncommon in the Orkney

group of islands. One of the worst easterly gales during recent years occurred during the evening of 3 March 1972 when the anemograph at Kirkwall Airport recorded an hourly mean speed of 54 mph and a highest gust of 76 mph from an east-south-easterly direction.

The number of days and hours with gusts to 39 mph or more and 55 mph or more at Kirkwall Airport are given in Tables 5C and 5D.

The speed, direction and date of occurrence of the highest gusts recorded at Kirkwall Airport in each month and year during the 10 years from 1963 to 1972 are given in Tables 5E and 5F.

High winds during the working part of the day

Strong winds often lead to hazardous working conditions on building sites and can also cause serious interruptions of work particularly at sites where tower cranes are in use.

It is not possible to decide a precise threshold of wind speed above which work on a building site would be hampered or have to stop because this will clearly depend on a number of complex factors including the exposure of the site, the type of work, the height above ground level at which men are working, the materials being used etc. However, experience suggests that in general, conditions become critical when gusts of wind of 40 mph or more are occurring.

Records showing the incidence of gusts of 40 mph or more during the working part of the day are not readily available but at Kirkwall Airport, gusts of 40 mph or more, first start to occur when the hourly mean wind speed reaches the level of about 20 mph and gusts to 40 mph or more, become quite frequent with hourly mean wind speeds of 25 mph or more. Accordingly, in view of the gusty nature of the winds, statistics of hourly mean wind speeds of 25 mph or more should serve as a good indication of the incidence of fairly frequent gusts to 40 mph or more.

Table 5G gives the total number of days at Kirkwall Airport on which the hourly mean wind speed reached 25 mph or more in at least one hour between 0700 and 1700 hours GMT during the 10 years from 1963 to 1972 and also the total

A table for converting miles per hour into metres per second is at Table 5H.

TABLE 5

Annual percentage frequency of wind direction and speed

at Kirkwall Airport

(10 years 1963 to 1972)

Height of vane of Kirkwall anemograph above mean sea level = 41 metres (134 feet)

" " " " " " " " ground = 15 " { 50 " }

Effective height of Kirkwall anemograph

Hourly mean wind speed	Wind directions in degrees (True)													All Directions
	350- 010	020- 040	050- 070	080- 100	110- 130	140- 160	170- 190	200- 220	230- 250	260- 280	290- 310	320- 340		
0 mph	-	-	-	-	-	-	-	-	-	-	-	-	2.7%	
1- 3 "	-	-	-	-	-	-	-	-	-	-	-	-	3.6%	
4- 7 "	0.5	0.6	0.6	0.8	0.9	0.8	0.9	0.8	0.7	1.3	0.7	0.5	9.1%	
8-12 "	1.2	1.2	1.2	1.5	1.9	2.1	3.2	2.7	1.7	2.1	1.7	1.1	21.6%	
13-18 "	1.9	1.5	1.0	1.5	2.8	4.1	5.2	3.4	2.9	3.4	2.5	2.1	32.3%	
19-24 "	1.1	0.7	0.3	0.5	1.6	2.2	1.9	1.2	1.8	2.0	1.2	1.1	15.6%	
25-31 "	0.7	0.4	0.2	0.4	1.1	1.4	0.7	0.5	1.4	1.6	0.7	0.9	10.0%	
32-38 "	0.3	0.1	0.1	0.1	0.4	0.4	0.1	0.1	0.6	0.7	0.2	0.4	3.5%	
39-46 "	0.2	0.1	0.0+	0.0+	0.1	0.1	0.0+	0.0+	0.2	0.4	0.1	0.2	1.4%	
47-54 "	0.0+	0.0+	0.0+		0.0+	0.0+	0.0+		0.1	0.1	0.0+	0.0+	0.2%	
55-63 "	0.0+								0.0+	0.0+	0.0+	0.0+	0.04%	
64-72 "									0.0+	0.0+			0.04%	
> 72 "													0.0%	
	5.9	4.6	3.4	4.8	8.8	11.1	12.0	8.7	9.4	11.6	7.1	6.3	100.0%	

Notes

1. The above frequencies have been calculated from values of wind direction and speed averaged over each hour during the 10 years from 1963 to 1972.
2. Wind directions are measured in degrees from True North and relate to the direction from which the wind is blowing. For example:

Direction 360 degrees = wind blowing from North

" 090 " = " " " East

"	180	"	"	"	"	South
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" 270 " " " " West

3. Adding the columns of the above table vertically gives the percentage amount of time in the year with winds from the stated directions.
4. Adding the columns of the above table horizontally gives the percentage amount of time in the year with winds in the stated speed ranges.
5. 0.0+ denotes a frequency of less than 0.05%.

TABLE 5A

Monthly percentage frequencies of wind direction and speed at
Kirkwall Airport
 (10 years from 1963 to 1972)

	Wind direction in degrees (True)												
Mean wind speed	350-010	020-040	050-070	080-100	110-130	140-160	170-190	200-220	230-250	260-280	290-310	320-340	All directions
<u>JANUARY</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	5.1%
4-12 mph	0.6	0.9	1.5	2.3	1.9	2.2	3.4	3.3	2.4	3.3	1.5	0.8	24.1%
13-24 mph	1.9	1.8	2.2	3.5	4.3	7.0	8.4	5.2	4.1	4.7	2.0	2.6	47.7%
25-38 mph	1.1	0.3	0.4	1.7	4.2	4.8	1.5	0.5	1.9	2.3	1.1	1.5	21.3%
39 mph or more	0.1	0.1	0.0+	0.1	0.5	0.5	0.0+		0.3	0.1	0.0+	0.1	1.8%
Total	3.7	3.1	4.1	7.6	10.9	14.5	13.3	9.0	8.7	10.4	4.6	5.0	100.0%
<u>FEBRUARY</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	6.0%
4-12 mph	1.8	1.1	1.8	1.7	3.0	2.4	3.1	3.0	2.1	2.8	2.0	1.9	26.7%
13-24 mph	2.9	2.2	1.7	2.6	5.4	7.2	6.7	4.3	3.4	4.7	4.2	3.0	48.3%
25-38 mph	1.2	0.6	0.4	0.7	3.6	2.7	1.2	0.7	1.3	2.5	0.6	1.3	16.8%
39 mph or more	0.3	0.1	0.0+		0.2	0.1	0.1		0.2	0.9	0.1	0.2	2.2%
Total	6.2	4.0	3.9	5.0	12.2	12.4	11.1	8.0	7.0	10.9	6.9	6.4	100.0%
<u>MARCH</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	5.0%
4-12 mph	1.5	1.4	1.2	1.3	1.1	2.4	3.1	2.7	1.6	2.3	1.6	1.7	21.9%
13-24 mph	2.9	0.9	0.7	1.1	2.6	7.5	7.7	5.6	5.7	4.8	3.9	3.4	46.8%
25-38 mph	1.1	0.4	0.2	0.7	3.8	3.8	0.9	0.7	2.8	4.0	1.6	2.7	22.7%
39 mph or more	0.3	0.0+	0.0+	0.0+	0.7	0.1			0.4	1.3	0.5	0.3	3.6%
Total	5.8	2.7	2.1	3.1	8.2	13.8	11.7	9.0	10.5	12.4	7.6	8.1	100.0%
<u>APRIL</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	6.7%
4-12 mph	2.2	2.4	2.3	3.0	2.9	2.4	3.5	4.5	2.9	2.8	1.8	1.1	31.8%
13-24 mph	3.7	3.3	1.4	2.9	5.0	4.5	5.0	4.6	5.5	4.8	3.5	2.9	47.1%
25-38 mph	1.6	0.9	0.3	1.2	1.3	0.6	0.5	0.2	1.9	1.7	0.9	1.5	12.6%
39 mph or more	0.3	0.1	0.0			0.1			0.2	0.5	0.4	0.2	1.8%
Total	7.8	6.7	4.0	7.1	9.2	7.6	9.0	9.3	10.5	9.8	6.6	5.7	100.0%

TABLE 5A (Contd)

Monthly percentage frequencies of wind direction and speed at
Kirkwall Airport
 (10 years from 1963 to 1972)

Wind direction in degrees (True)													
Mean wind speed	350-010	020-040	050-070	080-100	110-130	140-160	170-190	200-220	230-250	260-280	290-310	320-340	All directions
<u>MAY</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	5.3%
4-12 mph	2.0	2.7	2.6	3.2	4.0	3.1	3.7	2.9	1.9	1.7	1.7	1.5	31.0%
13-24 mph	3.6	3.4	2.3	4.1	11.1	8.1	5.8	2.8	3.4	3.3	3.0	3.2	54.1%
25-38 mph	0.6	0.2	0.2	0.6	2.5	1.4	0.2	0.1	1.2	0.9	0.5	0.8	9.2%
39 mph or more	0.1	0.1	0.0+	0.0+	0.1					0.0+		0.1	0.4%
Total	6.3	6.4	5.1	7.9	17.7	12.6	9.7	5.8	6.5	5.9	5.2	5.6	100.0%
<u>JUNE</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	7.5%
4-12 mph	2.2	2.9	2.7	4.1	5.1	4.5	4.5	4.0	2.2	3.1	2.5	1.7	39.5%
13-24 mph	4.3	2.4	1.3	1.1	6.8	9.1	4.7	2.1	3.6	5.9	3.4	2.7	47.4%
25-38 mph	0.1	0.1	0.1		0.3	0.4	0.1	0.0+	1.3	2.2	0.7	0.1	5.4%
39 mph or more									0.0+	0.2	0.0+		0.2%
Total	6.6	5.4	4.1	5.2	12.2	14.0	9.3	6.1	7.1	11.4	6.6	4.5	100.0%
<u>JULY</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	8.5%
4-12 mph	2.9	2.9	2.2	2.8	3.2	2.8	5.1	3.6	2.4	4.1	3.9	2.7	38.6%
13-24 mph	3.1	2.1	1.1	1.1	2.0	3.8	6.1	3.3	6.7	8.7	5.0	4.2	47.2%
25-38 mph	0.2	0.2			0.0+	0.3	0.1	0.0+	1.7	1.9	0.5	0.5	5.4%
39 mph or more									0.0+	0.2	0.1		0.3%
Total	6.2	5.2	3.3	3.9	5.2	6.9	11.3	6.9	10.8	14.9	9.5	7.4	100.0%
<u>AUGUST</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	10.3%
4-12 mph	3.3	3.5	3.4	3.3	4.5	4.7	4.4	3.4	2.5	4.0	3.6	2.7	43.3%
13-24 mph	3.5	1.6	1.6	1.2	2.4	6.0	4.6	1.8	3.7	5.3	4.6	4.6	40.9%
25-38 mph	0.6	0.1	0.4		0.2	0.8	0.1	0.0+	0.9	1.3	0.4	0.5	5.3%
39 mph or more	0.1	0.1	0.0+						0.0+	0.0+			0.2%
Total	7.5	5.3	5.4	4.5	7.1	11.5	9.1	5.2	7.1	10.6	8.6	7.8	100.0%

TABLE 5A (Contd)

Monthly percentage frequencies of wind direction and speed at
Kirkwall Airport
 (10 years from 1963 to 1972)

Wind direction in degrees (True)													
Mean wind speed	350-010	020-040	050-070	080-100	110-130	140-160	170-190	200-220	230-250	260-280	290-310	320-340	All directions
<u>SEPTEMBER</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	7.0%
4-12 mph	1.8	2.1	1.5	2.2	3.1	3.5	5.8	3.7	2.5	4.3	3.4	1.9	35.8%
13-24 mph	2.1	2.6	1.3	1.1	3.7	8.6	6.7	3.8	5.3	6.4	3.8	2.5	47.9%
25-38 mph	0.1	0.1	0.1	0.1	0.4	0.7	0.2	0.3	2.3	2.7	0.9	0.6	8.5%
39 mph or more	-	-	-	-	-	-	-	0.0	0.2	0.4	0.1	0.1	0.8%
Total	4.0	4.8	2.9	3.4	7.2	12.8	12.7	7.8	10.3	13.8	8.2	5.1	100.0%
<u>OCTOBER</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	5.8%
4-12 mph	0.5	0.5	0.5	1.1	1.8	3.5	6.3	4.1	2.9	4.6	2.2	0.8	28.8%
13-24 mph	1.3	0.5	0.3	2.1	3.6	7.4	10.8	7.2	5.8	5.6	2.8	2.4	49.8%
25-38 mph	0.6	0.4	0.1	0.0+	0.7	1.7	1.3	1.2	2.3	2.5	1.3	1.2	13.3%
39 mph or more	0.1	0.1	0.1	-	-	-	0.0+	0.0+	0.7	0.7	0.1	0.5	2.3%
Total	2.5	1.5	1.0	3.2	6.1	12.6	18.4	12.5	11.7	13.4	6.4	4.9	100.0%
<u>NOVEMBER</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	4.8%
4-12 mph	0.8	0.8	1.0	1.3	1.4	1.1	3.1	3.1	2.4	4.2	2.6	1.5	23.3%
13-24 mph	2.7	3.1	1.7	2.5	3.4	2.9	6.2	7.1	4.9	6.5	4.0	3.3	48.3%
25-38 mph	2.5	2.1	0.5	0.8	0.7	1.4	1.3	1.2	3.2	3.5	1.2	2.2	20.6%
39 mph or more	0.7	0.1	0.1	0.0+	-	0.1	0.0+	0.1	0.5	0.8	0.1	0.5	3.0%
Total	6.7	6.1	3.3	4.6	5.5	5.5	10.6	11.5	11.0	15.0	7.9	7.5	100.0%
<u>DECEMBER</u>													
Under 4 mph	-	-	-	-	-	-	-	-	-	-	-	-	4.2%
4-12 mph	0.7	0.8	0.7	1.3	1.6	1.5	3.5	3.7	2.1	3.3	2.2	1.0	22.4%
13-24 mph	3.7	2.0	0.6	1.2	2.5	4.3	12.1	6.7	4.7	4.0	3.4	3.9	49.1%
25-38 mph	2.3	0.6	0.2	0.1	0.5	2.7	2.4	1.8	3.9	2.9	1.2	2.6	21.2%
39 mph or more	0.2	0.2	0.0+	-	-	0.2	0.1	0.1	0.9	0.7	0.3	0.4	3.1%
Total	6.9	3.6	1.5	2.6	4.6	8.7	18.1	12.3	11.6	10.9	7.1	7.9	100.0%

TABLE 5B

Actual and average number of days with gales during the 20 years
from 1953 to 1972 at Kirkwall Airport

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1953	2	7	0	1	0	1	0	0	1	3	7	2	24
1954	8	4	3	3	0	0	0	1	3	2	6	4	34
1955	4	3	1	0	0	2	0	0	1	5	0	10	26
1956	6	0	3	0	3	2	1	0	1	1	5	6	28
1957	7	4	3	2	2	0	0	2	2	1	3	8	34
1958	4	2	4	0	3	0	0	1	0	0	0	5	19
1959	4	3	0	0	0	0	0	0	0	2	6	9	24
1960	4	6	2	3	0	2	0	0	0	0	4	4	25
1961	2	3	5	0	0	2	0	0	2	4	2	2	22
1962	2	8	2	1	1	0	0	2	1	3	1	4	25
1963	2	0	4	0	1	0	0	0	1	6	1	3	18
1964	1	1	3	1	1	0	1	3	0	0	2	5	18
1965	3	4	0	4	0	0	0	1	0	3	3	0	18
1966	0	0	8	0	1	0	0	0	2	2	5	9	27
1967	3	9	17	9	3	3	0	0	1	3	6	11	65
1968	7	3	7	4	3	0	0	0	0	4	4	7	39
1969	5	4	4	2	0	0	0	0	6	6	6	3	36
1970	4	3	6	3	1	1	1	2	2	4	3	3	33
1971	2	4	0	3	0	0	2	1	1	5	13	15	46
1972	7	2	1	0	0	0	0	0	0	3	4	3	20
20 years total	77	70	73	36	19	13	5	13	24	57	81	113	581
20 years average	3.9	3.5	3.7	1.8	0.9	0.6	0.3	0.6	1.2	2.9	4.1	5.6	29.1

TABLE 5C

Number of days and hours with gusts of 39 mph or more at Kirkwall Airport
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	Days Hours 8 49	8 65	9 106	8 54	11 59	1 1	3 12	1 9	8 85	14 120	15 67	13 125	99 752
1964	Days Hours 13 83	11 120	11 185	8 36	7 45	10 65	12 72	7 71	10 49	3 35	14 94	19 146	125 1001
1965	Days Hours 21 91	9 79	9 38	8 47	6 30	6 25	2 5	7 46	8 32	7 59	12 115	14 74	109 641
1966	Days Hours 13 99	4 23	19 169	6 37	3 32	3 8	3 13	2 10	13 120	9 57	17 169	24 223	116 960
1967	Days Hours 8 162	20 243	25 340	18 186	11 93	9 88	6 30	5 35	5 37	24 140	17 159	22 247	180 1760
1968	Days Hours 20 229	13 56	20 204	10 91	7 67	8 34	3 6	1 3	5 21	10 95	15 168	21 194	133 1168
1969	Days Hours 18 206	15 144	16 186	9 81	4 22	3 11	7 33	6 17	11 103	17 129	17 144	15 119	138 1195
1970	Days Hours 18 217	16 133	18 197	11 99	11 106	2 18	7 41	3 16	6 31	18 139	15 74	16 112	141 1183
1971	Days Hours 14 86	13 146	11 83	10 94	3 3	1 1	5 69	4 23	12 67	21 140	28 316	23 257	145 1285
1972	Days Hours 22 238	12 95	12 115	9 39	4 18	4 11	0 0	5 41	3 6	11 91	20 171	16 122	118 947
10-year means	Days Hours 15.5 146.0	12.1 110.4	15.0 162.3	9.7 76.4	6.7 47.5	4.7 26.2	4.8 28.1	4.1 27.1	8.1 55.1	13.4 100.5	18.0 147.7	18.3 161.9	130.4 1089.2

TABLE 5D

Number of days and hours with gusts of 55 mph or more at Kirkwall Airport
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	1 Days	0	1	0	0	0	0	0	4	5	3	6	20
	5 Hours	0	5	0	0	0	0	0	17	27	11	23	88
1964	2 Days	4	3	0	1	0	1	3	0	0	4	10	28
	4 Hours	20	43	0	2	0	13	16	0	0	8	41	147
1965	4 Days	3	1	4	0	0	0	1	0	4	3	1	21
	15 Hours	28	1	10	0	0	0	2	0	36	7	2	101
1966	0 Days	0	12	1	1	0	0	0	2	4	7	11	38
	0 Hours	0	42	1	10	0	0	0	16	5	33	65	172
1967	5 Days	10	19	8	3	4	0	1	1	5	7	10	73
	21 Hours	79	164	59	7	20	0	3	4	30	29	109	525
1968	9 Days	2	8	5	2	1	0	0	0	4	6	8	45
	44 Hours	11	52	31	9	1	0	0	0	7	16	35	206
1969	6 Days	5	3	1	0	0	0	0	6	6	5	3	35
	21 Hours	26	14	1	0	0	0	0	30	26	33	7	158
1970	5 Days	2	8	3	1	1	0	1	0	7	3	2	33
	10 Hours	6	34	24	1	1	0	5	0	37	22	11	151
1971	2 Days	6	2	2	0	0	2	1	1	5	15	14	50
	3 Hours	11	2	16	0	0	10	1	4	24	91	71	233
1972	7 Days	2	2	1	0	0	0	0	0	3	7	4	26
	68 Hours	3	18	1	0	0	0	0	0	24	28	11	153
10-year means	4.1 Days	3.4	5.9	2.5	0.8	0.6	0.3	0.7	1.4	4.3	6.0	6.9	36.9
	19.1 Hours	18.4	37.5	14.3	2.9	2.2	2.3	2.7	7.1	21.6	27.8	37.5	193.4

TABLE 5E

Speed, direction and date of occurrence of highest gust recorded
at Kirkwall Airport in each month of the year during the
10 years from 1963 to 1972

Highest gustJanuary

1963	61 mph (27 m/sec)	from 270 degrees on 25 January
1964	69 mph (31 m/sec)	from 260 degrees on 31 January
1965	73 mph (33 m/sec)	from 350 degrees on 14 January
1966	54 mph (24 m/sec)	from 150 degrees on 5 January
1967	65 mph (29 m/sec)	from 260 degrees on 13 January
1968	71 mph (32 m/sec)	from 250 degrees on 29 January
1969	69 mph (31 m/sec)	from 260 degrees on 30 January
1970	63 mph (28 m/sec)	from 330 degrees on 3 January
1971	59 mph (26 m/sec)	from 280 degrees on 20 January
1972	75 mph (33 m/sec)	from 150 degrees on 18 January

February

1963	46 mph (21 m/sec)	from 120 degrees on 6 February
1964	85 mph (38 m/sec)	from 270 degrees on 1 February
1965	94 mph (42 m/sec)	from 290 degrees on 13 February
1966	50 mph (22 m/sec)	from 120 degrees on 2 February
1967	93 mph (42 m/sec)	from 270 degrees on 3 February
1968	77 mph (34 m/sec)	from 160 degrees on 4 February
1969	136 mph (61 m/sec)	from 330 degrees on 7 February
1970	61 mph (27 m/sec)	from 250 degrees on 2 February
1971	62 mph (28 m/sec)	from 270 degrees on 3 February
1972	60 mph (27 m/sec)	from 030 degrees on 16 February

March

1963	58 mph (26 m/sec)	from 140 degrees on 14 March
1964	69 mph (31 m/sec)	from 130 degrees on 14 March
1965	57 mph (25 m/sec)	from 260 degrees on 7 March
1966	77 mph (34 m/sec)	from 300 degrees on 31 March
1967	92 mph (41 m/sec)	from 290 degrees on 19 March
1968	74 mph (33 m/sec)	from 290 degrees on 5 March
1969	75 mph (33 m/sec)	from 260 degrees on 8 March
1970	76 mph (34 m/sec)	from 320 degrees on 26 March
1971	67 mph (30 m/sec)	from 010 degrees on 10 March
1972	76 mph (34 m/sec)	from 110 degrees on 3 March

April

1963	45 mph (20 m/sec)	from 190 degrees on 13 April
1964	52 mph (23 m/sec)	from 260 degrees on 14 April
1965	66 mph (29 m/sec)	from 140 degrees on 9 April
1966	57 mph (25 m/sec)	from 300 degrees on 1 April
1967	91 mph (41 m/sec)	from 340 degrees on 5 April
1968	68 mph (30 m/sec)	from 050 degrees on 2 April
1969	57 mph (25 m/sec)	from 330 degrees on 13 April
1970	77 mph (34 m/sec)	from 270 degrees on 23 April
1971	77 mph (34 m/sec)	from 250 degrees on 18 April
1972	57 mph (25 m/sec)	from 250 degrees on 3 April

TABLE 5E (Contd)

Highest gustMay

1963	47 mph (21 m/sec)	from 300 degrees on 2 May
1964	59 mph (26 m/sec)	from 280 degrees on 8 May
1965	45 mph (20 m/sec)	from 120 degrees on 23 May
1966	74 mph (33 m/sec)	from 350 degrees on 23 May
1967	62 mph (28 m/sec)	from 100 degrees on 4 May
1968	63 mph (28 m/sec)	from 040 degrees on 5 May
1969	45 mph (20 m/sec)	from 110 degrees on 3 May
1970	62 mph (28 m/sec)	from 240 degrees on 20 May
1971	41 mph (18 m/sec)	from 240 degrees on 11 May
1972	45 mph (20 m/sec)	from 340 degrees on 27 May

June

1963	39 mph (17 m/sec)	from 270 degrees on 19 June
1964	48 mph (21 m/sec)	from 270 degrees on 16 June
1965	46 mph (21 m/sec)	from 130 degrees on 23 June
1966	51 mph (23 m/sec)	from 060 degrees on 24 June
1967	76 mph (34 m/sec)	from 270 degrees on 4 June
1968	57 mph (25 m/sec)	from 270 degrees on 26 June
1969	45 mph (20 m/sec)	from 130 degrees on 26 June
1970	55 mph (25 m/sec)	from 240 degrees on 25 June
1971	40 mph (18 m/sec)	from 310 degrees on 17 June
1972	44 mph (20 m/sec)	from 250 degrees on 22 June

July

1963	52 mph (23 m/sec)	from 270 degrees on 20 July
1964	68 mph (30 m/sec)	from 270 degrees on 28 July
1965	43 mph (19 m/sec)	from 280 degrees on 1 July
1966	45 mph (20 m/sec)	from 260 degrees on 22 July
1967	52 mph (23 m/sec)	from 260 degrees on 25 July
1968	48 mph (21 m/sec)	from 010 degrees on 3 July
1969	51 mph (23 m/sec)	from 250 degrees on 4 July
1970	54 mph (24 m/sec)	from 260 degrees on 13 July
1971	68 mph (30 m/sec)	from 270 degrees on 15 July
1972	37 mph (17 m/sec)	from 090 degrees on 4 July

August

1963	43 mph (19 m/sec)	from 130 degrees on 30 August
1964	61 mph (27 m/sec)	from 040 degrees on 18 August
1965	57 mph (25 m/sec)	from 270 degrees on 6 August
1966	50 mph (22 m/sec)	from 060 degrees on 10 August
1967	60 mph (27 m/sec)	from 280 degrees on 31 August
1968	40 mph (18 m/sec)	from 160 degrees on 20 August
1969	44 mph (20 m/sec)	from 010 degrees on 23 August
1970	58 mph (26 m/sec)	from 010 degrees on 16 August
1971	55 mph (25 m/sec)	from 240 degrees on 9 August
1972	53 mph (24 m/sec)	from 270 degrees on 9 August

TABLE 5E (Contd)

Highest gustSeptember

1963	90 mph (40 m/sec)	from 260 degrees on 26 September
1964	52 mph (23 m/sec)	from 260 degrees on 17 September
1965	52 mph (23 m/sec)	from 250 degrees on 21 September
1966	91 mph (41 m/sec)	from 250 degrees on 6 September
1967	66 mph (29 m/sec)	from 270 degrees on 2 September
1968	50 mph (22 m/sec)	from 160 degrees on 28 September
1969	101 mph (45 m/sec)	from 310 degrees on 28 September
1970	52 mph (23 m/sec)	from 270 degrees on 1 September
1971	69 mph (31 m/sec)	from 300 degrees on 23 September
1972	46 mph (21 m/sec)	from 290 degrees on 4 September

October

1963	73 mph (33 m/sec)	from 240 degrees on 11 October
1964	52 mph (23 m/sec)	from 350 degrees on 23 October
1965	92 mph (41 m/sec)	from 280 degrees on 31 October
1966	67 mph (30 m/sec)	from 330 degrees on 31 October
1967	69 mph (31 m/sec)	from 260 degrees on 26 October
1968	61 mph (27 m/sec)	from 260 degrees on 13 October
1969	73 mph (33 m/sec)	from 270 degrees on 29 October
1970	85 mph (38 m/sec)	from 250 degrees on 18 October
1971	75 mph (33 m/sec)	from 260 degrees on 22 October
1972	46 mph (21 m/sec)	from 290 degrees on 4 October

November

1963	69 mph (31 m/sec)	from 280 degrees on 22 November
1964	67 mph (30 m/sec)	from 270 degrees on 16 November
1965	61 mph (27 m/sec)	from 060 degrees on 23 November
1966	71 mph (32 m/sec)	from 330 degrees on 16 November
1967	101 mph (45 m/sec)	from 260 degrees on 11 November
1968	66 mph (29 m/sec)	from 040 degrees on 1 November
1969	75 mph (33 m/sec)	from 250 degrees on 1 November
1970	80 mph (36 m/sec)	from 260 degrees on 8 November
1971	77 mph (34 m/sec)	from 290 degrees on 16 November
1972	85 mph (38 m/sec)	from 230 degrees on 10 November

December

1963	69 mph (31 m/sec)	from 260 degrees on 25 December
1964	75 mph (33 m/sec)	from 250 degrees on 12 December
1965	57 mph (25 m/sec)	from 150 degrees on 17 December
1966	88 mph (39 m/sec)	from 310 degrees on 23 December
1967	98 mph (44 m/sec)	from 280 degrees on 3 December
1968	77 mph (34 m/sec)	from 300 degrees on 23 December
1969	60 mph (27 m/sec)	from 170 degrees on 19 December
1970	71 mph (32 m/sec)	from 250 degrees on 17 December
1971	81 mph (36 m/sec)	from 250 degrees on 21 December
1972	66 mph (29 m/sec)	from 220 degrees on 13 December

TABLE 5F

Speed, direction and date of occurrence of highest gust recorded
at Kirkwall Airport in each year during the 10 years from
1963 to 1972

<u>Year</u>	<u>Highest gust</u>
1963	90 mph (40 m/sec) from 260 degrees on 26 September
1964	85 mph (38 m/sec) from 270 degrees on 1 February
1965	94 mph (42 m/sec) from 290 degrees on 13 February
1966	91 mph (41 m/sec) from 250 degrees on 6 September
1967	101 mph (45 m/sec) from 260 degrees on 11 November
1968	77 mph (34 m/sec) from (160 degrees on 4 February) (300 degrees on 23 December)
1969	136 mph (61 m/sec) from 330 degrees on 7 February
1970	85 mph (38 m/sec) from 250 degrees on 18 October
1971	81 mph (36 m/sec) from 250 degrees on 21 December
1972	85 mph (38 m/sec) from 230 degrees on 10 November

TABLE 5G

Number of days on which the hourly mean wind speed reached 25 mph or more
in at least one hour between 0700 hours and 1700 hours

Greenwich Mean Time at
Kirkwall Airport - 10 years from 1963 to 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
<u>Number of days</u>													
1963	7	6	15	12	9	2	3	1	7	13	6	7	88
1964	9	11	11	7	6	8	9	6	9	3	10	12	101
1965	9	6	7	6	4	5	1	6	5	5	9	7	70
1966	9	4	16	6	6	2	5	3	11	7	11	20	100
1967	16	16	24	14	9	10	4	2	5	16	13	16	145
1968	14	4	20	9	8	8	2	0	3	8	11	13	100
1969	14	12	14	14	7	7	12	7	9	19	13	13	141
1970	17	11	17	11	13	3	6	2	7	13	11	8	119
1971	8	9	8	9	5	1	6	6	7	17	21	20	117
1972	15	10	9	6	8	4	0	7	1	7	16	12	95
10 year mean	11.8	8.9	14.1	9.4	7.5	5.0	4.8	4.0	6.4	10.8	12.1	12.8	107.6

Number of hours between 0700 hours and 1700 hours Greenwich Mean Time
with hourly mean wind speeds of 25 mph or more at
Kirkwall Airport - 10 years from 1963 to 1972

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
<u>Number of hours</u>													
1963	39	42	93	51	49	6	5	9	40	60	27	58	479
1964	51	59	97	36	41	59	51	47	30	14	41	63	589
1965	42	34	27	33	30	19	3	40	21	27	55	36	367
1966	56	21	89	42	33	5	15	14	73	27	82	85	547
1967	75	112	172	104	54	61	15	12	26	73	81	118	903
1968	72	24	103	54	57	35	6	0	10	51	79	96	587
1969	93	78	115	76	46	30	54	40	56	96	76	67	827
1970	115	85	113	72	87	22	34	6	37	63	54	49	737
1971	44	60	57	61	17	2	43	31	45	75	139	120	694
1972	114	65	60	15	37	17	0	34	3	39	93	70	547
10 year mean	70.1	58.0	92.6	54.4	45.1	25.6	22.6	23.3	34.6	52.5	72.7	76.2	627.7
10 year mean expressed as percentage of total working time	23%	20%	30%	18%	15%	9%	7%	8%	12%	17%	24%	25%	17%

TABLE 5H

Table for converting miles per hour to metres per second

(1 mile per hour = 0.44704 metres per second)

Miles per Hour	0	1	2	3	4	5	6	7	8	9
	Metres per second									
0	0.0	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.6	4.0
10	4.5	4.9	5.4	5.8	6.3	6.7	7.2	7.6	8.0	8.5
20	8.9	9.4	9.8	10.3	10.7	11.2	11.6	12.1	12.5	13.0
30	13.4	13.9	14.3	14.8	15.2	15.6	16.1	16.5	17.0	17.4
40	17.9	18.3	18.8	19.2	19.7	20.1	20.6	21.0	21.5	21.9
50	22.4	22.8	23.2	23.7	24.1	24.6	25.0	25.5	25.9	26.4
60	26.8	27.3	27.7	28.2	28.6	29.1	29.5	30.0	30.4	30.8
70	31.3	31.7	32.2	32.6	33.1	33.5	34.0	34.4	34.9	35.3
80	35.8	36.2	36.7	37.1	37.6	38.0	38.4	38.9	39.3	39.8
90	40.2	40.7	41.1	41.6	42.0	42.5	42.9	43.4	43.8	44.3
100	44.7	45.2	45.6	46.0	46.5	46.9	47.4	47.8	48.3	48.7
110	49.2	49.6	50.1	50.5	51.0	51.4	51.9	52.3	52.8	53.2
120	53.6	54.1	54.5	55.0	55.4	55.9	56.3	56.8	57.2	57.7
130	58.1	58.6	59.0	59.5	59.9	60.4	60.8	61.2	61.7	62.1
140	62.6	63.0	63.5	63.9	64.4	64.8	65.3	65.7	66.2	66.6
150	67.1	67.5	68.0	68.4	68.8	69.3	69.7	70.2	70.6	71.1

6. Visibility

Except in sea fog conditions, visibility in the Orkney group of islands is extremely good although serious temporary deteriorations are common in heavy squally showers of rain or snow.

With such a small land area and with considerable turbulence so often present owing to the prevalence of strong winds, marked inversions are infrequent and when present are soon broken down. In consequence, persistent fog over the land is very rare and the troublesom "haars" which often bedevil places along the east coast of the Scottish mainland are much less common in Orkney.

Wind directions associated with fog and poor visibility at Kirkwall Airport are shown in Table 6. It can be seen from Table 6 that in summer, sea fog is most common with winds from the quadrant between east and south. Indeed, winds from this quadrant usually bring poor visibility at any time of the year. Sea fog usually clears at once if the wind veers to west of south.

Frequencies of visibility below certain limits at various times of the day at Kirkwall Airport are given in Table 6A.

At Sule Skerry and Stenness, the observers record the number of days with fog (visibility less than 1,100 yards) at 0900 hours Greenwich Mean Time. The Sule Skerry and Stenness frequencies are given in Table 6B and can be compared with similar figures for Kirkwall Airport in Table 6C. The data in Tables 6B and 6C serve to emphasise the very low frequency of fog in Orkney.

TABLE 6

Percentage distribution of fog and poor visibility according to wind direction during the winter and summer "half years" at Kirkwall Airport - calculated from observations made 8 times per day at 00, 03, 06, 09, 12, 15, 18 and 21h GMT during the 15 years from 1957 to 1971

Wind direction measured in degrees from True North	Winter Half-Year (October to March)				Summer Half-Year (April to September)			
	Visibility less than 440 yards	Visibility 440 to 1,090 yards	Visibility 1,100 to 2,190 yards	Totals	Visibility less than 440 yards	Visibility 440 to 1,090 yards	Visibility 1,100 to 2,190 yards	Totals
(degrees)	%	%	%	%	%	%	%	%
350 to 010	0.8	4.6	3.8	9.2	1.8	0.7	2.4	4.9
020 to 040	0.4	1.5	1.5	3.4	2.3	0.8	2.5	5.6
050 to 070	0.7	0.8	1.9	3.4	3.6	2.4	2.8	8.8
080 to 100	1.1	1.2	4.6	6.9	3.7	2.4	4.1	10.2
110 to 130	2.3	3.0	7.3	12.6	7.4	7.2	7.2	21.8
140 to 160	3.4	7.7	10.7	21.8	7.1	6.7	9.0	22.8
170 to 190	3.1	3.4	5.7	12.2	2.8	2.4	2.6	7.8
200 to 220	0.7	1.2	1.9	3.8	0.4	0.2	0.2	0.8
230 to 250	0.0	0.4	1.1	1.5	0.4	0.1	0.2	0.7
260 to 280	0.4	0.4	2.3	3.1	0.1	0.2	0.6	0.9
290 to 310	0.8	0.4	1.1	2.3	0.1	0.0	0.7	0.8
320 to 340	2.7	4.5	4.6	11.8	0.3	0.8	1.7	2.8
Calms	4.2	0.8	3.0	8.0	6.4	3.4	2.3	12.1
Totals	20.6	32.9	49.5	100.0	36.4	27.3	36.3	100.0

Example

Out of the total number of 3-hourly observations of fog or poor visibility during the summer "half years" in the 15 years from 1957 to 1971, 3.6 per cent of the total observations had visibilities of less than 440 yards associated with winds from the sector between 050 and 070 degrees.

TABLE 6A

Percentage frequency of occurrence of visibilities less than the stated limits at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 hours GMT - calculated from visibilities observed at these 3-hourly intervals during the 15 years from 1957 to 1971 at Kirkwall Airport

Time of observation GMT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
	%	%	%	%	%	%	%	%	%	%	%	%	%
<u>Percentage frequency of occurrence of visibilities less than 5 miles (8000 metres)</u>													
00h midnight	7.5	9.7	13.1	8.7	19.1	17.8	13.1	16.8	12.3	14.7	4.7	4.9	11.9
03h	7.9	9.2	12.5	11.5	20.2	22.9	14.6	19.6	15.1	12.9	5.1	4.7	13.1
06h	8.6	7.3	13.3	11.8	17.2	19.3	12.1	19.2	17.3	12.7	4.0	3.9	12.3
09h	7.9	7.1	12.1	9.3	13.3	11.3	8.8	14.2	14.2	11.4	8.0	4.7	10.2
12h noon	8.4	9.9	11.4	7.8	10.8	8.1	7.8	11.2	10.9	10.5	6.7	3.7	8.9
15h	9.5	9.2	12.3	8.0	13.3	8.5	7.1	10.1	12.7	12.9	6.2	5.4	9.6
18h	9.7	10.9	13.3	7.8	10.3	8.0	10.2	10.3	12.9	14.4	5.6	5.6	9.9
21h	7.1	11.9	13.4	10.7	13.5	13.3	11.9	15.1	13.1	12.9	4.3	4.1	11.0
<u>Percentage frequency of occurrence of visibilities less than 2½ miles (4000 metres)</u>													
00h midnight	1.3	2.8	2.4	3.8	9.0	10.4	7.5	7.5	6.9	5.0	0.9	1.3	4.9
03h	3.0	2.8	3.0	5.1	9.7	13.3	7.7	8.8	8.4	4.7	0.2	1.3	5.7
06h	1.7	1.2	4.1	4.2	9.3	9.8	6.5	8.6	8.2	4.5	0.0	1.1	4.9
09h	2.1	1.4	3.4	3.8	6.7	4.9	4.1	5.8	5.3	3.9	1.3	0.6	3.6
12h noon	2.8	3.3	2.8	2.9	4.3	2.5	1.9	3.9	3.8	2.6	1.3	0.6	2.7
15h	1.9	2.8	3.4	2.7	3.9	3.3	3.2	3.2	3.6	4.3	2.0	0.6	2.9
18h	2.8	2.6	3.7	1.8	4.1	3.6	3.9	3.7	5.3	4.1	1.3	1.1	3.2
21h	1.1	3.3	3.9	5.1	6.9	7.3	5.2	6.2	6.0	4.9	0.7	0.6	4.3
<u>Percentage frequency of occurrence of visibilities less than 2200 yards (2000 metres)</u>													
00h midnight	0.6	1.9	0.6	3.1	6.2	8.5	5.6	6.0	3.6	2.8	0.7	0.4	3.3
03h	1.9	1.2	1.5	3.6	6.3	10.9	6.2	6.5	4.7	3.0	0.2	0.4	3.9
06h	0.4	0.7	1.5	2.7	6.2	7.1	5.4	6.0	5.8	2.8	0.0	0.9	3.3
09h	1.5	0.7	1.1	2.4	4.5	3.8	3.0	4.1	3.3	2.4	0.4	0.4	2.3
12h noon	1.9	1.7	0.9	1.3	2.2	1.1	1.5	1.7	2.0	1.3	0.4	0.4	1.4
15h	1.7	1.9	1.3	1.1	0.6	1.6	2.2	2.1	1.3	1.1	1.1	0.2	1.3
18h	2.2	1.9	1.5	1.3	1.7	2.9	2.8	2.8	3.5	1.9	0.4	0.2	1.9
21h	0.2	2.6	1.3	2.9	4.9	5.5	3.9	4.5	3.6	2.6	0.4	0.2	2.7

Example

In January, visibility at 1200 hours GMT was less than 2½ miles (less than 4000 metres) on 2.8 per cent of occasions during the 15 years from 1957 to 1971.

TABLE 6A(contd)

Time of observation GMT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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% % % % % % % % % % % % %

Percentage frequency of occurrence of visibilities less than 1100 yards
(1000 metres)

00h midnight	0.2	1.9	0.6	0.9	4.3	6.5	4.3	4.1	2.7	1.7	0.4	0.2	2.3
03h	1.3	0.5	0.4	2.9	4.3	8.2	4.9	5.2	3.3	1.9	0.0	0.2	2.8
06h	0.2	0.7	0.4	2.0	3.7	5.3	4.3	4.9	3.8	1.5	0.0	0.4	2.3
09h	0.9	0.5	0.2	1.6	2.4	2.2	1.3	3.0	1.3	1.5	0.2	0.2	1.3
12h noon	0.4	0.7	0.6	0.2	0.6	0.2	1.1	0.4	0.4	0.4	0.0	0.0	0.4
15h	0.9	0.9	0.4	0.0	0.2	0.2	0.6	0.2	0.4	0.2	0.9	0.2	0.4
18h	0.9	1.7	0.4	0.4	0.6	1.1	1.3	1.5	2.2	0.6	0.2	0.0	0.9
21h	0.2	1.2	0.6	2.2	3.9	3.6	2.6	3.4	2.2	0.9	0.2	0.0	1.8

Percentage frequency of occurrence of visibilities less than 440 yards
(400 metres)

00h midnight	0.2	0.2	0.2	0.9	2.4	4.9	2.6	2.4	1.8	0.2	0.0	0.0	1.3
03h	0.6	0.2	0.0	2.2	2.6	5.5	2.8	3.0	1.8	1.1	0.0	0.0	1.7
06h	0.2	0.2	0.2	0.9	1.9	2.4	2.6	3.0	2.4	1.1	0.0	0.2	1.3
09h	0.2	0.2	0.2	0.4	0.9	0.9	1.3	1.9	0.4	1.1	0.0	0.2	0.7
12h noon	0.2	0.4	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.1
15h	0.6	0.4	0.2	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.2
18h	0.4	0.4	0.0	0.4	0.2	0.2	0.6	0.6	1.1	0.2	0.2	0.0	0.4
21h	0.2	0.2	0.2	1.3	2.6	1.8	1.3	2.6	1.3	0.4	0.0	0.0	1.0

Percentage frequency of occurrence of visibilities less than 220 yards
(200 metres)

00h midnight	0.2	0.0	0.2	0.4	0.9	1.6	1.1	1.1	1.1	0.2	0.0	0.0	0.6
03h	0.6	0.2	0.0	0.9	0.9	1.8	1.3	1.7	0.9	0.2	0.0	0.0	0.7
06h	0.2	0.0	0.0	0.2	0.4	0.4	0.9	1.3	1.1	0.2	0.0	0.0	0.4
09h	0.2	0.0	0.0	0.0	0.4	0.0	0.4	0.6	0.2	0.2	0.0	0.0	0.2
12h noon	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
15h	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
18h	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2	0.2	0.0	0.1
21h	0.2	0.2	0.2	0.4	1.1	0.4	0.4	1.1	0.7	0.4	0.0	0.0	0.4

TABLE 6A (contd)

Time of observation GMT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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% % % % % % % % % % % % %

Percentage frequency of occurrence of visibilities less than 110 yards
(100 metres)

00h midnight	0.2	0.0	0.2	0.4	0.4	0.7	0.2	0.2	0.4	0.0	0.0	0.0	0.2
03h	0.2	0.0	0.0	0.2	0.4	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.1
06h	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.1
09h	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
12h noon	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
15h	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
18h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0+
21h	0.0	0.0	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.2	0.0	0.0	0.1

Percentage frequency of occurrence of visibilities less than 55 yards
(50 metres)

00h midnight	0.0	0.0	0.2	0.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.1
03h	0.2	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.1
06h	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
09h	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
12h noon	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
15h	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0+
18h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0+

NOTE: 0.0+ denotes a frequency of less than 0.05%

TABLE 6B

Number of days with fog (visibility less than 1,100 yards) at 0900 hours
Greenwich Mean Time at Sule Skerry
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	0	0	0	0	0	5	0	1	0	0	0	0	6
1964	0	0	0	0	2	0	1	2	1	0	0	0	6
1965	0	0	0	0	2	2	1	0	0	0	0	0	5
1966	0	0	0	0	1	6	0	0	0	0	0	0	7
1967	0	0	0	0	0	2	1	2	0	0	0	0	5
1968	0	0	0	1	2	3	2	0	2	0	0	0	10
1969	0	0	0	0	1	1	2	2	2	0	0	0	8
1970	0	0	0	0	0	1	0	1	1	2	0	0	5
1971	0	0	0	1	0	1	2	0	0	0	0	0	4
1972	0	0	0	0	0	0	4	0	0	0	0	0	4
10 year average 1963 to 1972	0.0	0.0	0.0	0.2	0.8	2.1	1.3	0.8	0.6	0.2	0.0	0.0	6.0

Number of days with fog (visibility less than 1,100 yards) at 0900 hours
Greenwich Mean Time at Stenness
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	0	0	0	1	0	1	1	0	0	0	0	0	3
1965	1	0	0	0	0	0	0	1	0	0	0	0	2
1966	0	1	0	0	0	0	0	0	0	0	0	0	1
1967	0	0	0	1	0	0	0	1	0	0	0	0	2
1968	0	0	0	1	0	0	1	0	0	1	0	0	3
1969	0	1	0	0	0	0	0	0	0	2	0	0	3
1970	0	0	0	0	0	0	0	1	1	1	1	0	4
1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1972	0	0	1	0	0	0	0	0	0	0	0	0	1
10 year average 1963 to 1972	0.1	0.2	0.1	0.3	0.0	0.1	0.2	0.3	0.1	0.4	0.1	0.0	1.9

TABLE 6c

Number of days with fog (visibility less than 1100 yards)
 at 0900 hours Greenwich Mean Time
 at Kirkwall Airport
 (22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
<u>Days</u>													
1951	0	0	0	0	0	0	1	2	0	0	0	0	3
1952	0	0	0	0	2	0	0	0	0	0	0	0	2
1953	0	0	1	0	1	0	1	0	0	0	0	0	3
1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1955	0	1	2	0	0	0	0	1	0	0	0	0	4
1956	0	0	3	0	0	0	2	0	6	0	0	0	11
1957	0	0	0	0	0	0	1	0	0	0	0	0	1
1958	0	0	0	0	0	1	1	3	2	0	1	0	8
1959	0	0	1	0	1	1	0	1	0	0	0	0	4
1960	0	0	0	0	1	0	0	0	0	0	0	0	1
1961	0	0	0	1	2	0	0	0	0	1	0	0	4
1962	0	0	0	0	1	0	0	0	1	1	0	0	3
1963	0	0	0	1	0	2	0	2	0	1	0	0	6
1964	0	0	0	1	0	1	1	0	0	0	0	1	4
1965	0	0	0	0	1	0	0	2	0	0	0	0	3
1966	1	0	0	0	0	2	0	0	0	0	0	0	3
1967	0	1	0	0	1	1	1	1	0	0	0	0	5
1968	1	0	0	3	1	2	1	0	0	2	0	0	10
1969	0	0	0	1	2	0	1	1	0	1	0	0	6
1970	2	1	0	0	0	0	0	3	1	1	0	0	8
1971	0	0	0	0	1	0	0	1	2	0	0	0	4
1972	0	0	2	0	0	0	1	0	0	0	0	1	4
22 year average 1951-1972	0.2	0.1	0.4	0.3	0.6	0.5	0.5	0.8	0.5	0.3	0.1	0.1	4.4

7. Snow

In the Orkney group of islands, as elsewhere in the British Isles, the incidence of snow falling and the persistence of snow cover are two of the most variable of all the meteorological elements. For example, during the winter of 1969/70 there were 27 mornings with snow lying on the ground at Kirkwall Airport but during the following winter of 1970/71 there was not even one morning with snow lying.

At Kirkwall Airport, there are, on average, about 64 days per year with snow or sleet falling. Most of the days of snowfall occur in the months from November to April but snow or sleet can fall in Orkney in any month of the year. However, snow or sleet falling in the months of June to September is a rare occurrence and snow falling in May and October seldom provides more than a temporary powdering of the ground.

The Meteorological Office at Kirkwall Airport is the only weather station in Orkney keeping a 24 hour watch on the weather, and is, therefore, the only weather station for which complete records of snow falling at any time of the day or night are available. However, up to heights of about 200 feet above sea level there is not much variation from place to place in the incidence of snowfall and therefore the Kirkwall Airport figures of the number of days of snow or sleet falling can be taken as being typical of most of Orkney.

Although there are many days during the winter months on which snow falls in the Orkney group of islands, days with snow lying on the ground are relatively few in number. For example, in contrast to the average of 64 days with snow or sleet falling at Kirkwall Airport, there are, on average, only about 15 days per year with an extensive coverage of snow at the time of the routine morning observation at 0900 hours GMT.

It is interesting to compare the Kirkwall averages of 64 days per year with snow or sleet falling and 15 days per year with snow lying on the ground at 0900 hours with a place on the mainland like Aberdeen Airport which although much further to the south, is more remote from the moderating influence of the sea.

The corresponding averages for Aberdeen Airport are 49 days per year with snow or sleet falling and 27 days per year with snow lying on the ground at 0900 hours.

The Orkney group of islands is very open to the sector between northwest and northeast and it is hardly surprising that the greatest risk of heavy snowfalls occurs when northerly winds bring polar air into the region. These heavy snowfalls are sometimes accompanied by strong northerly winds and therefore even relatively light falls of snow can lead to severe drifting.

The number of days with snow or sleet falling at Kirkwall Airport are given in Table 7.

The number of days with snow lying on the ground at Kirkwall Airport, Stenness and Sule Skerry are given in Table 7A.

The number of days per winter with snow lying at specified depths at Kirkwall Airport and Stenness are given in Table 7B. Records of snow depths are not available from Sule Skerry.

TABLE 7

Number of days with snow or sleet falling at any time of the day
at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
<u>Days</u>													
1951	4	13	17	12	2	0	0	0	0	2	3	10	63
1952	19	14	7	2	1	0	0	0	2	0	7	10	62
1953	4	9	4	10	0	2	0	0	0	0	0	3	32
1954	10	14	9	4	1	0	0	0	1	0	4	10	53
1955	11	17	14	1	10	0	0	0	0	5	1	17	76
1956	22	13	10	9	1	0	0	0	0	1	3	7	66
1957	7	11	3	2	4	0	0	0	0	0	4	11	42
1958	18	20	19	6	3	0	0	1	0	0	0	14	81
1959	24	4	1	4	1	0	0	0	0	2	3	10	49
1960	11	16	3	3	1	0	0	0	0	0	1	9	44
1961	14	6	9	7	2	0	0	0	0	2	8	15	63
1962	6	15	22	9	2	0	0	0	0	4	8	15	81
1963	19	17	1	1	4	0	0	0	0	0	8	10	60
1964	5	7	7	2	0	3	0	0	0	2	7	14	47
1965	19	6	12	6	4	0	1	0	0	1	19	13	81
1966	12	13	12	10	0	0	0	0	0	4	12	20	83
1967	10	8	19	9	6	0	0	0	0	3	8	14	77
1968	16	18	11	8	5	0	1	0	0	1	7	15	82
1969	12	24	16	9	2	0	0	0	2	2	17	9	93
1970	11	18	19	12	1	0	0	0	0	3	8	8	80
1971	9	4	9	5	1	0	0	0	0	2	12	5	47
1972	9	6	5	4	0	1	0	0	1	1	8	7	42
22 year average 1951-1972	12.4	12.4	10.4	6.1	2.3	0.3	0.1	0.1	0.3	1.6	6.7	11.2	63.9

TABLE 7A

Number of days with snow lying at 0900 hours Greenwich Mean
Time covering half or more of the ground surrounding
the weather station at Kirkwall Airport
(22 years from 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
	<u>Days</u>												
1951	0	4	5	1	0	0	0	0	0	0	0	2	12
1952	13	8	1	0	0	0	0	0	0	0	7	3	32
1953	0	2	0	0	0	0	0	0	0	0	0	0	2
1954	2	5	3	0	0	0	0	0	0	0	0	0	10
1955	11	16	5	0	0	0	0	0	0	0	0	9	41
1956	10	7	0	0	0	0	0	0	0	0	1	0	18
1957	0	0	0	0	0	0	0	0	0	0	0	2	2
1958	12	14	8	0	0	0	0	0	0	0	0	0	34
1959	11	0	0	0	0	0	0	0	0	0	0	0	11
1960	3	12	0	0	0	0	0	0	0	0	0	1	16
1961	0	0	1	2	0	0	0	0	0	0	0	12	15
1962	1	1	9	0	0	0	0	0	0	0	5	3	19
1963	14	2	0	1	0	0	0	0	0	0	0	4	21
1964	0	1	0	0	0	0	0	0	0	0	0	4	5
1965	3	1	3	0	0	0	0	0	0	0	8	3	18
1966	1	2	1	0	0	0	0	0	0	0	0	1	5
1967	0	0	0	0	0	0	0	0	0	0	0	6	6
1968	6	9	0	5	0	0	0	0	0	0	0	3	23
1969	0	16	2	0	0	0	0	0	0	0	2	1	21
1970	4	15	5	0	0	0	0	0	0	0	0	0	24
1971	0	0	0	0	0	0	0	0	0	0	3	0	3
1972	2	1	0	0	0	0	0	0	0	0	0	0	3
22 year average 1951-1972	4.2	5.3	1.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.5	15.5

TABLE 7A (Contd)

Number of days with snow lying at 0900 hours Greenwich Mean Time covering
half or more of the ground surrounding the Lighthouse
at Sule Skerry
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	4	0	0	0	0	0	0	0	0	0	0	0	4
1964	0	0	0	0	0	0	0	0	0	0	0	1	1
1965	0	1	2	0	0	0	0	0	0	0	4	4	11
1966	0	2	0	0	0	0	0	0	0	0	0	0	2
1967	0	0	1	0	0	0	0	0	0	0	0	0	1
1968	1	2	0	1	0	0	0	0	0	0	0	0	4
1969	0	8	0	0	0	0	0	0	0	0	2	1	11
1970	0	8	3	1	0	0	0	0	0	0	0	0	12
1971	0	0	0	0	0	0	0	0	0	0	2	0	2
1972	0	0	0	0	0	0	0	0	0	0	0	0	0
10 year average 1963-1972	0.5	2.1	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.6	4.8

Number of days with snow lying at 0900 hours Greenwich Mean Time covering
half or more of the ground surrounding the weather station
at Stenness
(10 years from 1963 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1963	19	0	0	1	0	0	0	0	0	0	1	5	26
1964	0	1	0	0	0	0	0	0	0	0	0	4	5
1965	8	1	5	0	0	0	0	0	0	0	9	6	29
1966	4	12	4	2	0	0	0	0	0	0	0	2	24
1967	3	0	0	0	0	0	0	0	0	0	0	6	9
1968	7	9	0	8	0	0	0	0	0	0	0	5	29
1969	1	16	7	0	0	0	0	0	0	0	4	2	30
1970	8	14	13	2	0	0	0	0	0	0	0	0	37
1971	2	0	0	0	0	0	0	0	0	0	6	0	8
1972	2	1	0	0	0	0	0	0	0	0	0	0	3
10 year average 1963-1972	5.4	5.4	2.9	1.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0	3.0	20.0

TABLE 7B

Number of days with snow lying at 0900 hours GMT at depths between specified
limits at Kirkwall Airport - altitude 26 metres
(17 winters from 1956-57 to 1972-73)

Depth - cm	0-2	3-5	6-10	11-15	16-20	21-30	31-40	Total
Depth - ins	0-1	2	3-4	5-6	7-8	9-12	13-16	
Maximum depth = 24 centimetres = 9½ inches								
Winter of:								
1956-57	1							1
1957-58	11	11	8	4	2			36
1958-59	4	3	2	2				11
1959-60	11	4						15
1960-61	3	1						4
1961-62	13	3	6	1				23
1962-63	16	6	3					25
1963-64	1	2	2					5
1964-65	4	5		2				11
1965-66	11	4						15
1966-67		1						1
1967-68	10	7	8			1		26
1968-69	5	4	9	3				21
1969-70	10	7	7	3				27
1970-71								0
1971-72		4	2					6
1972-73	4	4	1	3				12
Total	104	66	48	18	2	1	0	239
% Total	43.6	27.6	20.1	7.5	0.8	0.4	0	100%

TABLE 7B (Contd)

Number of days with snow lying at 0900 hours GMT at depths between specified
limits at Stenness - altitude 23 metres
(12 winters from 1961-62 to 1972-73)

Depth - cm	0-2	3-5	6-10	11-15	16-20	21-30	31-40	Total
Depth - ins	0-1	2	3-4	5-6	7-8	9-12	13-16	

Maximum depth = 18 centimetres = 7 inches

Winter of:								
1961-62	16	4	8	2				30
1962-63	8	9	14	1				32
1963-64	4		1	2				7
1964-65	14	3	2					19
1965-66	24	8	5					37
1966-67	5							5
1967-68	11	4	14		1			30
1968-69	12	5	9	2	1			29
1969-70	20	4	7	10	2			43
1970-71	2							2
1971-72		4	3		2			9
1972-73	4	4	3	3				14
Total	120	45	66	20	6			257
% Total	46.7	17.5	25.7	7.8	2.3			100%

Terms

Although squally showers of rain, hail or snow are by no means uncommon in

The number of days with thunder heard at Kirkwall Airport are given in Table 8.

TABLE 8

Number of days with thunder heard at Kirkwall Airport

(22 years 1951 to 1972)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1951	0	0	0	0	0	1	1	1	0	0	0	0	3
1952	1	0	0	0	1	0	1	0	0	0	0	1	4
1953	0	0	0	0	1	1	0	1	0	0	1	0	4
1954	1	0	0	0	3	0	1	1	0	0	1	1	8
1955	0	0	0	0	0	0	0	3	0	0	0	3	6
1956	1	0	1	0	0	0	0	1	0	0	1	2	6
1957	1	0	0	0	0	0	0	0	0	0	0	0	1
1958	2	0	0	1	1	0	0	0	0	1	0	0	5
1959	1	0	0	0	0	0	1	1	0	0	3	0	6
1960	0	0	0	0	0	1	0	2	0	0	1	0	4
1961	0	0	0	0	1	0	0	0	0	1	0	0	2
1962	1	2	1	0	0	0	0	0	0	1	0	1	6
1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1964	1	1	0	0	2	0	0	0	0	0	1	0	5
1965	1	0	0	0	0	0	1	0	0	0	1	0	3
1966	0	0	0	0	0	0	0	0	0	0	0	1	1
1967	0	1	2	1	0	0	1	0	1	0	2	0	8
1968	1	0	0	3	1	2	1	0	0	2	0	0	10
1969	0	0	0	0	0	0	1	2	0	0	1	0	4
1970	0	1	0	0	0	1	2	0	0	0	1	0	5
1971	0	2	0	0	0	0	2	0	0	1	2	2	9
1972	1	0	0	0	0	1	1	0	0	0	1	0	4
22 year average													
1951-1972	0.5	0.3	0.2	0.2	0.5	0.3	0.6	0.5	0.1	0.3	0.7	0.5	4.7

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