METEOROLOGICAL SERVICE

SOLAR RADIATION OBSERVATIONS 1982

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CONTENTS

C O N T E N T S (Contd).

SUMMARY

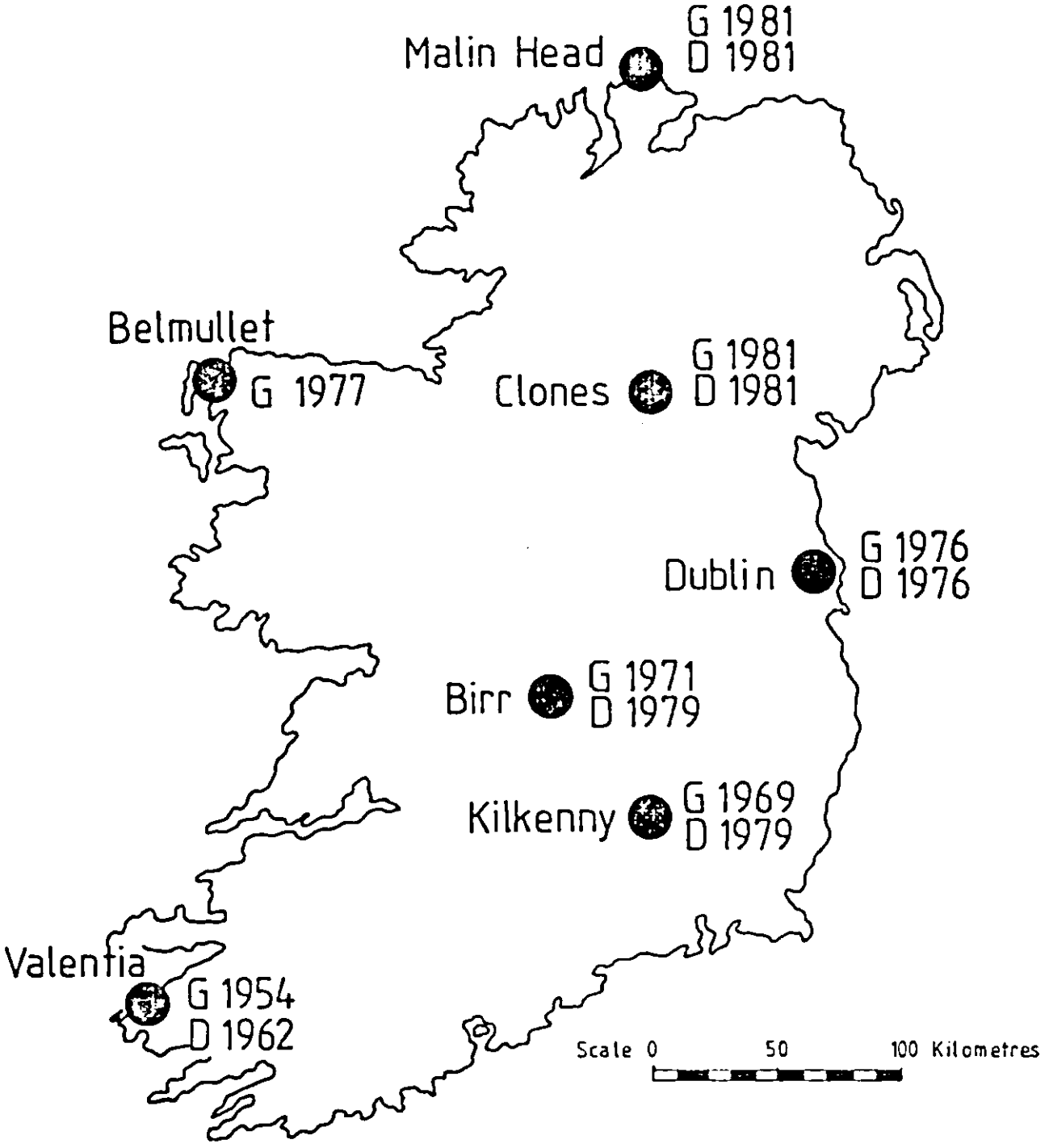
This volume contains a brief description of the site, equipment and observing procedures in use at the seven stations in the Irish network of Solar Radiation measuring stations i.e. Valentia Observatory, Kilkenny, Birr, Dublin Airport, Malin Head, Clones and Belmullet. The network diagram is on the following page.

In previous years hourly values were published but as and from January 1976, only daily totals are published apart from the spot values of Direct Sun at Normal Incidence (Table 4).

The hourly values may be had on request from: The Director, Meteorological Service, Glasnevin Hill, Dublin 9.

In compliance with a World Meteorological Organisation (WMO) recommendation a new radiation scale has been adopted from 1st January 1981. This is the World Radiometric Reference 1981 (WRR 1981) and replaces the International Pyrheliometer Scale, 1956 (IPS 1956) which has been in use for all radiation data published to date by the Irish Meteorological Service. The WRR (1981) scale is 2.2 percent greater than the IPS (1956) scale.

Archived radiation data up to 31st December 1980 will not be increased by the 2.2 percent. However, all radiation values in the following Tables are in the World Radiometric Reference Scale, 1981.



IRISH METEOROLOGICAL SERVICE

SOLAR RADIATION STATION NETWORK

SOLAR RADIATION OBSERVATIONS AT VALENTIA OBSERVATORY

1982

1. Introduction

Solar radiation observations were begun at Valentia Observatory in September, 1954. At that time a Moll thermopile pyranometer and a recording millivoltmeter were installed, and have, since then, provided a continuous record of Global Solar Radiation. A Linke-Feussner thermoelectric iron-clad Actinometer (Kipp and Zonen) was also brought into use at the same time and a schedule of routine observations on direct sunlight has been maintained when weather conditions permitted. In 1962, a second Moll thermopile pyranometer, fitted with shading ring, was installed to provide a record of Diffuse Solar Radiation.

Measurement of the Radiation Balance with a Funk type Net Pyrradiometer was introduced on a routine basis as from 1st January, 1971.

Measurements of the Direct Sun radiation, using an Eppley Normal Incidence Pyrheliometer, and of Infra-Red radiation, using an Eppley Precision Radiometer (Pyrgeometer), were introduced on a routine basis as and from 1st January 1979.

Data derived from these instruments and the results obtained from the direct sunlight observations for the period 1954 - 1959 have been published in [1]. The data for 1960 and subsequent years have been published in annual volumes. This volume contains the data for 1982.

2. Site of the Observatory

The Observatory which is in the extreme south-west of Ireland, (Lat. 51° 56' N; Long. 10° 15'W), is situated on the south-east side of the narrow estuary of Valentia River, which runs from approximately north-east to south-west (Fig. 1). It is about 1.2 Km to the south-west of the town of Cahirciveen. To the north, across the river estuary, is a range of hills 120 to 360 m high. To the north-east, beyond the town of Cahirciveen, the estuary opens out considerably and the terrain is generally an open boggy basin with only a gentle gradient. To the south-east, however, the ground rises rapidly again to a range of hills 270 to 360 m high, the highest peak (Bentee 375 m) being only 1.5 Km from the Observatory. To the south, the country opens out to a distance of nearly 8 Km from the Observatory, where the Kilkeaveragh range of hills runs east west, varying in height from 120 to 390 m. There is an opening to the sea to the south-west between the mainland and Valentia Island. The hills on the Island rise to a height of 270 m. North of the island there is another opening to the sea, and the circle of hills is completed by a range to the north-west, 120 to 270 m high, separated by a narrow gulley from the range to the northward.

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The layout of the Observatory is shown in Fig. 2. The sensor is exposed on the roof of the Radiation House and the recording instruments are installed inside the house. The pyranometer is at a height of 4 metres above ground level and 20 metres above Mean Sea Level. The nature of the exposure can be seen in Fig. 3, in which the outline of all obscuring objects is plotted on an Elevation-Azimuth diagram. Apart from one sector, the obscuring objects have an elevation of less than 5° so that their effect

on the diffuse radiation is negligible.

In the sector 080° to 150°E from north, the elevation of the obscuring objects lies between 8° and 10.5° approximately. The loss of diffuse radiation according to Blackwell's formula [2] works out at approximately 1%. This is also very small, so no corrections have been made to the data to allow for this loss. The loss of radiation due to the obscuring of the direct solar beam occurs mainly in the same sector (080° to 150°). During the period from the end of August to mid-April, the initial 30 to 70 minutes of the direct sun is cut off. This affects the hourly values given for the first and occasionally the second hour but the effect on the total for the day is negligible. No attempt has been made to correct the radiation data for this loss of direct sunlight.

3.2 Pyranometer Used

Details concerning the pyranometer and recording equipment are given in the Appendix.

3.3 Calibration of the Pyranometer

The pyranometer, recorder and integrator were calibrated by means of the Actinometer and Millivoltmeter, described in paragraphs 7, 7.1 and 7.2 below. The calibration was done by comparing the intensity of the direct sunlight as measured by the pyranometer with the corresponding intensity as measured by means of the actinometer.

3.4 Timing Control

To facilitate accurate timing, time marks were made on the chart, automatically, by standard clock, at each hour L.A.T. This clock, which also controlled the print-out unit, was adjusted daily to keep it within ½ minute of true L.A.T.

4. Measurement of Diffuse Solar Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same site as the global pyranometer, at a distance of 3.1 metres west of the latter. A description of the site is given in 3.1 above.

4.2 Pyranometer Used

See Appendix

4.3 Calibration of the Pyranometer

The shading-ring was displaced below the horizontal position. The pyranometer was then calibrated in exactly the same way as the global pyranometer (para 3.3 above). The calibration was checked by comparing the values recorded during the hours when the sky was overcast with the corresponding values as recorded on the global pyranometer.

4.4 Shading-Ring Correction

Corrections have been made to increase the values extracted from the charts to compensate for the diffuse energy intercepted by the ring simultaneously with the eclipse of the sun's disc. Theoretical corrections were computed following the method described by Blackwell [2].

5. Measurement of Direct Sun Radiation

5.1 Exposure of the Pyrheliometer

The Direct Sun Pyrheliometer is mounted on the same site as the global pyranometer at a distance of 2.4 metres north-west of the latter. A description of the site is given in 3.1 above.

5.2 Pyrheliometer Used

See Appendix

The Pyrheliometer is mounted on an Eppley Solar Tracker - a power driven equatorial mount with provision for varying the elevation and azimuth settings. The tracker settings are adjusted as necessary to keep the pyrheliometer directed at the sun at all times.

5.3 Calibration of the Pyrheliometer

The pyrheliometer and integrator were calibrated by means of the actinometer and millivoltmeter, as described in paragraphs 7, 7.1, 7,2 below. The calibration was done by comparing the intensity of the radiation as measured by the pyrheliometer with the intensity measured by the actinometer.

6. Measurement of Infra-red Radiation

6.1 Exposure of the Radiometer (Pyrgeometer)

The Infra-red Radiometer is mounted on the same site as the global pyranometer at a distance of 1 metre south-west of the latter. A description of the site is given in 3.1 above.

6.2 Radiometer Used

See Appendix

6.3 Calibration of the Radiometer

The radiometer was calibrated in a water-heated hemispherical cavity which provided a source of isotropic black-body radiation. The radiation as measured by the radiometer was compared with the radiation in the cavity as calculated from the Stefan-Boltzmann law.

7. Direct Sun Observations

A Linke-Feussner thermoelectric iron-clad actinometer (Serial No. 93) by Kipp and Zonen, provided with red and yellow filters, was used for all instantaneous direct sun observations. Sangamo Weston Millivoltmeter No. 56501 was used.

The actinometer body consists of six massive copper rings, which are made to serve as diaphragms. The openings of these diaphragms decrease progressively towards the thermopile, and the chambers formed between them are specially shaped so as to eliminate turbulent air currents within the instrument. Felt lagging around the body shields the instrument thermally.

The detachable filter head consists of a heavy copper core, which is screwed on to the exterior ring and carries a filter disc. Only a small segment of this disc protrudes from the head, so that the filters are kept at actinometer temperature. The Moll thermopile is divided into two equal sections, connected in opposition and each consisting of twenty constantin-manganin couples. One of the sections is screened from radiation and thus acts as a compensating device for the elimination of thermal effects associated with quasi-adiabatic pressure changes, occurring near the thermopile surface.

A thermometer for reading the temperature of the instrument is set inside the copper parts.

7.1 Filters Used

Three filters of Schott glass OG_1, RG_2, and RG_8 received from the Radiation Commission of the International Association of Meteorology, were used for all the observations. These filters were tested at Davos Observatory and a certificate with the reduction factor (DR) supplied.

For Filter OG_1, DR = 1.108

For Filter RG_2, DR = 1.132

For Filter RG_8, DR = 1.050

7.2 Calibration of the Actinometer

In 1961, an Angstrom Compensating Pyrheliometer (No. 548) was received, with calibration data, from Stockholm. This instrument is reserved as National Reference Standard. Its calibration has been maintained in agreement with IPS 1956 by participation in the W.M.O. Region VI Comparisons of National Standard Pyrheliometers held at Davos in 1964, in Carpentras, France, in 1969 and at Davos in October, 1975, and also by participation in a comparison organised by the E.E.C. in Carpentras in 1978.

The Actinometer and associated meter were calibrated by reference to the Pyrheliometer.

7.3 Observational Routine

All observations were made at a site about 6 metres south east of the Radiation House (Fig. 2) and at a height of 15.5 metres above M.S.L. Observations were made three times daily, when sky conditions permitted, at approximately 1030, 1230, i.e. at approximately the average time of local noon and at 1430 G.M.T. Each of the observations consisted of a double series of measurements in the order: - Zero - RG_8 - Total - RG_2 - OG_1 - OG_1 - RG_2 - Total - RG_8 - Zero. Observations were made of the time G.M.T. of each of the individual settings, the temperature at the beginning and end of each set of observations, as indicated by the thermometer attached to the actinometer, the cloud type and amount, visibility and weather.

7.4 Computation of the Sun's Zenith Distance (Z)

The Sun's Zenith Distance for each time of observation was obtained from a special table prepared for Valentia, based on Tables 5, 6 and 11 as given in Linke's "Meteorologisches Taschenbuch" Vol.IV (Leipzig, 1939 edition) and the "Alt Azimuth Tables for Latitude limits 30° to 64°", prepared by P. L. H. Davis and published by H. M. Stationery Office, London (1918 edition). The values are correct to the nearest tenth of a degree.

7.5 Computation of the Optical Air Mass (m)

The Relative Air Mass (m_h) was obtained from the Sun's Zenith Distance (Z) by using Table 137, page 422 of "Smithsonian Meteorological Tables" (1951 edition). This table is based on Bemporad's formula:-

$$m_h = \frac{\text{Atmospheric Refraction in Seconds}}{58.36 \sin Z}$$

The Optical Air Mass (m) was computed from the formula:-

$$m = m_h \frac{P}{1000}$$ where P = the atmospheric pressure in hectopascals (millibars)

8. Radiation Balance

Measurement of the radiation balance commenced on a routine basis in 1971. Details of the instruments used will be found in the Appendix.

The exposure is over a lawn surface adjacent to the Radiation House on the roof of which the other radiation instruments are exposed.

The calibration is checked regularly by reference to the Angstrom Pyrheliometer.

References

[1] Solar Radiation Observations at Valentia Observatory, 1954-1959 (Meteorological Service, Department of Transport and Power, Dublin 1961)

[2] Five years Continuous Recording of Total and Diffuse Solar Radiation at Kew Observatory - by M. J. Blackwell.
(Meteorological Research Committee, Air Ministry, London.
M.R.P. No. 895, 1954)

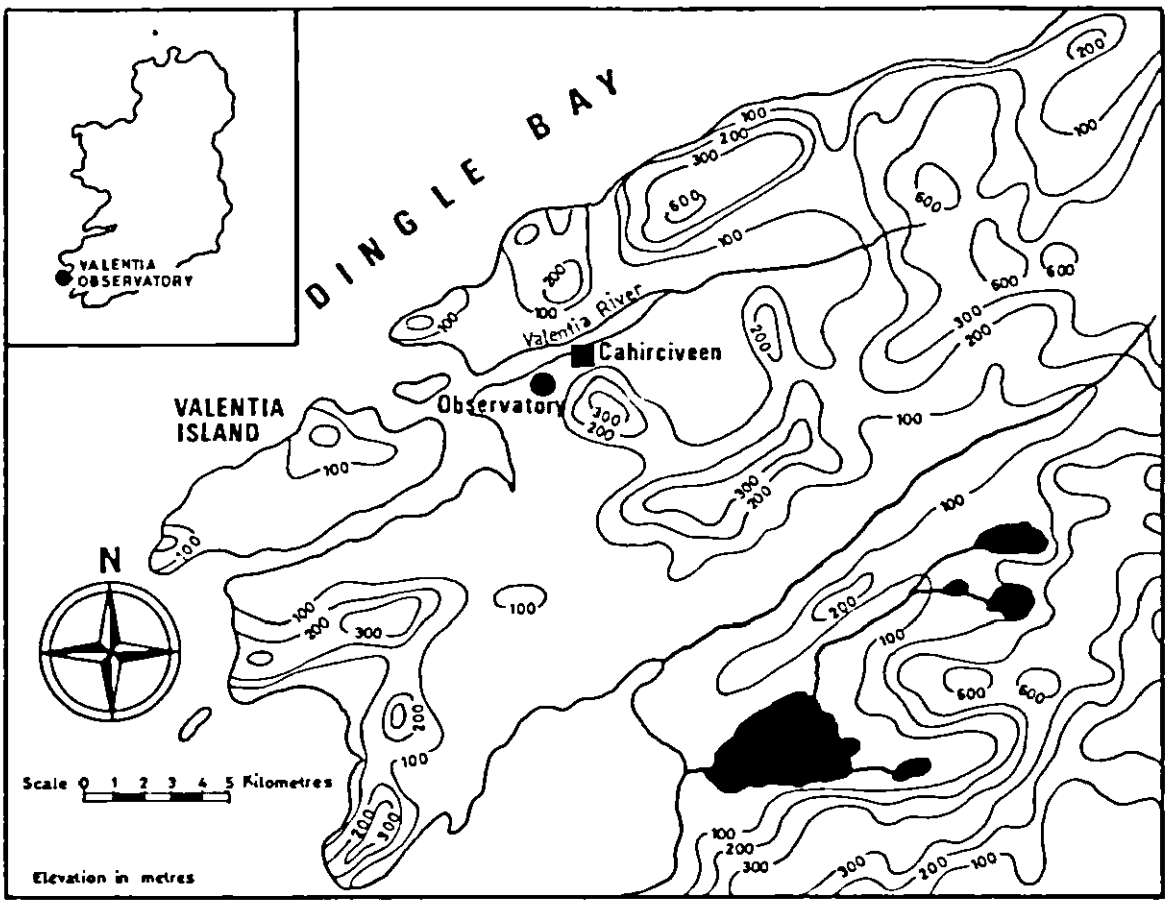


Fig. 1. Map showing the site of Valentia Observatory and its environs.

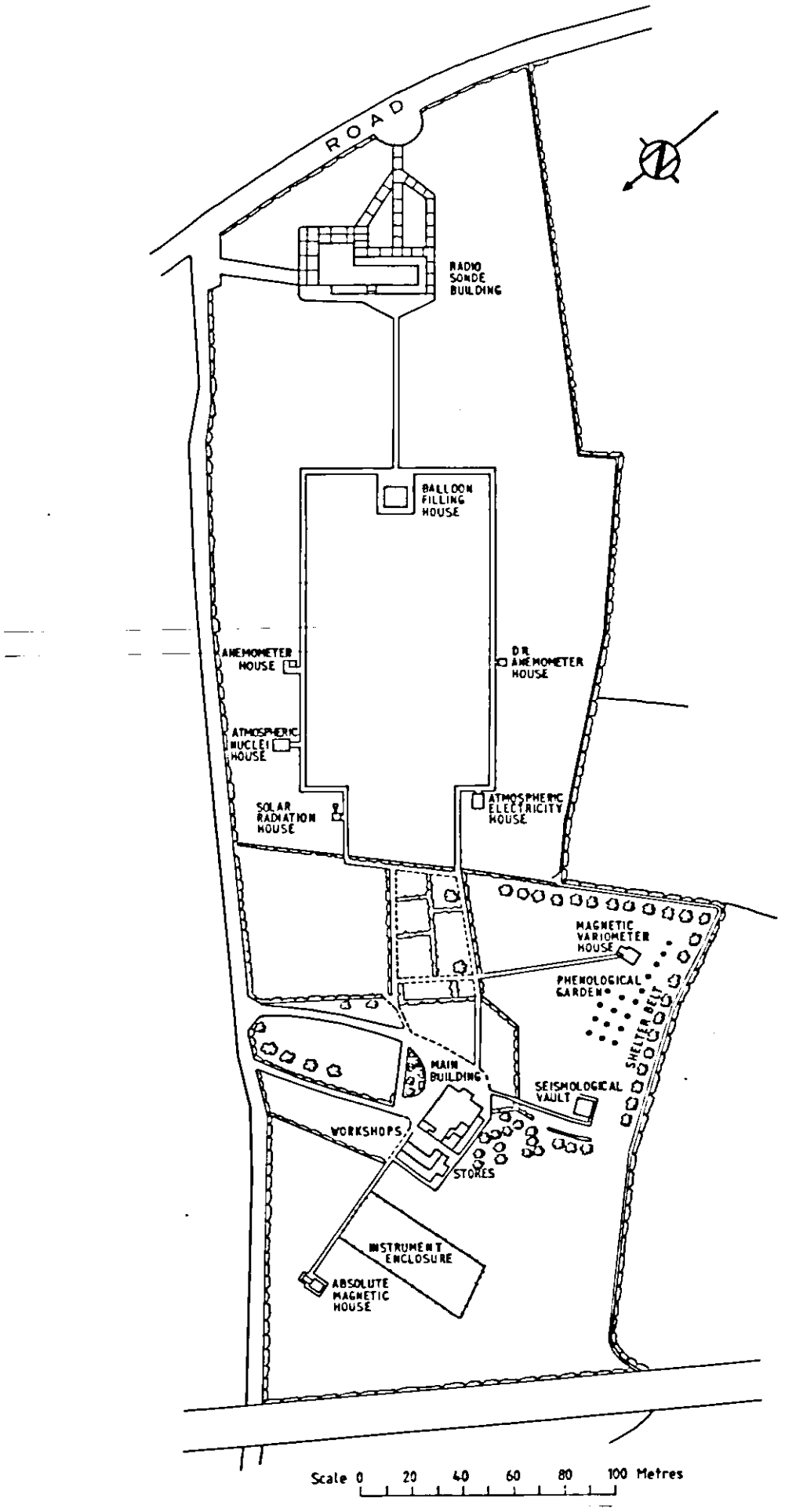


Fig. 2. General layout of Valentia Observatory

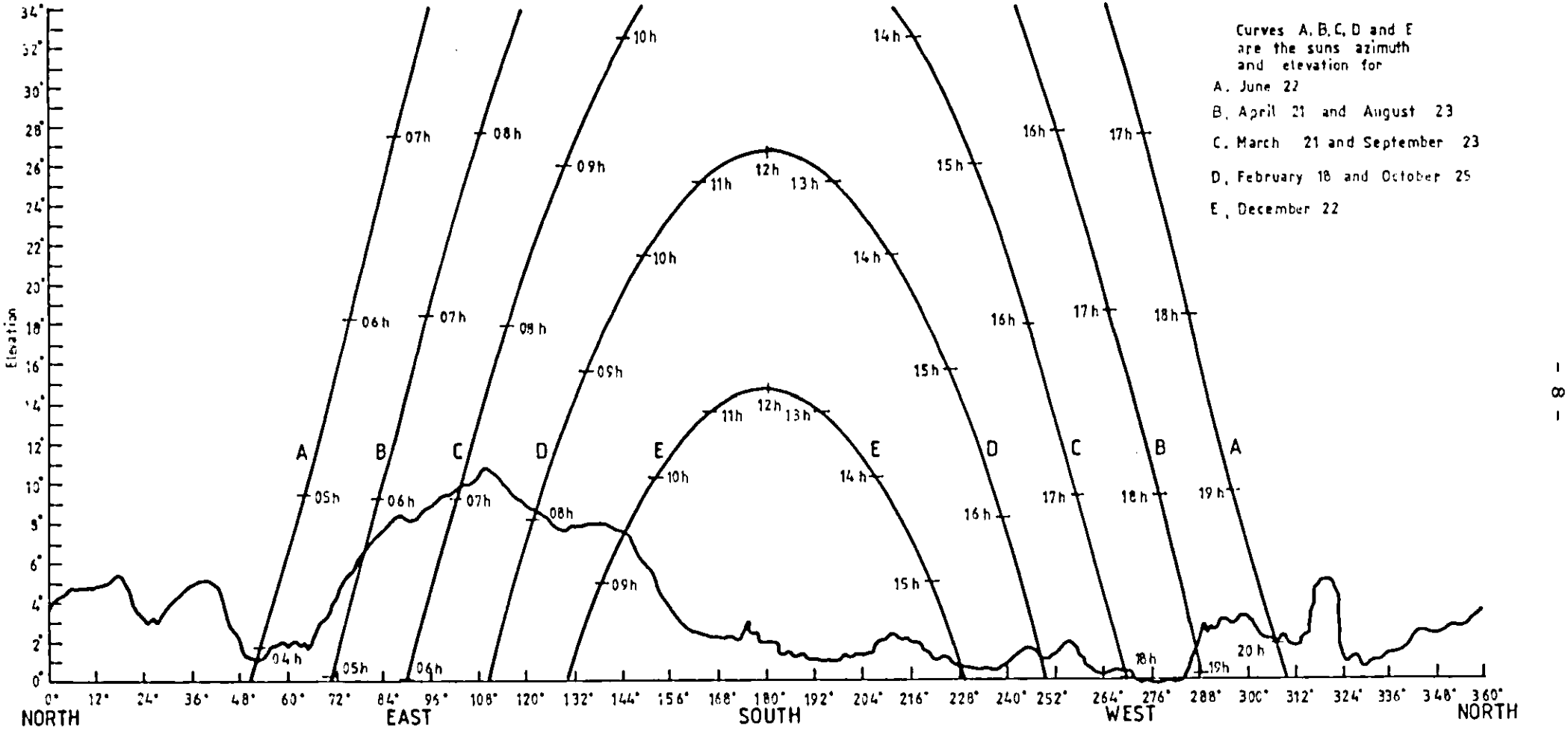


Fig. 3. Exposure diagram showing Azimuth and Elevation of all objects which obscure the pyranometer, together with Elevation and Azimuth of the sun at different times of the year.

SOLAR RADIATION OBSERVATIONS AT KILKENNY METEOROLOGICAL STATION

1982

1. Introduction

Measurements of Global Solar Radiation were begun at Kilkenny towards the end of 1968 while measurement of Duffuse Solar Radiation commenced in May 1979. Data given in this volume represent the results for 1982.

2. Site of the Observations

The Meteorological Station is situated 2 Km north-west of the centre of Kilkenny at Latitude 52° 40' N; Longitude 07° 16' W. Kilkenny is mainly a marketing town of population 10,000, in which there are no major industries or sources of atmospheric pollution. The countryside immediately surrounding the station is flat open grassland. Low hills beyond this area are sufficiently distant to avoid causing obstruction.

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The global pyranometer is installed on a stand at the southern edge of the flat roof of the station building 5 metres above ground level (Fig. 5) and 67 metres above sea level.

The exposure is good, all effective obstruction being below 2° elevation except between 57° and 59° azimuth where an anemometer mast obstructs to 65° elevation (See Fig. 6).

3.2 Pyranometer Used

See Appendix

3.3 Observing Procedure

Time marking of the records and control of print-out is by means of an electric clock, reset each night to maintain timing within ½ minute of time L.A.T. The method of tabulation of the records is the same as that already described for Valentia Observatory.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

4. Measurement of Diffuse Solar Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same site as the global pyranometer, at a distance of 9 metres north-east of the latter. A description of the site is given in Section 2 above.

4.2, 4.3, 4.4 - as for Valentia (page 2)

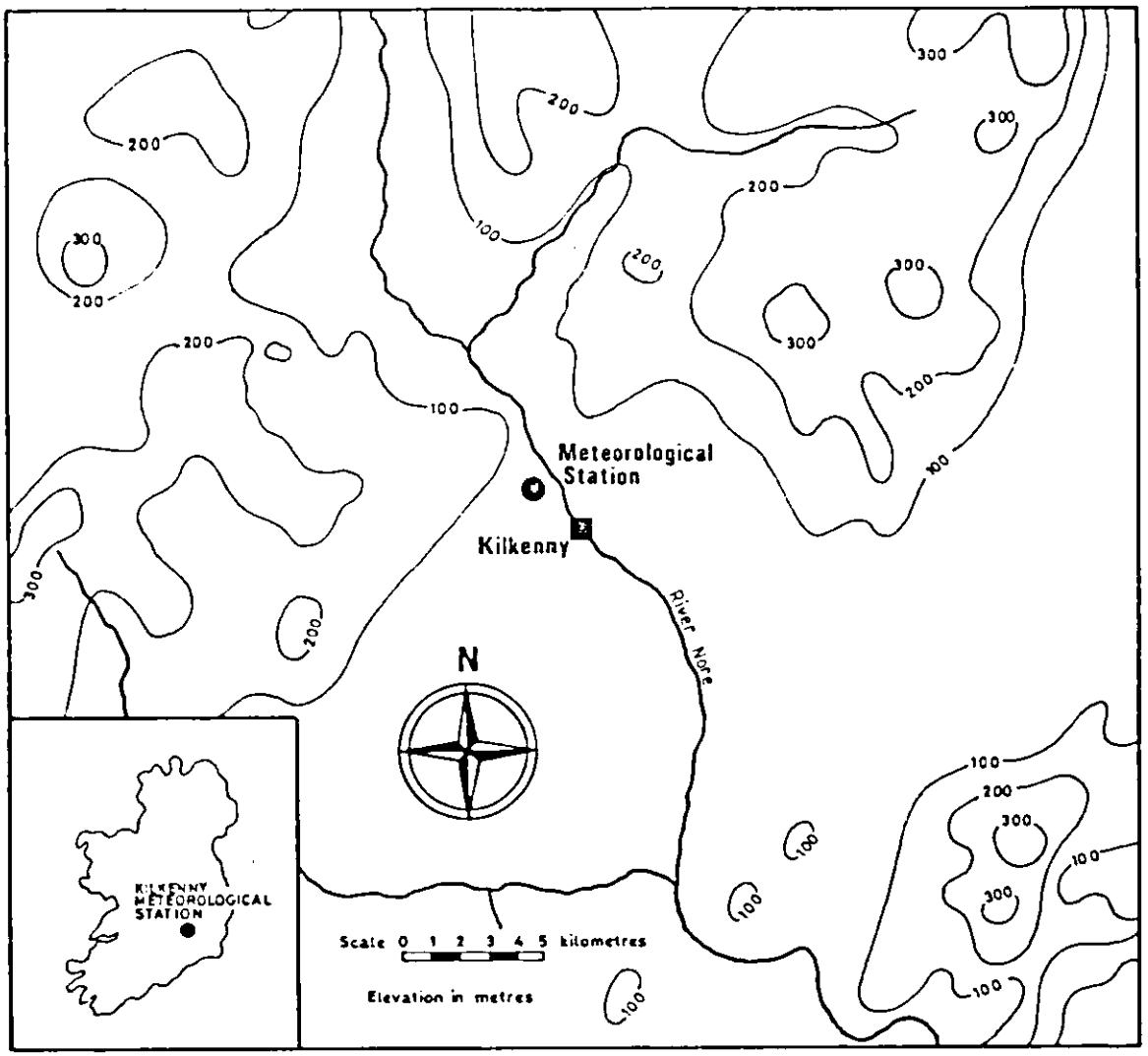


Fig. 4. Map showing site of Kilkenny Meteorological Station.

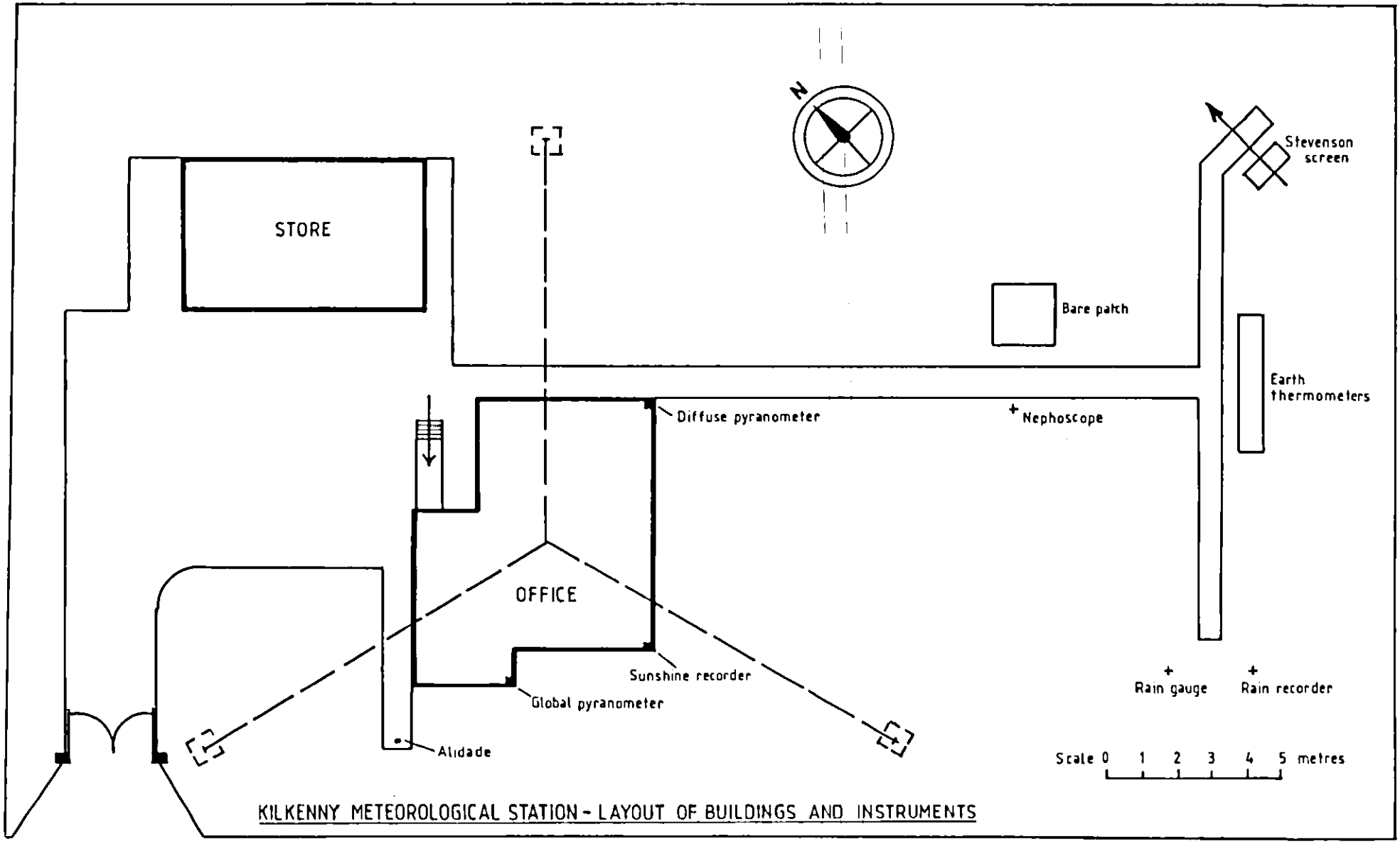

STORE
N
Stevenson screen
Bare patch
Earth thermometers
Diffuse pyranometer
Nephoscope
OFFICE
Sunshine recorder
Global pyranometer
Alidade
Rain gauge
Rain recorder
Scale 0 1 2 3 4 5 metres
KILKENNY METEOROLOGICAL STATION - LAYOUT OF BUILDINGS AND INSTRUMENTS

Fig. 5.

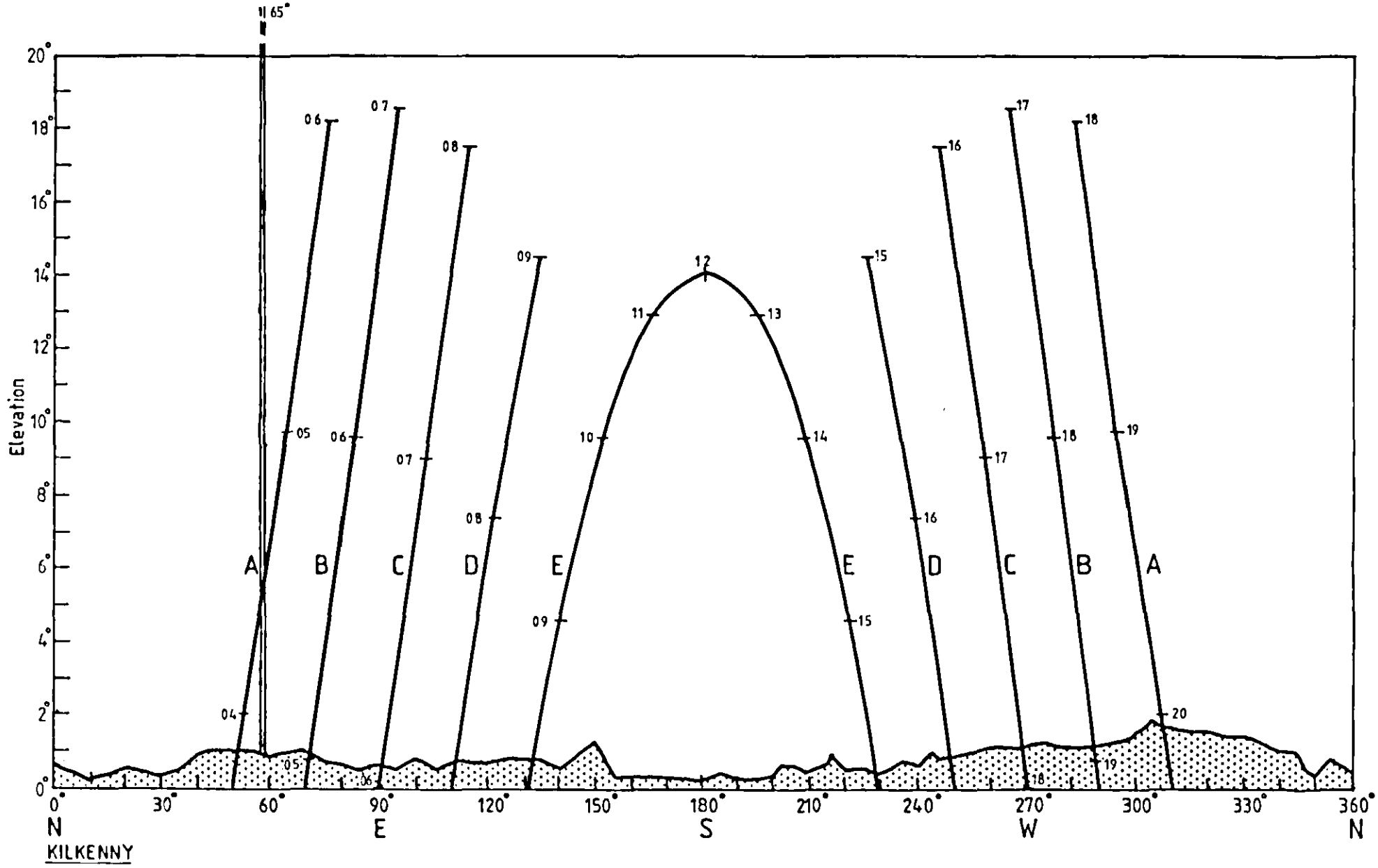


Fig. 6. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer.
(2) azimuth and elevation of sun at various times of year as follows: (A) June 22, (B) April 21, August 23
(C) March 21, September 23, (D) February 18, October 25, (E) December 22.

SOLAR RADIATION OBSERVATIONS AT BIRR METEOROLOGICAL STATION

1982

1. Introduction

Measurements of Global Solar Radiation were begun at Birr towards the end of 1970, while measurements of Diffuse Solar Radiation commenced in May 1979. Data given in this volume represent the results for 1982.

2. Site of the Observations

The Meteorological Station is situated in flat pasture land, fairly well wooded, about 1½ Km east of the town of Birr at Latitude 53° 05' N; Longitude 07° 54' W. The surrounding country is gently undulating. About 16 Km to the east lie the Slieve Bloom mountains, the main axis of which runs north east - south west. The highest peak of this range is 518 metres. About 10 Km to the north of the station, there is an extensive area of bog (see Fig. 7).

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The global pyranometer is installed on a stand at the southern edge of the flat roof of the station building 5 metres above ground level (Fig. 8) and 75 metres above sea level.

The exposure is generally good, all effective obstruction being below 2° elevation, except for a few isolated buildings which obstruct the horizon above 2° and between 37° and 39° azimuth where an anemometer mast obstructs to 64° elevation (See Fig. 9).

3.2 Pyranometer Used

See Appendix

3.3 Observing Procedure

Time marking of the records and control of print-out is by means of an electrical clock reset each night to maintain timing within ½ minute of true L.A.T. The method of tabulation of the records is the same as that already described for Valentia Observatory.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

4. Measurement of Diffuse Solar Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same site as the global pyranometer, at a distance of 7 metres north-east of the latter. A description of the site is given in Section 2 above.

4.2, 4.3, 4.4 - as for Valentia (page 2)

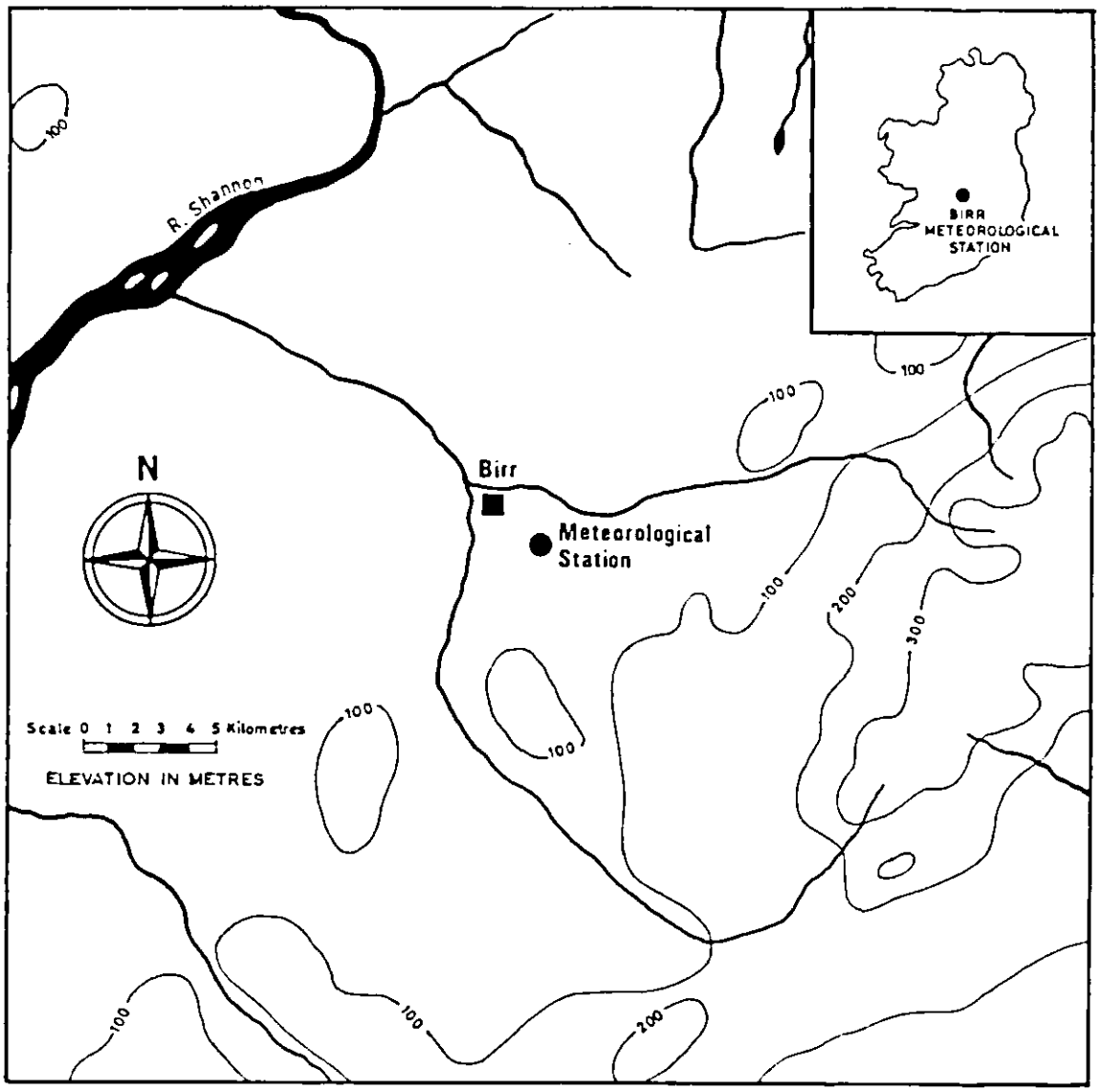
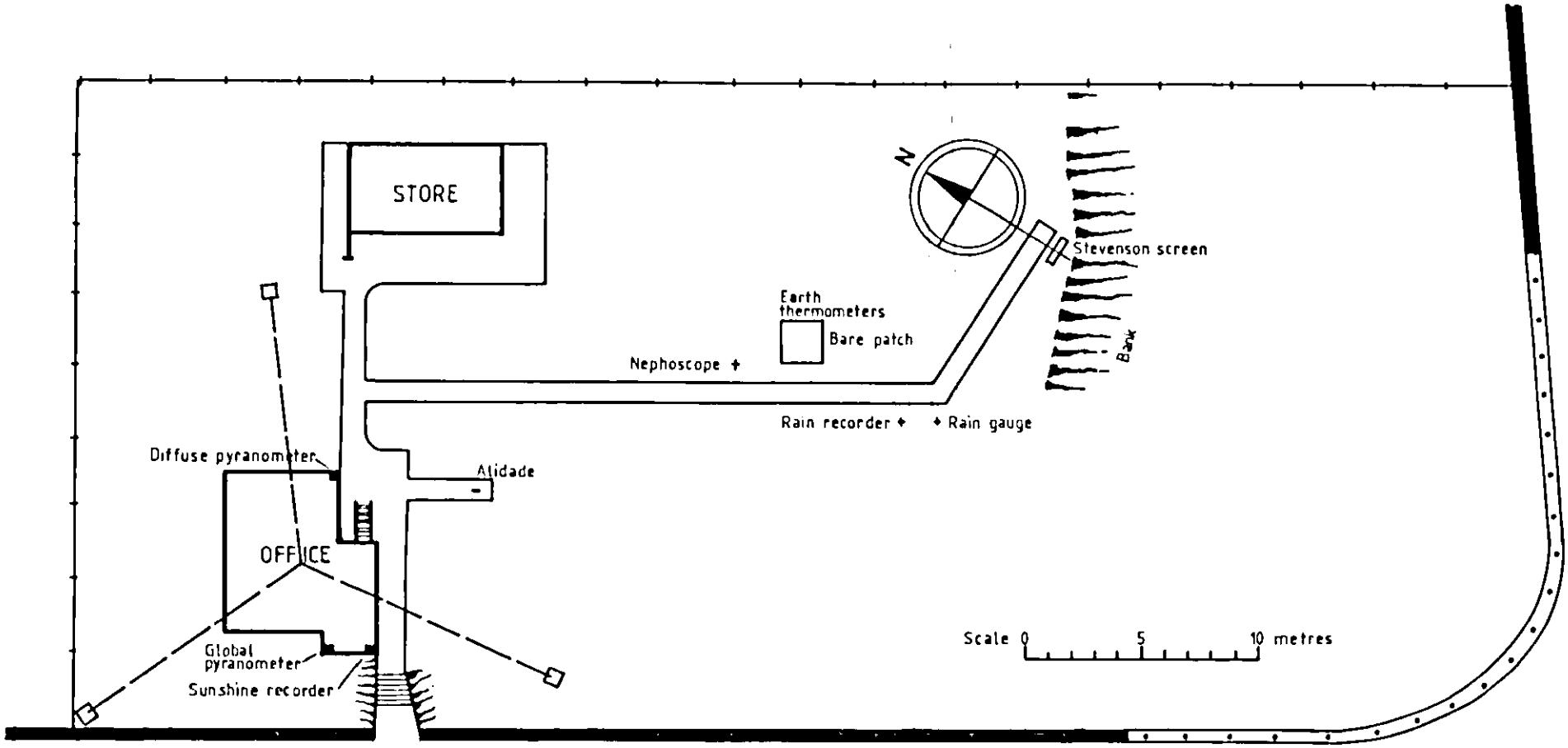


Fig. 7 Map showing site of Birr Meteorological Station.



BIRR METEOROLOGICAL STATION - LAYOUT OF BUILDINGS AND INSTRUMENTS

Fig. 8.

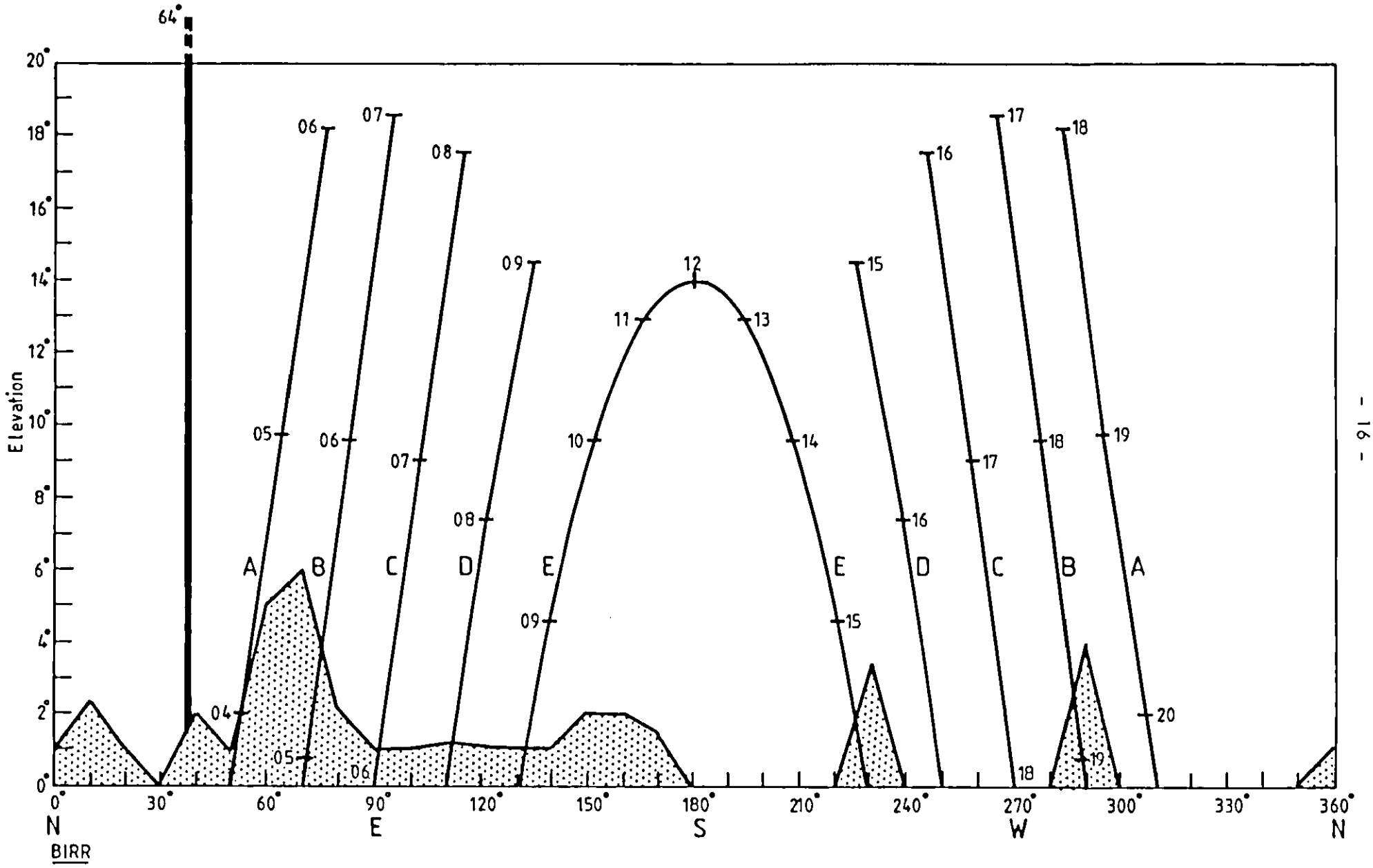


Fig. 9. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer.
(2) azimuth and elevation of sun at various times of year as follows (A) June 22 (B) April 21, August 23
(C) March 21, September 23 (D) February 18, October 25 (E) December 22

SOLAR RADIATION OBSERVATIONS AT DUBLIN AIRPORT

1982

1. Introduction

Measurements of Global Solar Radiation were begun at Dublin Airport in September, 1975 and of Diffuse Solar Radiation in May 1976. Data given in this volume represent the results for 1982.

2. Site of the Observations

Dublin Airport, Latitude 53° 26' N; Longitude 06° 14'W, is situated on a low hill 8 Km north of Dublin City and 9 Km from the sea to the east (Fig. 10). The surrounding country is flat, the nearest mountains lying about 20 Km to the south.

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The pyranometer is installed on the third storey balcony of the Terminal Building 13 metres above ground level and 82 metres above sea level. (Fig. 11).

As the prevailing winds are westerly and the sources of pollution from the city lie to the south the site is relatively pollution free.

There is some obstruction from surrounding buildings (Fig. 12) but as the vertical component of radiation lost is less than 0.5% no attempt has been made to allow for it.

3.2 Pyranometer Used

See Appendix

3.3 Observing Procedure

Time marking of records and control of print-out is by means of an electric clock, which is maintained within $\frac{1}{2}$ minute of L.A.T. The general procedure for maintaining the instruments and tabulating the records is the same as that already described for Valentia.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

4. Measurement of Diffuse Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same site as the global pyranometer, at a distance of approximately 14 metres to the north of the latter. A description of the site is given in section 2 above.

4.2, 4.3, 4.4 - as for Valentia (page 2)

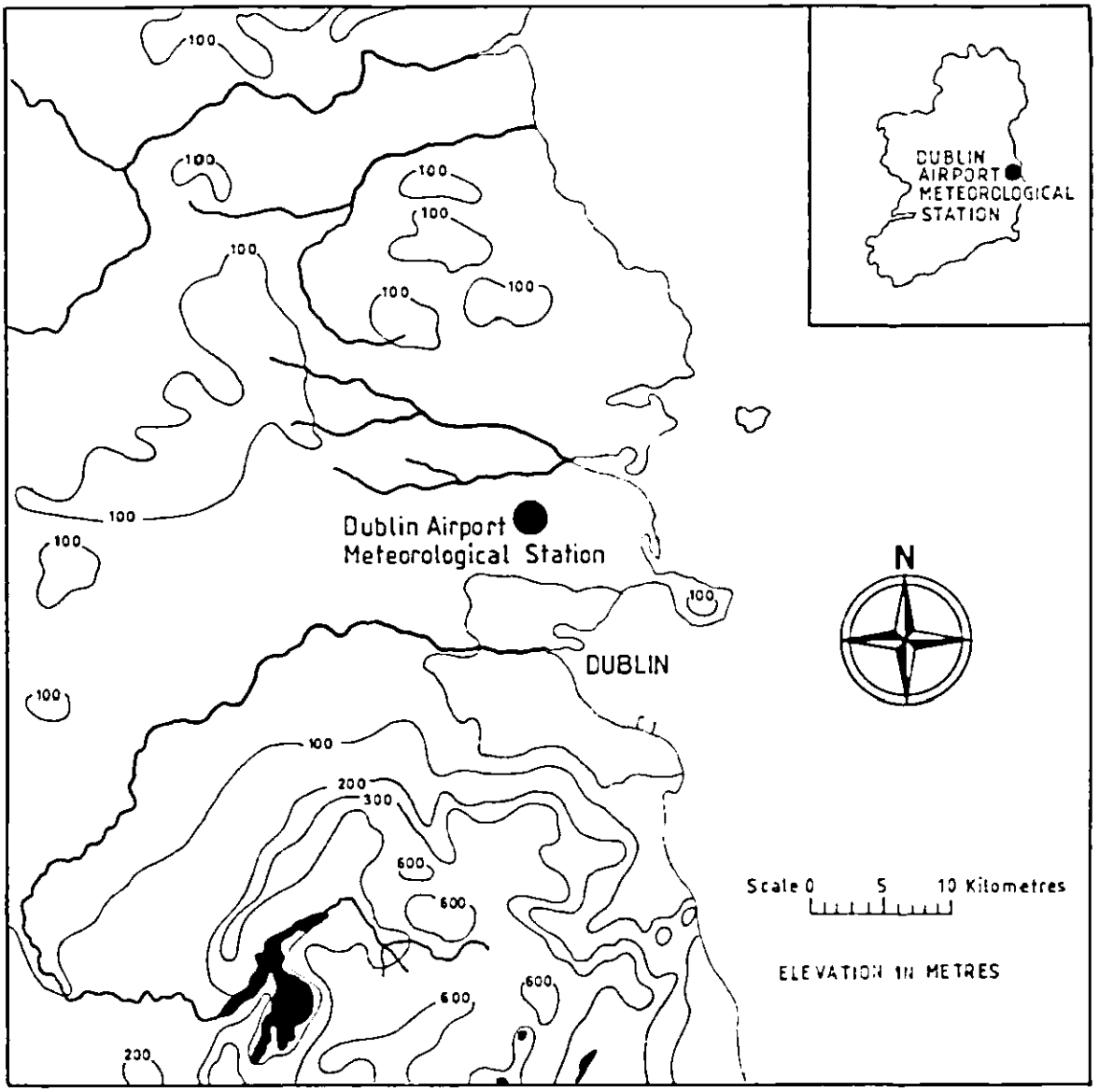
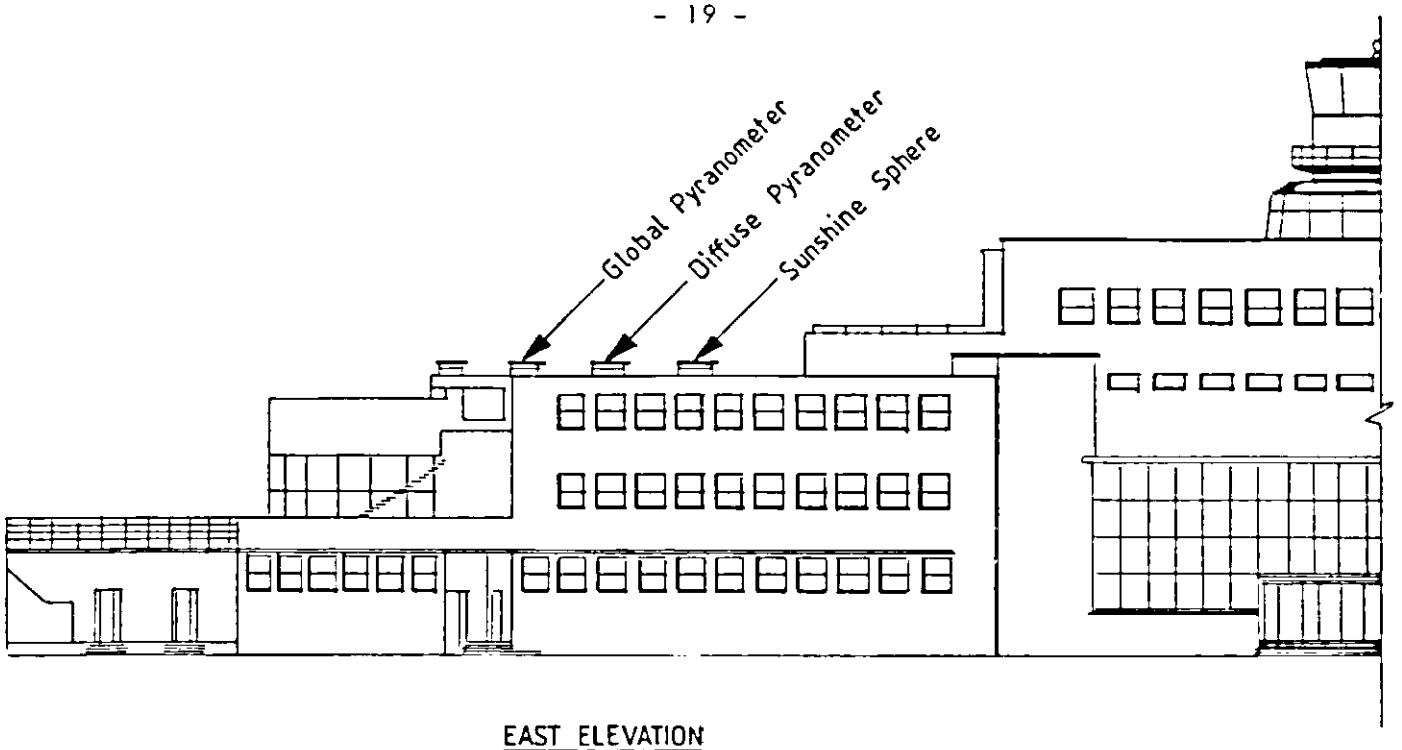
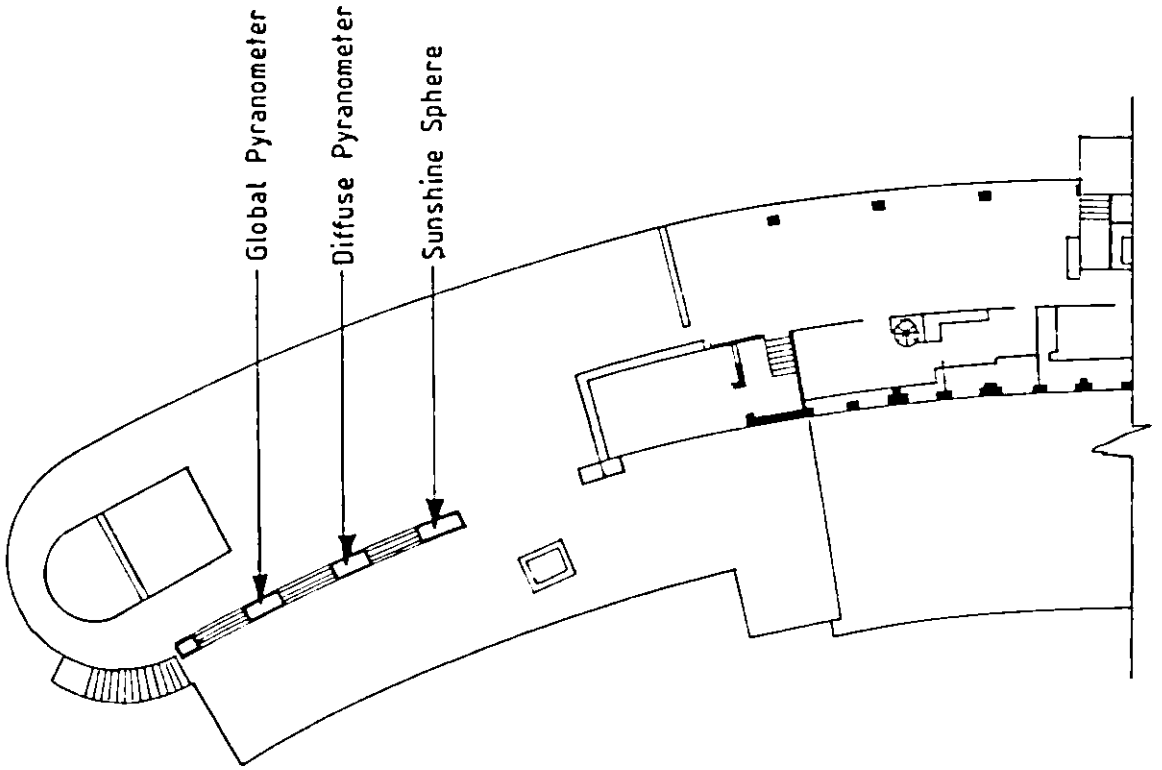


Fig. 10. Map showing site of Dublin Airport Meteorological Station

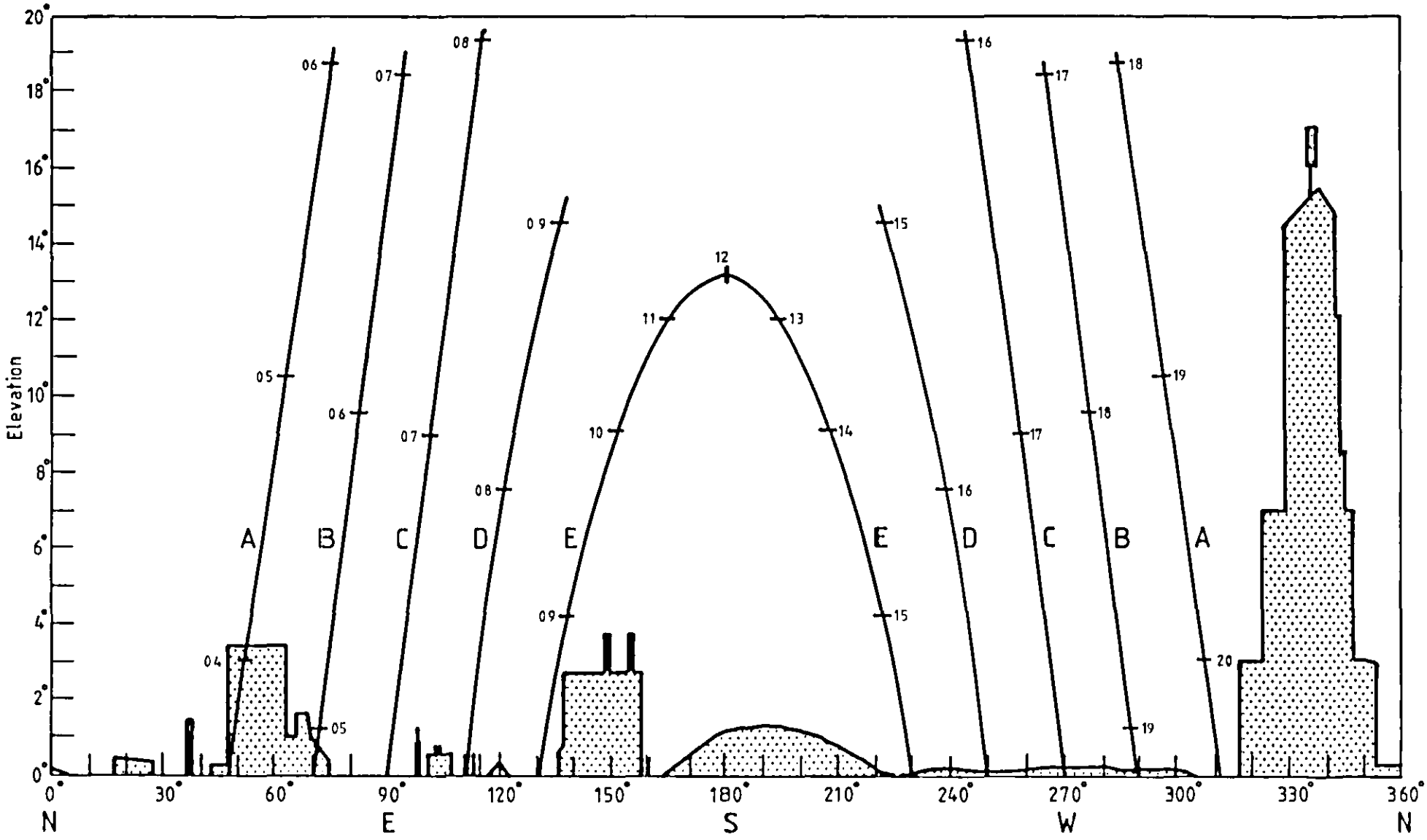


EAST ELEVATION



THIRD FLOOR PLAN

Fig. 11. Dublin Airport - layout of specified instruments on terminal building.



DUBLIN AIRPORT

Fig. 12. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer
(2) azimuth and elevation of sun at various times of year as follows (A) June 22, (B) April 21, August 23
(C) March 21, September 23 (D) February 18, October 25 (E) December 22

SOLAR RADIATION OBSERVATIONS AT MALIN HEAD METEOROLOGICAL STATION

1982

1. Introduction

Measurements of Global and Diffuse Solar Radiation were begun at Malin Head in June 1981. Data given in this volume represent the results for 1982.

2. Site of the Observations

The Meteorological Station is situated about 300 metres from the shoreline on the northwestern headland of the Inishowen peninsula at Latitude 55° 22' N; Longitude 07° 20' W. The site is 2.5 Km southeast of the most northerly point of Ireland. The countryside to the southeast, south and southwest is mostly hilly. Open sea lies to the northwest, north and northeast. The nearest major industrial centre is Derry City which is 40 Km to the south.

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The global pyranometer is installed on the southern end of a concrete stand at the western side of the flat roof of the station building 4 metres above ground level (Fig 14) and 28 metres above sea level.

Some obstruction is caused by nearby buildings, poles and an anemometer lattice tower in the northeast to southeast sector and by a hill in the sector southwest to northwest (Fig. 15).

3.2 Pyranometer Used

See Appendix.

3.3 Observing Procedure

Time marking of the records and control of printout is by means of an electronic clock, which is maintained within ½ minute of L.A.T. The general procedure for maintaining the instruments and tabulating the records is the same as that already described for Valentia Observatory.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

4. Measurement of Diffuse Solar Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same concrete stand as the global pyranometer at a distance of 1.2 metres to the north of the latter. A description of the site is given in Section 2 above.

4.2, 4.3, 4.4 - as for Valentia (page 2)

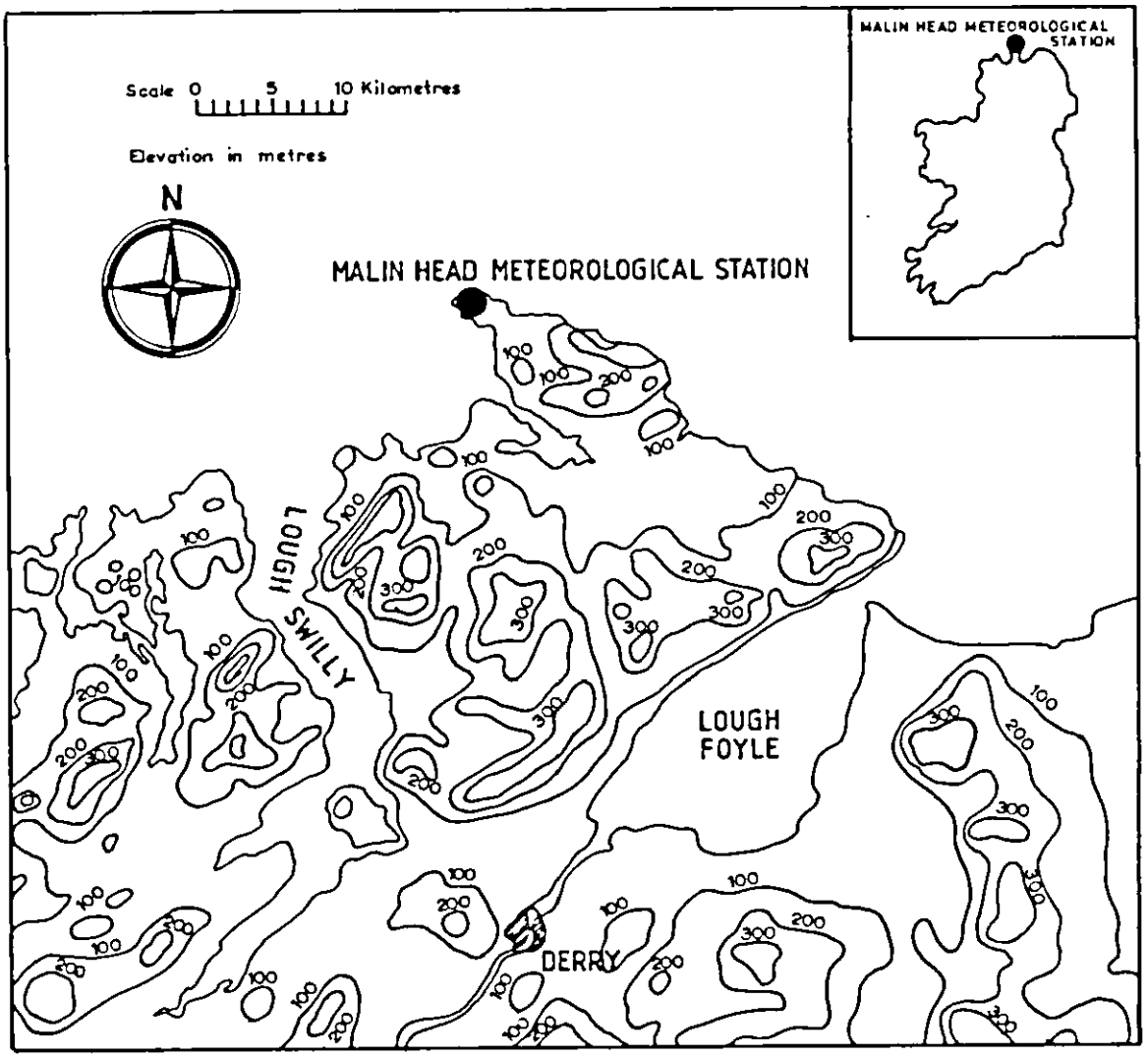
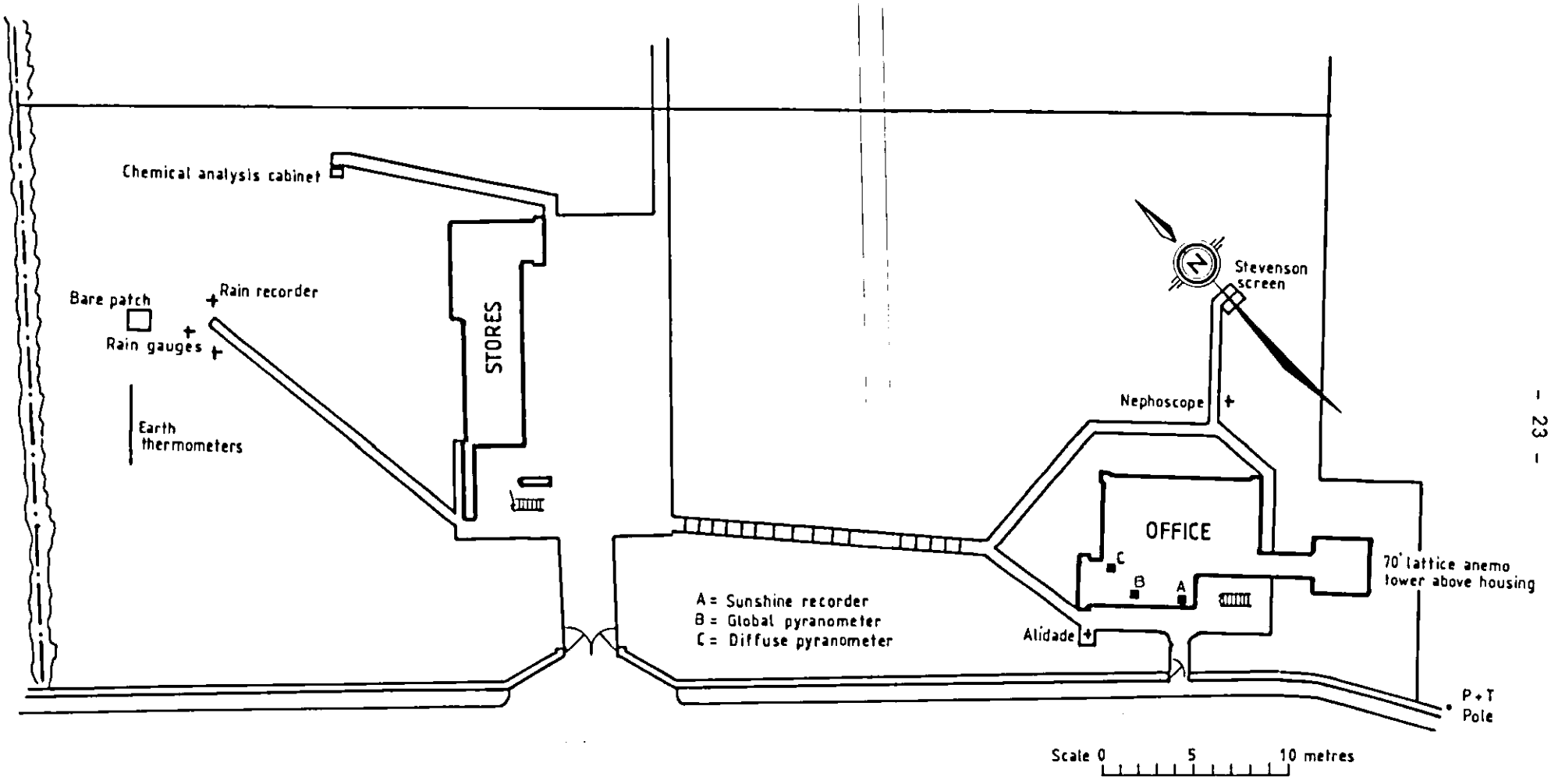
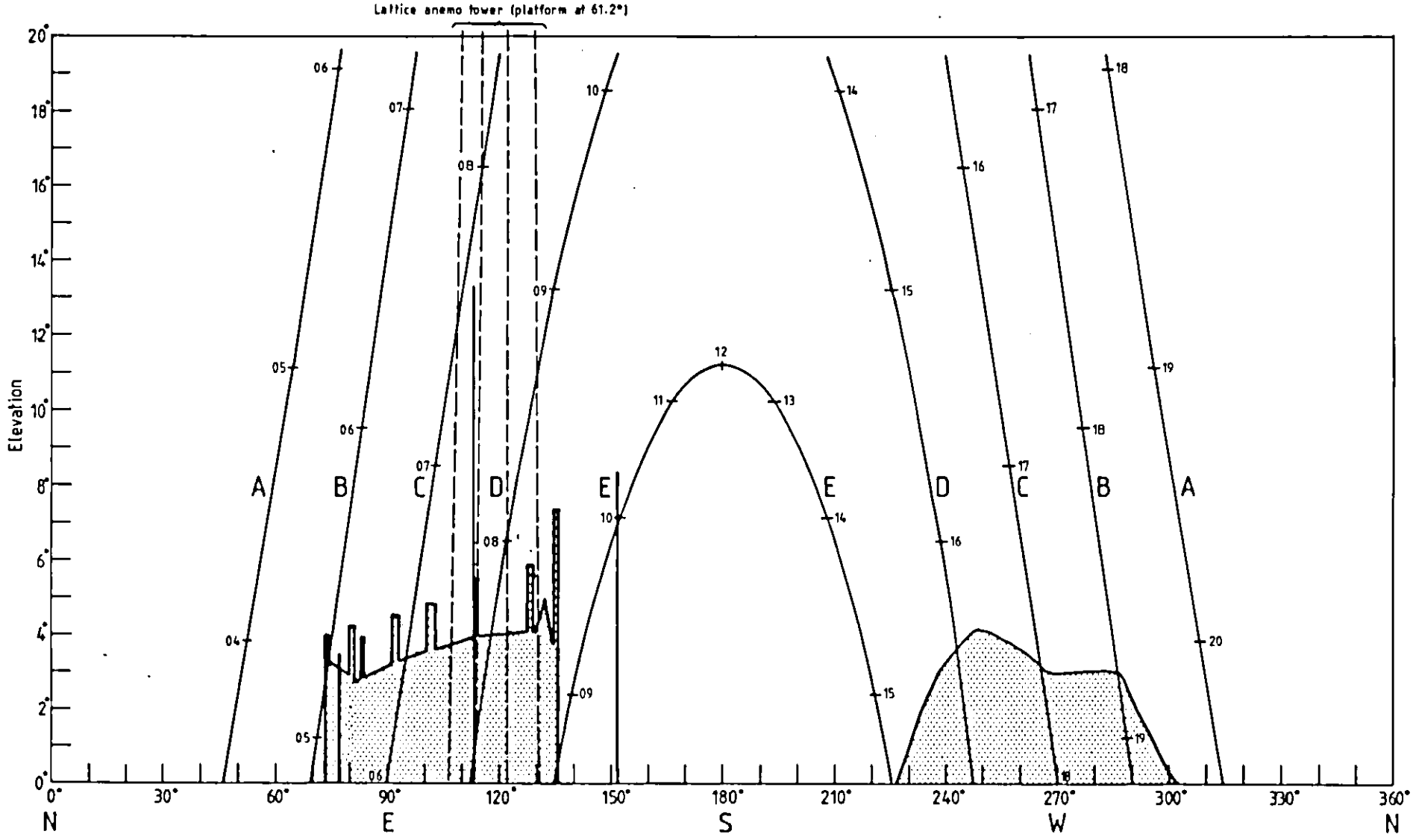


Fig. 13. Map showing site of Malin Head Meteorological Station.



MALIN HEAD METEOROLOGICAL STATION – LAYOUT OF BUILDINGS AND INSTRUMENTS

Fig. 14.



MALIN HEAD

Fig. 15. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer.
(2) azimuth and elevation of sun at various times of year as follows (A) June 22 (B) April 21, August 23 (C) March 21, September 23 (D) February 18, October 25 (E) December 22

SOLAR RADIATION OBSERVATIONS AT CLONES METEOROLOGICAL STATION

1982

1. Introduction

Measurements of Global and Diffuse Solar Radiation were begun at Clones in June 1981. Data given in this volume represent the results for 1982.

2. Site of the Observations

The Meteorological Station is situated on a hill about 1 Km to the north of the town of Clones at Latitude 54° 11' N; Longitude 07° 14' W. The site overlooks the adjacent countryside but at a distance of 10 Km from the station there are gently sloping hills in most sectors. (Fig. 16).

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The global pyranometer is mounted on a concrete pillar 2½ metres above ground level (Fig. 17) and 89 metres above sea level.

The exposure is generally good but a terrace of houses obstructs to between 7° and 9° elevation from azimuth 310° to 020°. In addition an anemometer mast and some poles obstruct to about 20° elevation. (Fig. 18).

3.2 Pyranometer Used

See Appendix

3.3 Observing Procedure

Time marking of the records and control of printout is by means of an electronic clock, which is maintained within ½ minute of L.A.T. The general procedure for maintaining the instruments and tabulating the records is the same as that already described for Valentia Observatory.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

4. Measurement of Diffuse Solar Radiation

4.1 Exposure of the Pyranometer

The diffuse pyranometer is mounted on the same pillar as the global pyranometer at a distance of 1.2 metres north of the latter. A description of the site is given in Section 2 above.

4.2, 4.3, 4.4 - as for Valentia (page 2)

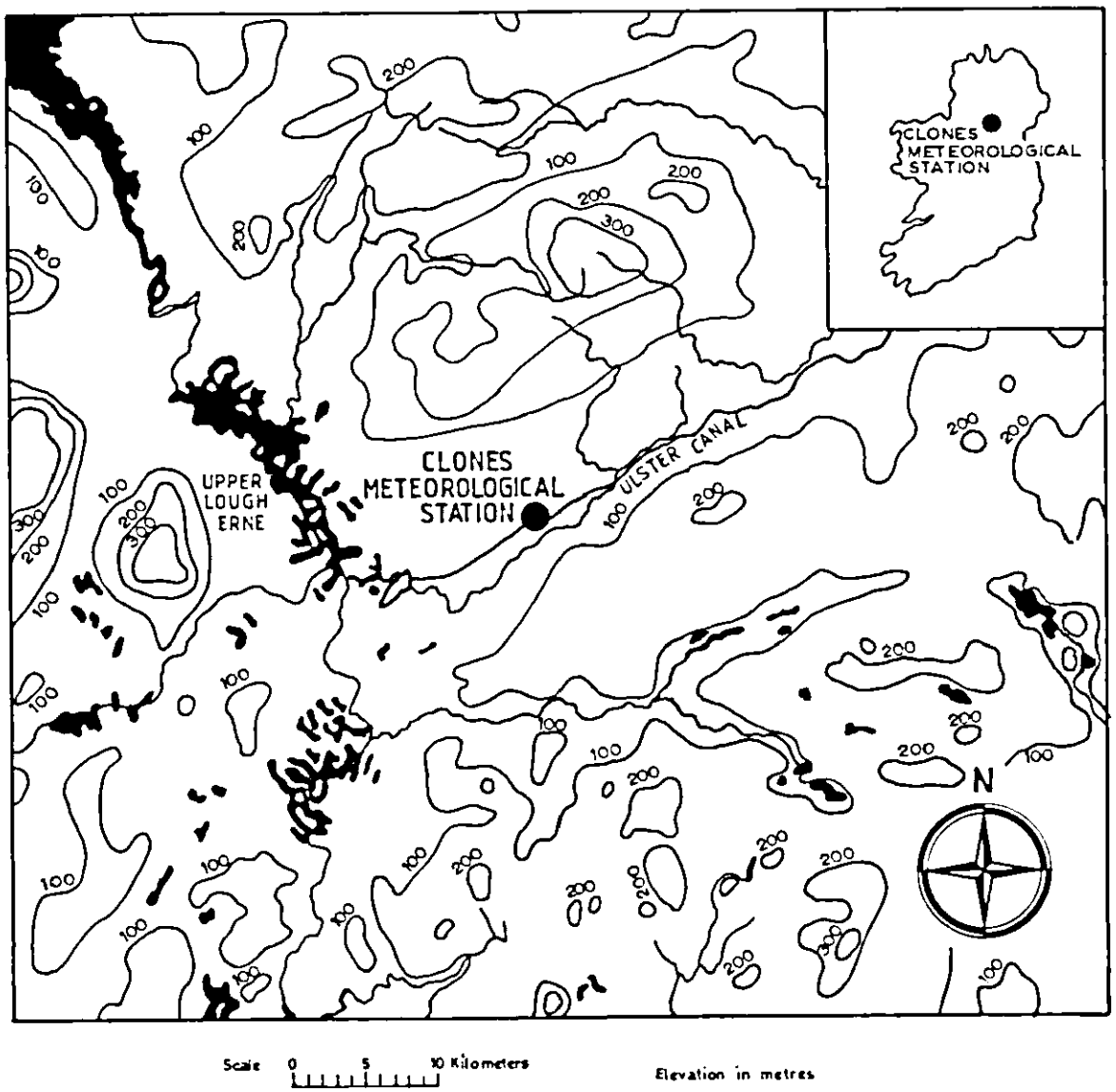
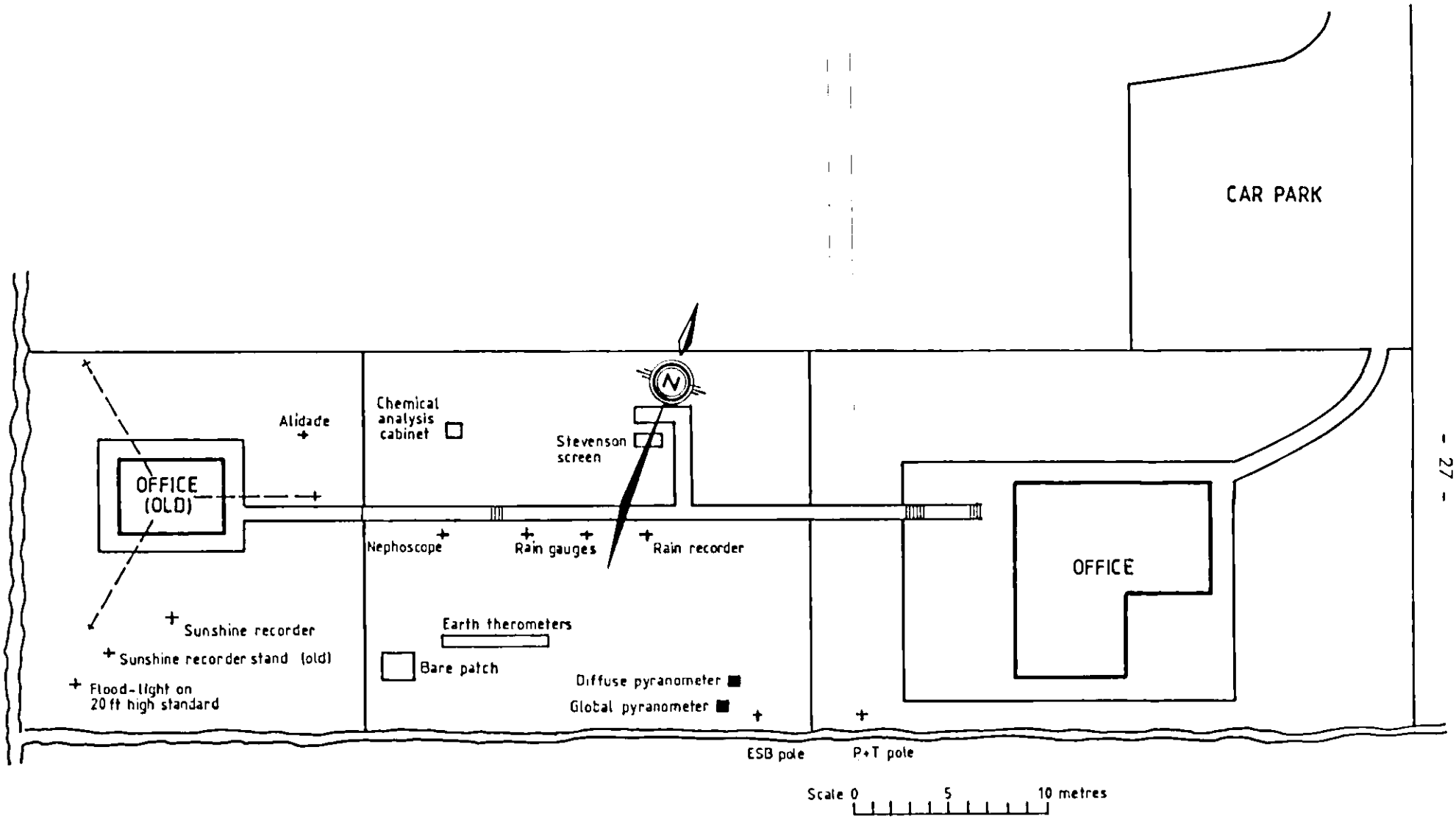
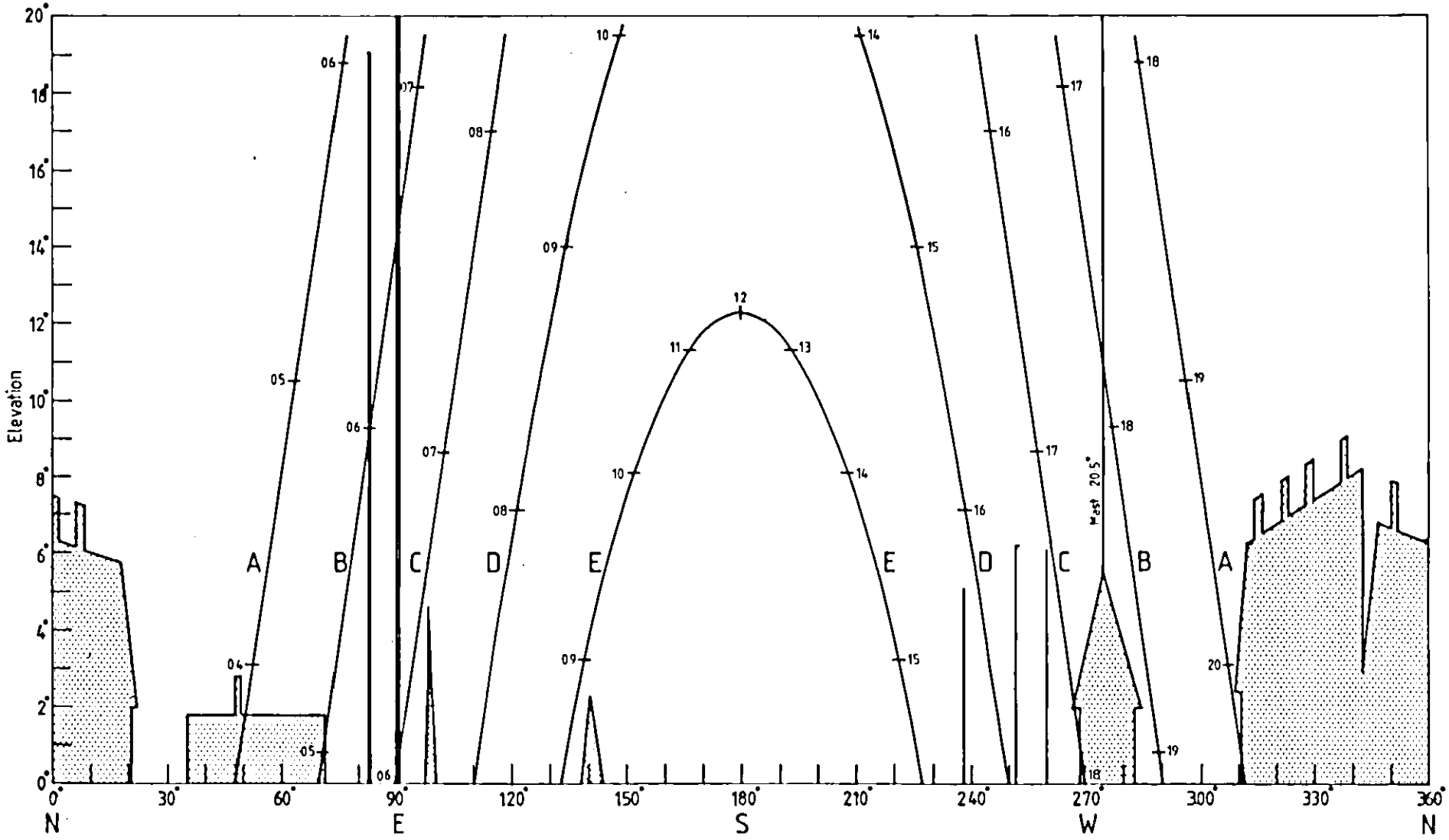


Fig. 16. Map showing site of Clones Meteorological Station.



CLONES METEOROLOGICAL STATION - LAYOUT OF BUILDINGS AND INSTRUMENTS

Fig. 17.



CLONES

Fig. 18. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer.
(2) azimuth and elevation of sun at various times of year as follows (A) June 22 (B) April 21, August 23
(C) March 21, September 23 (D) February 18, October 25 (E) December 22

SOLAR RADIATION OBSERVATIONS AT BELMULLET METEOROLOGICAL STATION

1982

1. Introduction

Measurements of Global Solar Radiation were begun at Belmullet in 1977. Due to instrument malfunction and non-availability of replacements there was a long break in continuity of the records. Measurements recommenced with the installation of new equipment in mid 1981 and data given in this volume represent the results for 1982.

2. Site of the Observations

The Meteorological Station is situated on the northern edge of Blacksod Bay about 1½ Km west of the town of Belmullet at Latitude 54° 14 ' N: Longitude 10° 00' W. The surrounding countryside is generally flat but with some low hills in the distance.

3. Measurement of Global Solar Radiation

3.1 Exposure of the Pyranometer

The pyranometer is installed on a stand at the southern edge of the flat roof of the station building 4 metres above ground level. (Fig 20) and 14 metres above sea level.

The exposure is good with practically all effective obstruction being below 2° elevation. Between 20° and 22° azimuth an anemometer mast obstructs to 64° elevation (Fig. 21).

3.2 Pyranometer Used

See Appendix.

3.3 Observing Procedure

Time marking of the records and control of print-out is by means of an electronic clock, reset each night to maintain timing within ½ minute L.A.T. The method of tabulation of the records is the same as that already described for Valentia Observatory.

3.4 Calibration of the Pyranometer

The instrument in use is similar to that in use at Valentia Observatory and was calibrated, before installation, against the Valentia Standard.

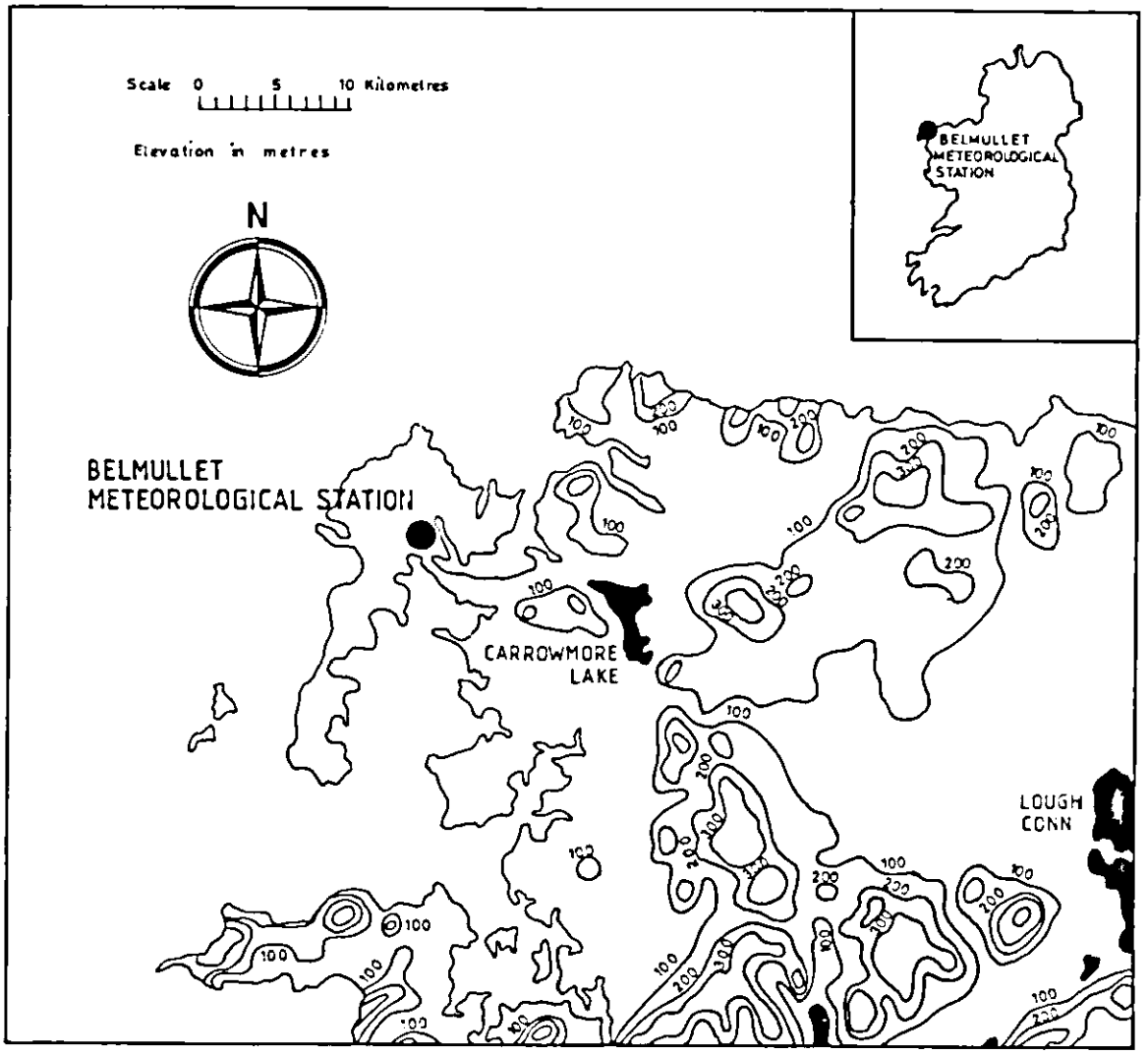


Fig. 19. Map showing site of Belmullet Meteorological Station.

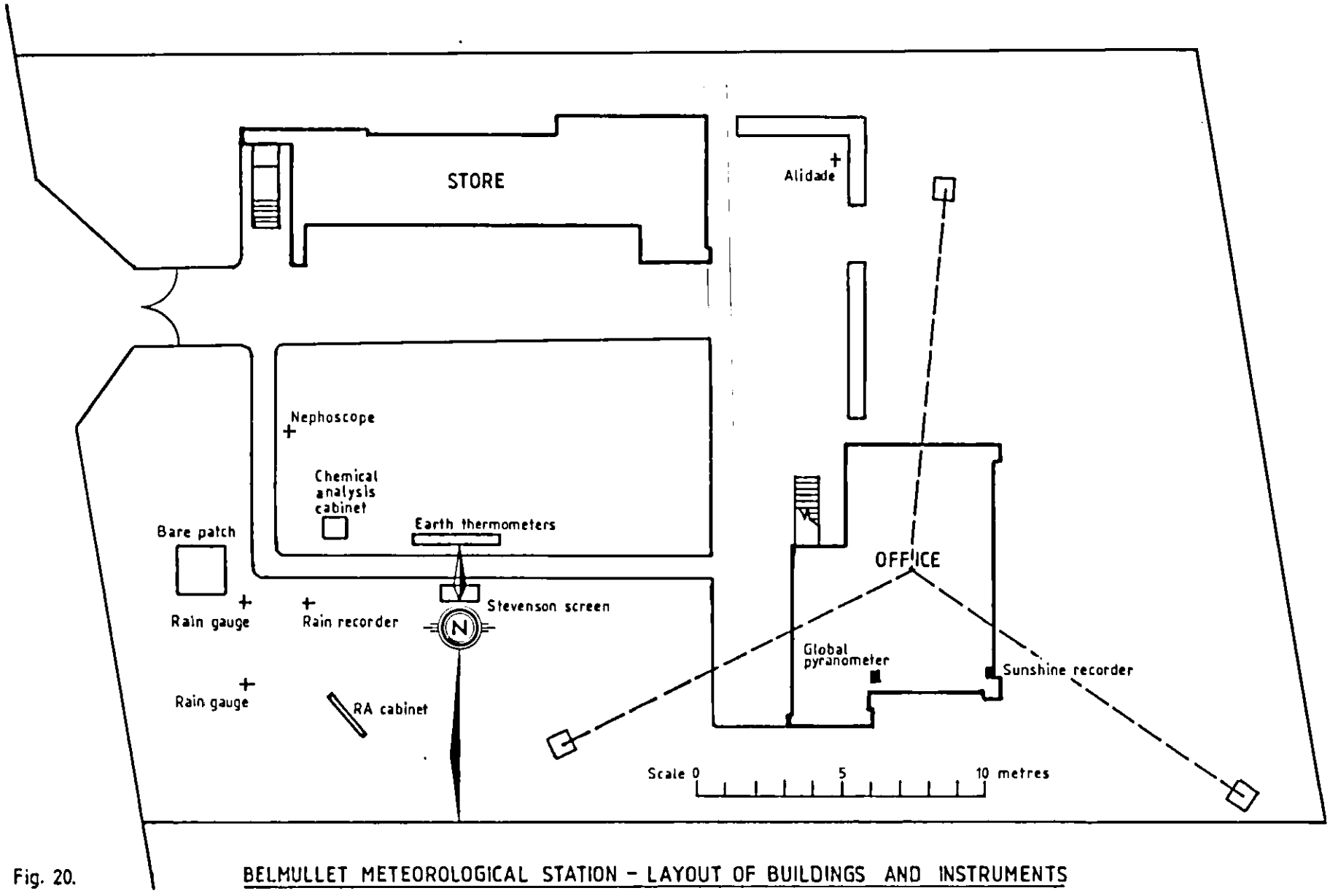
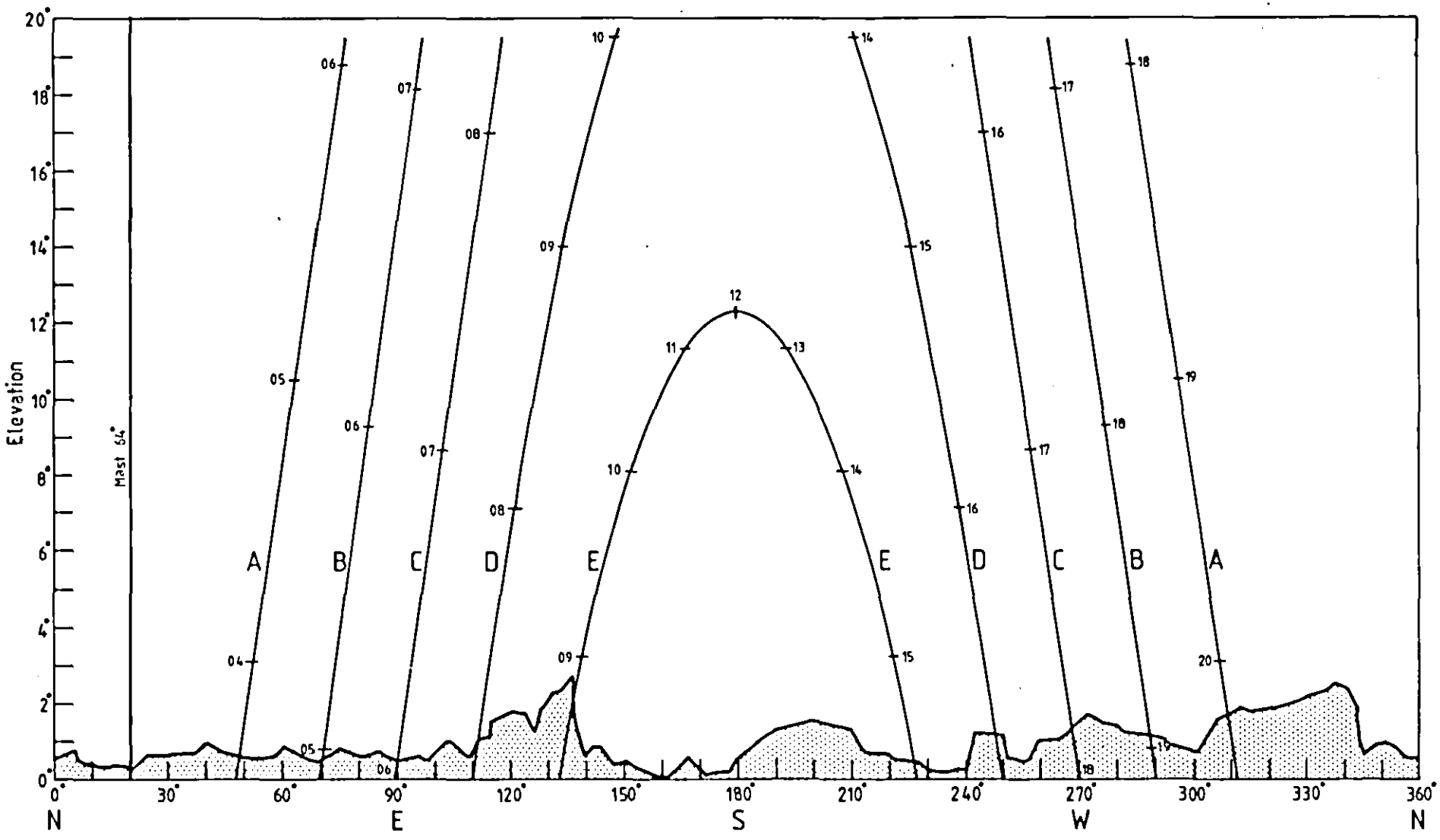


Fig. 20. BELMULLET METEOROLOGICAL STATION - LAYOUT OF BUILDINGS AND INSTRUMENTS



BELMULLET

Fig. 21. Exposure diagram showing (1) azimuth and elevation of all objects which obscure pyranometer.
(2) azimuth and elevation of sun at various times of year as follows (A) June 22 (B) April 21, August 23
(C) March 21, September 23 (D) February 18, October 25 (E) December 22

APPENDIX

TABLE OF INSTRUMENTS IN USE - 1982

	Sensor	Recorder	Integrator	Diffuse Shade Ring Width	Diffuse Shade Ring Diameter
Valentia					
Global	G2-847	No. 29	Lintronic 717A	-	-
Diffuse	G18-1387	No. 168	Lintronic 484B	48mm	308mm
Balance	Funk 695	Honeywell 68B/2124	-	-	-
Infra-Red	Eppley 17154F3	-	Eppley 411-5879	-	-
Direct Sun	Eppley 17247E6	-	Eppley 411-5880	-	-
Kilkenny					
Global	CM6-690224	XR4-550106	Lintronic 415A	-	-
	CM6-818048 (26th Nov-31st Dec)		Lintronic 606B (12th Feb-9th June)		
Diffuse	CM6 -785154	BD8-774733	-	51mm	305mm
Birr					
Global	CM6 -690246	XR4-188730-13	CC1-680076	-	-
Diffuse	CM6 -785160	BD8-785761	-	51mm	305mm
	CM6 -690224 (6th Dec-31stDec)				
Dublin Airport					
Global	CM6 -773731	Philips 8053	CC2-750338	-	-
Diffuse	CM6 -752732	Philips 8056	CC2-750262	52mm	315mm
Malin Head					
Global	CM6 -807223	BD8-806738	Eppley 411-7092	-	-
Diffuse	CM6 -807230	BD8-806748	-	51mm	304mm
Clones					
Global	CM6 -807237	BD8-806742	Eppley 411-7093	-	-
Diffuse	CM6 -807231	BD8-806752	-	51mm	304mm
Belmullet					
Global	CM6-683279	XR4-188730-15	CC1-680082	-	-

NOTE : All instruments are Kipp and Zonen unless otherwise stated.

Table 1 VALENTIA DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	168	126	599	709	1939	1082	1461	1944	1227	510	297	371
2	43	137	154	1030	641	1694	2087	1810	908	1055	171	60
3	79	485	812	410	1716	2590	2233	1360	1049	586	154	230
4	201	124	756	1550	1426	1326	2077	1175	744	625	271	234
5	193	493	288	602	1842	1743	807	173	1127	613	398	210
6	133	388	763	652	2098	1588	1668	1169	517	634	549	262
7	70	340	912	905	1896	1681	1142	1221	733	821	420	176
8	127	86	974	1572	2279	1113	1105	1475	634	871	58	277
9	244	243	202	2083	840	1766	1487	1084	1330	683	198	99
10	76	485	849	1398	1674	977	715	1643	1277	725	157	156
11	431	461	452	1104	1581	2514	678	1515	930	945	124	125
12	420	446	833	1203	1607	2813	1671	1110	709	702	397	152
13	186	544	1044	1296	1505	2441	537	2354	872	508	392	317
14	167	824	528	1851	2399	2972	2159	752	550	842	385	36
15	102	418	884	1547	1928	1777	1911	1164	925	450	227	73
16	362	620	923	2007	2124	1423	1622	1643	1166	325	346	220
17	184	212	1135	1538	1977	753	1790	502	453	214	95	120
18	165	416	478	2096	2020	1125	2781	1970	318	445	284	189
19	366	334	1366	2145	760	1883	2363	1412	223	454	350	179
20	327	143	336	993	2448	1204	2090	1083	786	670	211	173
21	102	946	1526	1551	720	877	1579	928	1393	634	238	210
22	433	1025	1218	1238	1717	599	1953	1540	883	269	123	229
23	123	916	743	1724	1852	1668	2669	1013	1097	648	231	75
24	161	173	1147	2279	766	1755	2279	1111	1069	410	219	114
25	155	558	1181	1995	1641	2080	2600	1253	735	459	282	100
26	220	695	1372	2234	2778	1534	2108	1658	1139	590	208	116
27	486	280	1365	2371	1710	1245	1441	1997	968	484	219	263
28	365	521	1259	2074	1557	2430	1317	1885	992	419	284	91
29	227		1061	1040	2451	2778	1992	1114	941	76	176	115
30	289		1780	464	2871	936	2172	1867	247	118	139	71
31	277		964		2487		2263	507		192		289
Total	6882	12439	27904	43661	55250	50367	54757	41432	25942	16977	7603	5332
Mean	222.0	444.3	900.1	1455.4	1782.3	1678.9	1766.4	1336.5	864.7	547.7	253.4	172.0

Table 2 VALENTIA DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	134	124	381	661	919	1039	1227	1135	909	434	263	177
2	43	137	153	702	605	1114	1044	1200	851	441	170	60
3	79	310	444	384	805	975	1269	966	864	392	154	209
4	164	124	462	684	780	1169	1389	1014	736	541	267	213
5	172	267	282	601	994	1300	784	170	735	478	343	146
6	133	308	423	631	750	1100	1200	1012	407	403	224	185
7	70	260	566	696	852	1279	1070	1093	703	454	265	162
8	127	86	510	971	774	948	1054	889	603	399	55	201
9	199	190	201	322	816	1125	1293	935	661	532	193	99
10	76	278	539	982	1218	901	700	859	704	505	152	136
11	109	277	427	930	1109	1222	658	1077	651	345	124	124
12	117	273	480	993	1055	910	1014	975	699	436	278	138
13	185	343	602	724	1042	1143	537	568	751	367	254	148
14	164	243	490	909	1082	613	1189	599	548	465	251	35
15	102	401	500	768	1076	905	1543	1011	793	442	226	73
16	164	404	676	629	1083	1154	1456	1057	731	266	263	165
17	184	208	482	1120	1164	723	1433	482	453	213	95	117
18	163	353	474	745	1084	958	804	730	318	395	246	138
19	206	334	569	494	741	1117	837	973	223	409	237	154
20	271	142	335	852	645	1031	921	847	647	342	201	156
21	86	317	521	918	697	825	904	825	564	387	217	181
22	242	214	719	980	1126	572	974	915	613	234	122	185
23	122	374	702	960	1413	1272	569	888	648	337	213	75
24	160	172	805	598	730	1203	872	872	474	400	188	113
25	151	421	580	911	1155	1040	1086	909	548	390	208	100
26	197	421	693	510	679	1226	1022	740	599	369	193	115
27	228	278	729	483	1146	1008	781	535	583	394	218	198
28	270	472	918	514	1277	1154	890	797	528	379	188	90
29	210		610	754	1111	843	1013	830	507	76	171	115
30	275		463	464	729	789	1088	804	247	118	139	70
31	260		877		1046		1057	503		192		225
Total	5063	7731	16613	21890	29703	30658	31678	26210	18298	11535	6118	4303
Mean	163.3	276.1	535.9	729.7	958.2	1021.9	1021.9	845.5	609.9	372.1	203.9	138.8

Table 3 VALENTIA DAILY TOTALS OF RADIATION BALANCE (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	-155	53	81	230	942	613	740	933	643	38	5	-84
2	29	-12	-88	319	245	887	976	923	397	240	-108	-72
3	2	-3	274	186	612	1302	1059	707	561	144	52	-123
4	-101	-36	156	644	519	730	1024	672	340	224	135	-9
5	-13	12	70	193	691	937	454	91	581	295	-37	-170
6	-149	-27	200	256	930	802	939	610	262	126	-13	-17
7	-9	-121	325	369	889	886	702	709	417	337	88	5
8	57	-11	308	503	941	571	565	813	287	231	4	-79
9	45	-11	99	826	489	993	746	541	744	294	-123	-120
10	-133	2	208	661	946	386	384	863	511	266	-134	-97
11	-394	-5	88	431	686	1304	310	826	413	297	-16	-108
12	-361	98	243	494	881	1291	853	489	378	279	43	-120
13	-100	72	377	513	701	1076	308	1108	518	172	-35	-257
14	-47	94	225	763	1249	1387	1028	297	311	208	-77	20
15	-25	-182	219	486	1053	904	922	569	368	161	-31	-23
16	-10	-164	190	857	1143	753	973	871	618	104	67	-183
17	-64	-50	324	497	913	429	993	276	233	98	12	-208
18	-14	97	121	686	892	590	1466	991	149	168	14	-117
19	-175	3	540	873	350	917	1144	665	53	259	-139	-46
20	-57	88	106	404	1125	584	1061	424	440	155	-78	-106
21	-199	255	554	738	405	429	741	512	523	148	-100	-186
22	-20	243	446	481	926	335	962	860	382	-121	-51	-108
23	86	328	369	654	992	906	1349	470	428	152	-7	19
24	104	-24	343	864	470	846	1108	512	345	112	-84	82
25	58	123	399	828	677	1082	1247	485	230	207	1	61
26	-62	275	270	810	1193	826	1010	617	493	81	-42	-92
27	25	130	450	925	941	739	597	771	444	33	24	-194
28	123	137	405	863	706	1288	536	1032	372	86	-133	-48
29	103		209	523	1161	1370	838	520	273	48	22	-15
30	123		606	224	1216	490	1036	918	96	59	-14	-119
31	148		356		1217		1061	311		73		-41
Total	-1185	1364	8473	17101	26101	25653	27132	20386	11810	4974	-755	-2555
Mean	-38.2	48.7	273.3	570.0	842.0	855.1	875.2	657.6	393.7	160.5	-25.2	-82.4

Table 4

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES

INSTANTANEOUS VALUES (mW/cm^2) 1982

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG_2)	YELLOW (OG_1)	RED (RG_8)					TYPE	AMOUNT
				$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	mb	°C	mb	Km		Okta
Jan													
11	1056	75.1	3.87	680	494	587	413	1006	1.6	4.6	35	Sc	Tr
11	1132	74.0	3.61	713	514	611	423	1006	1.6	4.6	35	Sc	Tr
11	1340	76.9	4.37	699	523	613	424	1007	3.0	4.3	35		0
12	0956	78.5	4.95	634	481	565	393	1025	2.0	5.6	40	Sc	1
12	1112	74.3	3.68	701	509	607	424	1025	4.9	6.5	40	FcSc	1+
Feb													
14	1004	69.7	2.86	758	523	634	434	1011	7.0	7.4	40	Cu	1
21	1334	65.8	2.43	768	514	629	423	1010	9.5	8.9	30	CuCi	2+
21	1516	75.3	3.92	598	429	516	357	1010	9.6	8.5	30	Cu	2
22	0852	74.2	3.65	675	489	576	405	1015	2.5	7.2	30	Ci	1
22	1036	64.7	2.33	783	530	640	431	1015	7.4	8.7	40	Ci	1
22	1324	64.7	2.33	811	546	668	456	1014	10.9	7.3	40	CuCi	2+
Mar													
27	0908	61.0	2.06	417	337	379	288	1018	7.0	9.3	4	St	1
27	1036	52.4	1.64	461	357	401	306	1019	8.7	9.4	4		0
30	0912	59.5	1.97	724	498	606	413	1024	7.0	7.1	30	Sc	1
30	1228	48.5	1.51	820	540	668	448	1023	10.2	8.2	35	FcCi	1
30	1356	53.9	1.69	721	494	598	407	1023	11.0	8.6	30	FcCi	2
Apr													
4	1304	48.1	1.50	834	521	656	434	1007	15.8	11.8	45	Cu	1
9	0800	65.9	2.44	763	526	637	438	1026	7.5	6.4	50	ScCi	1
9	0904	57.2	1.84	837	555	681	461	1026	8.8	6.3	50	CuCi	1
9	1000	50.8	1.58	859	558	690	463	1026	9.0	6.1	50	CuCi	1
9	1100	46.1	1.44	885	572	706	471	1026	10.0	6.0	50	Cu	1
9	1204	44.4	1.40	886	569	701	474	1025	10.3	6.8	50	Cu	1
9	1304	46.3	1.45	871	557	694	464	1025	10.0	7.0	50	Cu	1
9	1436	54.7	1.73	826	542	670	452	1025	10.0	7.2	50	Cu	Tr
9	1548	64.1	2.28	753	512	626	427	1025	10.0	6.9	50	Cu	Tr
13	0856	56.9	1.83	729	498	605	418	1023	10.0	9.2	45	CuScCi	4-
16	0856	56.0	1.78	724	501	606	421	1024	13.1	8.2	25	CuCi	1
16	0956	48.8	1.52	792	532	652	441	1024	13.7	8.6	25	FcCi	Tr
16	1104	43.4	1.38	791	531	650	445	1024	14.2	9.0	25	CuCi	1
16	1248	43.0	1.37	757	515	628	433	1024	14.3	9.3	25	Cu	3
18	0812	61.5	2.09	668	479	574	402	1024	10.5	8.9	30	Ci	3
18	0908	53.9	1.69	618	420	476	368	1024	11.5	8.9	25	Ci	6
18	1104	42.7	1.36	691	464	573	391	1023	12.5	10.3	25	FcCi	7
19	1032	44.6	1.40	792	532	649	444	1020	13.0	9.2	12	ScCi	Tr
19	1336	45.1	1.42	692	482	576	408	1020	14.3	11.0	12	CuCi	1+
24	1452	52.1	1.63	772	500	624	420	1037	12.4	10.9	45	Ci	4
24	1528	56.9	1.83	736	490	603	404	1037	12.4	10.9	45	Ci	3
24	1548	59.8	1.98	697	468	575	387	1037	12.4	10.9	45	Ci	3
26	0932	48.5	1.51	814	532	655	440	1038	15.4	10.8	40	Ci	1

Table 4 (Contd) DIRECT SOLAR RADIATION AT NORMAL INCIDENCES

INSTANTANEOUS VALUES (mW/cm^2) 1982

MONTH AND DAY	TIME LAT.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG_2)	YELLOW (OG_1)	RED (RG_8)					TYPE	AMOUNT
				x10^{-1}	x10^{-1}	x10^{-1}	x10^{-1}	mb	^{o}C	mb	Km		Okta
Apr													
27	0840	55.1	1.74	708	474	583	395	1036	11.9	11.1	30	Ci	1
27	0944	46.9	1.46	790	520	639	431	1036	13.3	12.5	30	Ci	Tr
27	1100	40.0	1.30	837	540	665	444	1035	16.0	12.2	20	Ci	1
27	1228	38.6	1.28	792	515	645	426	1035	16.0	13.3	20	Ci	1
27	1308	40.5	1.31	799	522	646	429	1034	17.2	13.1	20	Ci	1
27	1356	44.7	1.41	796	525	650	438	1034	16.5	10.1	20	Ci	1
27	1448	50.7	1.58	722	490	598	413	1034	16.5	10.1	20	Ci	1
27	1600	60.8	2.04	688	478	582	400	1034	16.3	12.9	20	Ci	1
28	0832	55.9	1.78	838	548	678	450	1033	13.1	10.3	35	Cu	Tr
28	0944	46.6	1.45	877	559	696	465	1033	13.3	11.0	35	Cu	Tr
28	1228	38.3	1.27	867	557	688	462	1032	13.2	10.6	35	Fc	Tr
28	1316	40.8	1.32	791	517	636	429	1032	13.2	11.4	35	CuFc	3
May													
6	1112	36.7	1.25	824	537	657	447	1020	9.5	7.3	45	CuCi	3
7	1352	41.6	1.34	795	531	649	442	1019	12.8	11.2	60	CuSc	2+
7	1524	53.3	1.67	700	479	577	404	1019	12.2	10.9	50	CuSc	5
20	1004	39.2	1.29	855	551	680	452	1020	14.5	14.9	50	Cu	2
20	1104	33.8	1.20	866	554	686	456	1020	15.0	12.5	50	CuCi	3
20	1252	33.5	1.20	867	555	688	455	1020	15.1	12.4	50	Cu	3
26	1104	32.7	1.19	880	558	694	462	1017	14.0	11.2	45	CuCi	3
26	1252	32.5	1.19	877	557	694	458	1017	14.1	11.3	50	CuCi	3
26	1344	36.8	1.25	861	546	681	452	1018	14.0	10.6	50	CuCi	3
26	1440	43.6	1.38	831	533	663	441	1018	13.9	10.6	50	Cu	2
26	1532	51.0	1.59	782	506	625	413	1019	13.9	10.6	50	Cu	2
30	1248	31.6	1.17	822	533	658	443	1020	20.6	15.2	45	Ci	Tr
30	1412	39.5	1.29	819	534	659	439	1019	22.0	13.6	45	Ci	1
31	0908	44.6	1.40	758	517	625	428	1016	18.5	13.7	20	Ci	4
31	1036	34.2	1.21	830	546	667	455	1016	18.1	11.8	20	Ci	3
June													
3	0912	43.8	1.39	838	525	663	434	1016	16.5	12.4	40	CuCi	3
3	1012	36.2	1.24	863	534	675	438	1016	17.2	12.7	45	CuCi	2
3	1104	31.5	1.17	867	534	678	435	1015	18.0	12.8	45	CuCi	4
12	1300	31.1	1.17	865	543	681	444	1003	16.0	12.2	30	Cu	5
12	1352	35.9	1.23	861	542	675	444	1003	16.1	12.2	30	Cu	2
13	1344	35.0	1.22	836	537	668	443	1014	16.7	13.5	30	CuSc	3
13	1448	43.0	1.37	817	530	655	433	1014	16.8	13.4	30	CuScAc	5
14	1236	29.5	1.15	853	540	674	441	1012	16.2	13.7	60	CuAc	2+
14	1348	35.3	1.22	848	534	671	437	1012	16.8	13.7	60	CuFc	2
14	1440	41.9	1.34	825	525	656	428	1012	16.3	13.8	60	CuFc	1
25	1300	30.8	1.16	850	531	665	432	996	18.7	15.6	40	Cu	4+
25	1412	38.1	1.27	804	507	633	411	996	18.8	15.4	40	Cu	4+
28	1340	34.4	1.21	821	525	654	427	1007	16.0	14.1	35	CuCi	4
29	1100	31.0	1.17	831	526	655	425	1015	13.8	10.8	30	Cu	2

Table 4 (Contd.)

DIRECT SOLAR RADIATION AT NORMAL INCIDENCES

INSTANTANEOUS VALUES (mW/cm^2) 1982

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG_2)	YELLOW (OG_1)	RED (RG_8)					TYPE	AMOUNT
				$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	mb	^oC	mb	Km		Okta
June													
29	1224	29.1	1.14	830	520	650	426	1015	15.3	12.8	30	Cu	2
29	1348	35.4	1.23	829	522	653	425	1017	15.8	12.9	40	Cu	2
July													
4	1520	47.9	1.49	742	472	591	382	1019	16.3	13.6	40	Cu	3
6	0908	43.9	1.39	853	531	667	426	1017	16.1	17.3	25	FsCuCi	4+
18	1308	33.6	1.20	761	479	599	381	1028	19.7	18.8	40	Cu	2
18	1510	47.9	1.49	715	461	564	372	1028	19.0	17.6	40	CuCi	3
19	1400	38.9	1.28	782	500	623	412	1026	20.2	18.9	35	Cu	1
19	1520	49.5	1.54	746	489	607	403	1026	22.5	17.3	35	Cu	1
20	0824	51.9	1.62	758	501	617	410	1025	20.0	16.7	30	Fc	Tr
22	0852	48.2	1.50	569	410	495	335	1024	20.7	17.0	20	ScCi	Tr
23	0844	49.4	1.54	790	512	636	418	1023	19.1	15.9	15	Fc	1
23	1056	34.2	1.21	798	506	632	415	1023	20.0	18.0	25	CuFc	1
23	1444	45.0	1.41	658	449	548	369	1023	18.6	18.9	25	CuFc	1
23	1516	49.4	1.54	652	445	547	364	1023	18.6	18.9	25	CuFc	1
24	1036	36.0	1.24	807	516	643	421	1023	18.0	16.7	30	CuCi	3
24	1500	47.3	1.47	742	488	601	397	1023	18.9	16.9	40	FcCi	2+
25	1536	52.7	1.65	499	362	428	301	1027	20.2	17.4	10	Cu	2
26	0932	43.4	1.38	580	401	489	331	1028	19.3	16.2	12	Cu	2
26	1328	36.8	1.25	695	458	564	378	1027	20.7	15.0	15	CuFcAcCi	4
26	1404	40.5	1.31	656	422	514	356	1027	21.0	15.6	18	CuAcCi	5
27	0920	45.1	1.42	699	458	568	375	1023	18.9	14.9	20	CuCi	1
29	1504	48.8	1.52	635	449	538	372	1020	19.1	15.9	18	Fc	Tr
31	0956	41.5	1.33	462	362	413	305	1011	23.9	17.0	12	Cu	Tr
31	1312	36.5	1.24	538	397	466	331	1010	25.7	16.8	15	Cu	Tr
Aug													
8	1356	42.6	1.36	838	520	656	420	1020	18.9	15.9	30	CuSc	1
10	0904	50.3	1.56	777	498	623	405	1021	17.9	13.8	60	CuScCi	3+
13	0800	60.1	2.00	718	486	594	394	1007	14.7	11.2	50	Cu	2
13	0940	46.5	1.45	803	516	642	420	1008	15.5	11.6	50	CuSc	2
13	1302	39.3	1.29	838	534	666	433	1010	16.7	12.4	50	Cu	3
13	1356	43.9	1.39	818	525	653	428	1010	16.6	11.2	50	CuSc	1+
13	1548	58.4	1.90	751	496	609	406	1010	16.6	11.9	50	Cu	2
16	0858	52.6	1.64	703	448	557	355	1006	15.5	12.5	15	Sc	5
18	1408	46.6	1.45	762	483	605	393	1011	15.8	12.0	40	Cu	1-
22	1240	41.0	1.32	713	443	544	348	1016	16.0	13.8	30	CuFcSc	4
27	1354	47.8	1.49	821	528	650	425	1012	15.7	12.6	50	Cu	1
28	0840	58.4	1.90	804	522	649	422	1018	12.8	13.0	50	FcAcCi	3
30	1040	46.0	1.44	798	509	630	411	1022	14.8	10.4	30	CuFc	3
Sept													
21	1328	54.5	1.72	815	524	653	421	1008	14.9	11.2	25	CuAc	1

Table 4 (Contd.) DIRECT SOLAR RADIATION AT NORMAL INCIDENCES

INSTANTANEOUS VALUES (mW/cm^2) 1982

MONTH AND DAY	TIME L.A.T.	ZENITH DISTANCE (Z)	AIR MASS (m)	RADIATION				PRESSURE	TEMPERATURE	VAPOUR PRESSURE	VISIBILITY	CLOUD	
				CLEAR	RED (RG_2)	YELLOW (OG_1)	RED (RG_8)					TYPE	AMOUNT
				$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	$x10^{-1}$	mb	^oC	mb	Km		Okta
Sept													
21	1420	59.1	1.94	775	503	622	406	1009	14.7	11.8	25	CuAc	3
23	1124	52.5	1.64	738	474	584	379	1002	12.6	11.5	30	CuSc	5
26	1444	63.5	2.23	681	453	572	363	992	14.0	10.7	30	CbCuFc	3
Oct													
11	1252	60.0	2.00	782	512	630	417	1009	13.2	9.4	45	Cu	1
11	1348	63.3	2.22	733	487	598	393	1009	13.5	9.8	45	Cu	1
Nov													
6	1032	70.5	2.98	675	473	571	385	994	10.0	9.0	45	Sc	1
Dec													
1	1152	73.8	3.57	578	412	497	338	1025	9.7	8.8	30	Sc	3
1	1348	77.4	4.54	481	361	423	295	1024	10.7	8.6	50	Sc	2

Table 5 VALENTIA DAILY TOTALS OF DIRECT SOLAR RADIATION AT NORMAL INCIDENCES (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	165	0	389	59	1275	26	160	1023	579	241	85	750
2	0	0	0	614	128	1058	1419	585	57	1062	0	0
3	0	299	707	58	1522	2163	1420	379	170	306	2	91
4	121	0	634	1342	1266	95	1086	82	0	150	8	54
5	68	311	0	5	1511	457	0	0	655	236	162	295
6	0	65	675	45	1787	502	454	151	190	459	1083	304
7	0	162	647	288	1302	611	18	106	7	700	468	65
8	0	0	862	987	2258	158	50	806	42	1158	0	285
9	123	222	0	3172	1	821	228	330	868	253	7	0
10	0	440	619	669	377	201	0	1220	919	493	30	97
11	1453	487	50	378	592	1761	48	485	499	1231	0	1
12	1354	333	566	387	704	2780	714	74	0	422	330	26
13	0	425	718	1029	479	1935	3	2865	23	245	478	719
14	3	1676	41	1381	1708	3464	1455	277	3	782	383	0
15	0	53	544	1593	976	1117	536	119	209	0	0	0
16	686	482	360	2237	1373	325	108	686	747	145	253	186
17	9	10	1296	571	1152	20	386	0	2	0	0	13
18	4	105	0	2274	1349	148	2850	1827	0	65	142	159
19	553	5	1390	2492	2	963	2226	518	1	62	393	82
20	140	3	0	221	2501	129	1972	231	136	747	7	61
21	75	1630	1762	802	18	19	1030	85	1443	570	121	112
22	516	2093	767	554	664	16	1419	753	559	110	1	147
23	0	1255	8	1051	575	342	3282	116	714	679	75	3
24	0	0	459	2806	8	649	1999	404	1177	14	143	0
25	6	257	799	1512	657	1264	2170	370	315	152	311	0
26	44	460	1147	947	3070	279	1478	1521	978	490	60	0
27	866	3	916	3249	739	256	1091	2428	714	169	6	222
28	217	56	447	2505	266	1423	75	1551	879	78	377	0
29	53		791	433	2047	2579	985	315	839	0	24	0
30	4		2264	1	3404	136	1600	1522	0	0	0	0
31	19		52		1859		1661	0		0		216
Total	6479	10832	18910	33662	35590	25697	31923	20829	12722	11019	4949	3888
Mean	209.0	386.9	610.0	1122.1	1148.1	856.6	1029.8	671.9	424.1	355.5	165.0	125.4

Table 6 VALENTIA DAILY TOTALS OF LONG-WAVE (INFRA-RED) RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	2399	2944	2475	2635	2629	3181	3022	2967	3109	2725	2731	-
2	3094	2843	2638	2502	2728	2927	2704	3118	2981	2535	2548	-
3	2959	2614	2484	2881	2368	2788	2837	3145	3220	2753	2824	-
4	2743	2895	2419	2612	2376	3130	2947	3341	3126	2797	2965	-
5	2738	2595	2785	2866	2343	3127	3165	3326	3064	2841	2490	-
6	2449	2618	2571	2815	2427	2984	3244	3106	3098	2742	2367	-
7	2625	2387	2473	2796	2703	3002	3308	3161	3125	2713	2807	-
8	2564	2901	2435	2483	2486	3130	3324	3204	3068	2620	2980	-
9	2394	2672	2938	2318	2971	3084	3079	3111	3088	2827	2677	-
10	2337	2519	2520	2668	2938	2953	3077	2996	2878	2783	2737	-
11	1703	2461	2636	2578	2749	2762	3047	3109	2931	2673	2931	-
12	1804	2725	2402	2626	2966	2648	3076	2994	3146	2882	2601	-
13	2478	2411	2539	2563	2884	2602	3268	2601	3173	2793	2415	-
14	2645	2104	2728	2557	2792	2607	2861	2933	3282	2559	2336	3037
15	2832	2302	2413	2370	2851	2932	2888	3138	3041	2802	2654	2955
16	2614	2137	2414	2503	2831	3051	3094	2990	3021	2992	2717	2424
17	2638	2562	2271	2561	2764	3219	3274	3199	3177	2955	2908	2363
18	2810	2665	2526	2262	2620	3117	3049	2734	3158	2835	2685	2526
19	2343	2715	2522	2406	2947	2910	2908	2898	3045	3109	2407	2722
20	2556	2980	2835	2791	2661	3039	2826	2856	2990	2630	2647	2544
21	2626	2423	2480	2850	3096	3093	3037	3173	2515	2543	2502	2390
22	2492	2123	2475	2725	2881	3129	2993	3053	2845	2423	2642	2452
23	3029	2304	2890	2453	2945	3007	2887	3074	2723	2582	2564	2895
24	3044	2700	2507	2333	3130	2921	2916	3009	2588	2787	2406	3036
25	2944	2614	2483	2520	2797	3018	2783	2826	2664	2975	2416	3032
26	2626	2769	2262	2435	2474	3016	2899	2672	2676	2627	2139	2786
27	2512	2972	2355	2408	2696	3031	2910	2555	2745	2653	1951	2376
28	2885	2782	2383	2515	2849	2857	2935	2838	2624	2840	1891	2806
29	2978		2351	2879	2698	2718	2818	3057	2491	3043	2284	2866
30	2948		2287	2941	2542	3085	2783	2791	3004	3135	2301	2635
31	2927		2662		2814		2976	3208		2954		2463
Total	81736	72737	78159	77852	84956	89068	92935	93183	88596	86128	76523	-
Mean	2636.6	2590.6	2521.3	2595.1	2740.5	2968.9	2997.9	3005.9	2953.2	2778.3	2550.8	-

No data for period 1-13th December due to instrument malfunction

Table 7 KILKENNY DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	281	195	699	496	1865	2515	1410	987	799	331	255	274
2	77	146	338	1184	795	1388	1754	1876	1978	990	184	122
3	42	26	794	185	1778	1416	1859	2138	657	652	167	202
4	247	140	704	760	1781	1197	2074	456	858	1045	117	33
5	195	385	477	1277	2177	1443	1209	871	849	660	134	156
6	330	234	418	750	2040	1240	1242	1021	871	188	175	159
7	111	410	1158	843	988	1922	1262	2099	744	885	306	121
8	147	103	1028	1455	1772	1726	1454	1563	708	368	58	267
9	312	110	293	1500	1634	1702	906	1521	1131	331	463	90
10	234	458	734	1079	1138	331	787	1942	430	884	266	191
11	446	642	863	927	2238	2230	1138	1270	1391	511	194	228
12	469	128	963	1381	639	2114	1324	1672	1216	399	412	259
13	289	415	1085	1767	1436	1946	779	2146	1446	507	409	275
14	190	812	412	768	541	1432	1106	1435	1017	916	433	68
15	47	474	1033	1559	1043	1242	1984	1265	748	772	348	75
16	171	649	1043	1292	1709	1721	1525	1685	1411	154	454	228
17	256	81	1116	1666	1440	1500	722	704	569	186	98	234
18	67	453	924	1881	1676	2041	1632	1787	254	614	325	288
19	227	253	819	2087	825	1895	2802	1703	209	338	325	126
20	266	112	776	1221	1490	1590	2545	1446	864	376	352	154
21	149	304	1294	965	524	1425	2322	1003	1461	847	163	270
22	454	839	1129	1044	1943	575	2434	1411	958	737	141	196
23	113	835	1021	1625	1888	836	2566	1182	1299	827	134	43
24	160	162	1443	2004	1210	706	1187	803	515	465	192	91
25	210	821	1534	1665	1315	1261	1437	1504	687	569	321	229
26	382	590	1410	2155	1729	1716	1781	1430	967	610	384	52
27	233	341	1084	2306	2112	1274	2020	1419	598	673	337	251
28	333	673	391	1416	1864	2058	2279	1824	844	384	342	215
29	190		1305	770	2758	2336	1881	1249	1300	74	218	208
30	234		1437	664	2641	686	2348	1583	342	112	129	56
31	266		1019		1902		1946	726		199		284
Total	7128	10791	28744	38692	48891	45464	51715	43721	27121	16604	7836	5445
Mean	229.9	385.4	927.2	1289.7	1577.1	1515.5	1668.2	1410.4	904.0	535.6	261.2	175.6

Table 8 KILKENNY DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	125	179	375	464	915	1005	1228	894	676	331	239	156
2	77	134	275	756	784	1214	1285	1243	346	401	182	120
3	42	26	432	168	838	1336	1189	1092	629	407	155	187
4	148	131	398	681	837	1094	1165	453	813	497	117	35
5	162	220	450	901	785	1220	1104	785	747	421	133	153
6	173	189	416	727	928	833	1157	914	703	188	172	174
7	111	288	254	701	919	1312	1099	851	661	488	247	124
8	147	103	350	781	1234	1242	1173	924	617	356	58	134
9	270	104	292	620	1095	1486	781	978	727	327	251	100
10	215	322	471	931	943	324	741	991	361	411	203	154
11	109	216	565	872	1008	1079	951	808	713	446	184	153
12	129	127	411	750	636	1007	971	887	755	239	279	152
13	252	281	584	770	1051	1426	749	735	464	443	243	133
14	190	176	378	666	534	1063	1064	762	766	333	235	74
15	47	-	436	742	870	702	1116	922	666	415	276	82
16	138	368	460	894	1017	1390	1281	821	708	153	244	129
17	198	78	435	908	888	1261	718	682	528	181	98	168
18	67	353	662	860	970	1234	1052	850	253	423	217	132
19	212	231	450	567	811	1480	840	798	203	313	199	111
20	132	109	662	814	1064	1355	887	902	673	353	217	141
21	149	177	492	796	513	1077	963	884	424	291	163	134
22	195	338	592	872	1082	536	731	928	672	271	137	144
23	112	284	704	958	1017	806	718	973	534	257	134	46
24	157	162	541	782	1162	661	792	754	360	407	136	100
25	206	315	368	1084	1067	949	1227	965	459	476	212	133
26	235	399	559	605	1313	1335	1280	767	555	378	163	58
27	224	338	753	451	1036	1066	857	920	441	328	152	172
28	241	449	384	1086	1398	1061	1052	791	484	355	164	162
29	188		583	743	600	879	1189	778	405	74	212	180
30	206		756	660	593	588	1108	699	341	112	148	61
31	254		891		1306		922	695		196		187
Total	5111	-	15379	22610	29214	32021	31390	26446	16684	10271	5570	3989
Mean	164.9	-	496.1	753.7	942.4	1067.4	1012.6	853.1	556.1	331.3	185.7	128.7

No Data for 15th February due to a power outage

Table 9 BIRR DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	286	106	617	870	1996	2449	1425	1427	1040	503	361	309
2	71	108	317	1326	649	1791	1965	1354	1969	1070	250	208
3	81	71	713	320	2041	1401	2199	1892	896	643	245	303
4	150	295	889	1445	1785	1947	1905	718	761	899	259	133
5	134	334	454	1133	1582	1859	1100	630	867	421	223	198
6	273	378	545	847	2154	1172	2076	690	759	456	159	287
7	193	328	1160	841	1245	1990	1416	1799	901	785	344	200
8	57	153	1061	1393	1656	1634	1077	1199	1008	513	87	266
9	256	102	324	1344	1561	1481	709	1515	1242	386	424	102
10	276	647	691	863	1182	541	906	1724	765	1048	252	255
11	447	575	778	1175	2482	1714	875	1269	1354	436	205	269
12	470	224	1126	1459	785	2109	1637	1488	926	508	386	309
13	405	421	936	1533	1972	1685	1027	1790	1360	583	358	332
14	308	741	555	1015	1134	1534	596	1370	950	926	441	60
15	93	516	1075	1479	1461	1209	1428	1089	709	739	287	86
16	204	788	1109	1225	1584	1519	1582	1699	1441	241	389	268
17	309	200	1019	990	1618	971	1295	785	1127	497	128	196
18	110	745	956	1906	1703	1897	2529	1691	392	710	301	410
19	253	419	918	2129	1285	1447	2738	1344	231	361	300	178
20	254	140	888	828	1746	1640	2449	1722	981	528	357	197
21	100	460	1408	1337	833	1756	2263	1059	1329	839	223	282
22	324	902	1179	1017	1915	465	2404	1278	799	752	149	236
23	138	855	1149	1656	1630	513	2611	1187	1276	828	103	67
24	153	260	1464	2164	1015	970	1237	948	811	514	280	100
25	94	860	1602	1716	1790	1418	1186	1180	858	547	352	148
26	212	657	1506	2113	1920	1887	1799	1450	711	584	363	100
27	281	432	1410	2188	2148	1397	1782	1285	677	680	366	232
28	324	707	504	1555	1686	1707	1938	1746	909	402	361	224
29	151		1182	828	2834	2454	1503	1100	1094	155	305	230
30	215		1172	645	2825	1099	1987	1316	538	191	263	73
31	309		890		1979		2128	624		239		298
Total	6931	12424	29597	39340	52196	45656	51772	40368	28681	17984	8521	6556
Mean	223.6	443.7	954.7	1311.3	1683.7	1521.9	1670.1	1300.1	956.0	580.1	284.0	211.6

Table 10 BIRR DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	142	106	321	676	861	1050	1305	1028	684	480	358	191
2	68	104	273	682	583	1324	1171	1142	399	406	250	167
3	77	64	381	318	852	1271	1167	1167	812	479	228	162
4	148	264	427	769	1081	1453	1311	713	698	522	238	87
5	132	263	434	906	1051	1390	1070	621	767	370	212	161
6	164	282	494	653	985	772	1072	683	684	395	154	217
7	188	303	370	749	1106	1302	1309	1092	776	479	242	159
8	57	153	444	845	1227	1094	1016	881	893	491	76	194
9	207	102	321	767	828	1348	622	803	679	368	341	102
10	251	250	432	823	1100	511	878	1135	590	290	213	176
11	161	234	576	929	824	890	839	991	760	388	205	185
12	136	190	442	839	753	931	1358	952	828	351	287	164
13	197	301	531	638	1175	1445	955	804	722	389	246	171
14	213	146	509	1001	938	1159	577	812	718	355	254	60
15	93	420	489	836	1090	785	1259	922	653	478	266	77
16	-	205	496	811	1123	1349	1365	935	621	220	250	146
17	-	196	501	857	1041	853	857	698	831	402	124	178
18	109	326	687	842	995	1183	840	933	376	456	232	170
19	-	358	558	566	1182	1143	503	854	187	327	176	152
20	-	139	730	748	1158	1391	901	935	720	332	236	164
21	100	314	497	855	810	1309	1045	924	578	354	193	165
22	-	412	637	928	1218	444	743	989	667	306	146	178
23	138	329	605	964	1130	469	680	976	592	242	95	66
24	153	250	540	805	949	951	860	886	498	431	187	98
25	92	338	372	1253	1168	1118	1144	877	523	430	206	144
26	198	480	558	715	1189	1225	1297	891	482	314	185	95
27	281	404	695	651	1163	1176	1116	856	571	317	158	202
28	255	434	457	1058	1453	1198	1176	764	573	322	179	171
29	151		588	778	503	1020	1163	764	534	141	223	180
30	201		902	645	569	872	1022	873	514	175	179	68
31	259		814		1266		1063	610		207		238
Total	-	7367	16081	23907	31371	32426	31684	27511	18930	11217	6339	4688
Mean	-	263.1	518.7	796.9	1012.0	1080.9	1022.1	887.5	531.0	361.8	211.3	151.2

No data for dates in January due to malfunction in recorder

Table 11 DUBLIN AIRPORT DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	276	226	787	770	1884	2482	1589	1269	940	141	248	304
2	67	124	506	1030	928	2476	2007	861	1894	992	231	64
3	38	65	667	362	2254	2400	2045	1202	860	803	128	133
4	194	73	612	1397	1905	2522	1862	1472	775	662	144	36
5	112	363	667	1209	1973	2292	1084	778	400	663	92	218
6	173	221	364	1165	1936	1526	1988	1167	720	119	30	358
7	115	435	1132	1009	1352	2092	1110	2018	986	465	202	92
8	70	148	1043	1254	2188	2499	1446	1490	860	575	41	253
9	154	182	376	1671	1808	1626	1122	969	1180	233	398	86
10	402	611	663	934	1557	383	881	1739	547	767	402	197
11	409	616	843	1312	2466	1940	1448	1486	1475	734	202	279
12	371	86	1078	1531	1245	2085	1655	1897	1250	165	335	144
13	368	418	1001	1211	941	1400	1616	1598	1201	507	341	177
14	357	757	805	1071	631	2140	1240	1720	997	872	475	66
15	83	349	1117	1297	672	750	1692	960	783	795	343	60
16	75	564	730	1583	1558	1310	1471	1677	1138	193	338	262
17	362	86	1089	2111	1204	2233	1136	1222	1244	264	128	165
18	44	120	978	1936	1636	1526	2650	1714	412	629	322	282
19	169	432	571	2025	1139	1458	2692	1518	251	270	325	128
20	112	145	921	1321	1718	1699	2460	1849	797	394	348	131
21	139	78	1242	1723	683	1769	2444	1038	1358	808	161	266
22	334	576	1121	1196	1797	181	2582	1374	710	815	150	230
23	204	755	1443	1587	1730	418	2243	1114	1072	825	122	52
24	175	223	1462	1753	1150	1410	1975	824	316	463	117	98
25	155	895	1548	1263	1054	557	1543	1187	818	555	345	246
26	273	785	1519	2166	1725	1594	2323	1408	668	399	359	62
27	272	559	808	2305	2223	1785	2451	967	324	657	372	254
28	387	888	1246	1615	1530	1804	1545	1465	798	235	310	204
29	142		1202	679	2816	2385	2364	1041	1143	145	276	154
30	284		1213	1008	2720	1193	2245	1155	444	115	261	75
31	217		1200		1775		1092	847		282		268
Total	6533	10780	29954	41494	50198	49935	56001	41026	26361	15542	7546	5344
Mean	210.7	385.0	966.3	1383.1	1619.3	1664.5	1806.5	1323.4	878.7	501.4	251.5	172.4

Table 12 DUBLIN AIRPORT DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	113	211	390	614	885	895	1373	1184	676	138	231	123
2	65	121	333	616	885	1108	1149	823	341	554	231	57
3	36	58	391	343	608	1208	1095	999	737	372	124	93
4	140	67	396	655	793	981	1104	1042	715	528	134	33
5	108	190	455	863	845	1320	1056	744	398	539	89	160
6	112	209	362	741	873	1213	889	997	696	117	26	127
7	106	256	218	756	1088	1087	1000	902	721	342	168	81
8	67	148	335	728	759	646	1157	914	511	411	33	149
9	154	181	373	557	1052	1271	876	699	557	231	211	83
10	96	310	469	717	945	383	770	885	509	371	180	124
11	88	186	521	705	570	881	1269	775	670	446	188	114
12	90	84	361	810	1107	847	1217	784	719	157	272	114
13	171	358	458	987	905	1258	1225	769	689	422	218	124
14	180	167	602	865	607	1320	936	586	648	306	163	64
15	80	336	390	699	653	554	1100	719	749	339	228	58
16	71	336	507	977	950	1168	1304	781	630	190	214	137
17	134	84	392	412	910	1101	891	810	697	191	123	110
18	43	116	526	735	878	1148	654	785	398	469	161	120
19	160	350	428	537	939	1265	627	739	243	256	213	101
20	83	144	563	890	1108	1166	795	774	622	326	202	111
21	131	72	512	718	682	1165	808	913	431	179	160	112
22	169	453	504	963	1102	172	440	869	636	198	137	128
23	191	395	314	809	1070	417	1058	914	464	185	119	47
24	165	219	367	820	999	1001	1202	762	264	347	90	95
25	153	266	265	983	759	530	1112	861	495	330	167	144
26	205	387	433	675	1286	1082	847	710	494	329	120	59
27	261	373	725	446	929	1292	507	840	309	305	131	140
28	239	292	659	874	1297	1147	1156	832	442	235	153	127
29	141		474	630	405	846	896	663	376	142	185	127
30	244		749	876	575	678	936	756	422	115	165	73
31	192		880		1284		903	792		275		158
Total	4188	6369	14352	22001	27848	29150	30352	25623	16259	9345	4836	3293
Mean	135.1	227.5	463.0	733.4	898.3	971.7	979.1	826.5	542.0	301.5	161.2	106.2

Table 13 MALIN HEAD DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	171	217	656	577	1337	2546	1417	809	1667	650	306	204
2	43	214	378	816	765	2681	2479	939	1783	903	444	241
3	153	51	565	766	1065	1888	2469	1420	572	888	548	266
4	108	288	1030	1319	2202	2249	1621	520	463	459	138	69
5	50	317	623	799	908	2571	1259	697	170	634	135	240
6	201	359	626	1112	2345	1205	2286	661	437	877	89	249
7	255	254	1061	1652	1852	2127	2404	2166	958	657	132	42
8	52	195	886	1114	2450	1806	1429	1140	1546	402	144	199
9	178	160	262	837	1510	2401	599	1528	1064	425	262	91
10	305	570	614	1592	1794	567	1376	1218	1021	993	201	203
11	294	545	789	1775	2633	1075	2990	1702	1410	465	109	157
12	193	250	718	1244	1731	787	1692	1833	483	173	168	103
13	263	411	771	1490	1413	2213	1013	1990	1064	758	191	199
14	194	720	681	969	635	2576	1099	1874	645	562	315	77
15	251	474	935	1546	666	780	1567	1739	452	652	135	52
16	227	716	941	1704	1752	2856	1864	1362	675	255	251	77
17	272	144	737	2053	1516	1572	1719	767	794	464	62	133
18	113	125	1043	1914	1452	864	2545	1457	280	552	218	148
19	184	542	398	2169	2124	483	2801	1007	713	409	224	142
20	141	136	1219	2001	2553	2061	2267	932	685	681	221	94
21	114	149	1126	692	933	2807	2459	630	1152	599	177	128
22	165	810	1306	1113	1427	2055	1479	883	785	742	177	120
23	209	750	733	1802	2198	1750	2200	1294	1071	670	79	30
24	110	400	799	1648	872	766	1675	768	358	412	120	99
25	62	783	1578	1829	2317	792	1727	1428	1171	627	302	77
26	319	567	1406	2331	2207	1246	1643	1786	625	463	236	103
27	320	473	1062	1470	1787	1383	2622	1511	472	528	235	144
28	205	845	670	1184	1213	1841	1817	1408	920	279	173	131
29	81		1360	609	2295	2749	1923	712	695	104	156	134
30	295		890	556	2963	1707	2513	813	260	118	278	51
31	211		1213		1809		1759	890		112		140
Total	5739	11465	27076	40683	52724	52404	58713	37884	24391	16516	6226	4143
Mean	185.1	409.5	873.4	1356.1	1700.8	1746.8	1894.0	1222.1	813.0	532.8	207.5	133.6

Table 14 MALIN HEAD DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	110	192	405	560	942	1009	1144	798	750	514	238	155
2	42	208	324	687	550	997	1027	893	665	386	266	139
3	104	50	467	623	806	1324	1288	1288	544	471	184	116
4	104	225	307	622	777	1202	1326	510	463	439	138	68
5	49	177	393	703	854	1143	1094	684	170	471	135	156
6	123	251	393	779	845	911	1029	644	429	425	89	108
7	88	205	315	409	938	1050	1151	868	731	439	128	42
8	48	193	345	859	844	1052	1108	1007	579	376	144	138
9	141	160	257	803	1116	1206	545	899	547	425	200	87
10	102	246	444	795	1088	554	1171	1039	617	337	156	130
11	78	190	452	787	469	770	542	884	610	413	108	120
12	147	210	390	898	1041	775	1371	814	476	173	147	103
13	143	285	464	1128	1078	901	912	618	608	331	156	102
14	174	145	374	899	631	938	797	941	518	398	182	77
15	149	373	471	716	650	716	1301	792	428	495	135	49
16	127	199	477	890	954	872	1295	749	599	254	190	68
17	200	143	519	452	932	1323	1384	707	666	343	59	118
18	111	125	481	660	980	775	703	817	272	391	167	115
19	141	348	360	468	808	478	562	647	493	383	177	100
20	128	135	492	697	615	1051	914	758	451	343	177	94
21	92	149	636	688	861	1186	940	611	555	320	144	109
22	152	236	527	600	927	946	972	820	642	271	125	109
23	154	328	688	785	1175	1156	1146	975	424	244	78	30
24	109	342	661	951	823	763	1437	726	298	385	118	95
25	61	257	311	954	858	777	1362	812	474	304	129	77
26	160	359	606	631	771	1199	1191	714	467	345	178	100
27	181	349	664	1155	911	1036	729	895	454	336	177	115
28	180	277	628	867	1105	1325	1002	870	415	256	143	114
29	80		535	608	1179	813	908	672	406	104	153	105
30	216		812	556	558	1029	714	755	260	118	149	51
31	196		618		1284		1075	845		112		126
Total	3890	6357	14816	22230	27370	29277	32140	25052	15011	10602	4570	3116
Mean	125.5	227.0	477.9	741.0	882.9	975.9	1036.8	808.1	500.4	342.0	152.3	100.5

Table 15 CLONES DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	230	148	738	703	2154	2552	1654	918	1621	498	401	239
2	48	203	414	1621	600	2398	2178	1839	1876	1155	366	103
3	98	87	781	455	1757	1804	1911	1807	479	871	422	277
4	124	282	788	1486	1747	2241	1803	1277	556	503	120	65
5	80	343	641	929	981	2004	1059	858	451	539	164	175
6	281	358	581	963	2151	1150	2443	567	524	300	99	280
7	263	265	1192	970	1205	2046	2057	1856	673	559	110	93
8	103	141	1121	1187	1860	2091	1091	1246	1366	540	59	244
9	258	-	218	1173	1299	1902	687	1628	840	338	377	57
10	342	-	728	1200	906	496	1103	1633	719	659	180	241
11	566	-	733	1246	2442	2192	2138	1429	1251	495	136	269
12	528	186	877	1259	1107	1515	2153	1998	989	242	246	97
13	351	495	811	1568	1207	1505	891	2040	817	576	312	268
14	309	784	664	958	793	2035	544	1850	874	852	381	51
15	170	472	934	1618	645	767	1587	1284	768	749	209	50
16	124	575	475	804	1714	1382	1544	1883	1436	213	306	192
17	324	92	1084	2167	1887	2309	2180	1008	1227	503	123	58
18	77	157	1113	2014	1586	823	2627	1797	387	495	268	270
19	166	468	590	2125	1521	1122	2894	1011	248	261	338	185
20	156	228	1061	1031	2018	1702	2660	1599	888	614	252	95
21	85	69	1028	1008	944	880	2077	828	1227	741	189	228
22	249	652	1158	877	1631	348	2550	775	561	-	144	182
23	177	694	1038	1595	1789	1878	2001	1421	1222	827	107	40
24	121	306	1058	2115	1221	837	1899	1022	506	440	159	113
25	86	848	1624	1183	2037	626	1545	1480	1127	638	227	53
26	237	802	1381	2366	2018	1451	1829	1306	555	513	340	74
27	297	234	1315	2344	1967	1719	2158	1394	443	620	337	211
28	367	745	1182	1757	1609	1909	1658	1544	874	384	264	215
29	109		1355	399	2640	2430	1858	994	948	103	265	177
30	126		990	339	2923	1259	2483	862	512	111	143	39
31	218		863		2068		1320	807		165		220
Total	6670	-	28536	39450	50387	46373	56582	41961	25965	-	7044	4861
Mean	215.2	-	920.5	1315.3	1625.4	1545.8	1825.2	1353.6	865.5	-	234.8	156.8

No Data available 9th/11th February and 22nd October due to power interruptions.

Table 16 CLONES DAILY TOTALS OF DIFFUSE SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	119	147	325	589	1051	987	1337	858	542	479	271	159
2	46	202	332	768	507	1379	1146	1328	574	453	287	103
3	95	86	398	427	853	1434	1307	1101	477	507	157	136
4	119	244	392	785	797	1273	1062	1149	524	456	117	65
5	75	256	450	812	853	1392	1002	847	427	413	161	153
6	84	242	437	687	1045	943	838	555	496	276	96	141
7	132	236	308	706	1106	1279	1260	1047	591	463	100	86
8	100	141	374	838	1256	1206	967	937	759	384	54	147
9	190	-	216	899	838	1449	656	1018	685	338	240	53
10	119	-	512	804	872	480	1048	1215	632	411	103	132
11	112	-	518	923	872	1000	1087	1076	751	443	136	121
12	119	184	429	772	963	924	1479	943	221	230	206	94
13	188	380	495	718	940	995	-	892	756	499	238	106
14	227	221	520	891	733	1302	465	893	712	336	166	51
15	141	423	605	753	629	587	1299	1030	628	472	208	49
16	113	328	436	717	-	1203	1279	804	510	212	230	128
17	180	90	452	580	1090	1329	955	679	721	-	121	51
18	72	156	567	815	1176	784	854	983	383	400	187	146
19	166	370	442	608	1265	1009	448	811	242	257	228	128
20	122	228	643	754	1105	1353	764	935	554	324	201	85
21	78	68	642	946	908	858	1338	758	477	410	162	129
22	143	507	713	752	1236	346	628	764	523	-	132	148
23	174	502	580	937	1267	826	1342	956	512	233	103	40
24	112	303	738	767	967	803	1318	800	374	397	134	102
25	72	506	330	1070	1216	604	1262	790	527	330	178	49
26	188	501	707	693	1135	1157	1365	854	481	365	143	65
27	243	234	748	740	1066	1265	1253	475	381	366	142	148
28	253	473	809	949	1299	1130	1082	529	456	357	157	143
29	106		633	385	954	1032	1129	342	520	103	216	126
30	126		813	339	626	791	887	371	491	111	138	31
31	193		804		1317		1074	387		157		174
Total	4207	-	16368	22424	-	31120	-	26127	15927	-	5032	3289
Mean	135.7	-	528.0	747.5	-	1037.3	-	842.8	530.9	-	167.7	106.1

No Data available on occasions due to power interruptions and instrument malfunction.

Table 17 BELMULLET DAILY TOTALS OF GLOBAL SOLAR RADIATION (J/cm^2) 1982

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Day 1	189	483	439	446	2031	1771	2399	1906	1854	700	431	150
2	49	280	173	1440	1004	1122	2237	455	1815	1084	473	170
3	150	559	615	293	2075	2598	2425	1472	469	488	650	259
4	185	183	983	1688	1075	1809	2413	914	349	762	234	175
5	121	405	234	731	1461	1952	635	440	649	418	390	195
6	322	355	916	1094	2386	1116	2486	1071	276	875	522	359
7	260	271	745	1335	2115	1891	2709	1350	1175	572	228	109
8	173	73	804	745	2086	1383	625	1439	1621	521	82	153
9	366	210	219	1213	666	2028	1427	1874	1079	396	170	111
10	373	501	660	1264	1407	405	1091	1577	1249	594	194	216
11	404	322	795	1837	2208	2715	2833	1372	1180	723	109	195
12	410	278	782	1551	911	2108	2431	1894	691	551	291	246
13	99	258	794	893	2419	2604	1139	2061	761	602	380	277
14	164	816	399	1351	1639	1830	2358	1468	696	760	278	38
15	160	461	779	1201	2488	1061	1713	1204	557	513	128	67
16	196	712	707	972	1913	1985	1251	1776	1039	226	223	139
17	116	189	1307	999	1928	655	2633	529	334	557	78	63
18	76	723	812	2119	2137	1182	2815	1776	336	498	279	174
19	403	504	1035	2180	1686	1278	2797	1491	572	313	320	155
20	204	161	713	1921	2788	1489	2656	1338	1178	723	258	101
21	46	614	1400	992	709	1563	1423	1020	1303	528	268	155
22	272	898	1011	1810	1406	532	2439	829	860	376	245	175
23	192	764	788	1903	2139	1078	2772	766	1198	685	211	47
24	234	165	909	1674	1055	885	1231	1364	1136	428	206	71
25	81	680	982	1922	2567	973	1441	1557	863	421	225	61
26	307	741	845	2386	2815	1770	2322	1732	1134	549	168	98
27	352	361	1401	2239	1613	1460	2548	1892	585	344	240	177
28	243	630	990	1851	1094	2391	2305	1577	941	221	259	124
29	114		1366	882	1042	2518	2317	1010	1234	162	95	158
30	255		1020	457	2902	1655	2018	1388	211	82	171	112
31	299		705		2130		2297	850		173		103
Total	6815	12597	25328	41389	55895	47807	64186	41392	27345	15845	7806	4633
Mean	219.8	449.9	817.0	1379.6	1803.1	1593.6	2070.5	1335.2	911.5	511.1	260.2	149.5