ABBREVIATED WEATHER REPORTS

(INSTRUCTIONS TO OBSERVERS)

METEOROLOGICAL OFFICE

ABBREVIATED WEATHER REPORTS

(INSTRUCTIONS TO OBSERVERS)

UDC 551.501.1:551.509.1

METEOROLOGICAL OFFICE

ABBREVIATED WEATHER REPORTS

CONTENTS

Introductory note

The codes and specifications set out in this publication supersede all previous instructions relating to reports in abbreviated code and operate with effect from 1 January 1988.

The code tables given in Section 5 are in the same order as the corresponding symbols in the code used for abbreviated weather reports and have been given the same numbers as the tables on the wallcards Met.O.951 and Met.O.951A.

SECTION 1 REGISTER OF OBSERVATIONS

1.1 The *Register* is the permanent record of a station's observations and its coded reports. It may be called for at a later date to provide evidence in a Court of Law or data for an important investigation. Completed *Registers* will be collected and held in the Meteorological Office archives on behalf of the Public Record Office.

1.2 The page layout of the *Register* has been arranged so that the entries in columns 2 to 35 are in the order required in the coded message. Consequently when the code figures have been entered the complete coded message can be sent without any rearrangement of the figures. The symbols representing the elements to be entered in each column are printed at the top of the column in bold type. For those stations not recording temperatures, columns 10–15 will always be left blank; on occasions of insignificant weather the weather group, columns 16–18, will not be sent and when no cloud is present there will be no entries in columns 19–35. The coded report may thus vary in length.

1.3 For the United Kingdom the standard of time is Greenwich Mean Time. All times entered in the *Register* must be GMT throughout the year.

1.4 A pocket-sized pad is provided for the observer's use when actually making the observations. The use of odd scraps of paper is to be avoided. In all columns of the *Register of Observations* the space for each set of observations is divided into upper and lower portions by a thin dotted line. The initial observation should be written above the line and the corresponding code figure below the line. All entries must be completed in black ink; ball-point pens may be used but not fibre-tipped pens. The entry above the line in columns 14 and 15 is the **wet-bulb** reading but below the line the entry will be the computed **dew-point**. Space is provided for 13 observations on each page. Stations reporting more than 13 observations per day will use two pages, starting a new page for the first observation each day. For those stations reporting the National Climatological Message (NCM) a new page must be used for each day's observations. Stations not submitting the NCM and recording six or less observations per day may enter more than one day's observations per page. Where this is done a space must be left between each day's observations, and the day's date must be clearly entered in column 1.

1.5 If for any reason a figure is missing from the coded message it will be replaced by an oblique (or solidus) '/'. When this results in all the information of the group being replaced by solidi (for most groups this will be four solidi) then that group will not be reported. Care must be taken not to confuse a / with a figure 1.

1.6 If an error is discovered after entry in the *Register of Observations* the incorrect entry should be crossed out in red ink without obscuring the original entry and the correct figure written in red ink close to the original entry. The original entry must never be erased. A serial number should be allotted to the correction, starting at 1 in each *Register*, entered in red ink in the Remarks column, and the correction page at the back of the *Register of Observations* completed.

If an error is discovered after the observation has been despatched the correction should be passed to the collecting office with the next observation.

SECTION 2 REPORTS AT FIXED HOURS

2.1 An internationally agreed code is used for the exchange of weather information. The SYRED code is an abbreviated version of that code for use in the United Kingdom. The standard form used is:

iii $4i_xhVV$ Nddff $1s_nTTT$ $2s_nT_dT_dT_d$ $7wwW_1W_2$ 333 $8N_sCh_sh_s$ 555 $1V'\overline{V'}f'f'$

2.2 These letters represent the positions occupied in the message by the code figures of the various elements reported:

iii	=	Station number	
4	=	Indicator	
$\mathbf{i_x}$	=	Significant weather indicator	Table 2 page 24
h	=	Height of lowest layer of cloud	Table 3 page 24
VV	=	Visibility	Table 4 page 25
N	=	Total amount of cloud	Table 5 page 26
dd	=	Wind direction	Table 6 page 26
ff	=	Wind speed	Table 7 page 27
1	=	Indicator, dry-bulb temperature	
$\mathbf{s_n}$	=	Sign of dry-bulb temperature (+ or −)	Table 8 page 27
TTT	=	Dry-bulb temperature	
2	=	Indicator, dew-point temperature	
$\mathbf{s_n}$	=	Sign of dew-point temperature (+ or −)	Table 8 page 27
$\mathbf{T_dT_dT_d}$	=	Dew-point temperature	
7	=	Indicator, weather	
ww	=	Present weather	Table 11 page 28
$\mathbf{W_1}$	=	Past weather	Table 12 page 32
$\mathbf{W_2}$	=	Past weather	Table 12 page 32
333	=	Indicator	
8	=	Indicator, cloud layer	
$\mathbf{N_s}$	=	Cloud amount	Table 5 page 26
C	=	Type of cloud	Table 19 page 32
$\mathbf{h_sh_s}$	=	Height of base of cloud layer	Table 20 page 33
555	=	Indicator	
1	=	Indicator, fog and/or gusts	
V'V'	=	Visibility in metres	
(f')f'f'	=	Speed in knots of maximum gust in past hour	

2.3 Entries in the *Register of Observations*:

Columns 1 and 2 — DATE, TIME and STATION IDENTIFICATION NUMBER

Month:	STATION NUMBER
Date:	
Time (GMT)	iii
1	2

Col. 1 Enter the month in the space provided at the top of the page. Enter the date in the space below. When more than one day's observations are entered on a page the new date must be inserted between each day's observations.

Enter against each observation the time of completion to the nearest minute. Add in brackets at each synoptic hour the first two figures of the nominal hour of observation, e.g. 2354(00), 0248(03), etc.

- Synoptic hours are: 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 GMT.
- Note: All times are GMT throughout the year.

Col. 2 Enter the station number (this is the World Meteorological Organization number).

Columns 3 to 6 — INDICATORS, HEIGHT OF LOWEST CLOUD and VISIBILITY

Notes on observing these elements are given in paragraphs 3.2 and 3.3.

Indicators		Height of lowest cloud	Visibility
Precipitation	Station/Weather		
4 i_x		h	VV
3	4	5	6

Col. 3 Enter below the line the indicator number 4.

Col. 4 Enter below the line the code figure to indicate whether past and present weather (wwW_1W_2) are reported or not reported. (CODE TABLE 2)

Col. 5 Enter below the line the code figure for the height of the lowest cloud layer. (CODE TABLE 3)

Col. 6 Enter above the line the observed visibility, in metres up to and including 5000 metres but in kilometres above 5000 metres.

Enter below the line the code figure for visibility. (CODE TABLE 4)

Columns 7 to 9 — TOTAL CLOUD AMOUNT and WIND SPEED AND DIRECTION

Notes on observing these elements are given in paragraphs 3.2 and 3.4.

Total Cloud	WIND	
	Direction	Speed
N	**dd**	**ff**
7	8	9

Col. 7 Enter below the line the code figure for the total amount of cloud. (CODE TABLE 5)

Col. 8 When an anemometer is not available (or is not in use) enter above the line the observed wind direction as a compass point, e.g. NNE.

Enter below the line the code figure for the wind direction. (CODE TABLE 6)

Col. 9 Enter above the line the observed wind speed in knots. When the wind speed is less than 5 knots or when no anemometer is available enter the estimated Beaufort Force, e.g. F1, F2, etc. F0 = calm.

Enter below the line the wind speed in knots corrected to the standard height of 10 metres, or the equivalent wind speed in knots of the Beaufort Force. (CODE TABLE 7)

Columns 10 to 15 — TEMPERATURES

TEMPERATURES					
Indicator	Sign	Dry bulb	Indicator	Sign	Wet bulb
				Sign	Dew-point
1	**s_n**	**TTT**	**2**	**s_n**	**$T_dT_dT_d$**
10	11	12	13	14	15

Col. 10 Enter below the line the indicator number 1 if the **dry-bulb** temperature is to be reported.

Col. 11 Enter above the line the sign + or − for the **dry-bulb** temperature.

Enter below the line the code figure for the sign (+ or −) of the **dry-bulb** temperature. (CODE TABLE 8)

Col. 12 Enter above the line the **dry-bulb** temperature in degrees C and tenths.

Enter below the line the coded value of the **dry-bulb** temperature, e.g. 0.6 °C is coded as 006, 1.6 °C is coded as 016 and 11.6 °C is coded as 116.

Col. 13 Enter below the line the indicator number 2 if the **dew-point** temperature is to be reported.

Col. 14 Enter above the line the sign + or − for the **wet-bulb** temperature.

Enter below the line the code figure for the sign (+ or −) for the **dew-point** temperature. (CODE TABLE 8)

Col. 15 Enter above the line the **wet-bulb** temperature in degrees C and tenths.

Enter below the line the coded value of the computed **dew-point** temperature in degrees C and tenths as three figures omitting the decimal point.

Is the wet-bulb muslin CLEAN?

If not it should be changed.

Frequent changes mean accurate dew-point temperatures, essential for forecasting fog.

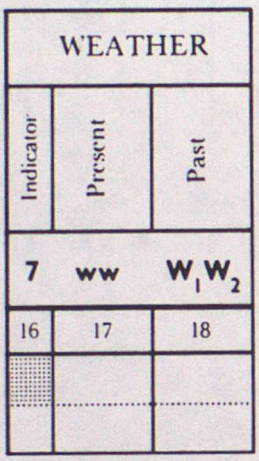
Columns 16 to 18 — WEATHER

These columns are ALWAYS completed but reported only if present or past weather phenomena of significance, or both, were observed.

- Present weather (ww) code figures 00, 01, 02, 03 and past weather (W_1W_2) code figures 0, 1 and 2 are considered to represent phenomena without significance.

When both present and past weather are insignificant, brackets '( )' should be inserted around the whole group to indicate to the observer that the group is not to be included in the message sent to the collecting office. The code figure entered in column 4 indicates whether or not this group is being reported.

Paragraphs 3.6, 3.7 and 3.8 deal with coding present and past weather.



Col. 16 Enter below the line the indicator number 7.

Col. 17 and 18
Enter above the line the Beaufort letters to describe the weather since the last observation (significant or not). See paragraph 3.9 for a description of Beaufort letters.

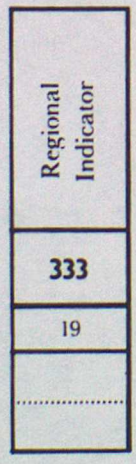
Col. 17 Enter below the line the highest applicable code figure for the present weather, bearing in mind that the code figure 17 takes precedence over figures 20 to 49 inclusive. (CODE TABLE 11)

Col. 18 Enter the code figures for W_1 and W_2 (past weather). If different code figures are used for W_1 and W_2 then W_1 must be the higher figure. (CODE TABLE 12)

The period covered by the coded past weather will be:

- SIX hours for observations at 0000, 0600, 1200 and 1800 GMT.
- THREE hours for observations at 0300, 0900, 1500 and 2100 GMT.
- ONE hour at all other hours.

Column 19 — REGIONAL INDICATOR



Col. 19 Enter below the line the figures 333 when there is any information to be reported anywhere in columns 20 to 35 inclusive, otherwise leave blank.

Columns 20 to 35 — CLOUDS

Paragraph 3.2 describes methods of observing clouds.

CLOUDS															
Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station
8	N_s	C	h_sh_s	8	N_s	C	h_sh_s	8	N_s	C	h_sh_s	8	N_s	C	h_sh_s
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

Columns 20 to 35 ARE USED ONLY WHEN CLOUD IS PRESENT at the time of the observation. All cloud layers are to be recorded or reported. Each set of four columns is identical and up to four significant cloud layers may be reported.

The cloud to be reported is entered below the line and the selection of significant cloud is made according to the following rules:

1. The lowest individual layer of any amount ($N \geqslant 1$).
2. The next layer of 3 eighths or more ($N \geqslant 3$).
3. The next layer of 5 eighths or more ($N \geqslant 5$).
4. Any cumulonimbus cloud, irrespective of the amount, which has not been reported under 1, 2 or 3.

Cloud layers are entered from left to right in order of **height above the ground**, starting with the lowest. When cumulonimbus is one of the clouds to be reported it will be included in its correct height sequence irrespective of the amount.

The lowest layer of cloud to be reported will be entered in columns 20 to 23 as follows:

Col. 20 Enter below the line the indicator number 8.

Col. 21 Enter below the line the amount in eighths of the layer.

Col. 22 Enter below the line the code figure for the predominant cloud type in the layer. (CODE TABLE 19)

Col. 23 Enter below the line the code figure for the height of the layer. (CODE TABLE 20)

The first layer of cloud which is not reportable will be recorded above the line in columns 20 to 23 in the same form as above except that the indicator number 8 is not entered in column 20.

Successive layers will be entered above the line (if not to be reported) or below the line in columns 24–27, 28–31 or 32–35.

If two or more types of cloud occur with their bases at the same level and this level is to be reported in accordance with the rules above then:

- C refers to the cloud type that represents the greatest amount.
- N_s refers to the total amount of cloud at that level.

However, if one of these cloud types is CUMULONIMBUS then one reporting group will be used to report only this type, with:

- C reported as 9.
- N_s reporting the amount of cumulonimbus.

The remaining types of cloud in the layer, with their bases at the same level, will be reported in accordance with the rules given above if amounts are sufficient.

Whenever the cloud height is measured by searchlight enter the letter (s) against the code figure for the height.

When the sky is obscured by meteorological phenomena (fog, blowing snow, etc.) the group is not reported unless a reasonable estimate of vertical visibility can be made (see paragraph 3.2(ii)). When this is possible the group is entered and reported as $89/h_sh_s$ where h_sh_s is the vertical visibility coded from the height table. (CODE TABLE 20)

When the cloud cover is indiscernible for reasons other than being obscured by meteorological phenomena, for example because of nearby bright lights at night, and vertical visibility cannot be estimated, or whenever an observation of cloud is not made, the group is not reported. In these cases the following coding applies:

Sky	Height of base of lowest cloud — h (Col. 5) Code	Total amount of cloud — N (Col. 7) Code	$8N_sCh_sh_s$ (Cols. 20–23) Code
Obscured by met phenomena, NO vertical visibility	/	9	not reported
Obscured by met phenomena, vertical visibility reported	/	9	$89/h_sh_s$
Obscured by non-met phenomena or observation not made	/	/	not reported

Column 36 — REMARKS

This space is used to record information amplifying elements contained in the report and for additional groups for which there is no provision in the preceding columns, such as:

- Time of onset, change or cessation of any phenomena (precipitation, fog, thunderstorms, etc.).
- Variations of visibility with direction.
- COTRA when the cloud reported consists wholly or partially of condensation trails.
- Serial number for error correction.

On occasions of visibility less than 100 m and/or wind gusting to 34 kn or more on an anemograph, a special group should be entered in the Remarks column and sent with the observation, in the following form:

- 555 1V'V'(f')f'f'

555 Indicator group, fog and/or gust information follows

1 Enter indicator number 1
V'V' Enter visibility in metres
(f')f'f' Enter maximum gust during past hour in knots

When only one element is to be reported then the other element will be coded as //. For example, visibility 75 m, no gusts above 34 kn is encoded:

555 175//

When reporting gusts greater than 99 kn the entry will be 1/f'f'f'. For example, maximum gust 109 kn is encoded:

555 1/109

In the unlikely event of visibility less than 100 m and maximum gust greater than 99 kn two groups will be reported. For example, visibility 45 m, gust 112 kn is encoded:

555 145// 1/112

SECTION 3 NOTES ON THE OBSERVATIONS

3.1 General

The *Observer's Handbook* contains full details of the procedure for making observations. These notes concentrate on aspects which are of particular importance for observers preparing abbreviated weather reports.

3.2 Cloud observations

(i) *Cloud height*

The estimation of the height of the base of clouds is far from easy, particularly for the observer with no means of comparing estimates with subsequent measurements (e.g. by aircraft). The observer should endeavour to estimate the cloud height as follows:

Heights below 1000 ft	to the nearest 100 ft
Heights between 1000 and 2000 ft	to the nearest 200 ft
Heights between 2000 and 5000 ft	to the nearest 500 ft
Heights above 5000 ft	to the nearest 1000 ft

At stations where hills or mountains can be seen, cloud height can be judged very easily when the cloud covers part of a mountain of known height. Cloud height can be estimated fairly reliably when the cloud almost touches a mountain. Any very tall structures, towers, chimneys, etc. can be very useful in determining cloud height.

As a guide in selecting suitable code figures for the height of altocumulus, altrostratus (medium-level clouds) and cirrus, cirrocumulus, cirrostratus (high-level clouds) the following height ranges are generally applicable in the latitudes of the United Kingdom:

Medium-level clouds	6500–20 000 ft
High-level clouds	16 500–45 000 ft

If great difficulty is encountered in estimating heights of medium- and high-level clouds then the following nominal heights may be reported:

			Code figure
(a)	Medium cloud		
	Nominal height of lowest layer	10 000 ft (3000 m)	$h_sh_s = 60$
	Nominal height of any second layer	15 000 ft (4500 m)	$h_sh_s = 65$
(b)	High cloud		
	Nominal height of lowest layer	25 000 ft (7500 m)	$h_sh_s = 75$
	Nominal height of any second layer	35 000 ft (10 500 m)	$h_sh_s = 81$

Nominal heights are not allocated to low clouds but the usual range of cloud-base heights is as follows:

Stratus	Surface–2000 ft
Stratocumulus	1000–4500 ft
Cumulus	1000–5000 ft
Cumulonimbus	2000–5000 ft

When estimating cloud heights at night, success depends on the correct identification of the form of the cloud. General meteorological knowledge and a close watch on the weather are very important in judging whether the height of a cloud base has remained substantially unchanged or has risen or fallen. The observer should allow two or three minutes for his eyes to become adapted to darkness before making the observations, which should be made from a dark place as far as possible from lights, especially when the atmosphere is hazy. A chapter dealing with cloud observations at night will be found in *Cloud Types for Observers* (Met.O.716).

At night the height of the cloud base can be measured by cloud searchlight if this instrument is available. The searchlight throws a bright spot of light on the base of the cloud vertically above it, and the observer measures the angle of elevation of the spot by means of an alidade sited about 1000 ft from the searchlight. A list of cloud heights equivalent to each angle of elevation is provided for each site and cloud heights should be obtained from the list.

Full details of the use of the cloud searchlight will be found in the *Observer's Handbook*.

(ii) *Vertical visibility*
The vertical visibility may be taken as the height above ground at which a balloon in daylight, if rising vertically, would disappear from view.

When the obscuring medium is so dense that the tops of tall structures are invisible from a point near their base, an estimate of vertical visibility can be made if the observer knows the height above ground of various points on the structures. An open structure, such as a lattice mast, is preferable to a building.

If the observer has no basis for making an estimate that can be considered reasonably reliable then the 8-group should not be reported. If the sky is discernible the partially obscuring phenomena are ignored and the clouds are coded in accordance with instructions for reporting clouds.

(iii) *Cloud amount*
The observer has to estimate the amount of sky covered by all cloud (N) and the amount of sky covered by individual layers (N_s).

N — Total cloud amount
On a day when there are small elements of cloud scattered about the sky it will be helpful to imagine all these small elements pushed together into the same part of the sky. When brought together in this way it is easier to make an estimate of the total amount. When only a trace of cloud is present then code figure 1 will be used. Code figure 8 is used when the sky is totally covered. When the sky is almost completely covered but the observer can see one or two small clear patches then code figure 7 will be used. Code figure 9 is used when either the sky is invisible through fog, snow, etc., or the observer cannot estimate the cloud amount due to darkness. On most nights it will usually be possible to estimate the total amount of cloud by observing any stars that are visible, although it should be borne in mind that stars near the horizon may be blotted out by haze alone. When the sky is indiscernible because of non-meteorological phenomena such as bright lights in the area, or when a cloud observation is not made, a solidus '/' should be used instead of a code figure.

N_s — Amount of each cloud layer
The observer is required to estimate how much of the sky is covered by each layer as if it were the only cloud present in the sky. This requires the observer to spend some minutes watching the sky, to allow gaps, where present in the lower cloud, to reveal the amounts of upper layers. In general if no blue sky or stars can be seen through openings of the lower layers the observer is entitled to assume that the upper layer covers the whole sky and to code it as 8. It should be noted that the sum of the amounts of separate layers will often exceed 8/8.

(iv) *Cloud forms*
Illustrations of the various cloud forms will be found in the *Observer's Handbook* and in *Cloud Types for Observers*, copies of which should be readily available to the observer. When selecting the code figure for C in the group $8N_sCh_sh_s$ the red figures given in *Cloud Types for Observers* should be used.

3.3 Visibility

The minimum horizontal visibility in any direction is always reported. At stations with a clear view of the sea the visibility over the sea should be noted in the Remarks column of the *Register*.

A list of selected visibility objects is provided for auxiliary stations and should be displayed for the use of all observers.

It is, of course, important that the distances of all objects from the point of observation should be accurately determined and that the objects should be prominent and easily recognized. When the furthest known visibility point is clearly visible the actual visibility, beyond this point, should be estimated taking into account the clarity of the atmosphere. When the exact distance of visibility is between two of the distances given in the code table, the lower value is taken, e.g. a visibility of 270 m is coded as 02.

The code figures from 00 to 50 provide for the reporting of any visibility up to 5000 m with great precision, but it is not expected that observers will achieve this precision over the whole range. A coarse scale (code figures 90–99) is provided for use at stations where the observation of visibility is difficult owing to the absence of suitable objects or good viewpoints. Every effort should be made to use the main body of the table rather than this coarse scale.

3.4 Wind

Observation of the direction and speed of the wind should be made from a well exposed situation where the effects of local eddies due to buildings, trees, etc., are least. As the wind is seldom constant, but varies continuously, the observation of direction and speed should refer to average conditions over several minutes.

(i) *Direction*
The wind direction to be reported is the direction from which the wind is blowing. Where a station is equipped with a wind vane recording on a chart (anemograph) the observer should report the mean wind direction averaged over the last 10 minutes. However, when there has been a change of 30° or more in direction during this period, and the new direction has been maintained for at least 3 minutes, the observer should report the new direction.

If the wind direction is obtained from a dial or a simple vane the observer should take at least two readings of the mean wind direction at the beginning and end of the observations. If the two readings differ by 30° or more a third reading should be taken. If the last two readings agree the first reading is ignored. If the first and third reading agree then a mean of all three readings is reported. It is possible that on occasions when the wind speed is less than 3 kn all three readings may differ by 30° or more. In this case the last reading should be reported.

When no instrumental aid is available the observer may be guided by drift of smoke from elevated chimneys, movement of flags, blowing spray, by a light streamer attached to a tall pole for that purpose, movement of small saplings, leaves, etc. Cloud movement should not be used as this is often markedly different from the surface wind direction.

In calm conditions the wind direction is always coded as dd = 00.

(ii) *Speed or force*

The observer should follow the same procedure as for wind direction. At anemograph stations the observer reports the mean wind speed averaged over the last 10 minutes, but where there has been a change of 10 kn or more and this has been maintained for at least 3 minutes the observer reports the new speed. Where anemograph records are not available, but a reading is obtainable from a wind speed dial then, as with direction, two readings are taken. If the two readings differ by 10 kn or more then a third reading is taken. If the last two readings agree within 10 kn then the mean of these two readings is reported. If the third reading is nearer to the first reading, the observer should report the mean of all three readings.

Surface wind speeds are measured at a standard height of 10 m above open and level terrain. Where surrounding objects such as buildings or trees disturb the air flow an anemometer may be mounted at a height greater than 10 m, in which case the 'effective height' of the anemometer will be calculated and it may be necessary to apply corrections to the wind speeds before they are reported. A table of corrections and instructions for their use will be issued to stations when necessary (an explanation of exposure of anemometers and the definition of 'effective height' are given in the *Observer's Handbook*).

- When wind speed is measured using a hand-held anemometer, readings should be taken at a position well clear of buildings and other obstructions. If a hand-held anemometer is used at ground level, the speed read from the instrument will need to be increased by 30% to give a corrected wind speed which equates to that at 10 m above the ground.

At some stations wind speed will have to be estimated and observers will find the specifications given in the Beaufort Scale (Table 7 page 27) of assistance in arriving at this estimate. Coastal stations may find the *State of Sea Booklet* of use in estimating wind speeds.

3.5 Temperatures

At some stations thermometer screens have been installed and equipped with thermometers. These stations are required to include temperature groups with their observations.

The importance of frequent changes of muslin and wick on the wet-bulb thermometer cannot be overstressed; a clean muslin is essential if the correct wet-bulb temperature is to be obtained. The thermometer screen should also be kept clean, inside and out.

All temperatures are read and reported to the nearest tenth of a degree. Dew-points, calculated from *Hygrometric Tables* or humidity slide-rule, are also reported to the nearest tenth of a degree.

When reporting negative temperatures the minus (−) sign should be inserted before the reading but a plus (+) sign need not be used for positive values.

3.6 Present weather

The code is arranged in ten decades, the first five of which describe conditions with no precipitation at the station at the time of observation whilst the other five decades refer to precipitation at the station at the time of the observation. The highest applicable figure is to be selected but code figure 17 (thunderstorm but no precipitation at the time of observation) takes precedence over code figures 20–49.

A clear distinction must be drawn between showery and intermittent precipitation. Showers are characterized by their abrupt beginning and ending and by the generally rapid and sometimes violent variations in the intensity of the precipitation. Whether the precipitation occurs as showers or not depends on the clouds from which it originates. Showers fall from convection (cumuliform) clouds whereas non-showery precipitation falls from layer (stratiform) clouds. It is thus possible at night and in doubtful cases by day to identify clouds by the character of their precipitation.

Precipitation is coded as continuous when it has continued without a break for at least 60 minutes. All other precipitation (except showers) is coded as intermittent. If precipitation stops before an observer has completed the observation, it is reported as 'in the past hour' provided this is the appropriate code figure. The classifications 'continuous' and 'intermittent' are applied to precipitation which has fallen from stratiform cloud.

For the purposes of synoptic reporting, the terms 'slight', 'moderate', 'heavy' or 'violent' for describing precipitation refer to the rate of fall of the precipitation and not to the total amount.

The following notes will be found helpful when selecting the appropriate code figure for ww.

When using **code figures 01, 02 and 03** there is no limitation on the magnitude of the change of the cloud amount. When the sky is clear at the time of the observation, ww = 00, 01, 02 may be used. The following interpretations will then apply:

ww = 00 is used when the preceding conditions are not known, for example at the first observation of the morning when the station has been closed overnight.
ww = 01 is used when the clouds have dissolved during the past hour.
ww = 02 is used when the sky has been continuously clear during the past hour.

When cloud is present at the time of the observation:

ww = 01 is used when clouds are generally dissolving or becoming less developed.
ww = 02 is used when the state of sky is generally unchanged.
ww = 03 is used when clouds have increased in amount or become more developed during the past hour.

Code figure 05 is used when the obstruction to vision cannot be definitely attributed to smoke, dust, sand or water droplets, but is mainly caused by dry particles. When the phenomenon is not predominantly water droplets the appropriate code figure should be selected without regard to visibility. For **code figures 04, 05, 06 and 07** no visibility restriction, upper or lower, applies. **Code figure 10**, however, will be used only when visibility is reported as 1000 m or more, and the observer decides the obscurity is due to water droplets or ice crystals. (Relative humidity is 95% or more on these occasions.)

Code figures 11 and 12 refer to shallow fog or ice fog with visibility 1000 m or more above the fog layer. Shallow is defined as less than 2 m over land and less than 10 m over sea.

Code figure 17 is used when thunder is heard but there is no precipitation at the time of the observation.

Code figure 18 is used for reporting a squall. The definition of a squall is given as a sudden increase in wind speed of at least three stages of the Beaufort Scale (or 16 kn), the speed rising to Force 6 (or 22 kn) or more for at least one minute.

Code figure 19 is used to report the presence of a cloud column or inverted cloud cone protruding from the base of a cumulonimbus cloud (rarely under cumulus cloud), often accompanied by a violent whirlwind.

Code figures 20–29 are used when precipitation, fog, ice fog or thunder has occurred during the preceding hour but is not occurring at the time of the observation. **Code figure 28** is used only if the visibility at the station has been less than 1000 m.

Code figures 30–39 refer to duststorm, sandstorm, drifting or blowing snow at the time of observation. When the horizontal visibility is less than 1000 m but not less than 200 m the entry for ww is 30, 31 or 32. When less than 200 m the entry is 33, 34 or 35. The distinction between codes 30–35 and 06, 07 is that the airborne dust or sand is reported by one of the figures 30–35 when it is accompanied by strong winds. Code figures 36–39 are used to report snow raised from the ground after it has fallen. When drifting is confined to heights below eye-level code figures 36 or 37 are used, and when blowing snow extends above eye-level codes 38 or 39 are appropriate.

Code figures 40–49 refer to fog or ice fog of substantial vertical depth. For shallow fog, less than 2 m, code figures 11 or 12 are used. For code figures 41–49 the visibility must be less than 1000 m. For ww = 40 the observed visibility at the station is greater than 1000 m but apparent visibility in the distant fog or ice fog patch is less than 1000 m.

When using code figures 40–49 the following definitions apply:

- **At the station** — Within 1000 m of the point where the observation of visibility is normally taken.
- **At a distance** — Greater than or equal to 1000 m from the point where the observation of visibility is normally taken.
- **Sky visible/invisible** — The sky directly over the point where the observation of visibility is normally taken.

Code figures 24, 56, 57, 66, 67 refer to drizzle or rain which freezes on contact with solid objects causing glazed frost.

Code figures 91–99. For observational purposes a thunderstorm is regarded as being at the station from the time thunder is first heard, whether or not lightning is seen or precipitation is occurring at the station. A thunderstorm is reported in present weather if thunder is heard within the normal observational period preceding the time of the report. A thunderstorm is regarded as having ceased at the time of the last audible thunder and the cessation is confirmed if thunder is not heard for 10 minutes after this time. When it is evident that the thunderstorm has already passed the station, the observer should not report 'thunderstorm at the time of observation' even though it is less than 10 minutes since the last peal of thunder was heard. However, if there is any doubt that the thunderstorm has passed, the report 'thunderstorm at the time of obervation' will be made if the thunderstorm has been heard within the last 10 minutes.

3.7 Past weather

Two entries are required for past weather, W_1 and W_2. If the weather during the past weather period is best described by two different code figures then the higher code figure is reported as W_1 and lower code figure as W_2. If the weather has not changed during the period, W_1 and W_2 will be the same.

The period covered by W_1W_2 is as follows:

The previous 6 hours for observations at 0000, 0600, 1200 and 1800 GMT.

The previous 3 hours for observations at 0300, 0900, 1500 and 2100 GMT.

The previous hour for all other observations.

The code figures for W_1W_2 should be selected in such a way that W_1W_2 and ww together give as complete a description as possible of the weather in the time interval concerned. For example, if the type of weather has undergone a change during the time interval concerned, the code figures selected for W_1 and W_2 should describe the weather prevailing **before** the type of weather indicated by ww began.

If the past weather is known for only part of the period concerned then W_1 might be coded as usual and W_2 might be coded as /.

3.8 Significant weather

The group $7wwW_1W_2$ is **always recorded** but is **only reported** if present or past weather of significance, or both, were observed. Weather coded as present weather (ww) 00, 01, 02 and 03 or past weather (W_1W_2) 0, 1 and 2 is not considered significant. If not being reported the group will be enclosed in brackets '( )' in the *Register of Observations*.

Following the decision on whether the weather group $7wwW_1W_2$ is significant the code figure for i_x, in the group $4i_xhVV$, which follows the station number, is selected from Table 2 (page 24).

3.9 Beaufort letters

Beaufort letters are used to provide a continuous record of weather in a brief form and to identify individual weather phenomena.

Their entry above the line in columns 17 and 18 of the *Register* in the correct sequence during the appropriate interval (see para. 3.7) will enable the correct selection of code figures for W_1W_2 to be made. Beaufort letters may be used in the remarks column of the *Register* when noting times of onset and cessation of various weather phenomena.

A complete list of Beaufort letters, international symbols and full instructions for their use are given in the *Observer's Handbook*.

A selection of the more commonly used Beaufort letters is given below.

State of sky	*Beaufort letter*
0–2/8 cloud	b
3/8–5/8	bc
6/8–8/8	c
8/8 cloud cover, by a uniform layer	o
Precipitation	
Drizzle	d
Rain	r
Snow	s
Hail	h
Atmospheric obscurity	
Fog, visibility reduced by water droplets to 200 m or more but less than 1000 m	f
Fog, visibility reduced by water droplets to less than 200 m	F
Other phenomena	
Gale, mean wind speed 34–47 kn over a period of 10 minutes or more	g
Storm, mean wind speed 48 kn or more over a period of 10 minutes or more	G
Thunderstorm	tl
Lightning	l
Dew	w
Hoar frost	x
The intensity of any phenomenon is indicated in the following manner:	
Slight — the addition of the suffix 'o' to the Beaufort letter, e.g. slight hail	h_o
Ordinary or moderate — the use of the Beaufort letter, e.g. moderate hail	h
Intense, heavy or severe — the use of the capital Beaufort letter, e.g. heavy hail	H
Violent — the addition of the suffix '2' to the capital Beaufort letter, e.g. violent hail	H_2
Continuity of phenomena is indicated as follows:	
Intermittent — the addition of the prefix 'i', e.g. intermittent moderate drizzle	id
Continuous — the repetition of the Beaufort letter, e.g. continuous slight rain	r_or_o

To be classified as continuous, precipitation etc. must have continued for 60 minutes without a break but it need not have been continuous at the intensity currently reported over that 60-minute period.

3.10 Rainfall and snowfall

Where a rain-gauge is installed it should be read and the measurement reported at 0900 and 2100 GMT covering the preceding 12 hours. If the station is not open at 2100 GMT the reading and report should relate to the 24 hours ending at 0900 GMT.

Collection of rain and drizzle by a rain-gauge and its subsequent measurement is straightforward. Hail or sleet may be similarly sampled and after thawing by natural or artifical means, e.g. application of a hot cloth to the outside of the funnel, the liquid equivalent may be measured.

Measurement of liquid equivalents of snowfall will present problems to all observers. If only light snow is falling then that snow within the funnel may be melted and added to any water already in the rain-gauge bottle and the total measured.

When all the precipitation has occurred as snow and no snow was on the ground prior to the snow to be measured, obtain a sample by pressing the empty inverted funnel of the rain-gauge vertically downwards through the level of undrifted snow until it touches the ground. Melt this sample and measure it in the rain measure. Due to uneven coverage it may be necessary to take more than one sample. Where possible three different samples should be taken from well separated positions. Each of the samples should be melted separately and the average liquid equivalent obtained.

During snowy periods, after the measurement of snow has been taken, a reasonably sized area should be cleared of snow so that on the next occasion the amount of fresh snow can be ascertained. Alternatively a board may be placed on the existing snow and the next sample taken from this board, which is then cleared. Thus on each occasion the extent of fresh snow fallen since the last occasion can be ascertained.

Further guidance on the measurement of rainfall and snowfall is given in the *Observer's Handbook*.

3.11 Snow depth

The total depth and fresh depth of snow, if recorded, should be measured in centimetres, using a rule held vertically. The measurement should be made at a representative spot in level snow in an area free from drifting and not scoured by the wind. If possible the measurement should be made near to the rain-gauge if one is installed. If the snow cover is uneven the depth should be measured at three different positions and a mean taken of all three readings.

3.12 Avoidance of errors

Completion of the observation should be carried out briskly without sacrificing accuracy for speed. It is important to check the entries immediately after they are made in the *Register of Observations* to ensure that nothing has been omitted and that no gross error has been made. The whole observation should be examined to ensure that it is mutually consistent. Common errors are:

- 5 °C and 10 °C errors in reading the thermometers; a second glance will avoid this easily made error.
- Maximum temperature *lower* than *highest* dry-bulb reading. This error is usually avoided by careful setting of the thermometer and checking that it agrees with the dry-bulb reading at the time of resetting.

  Minimum temperature *higher* than the *lowest* dry-bulb reading is treated in the same way as the maximum temperature discrepancy.

  If a discrepancy is noted at the time of reading, the extreme value should be adjusted to agree with the dry-bulb. If the discrepancies are consistently greater than 0.3 °C the thermometer is to be regarded as suspect and should be replaced.
- Reading the wrong end of the minimum thermometer index.
- Rainfall readings inconsistent with reports of 'weather'.
- Visibility inconsistent with the entry for present weather.
- Snow depths inconsistent with present and past weather.
- Snow depths reported in millimetres instead of centimetres.

3.13 Care of instruments and equipment

Care should be taken to keep the meteorological equipment clean and in good working order; this will ensure good performance and lengthen its useful life.

Thermometer screen
The thermometer screen should be brushed out frequently and about once a month a good wash with soap or detergent and water should be given.

Cleaning is best carried out after the early-morning observation (0900 GMT) so that the thermometers have time to recover from the disturbance before the next observation.

Thermometers
These require little attention, but in foggy conditions any moisture deposited on the dry-bulb should be removed using a clean tissue or cloth.

The wet-bulb wick will only act efficiently when clean and for this reason it should be changed regularly.

The water used for maintaining the wet-bulb should be purified water. Water obtained when defrosting a refrigerator may also be used. Clean rain water may be used in an emergency.

Bubbles may occur in any of the spirit thermometers and must be cleared before the instrument can be used. The *Observer's Handbook* gives guidance on clearing these bubbles. When all the bubbles have been cleared the thermometer must be kept in a vertical position, bulb end downwards, for 24 hours. This is easily accomplished by placing it in a suitable container such as an empty milk bottle and ensures that minute amounts of spirit clinging to the capillary walls drain away, thus preventing bubbles reforming when the thermometer is brought into use.

Anemograph
The recorder requires little attention other than keeping it clear of dust and spilt ink and topping up the ink-wells.

To enable full use to be made of the record, daily time-marks should be made using a soft pencil or ball-point pen. The date and time should be entered on the chart against each time-mark. Time-marks tell the analyst whether the records are accurately timed and enable him to make adjustments when necessary.

Cloud searchlight
Regularly clean the cover glass and remove snow and ice from it whenever necessary.

Rain-gauge and rain measure
The gauge must be kept clear of fallen leaves or other debris which might block the funnel and thus prevent the collected water from flowing into the receiver. Care must be taken to avoid damage to the rain-gauge through bending or straining of the delivery pipe when ensuring that it enters the collecting bottle when the funnel is replaced, and to avoid damage to the casing when the grass is being cut around it.

The measure should be kept clean and stored in an inverted position (to drain) in a safe place when not in use.

3.14 Distant-reading thermometers

Stations equipped with distant-reading thermometers should check the temperature sensors once a week against the ordinary mercury-in-glass thermometers. The readings should be noted in the Remarks column of the *Register of Observations*. The checks should be repeated if the differences are greater than 0.3 °C for the dry-bulb temperatures and 0.5 °C for wet-bulb temperatures. If the repeated checks cannot agree within these tolerances then the electrical sensors should be regarded as suspect and the collecting office informed.

The wet-bulb sensor wick should be changed frequently, particularly in coastal locations where salt encrustation may occur. The length of that part of the wick covering the sensor is critical and should be 40 mm.

3.15 Reporting faults

Any faults that develop, including breakages, in any of the instruments or equipment should be reported to your collecting station at the earliest opportunity. Repairs will be arranged, or replacements sent, as quickly as possible so that interruption of the observing programme is kept to a minimum.

SECTION 4 NATIONAL CLIMATOLOGICAL MESSAGES

4.1 The National Climatological Message (NCM) is a coded message for the exchange of climatological information. The message is sent once or twice daily by those stations requested to do so.

For those stations sending the message at 0900 GMT and 2100 GMT the standard message is:

At 0900	iii	$0s_nT_gT_gT_g$	$1s_nT_cT_cT_c$	$2/EE'E_c$			
	555	$0s_nT_xT_xT_x$	$1s_nT_nT_nT_n$	$2R_tR_tR_tR_t$ (These three groups cover the period 21–09)			
		$3/SSS$	$4s_nT_3T_3T_3$	$5s_nT_1T_1T_1$	6HTFG	7Ssss	$8/s_ds_ds_d$
	888	0EEEE	1EEEE	2E′E′E′E′	3E′E′E′E′		
At 2100	iii	444	$0s_nT_xT_xT_x$	$1s_nT_nT_nT_n$	$2R_tR_tR_tR_t$ (These three groups cover the period 09–21)		

For those stations sending the message at 0900 GMT only the standard message is:

iii	$0s_nT_gT_gT_g$	$1s_nT_cT_cT_c$	$2/EE'E_c$			
555	$3/SSS$	$4s_nT_3T_3T_3$	$5s_nT_1T_1T_1$	6HTFG	7Ssss	$8/s_ds_ds_d$
666	$0s_nT_xT_xT_x$	$1s_nT_nT_nT_n$	$2R_tR_tR_tR_t$ (These three groups cover the period 09–09)			
888	0EEEE	1EEEE	2E′E′E′E′	3E′E′E′E′		

4.2 These letters represent the positions occupied in the actual message by the code figures of the various elements reported:

iii	=	Station number	
0	=	Indicator, grass minimum temperature	
$\mathbf{s_n}$	=	Sign of grass minimum temperature (+ or −)	Table 8 page 34
$\mathbf{T_gT_gT_g}$	=	Grass minimum temperature at 0900 GMT	
1	=	Indicator, concrete minimum temperature	
$\mathbf{s_n}$	=	Sign of concrete minimum temperature (+ or −)	Table 8 page 34
$\mathbf{T_cT_cT_c}$	=	Concrete minimum temperature at 0900 GMT	
2	=	Indicator, state of ground and slab	
/	=	A solidus is always entered	
either **E**	=	State of ground at 0900 GMT without snow or measurable ice cover	Table 16 page 34
or **E′**	=	State of ground at 0900 GMT with snow or measurable ice cover	Table 17 page 35
$\mathbf{E_c}$	=	State of concrete slab at 0900 GMT	Table 22 page 35

Note: Depending on snow or ice cover E OR E′ is reported, a solidus '/' replacing the non-reported value.
When the concrete slab is covered by snow, or the state of the slab cannot be adequately described by the code figures in Table 22 (page 35), a solidus '/' is entered for E_c.

444/555/666 = Indicator, periods of time

0 = Indicator, maximum temperature
s_n = Sign of maximum temperature (+ or −) — Table 8 page 34
$T_xT_xT_x$ = Maximum temperature

1 = Indicator, minimum temperature
s_n = Sign of minimum temperature (+ or −) — Table 8 page 34
$T_nT_nT_n$ = Minimum temperature

2 = Indicator, rainfall
$R_tR_tR_tR_t$ = Total amount of rainfall in tenths of a millimetre. Trace of precipitation (less than 0.05 mm) is entered as 9999.

Note: When following the indicator 444 these three groups refer to the period 0900–2100 GMT.
When following the indicator 555 these three groups refer to the period 2100–0900 GMT.
When following the indicator 666 these three groups refer to the period 0900–0900 GMT.

3 = Indicator, sunshine
/ = A solidus is always entered
SSS = Total amount of bright sunshine, in tenths of an hour, for previous day

4 = Indicator, 30 cm soil temperature
s_n = Sign of soil temperature (+ or −) — Table 8 page 34
$T_3T_3T_3$ = Soil temperature at a depth of 30 cm at 0900 GMT

5 = Indicator, 100 cm soil temperature
s_n = Sign of soil temperature (+ or −) — Table 8 page 34
$T_1T_1T_1$ = Soil temperature at a depth of 100 cm at 0900 GMT

6 = Indicator, weather phenomena
H = Day of hail, ice, etc. (0000–2400 GMT previous day) — Table 23 page 36
T = Day of thunder (0000–2400 GMT previous day)
1 = Thunder heard
0 = Thunder not heard
9 = Thunder not heard (restricted period)
F = Day of fog
1 = Visibility less than 1000 m at 0900 GMT (previous day)
0 = Visibility 1000 m or more at 0900 GMT (previous day)
G = Day of gale (0000–2400 GMT previous day)
1 = Gale (mean wind speed 34 kn (Beaufort Force 8) or more for a period of at least 10 minutes)
0 = No gale
9 = No gale (restricted period)

7 = Indicator, snow or sleet
S = Day of snow or sleet (0000–2400 GMT previous day)
1 = Sleet
5 = Snow
0 = No snow or sleet
9 = No snow or sleet (restricted period)
sss = Depth of snow in centimetres at 0900 GMT (day of observation) Table 18 page 36

Notes: (1) This group must be reported every day even if the entry for Ssss is 0000. If the ground representative of the station is less than half covered with snow then sss should be coded as 998.

(2) Code figure 9 indicates those days when a phenomenon is known not to have occurred during a period of restricted weather watch of less than 0000–2400 GMT, but may have occurred outside the period of restricted weather watch.

8 = Indicator, depth of fresh snow
/ = A solidus is always entered
$s_d s_d s_d$ = Depth of fresh snow in centimetres at 0900 GMT (day of observation) Table 18 page 36

Note: When there is no fresh snow or the depth is not measurable this group is not reported.

888 = Indicator, states of ground follow

0 = Indicator, states of ground
EEEE = State of ground without snow or measurable ice cover at 1200, 1500, 1800, 2100 GMT (previous day) Table 16 page 34

1 = Indicator, states of ground
EEEE = State of ground without snow or measurable ice cover at 0000, 0300, 0600, 0900 GMT (day of observation) Table 16 page 34

2 = Indicator, states of ground
E′E′E′E′ = State of ground with snow or measurable ice cover at 1200, 1500, 1800, 2100 GMT (previous day) Table 17 page 35

3 = Indicator, states of ground
E′E′E′E′ = State of ground with snow or measurable ice cover at 0000, 0300, 0600, 0900 GMT (day of observation) Table 17 page 35

Note: When the station is closed a solidus is to be entered in the appropriate position for E and E′. Depending on snow or ice cover E *or* E′ is reported for each hour, a solidus will replace the non-reported entry.
When any of the groups for state of ground consist of four solidi, that group is not reported.

4.3 Stations completing NCMs should enter the readings in the *Register of Observations* in the spaces provided at the bottom of the right-hand page. These entries should always be recorded on the same page as the 0900 GMT observation. The NCM should be made up from the readings available, those groups for which no data are available being omitted (with the exception of 7Ssss which must always be included). The complete message is sent following the normal report.

SECTION 5 CODE TABLES

Part I

Code tables for use in **SYRED** reports.

i_x Indicator for inclusion or exclusion of present and past weather group

Table 2

Group $7wwW_1W_2$ is:

Code figure	
1	included
2	omitted, no significant weather to report (ww = 00 to 03 and W_1W_2 = 0 to 2)
3	omitted, not observed, data not available

h Height above ground of the base of the lowest cloud seen

Table 3

Code figure	feet
0	0–149
1	150–299
2	300–599
3	600–999
4	1000–1999
5	2000–2999
6	3000–4999
7	5000–6499
8	6500–7999
9	≥8000 or no clouds
/	Height of base of cloud not known or base of clouds at a level lower and tops at a level higher than that of the station

VV Horizontal visibility at surface — **Table 4**

Code figure	km	m
00	< 0.1	< 100
01	0.1	100
02	0.2	200
03	0.3	300
04	0.4	400
05	0.5	500
06	0.6	600
07	0.7	700
08	0.8	800
09	0.9	900
10	1.0	1000
11	1.1	1100
12	1.2	1200
13	1.3	1300
14	1.4	1400
15	1.5	1500
16	1.6	1600
17	1.7	1700
18	1.8	1800
19	1.9	1900
20	2.0	2000
21	2.1	2100
22	2.2	2200
23	2.3	2300
24	2.4	2400
25	2.5	2500
26	2.6	2600
27	2.7	2700
28	2.8	2800
29	2.9	2900
30	3.0	3000
31	3.1	3100
32	3.2	3200
33	3.3	3300
34	3.4	3400
35	3.5	3500
36	3.6	3600
37	3.7	3700
38	3.8	3800
39	3.9	3900
40	4.0	4000
41	4.1	4100
42	4.2	4200
43	4.3	4300
44	4.4	4400
45	4.5	4500
46	4.6	4600
47	4.7	4700
48	4.8	4800
49	4.9	4900
50	5.0	5000
51	not used	
52		
53		
54		
55		
56	6	
57	7	
58	8	
59	9	
60	10	
61	11	
62	12	
63	13	
64	14	
65	15	
66	16	
67	17	
68	18	
69	19	
70	20	
71	21	
72	22	
73	23	
74	24	
75	25	
76	26	
77	27	
78	28	
79	29	
80	30	
81	35	
82	40	
83	45	
84	50	
85	55	
86	60	
87	65	
88	70	
89	> 70	
90	< 0.05	< 50
91	0.05	50
92	0.2	200
93	0.5	500
94	1	1000
95	2	2000
96	4	4000
97	10	
98	20	
99	⩾ 50	

Notes: (1) If the visibility is between two of the distances given in the table, the code figure for the lower distance is reported, e.g. a visibility of 470 m is reported as 04.

(2) When VV = 00 the actual visibility is reported by the extra groups 555 1V′ $\frac{f'}{V'}$ f′f′ at end of message.

N,N, Amount of cloud — **Table 5**

Code figure	
0	Nil
1	1 eighth of sky covered, or less, but not nil
2	2 eighths of sky covered
3	3 eighths of sky covered
4	4 eighths of sky covered
5	5 eighths of sky covered
6	6 eighths of sky covered
7	7 eighths of sky covered, or more, but not completely covered
8	Sky completely covered
9	Sky obscured by fog and/or other meteorological phenomena
/	Cloud cover is indiscernible for reasons other than in 9, or observation not made

dd Conversion of wind direction read in compass points into code figures — **Table 6**

Direction (compass point)	Exact equivalent in degrees true	Code figure	Direction (compass point)	Exact equivalent in degrees true	Code figure
Calm	—	00			
N'E	11¼	01	S'W	191¼	19
NNE	22½	02	SSW	202½	20
NE'N	33¾	03	SW'S	213¾	21
NE	45	05	SW	225	23
NE'E	56¼	06	SW'W	236¼	24
ENE	67½	07	WSW	247½	25
E'N	78¾	08	W'S	258¾	26
E	90	09	W	270	27
E'S	101¼	10	W'N	281¼	28
ESE	112½	11	WNW	292½	29
SE'E	123¾	12	NW'W	303¾	30
SE	135	14	NW	315	32
SE'S	146¼	15	NW'N	326¼	33
SSE	157½	16	NNW	337½	34
S'E	168¾	17	N'W	348¾	35
S	180	18	N	360	36

ff Wind speed equivalent of Beaufort numbers

Table 7

Beaufort Force number	Description	Equivalent speed in knots*		Code figure
		Mean	Limits	
0	Calm	0	< 1	00
1	Light air	2	1–3	02
2	Light breeze	5	4–6	05
3	Gentle breeze	9	7–10	09
4	Moderate breeze	13	11–16	13
5	Fresh breeze	19	17–21	19
6	Strong breeze	24	22–27	24
7	Near gale	30	28–33	30
8	Gale	37	34–40	37
9	Strong gale	44	41–47	44
10	Storm	52	48–55	52
11	Violent storm	60	56–63	60
12	Hurricane force	—	>63	68

* At an effective height of 10 m above the ground.

s_n Sign of temperature

Table 8

Code figure	
0	Temperature positive or zero
1	Temperature negative

ww Present weather **Table 11**

ww = 00–49	*No precipitation at the station at the time of observation*
ww = 00–19	No precipitation, fog, ice fog (except for 11 and 12), duststorm, sandstorm, drifting or blowing snow at the station at the time of observation or, except for 09 and 17, during the preceding hour

Code figure		
00	Cloud development not observed or not observable	characteristic change of the state of sky during the past hour
01	Clouds generally dissolving or becoming less developed	
02	State of sky on the whole unchanged	
03	Clouds generally forming or developing	
04	Visibility reduced by smoke, e.g. veldt or forest fires, industrial smoke or volcanic ashes	
05	Haze	
06	Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation	
07	Dust or sand raised by wind at or near the station at the time of observation, but no well-developed dust whirl(s) or sand whirl(s), and no duststorm or sandstorm seen; or, in the case of ships, blowing spray at the station	
08	Well developed dust whirl(s) or sand whirl(s) seen at or near the station during the preceding hour or at the time of observation, but no duststorm or sandstorm	
09	Duststorm or sandstorm whithin sight at the time of observation, or at the station during the preceding hour	
10	Mist	
11	Patches of	shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2 m on land or 10 m at sea
12	More or less continuous	
13	Lightning visible, no thunder heard	
14	Precipitation within sight, not reaching the ground or the surface of the sea	
15	Precipitation within sight, reaching the ground or the surface of the sea, but distant, i.e. estimated to be more than 5 km from the station	
16	Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station	
17	Thunderstorm, but no precipitation at the time of observation	
18	Squalls	at or within sight of the station during the preceding hour or at the time of observation
19	Funnel cloud(s)*	

* Tornado cloud or waterspouts

ww = 20–29 Precipitation, fog, ice fog or thunderstorm at the station during the preceding hour but not at the time of observation

20	Drizzle (not freezing) or snow grains	not falling as shower(s)
21	Rain (not freezing)	
22	Snow	
23	Rain and snow or ice pellets	
24	Freezing drizzle or freezing rain	
25	Shower(s) of rain	
26	Shower(s) of snow, or of rain and snow	
27	Shower(s) of hail†, or of rain and hail†	
28	Fog or ice fog	
29	Thunderstorm (with or without precipitation)	

† Hail, small hail, snow pellets

ww = 30–39 Duststorm, sandstorm, drifting or blowing snow

30	Slight or moderate duststorm or sandstorm	— has decreased during the preceding hour
31		— no appreciable change during the preceding hour
32		— has begun or has increased during the preceding hour
33	Severe duststorm or sandstorm	— has decreased during the preceding hour
34		— no appreciable change during the preceding hour
35		— has begun or has increased during the preceding hour
36	Slight or moderate drifting snow	generally low (below eye-level)
37	Heavy drifting snow	
38	Slight or moderate blowing snow	generally high (above eye-level)
39	Heavy blowing snow	

ww = 40–49 Fog or ice fog at the time of observation

40	Fog or ice fog at a distance at the time of observation, but not at the station during the preceding hour, the fog or ice fog extending to a level above that of the observer	
41	Fog or ice fog in patches	
42	Fog or ice fog, sky visible	has become thinner during the preceding hour
43	Fog or ice fog, sky invisible	
44	Fog or ice fog, sky visible	no appreciable change during the preceding hour
45	Fog or ice fog, sky invisible	
46	Fog or ice fog, sky visible	has begun or has become thicker during the preceding hour
47	Fog or ice fog, sky invisible	
48	Fog, depositing rime, sky visible	
49	Fog, depositing rime, sky invisible	

Table 11 *cont.*

ww = 50–99	*Precipitation at the station at the time of observation*	
ww = 50–59	Drizzle	
50	Drizzle, not freezing, intermittent	slight at time of observation
51	Drizzle, not freezing, continuous	
52	Drizzle, not freezing, intermittent	moderate at time of observation
53	Drizzle, not freezing, continuous	
54	Drizzle, not freezing, intermittent	heavy (dense) at time of observation
55	Drizzle, not freezing, continuous	
56	Drizzle, freezing, slight	
57	Drizzle, freezing, moderate or heavy	(dense)
58	Drizzle and rain, slight	
59	Drizzle and rain, moderate or heavy	
ww = 60–69	Rain	
60	Rain, not freezing, intermittent	slight at time of observation
61	Rain, not freezing, continuous	
62	Rain, not freezing, intermittent	moderate at time of observation
63	Rain, not freezing, continuous	
64	Rain, not freezing, intermittent	heavy at time of observation
65	Rain, not freezing, continuous	
66	Rain, freezing, slight	
67	Rain, freezing, moderate or heavy	
68	Rain or drizzle and snow, slight	
69	Rain or drizzle and snow, moderate or heavy	
ww = 70–79	Solid precipitation not in showers	
70	Intermittent fall of snowflakes	slight at time of observation
71	Continuous fall of snowflakes	
72	Intermittent fall of snowflakes	moderate at time of observation
73	Continuous fall of snowflakes	
74	Intermittent fall of snowflakes	heavy at time of observation
75	Continuous fall of snowflakes	
76	Diamond dust (with or without fog	
77	Snow grains (with or without fog)	
78	Isolated star-like snow crystals (with or without fog)	
79	Ice pellets	

Table 11 *cont.*

ww = 80–99	Showery precipitation, or precipitation with current or recent thunderstorm

80	Rain shower(s), slight	
81	Rain shower(s), moderate or heavy	
82	Rain shower(s), violent	
83	Shower(s) of rain or snow mixed, slight	
84	Shower(s) of rain and snow mixed, moderate or heavy	
85	Snow shower(s), slight	
86	Snow shower(s), moderate or heavy	
87	Shower(s) of snow pellets or small hail with or without rain or rain and snow mixed	— slight
88		— moderate or heavy
89	Shower(s) or hail, with or without rain or rain and snow mixed, not associated with thunder	— slight
90		— moderate or heavy
91	Slight rain at time of observation	thunderstorm during the preceding hour but not at time of observation
92	Moderate or heavy rain at time of observation	
93	Slight snow, or rain and snow mixed, or hail† at time of observation	
94	Moderate or heavy snow, or rain and snow mixed, or hail† at time of observation	
95	Thunderstorm, slight or moderate, without hail† but with rain and/or snow at time of observation	thunderstorm at time of observation
96	Thunderstorm, slight or moderate, with hail† at time of observation	
97	Thunderstorm, heavy, without hail† but with rain and/or snow at time of observation	
98	Thunderstorm combined with duststorm or sandstorm at time of observation	
99	Thunderstorm, heavy, with hail† at time of observation	

† Hail, small hail, snow pellets

W_1W_2 Past weather

Table 12

Code figure	
0	Cloud covering ½ or less of the sky throughout the appropriate period
1	Cloud covering more than ½ of the sky during part of the appropriate period and covering ½ or less during part of the period
2	Cloud covering more than ½ of the sky throughout the appropriate period
3	Sandstorm, duststorm or blowing snow
4	Fog or ice fog or thick haze (visibility less than 1000 m)
5	Drizzle
6	Rain
7	Snow, or rain and snow mixed
8	Shower(s)
9	Thunderstorm(s) with or without precipitation

The following table shows the period to which W_1W_2 refers in reports made at main and intermediate hours.

Observation time	Period for W_1W_2
0000	1800–0000
0300	0000–0300
0600	0000–0600
0900	0600–0900
1200	0600–1200
1500	1200–1500
1800	1200–1800
2100	1800–2100

C Type of cloud

Table 19

Code figure	
0	Cirrus (Ci)
1	Cirrocumulus (Cc)
2	Cirrostratus (Cs)
3	Altocumulus (Ac)
4	Altostratus (As)
5	Nimbostratus (Ns)
6	Stratocumulus (Sc)
7	Stratus (St)
8	Cumulus (Cu)
9	Cumulonimbus (Cb)
/	Cloud not visible owing to darkness, fog, duststorm, sandstorm, or other similar phenomena

h_sh_s Height of cloud

Table 20

Code figure	Height ft	Height m
00	< 100	< 30
01	100	30
02	200	60
03	300	90
04	400	120
05	500	150
06	600	180
07	700	210
08	800	240
09	900	270
10	1000	300
11	1100	330
12	1200	360
13	1300	390
14	1400	420
15	1500	450
16	1600	480
17	1700	510
18	1800	540
19	1900	570
20	2000	600
21	2100	630
22	2200	660
23	2300	690
24	2400	720
25	2500	750
26	2600	780
27	2700	810
28	2800	840
29	2900	870
30	3000	900
31	3100	930
32	3200	960
33	3300	990
34	3400	1020
35	3500	1050
36	3600	1080
37	3700	1110
38	3800	1140
39	3900	1170
40	4000	1200
41	4100	1230
42	4200	1260
43	4300	1290
44	4400	1320
45	4500	1350
46	4600	1380
47	4700	1410
48	4800	1440
49	4900	1470
50	5000	1500
51	not used	
52	not used	
53	not used	
54	not used	
55	not used	
56	6000	1800
57	7000	2100
58	8000	2400
59	9000	2700
60	10 000	3 000
61	11 000	3 300
62	12 000	3 600
63	13 000	3 900
64	14 000	4 200
65	15 000	4 500
66	16 000	4 800
67	17 000	5 100
68	18 000	5 400
69	19 000	5 700
70	20 000	6 000
71	21 000	6 300
72	22 000	6 600
73	23 000	6 900
74	24 000	7 200
75	25 000	7 500
76	26 000	7 800
77	27 000	8 100
78	28 000	8 400
79	29 000	8 700
80	30 000	9 000
81	35 000	10 500
82	40 000	12 000
83	45 000	13 500
84	50 000	15 000
85	55 000	16 500
86	60 000	18 000
87	65 000	19 500
88	70 000	21 000
89	> 70 000	> 21 000

Code figure	Height ft	Height m
90	< 150	< 50
91	150–299	50–99
92	300–599	100–199
93	600–999	200–299
94	1000–1999	300–599
95	2000–2999	600–999
96	3000–4999	1000–1499
97	5000–6499	1500–1999
98	6500–7999	2000–2499
99	⩾ 8000 or no clouds	⩾ 2500 or no clouds

Notes: (1) If the height of the cloud base is between two of the heights given in the table the code figure for the lower height is reported, e.g. a cloud height of 450 ft is reported as 04.

(2) The decade 90–99 should be used only on those occasions when the height of the cloud base cannot be determined with greater accuracy.

Part II

Code tables for use in **National Climatological Message**

s_n Sign of temperature

Table 8

Code figure	
0	Temperature positive or zero
1	Temperature negative

E State of ground without snow or measurable ice cover

Table 16

Code figure	
0	Surface of ground dry (without cracks and no appreciable amount of dust or loose sand)
1	Surface of ground moist
2	Surface of ground wet (standing water in small or large pools on surface)
3	Flooded
4	Surface of ground frozen
5	Glaze on ground
6	Loose dry dust or sand not covering ground completely
7	Thin cover of loose dry dust or sand covering ground completely
8	Moderate or thick cover of loose dry dust or sand covering ground completely
9	Extremely dry with cracks

Notes:
(1) The definitions in the code for E for numbers 0 to 2, and 4, apply to representative bare ground and numbers 3, and 5 to 9, to an open representative area.
(2) In all instances the highest code figure applicable is to be reported.

E′ State of ground with snow or measurable ice cover

Table 17

Code figure	
0	Ground predominantly covered by ice
1	Compact or wet snow (with or without ice) covering less than one-half of the ground
2	Compact or wet snow (with or without ice) covering at least one-half of the ground but ground not completely covered
3	Even layer of compact or wet snow covering ground completely
4	Uneven layer of compact or wet snow covering ground completely
5	Loose dry snow covering less than one-half of the ground
6	Loose dry snow covering at least one-half of the ground (but not completely)
7	Even layer of loose dry snow covering ground completely
8	Uneven layer of loose dry snow covering ground completely
9	Snow covering ground completely; deep drifts

Notes:
(1) The definitions in the code E′ apply to an open representative area.
(2) In all instances the highest code figure applicable is to be reported.
(3) In the above code table, whenever reference is made to ice it also includes solid precipitation other than snow.
(4) An entry is required for E *or* E′, a solidus '/' is entered for the non-recorded value.

E_c State of concrete slab

Table 22

Code figure	
0	Slab dry
1	Slab moist
2	Slab wet
3	Slab icy

Note: When the concrete slab is covered by snow, or the state of the slab cannot be adequately described by the above scale, a solidus '/' is entered.

H Day of hail, ice, etc. (0000–2400 GMT)

Table 23

Code figure	
0	No hail, ice, etc.
1	Diamond dust
2	Snow grains
3	Snow pellets
4	Ice pellets
5	Hail (diameter 5–9 mm)
6	Hail (diameter 10–19 mm)
7	Hail (diameter 20 mm or more)
9	No hail, ice, etc. (restricted period)

S Day of snow or sleet (0000–2400 GMT)

Table 24

Code figure	
0	No snow or sleet
1	Sleet
5	Snow
9	No snow or sleet (restricted period)

Notes:

(1) When sleet and snow are observed on the same day the entry is 5. Entries are to be made even when the fall yields no measurable amount in the rain-gauge.

(2) Code figure 9 indicates those days when a phenomenon is known not to have occurred during a period of restricted weather watch of less than 0000–2400 GMT, but may have occurred outside the period of restricted weather watch.

sss, $s_d s_d s_d$ Depth of snow

Table 18

Code figure	
001	1 cm
002	2 cm
...	...
996	996 cm
997	Less than ½ cm
998	Snow cover, not continuous
999	Measurement impossible or inaccurate

Month: JUNE / Date: 7 / Time (GMT)	STATION NUMBER	Indicators: Precipitation	Indicators: Station/Weather	Height of lowest cloud	Visibility	Total Cloud	WIND: Direction	WIND: Speed	TEMPERATURES: Indicator	TEMPERATURES: Sign	TEMPERATURES: Dry bulb	TEMPERATURES: Indicator	TEMPERATURES: Wet bulb Sign	TEMPERATURES: Wet bulb Dew-point	WEATHER: Indicator	WEATHER: Present	WEATHER: Past
Time (GMT)	iii	4	i_x	h	VV	N	dd	ff	1	s_n	TTT	2	s_n	$T_dT_dT_d$	7	ww	W_1W_2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
EXAMPLES																	
0552 (06)	999				2000m		SW	F1		+	10.1		+	9.7		b, bm	
		4	1	6	20	2	23	02	1	0	101	2	0	093	7	10	00
0847 (09)	999				50m			F0		+	9.8		+	9.8		bm, bf,	FF
		4	1	/	00	9	00	00	1	0	098	2	0	098	7	47	44
1149 (12)	999				3000m		SSE	15		+	11.1		+	10.6		FF, bc, f, cm, cr.	
		4	1	4	30	8	16	20	1	0	111	2	0	101	7	60	44
1450 (15)	999				5000m		S	21		+	13.0		+	12.9		cr, crr, cR	
		4	1	2	50	8	18	27	1	0	130	2	0	128	7	65	66
1751 (18)	999				20Km		SSW	16		+	14.2		+	12.3		cR, cr, c, cr, c, cr, c, cr, c, c	
		4	1	4	70	6	20	21	1	0	142	2	0	106	7	25	86
2052 (21)	999				30Km		W	12		+	13.4		+	11.9		c, bc	
		4	2	5	80	3	27	16	1	0	134	2	0	105	(7	01	11)

Regional Indicator	CLOUDS: Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station	Indicator	Amount	Form	Height above station	REMARKS	Initials
333	8	N_s	C	h_sh_s	8	N_s	C	h_sh_s	8	N_s	C	h_sh_s	8	N_s	C	h_sh_s	This column is used to record any additional information $\frac{f'}{f}$ 555 $1V'\overline{V}'f'f'$	
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
																	m = mist	SLH
333	8	2	6	40														
																	VIS 1000M 0610 VIS 100 M 0721 555 150//	SLH
																	VIS 1000M 1104 rain started 1131	SLH
333	8	4	6	15	8	5	6	25	8	8	5	50						
		2	7	10													heavy rain 1427	SLH
333	8	3	7	05	8	6	6	15	8	8	5	20						
		2	8	20													rain ceased 1530 shower 1605 - 1611 shower 1721 - 1733	SLH
333	8	2	7	12	8	2	9	18	8	4	6	45						
		1	6	45		2	0	75										SLH
333	8	1	8	20														

Time	Station number	Grass min. 09	Concrete min. 09	State of ground 09	21—09 DATA	Max. temp.
0900	iii	0 $s_nT_gT_gT_g$	1 $s_nT_cT_cT_c$	2 / E E′ E_c	555	0 $s_nT_xT_xT_x$
	999	00081	10085	2/1/1	555	00127
	Total sunshine	30 cm Soil temp. 09	100 cm Soil temp. 09	Hail Thndr Fog Gale	Depth of snow 09	Depth of fresh snow
	3 / $s_ss_ss_s$	4 $s_nT_3T_3T_3$	5 $s_nT_1T_1T_1$	6 H T F G	7 S s s s	8 / $s_ds_ds_d$
	3/081			60000	70000	
	Min. temp.	Total rainfall	States of ground	12 15 18 21	00 03 06 09	Snow 12 15 18 21
	1 $s_nT_nT_nT_n$	2 R R R R	8 8 8	0 E E E E	1 E E E E	2 E′E′E′E′
			888	0 1 1 1 1	1 / / 1 1	
Time	Station number	09—21 DATA	Max. temp.	Min. temp.	Total rainfall	TOD
2100	iii	4 4 4	0 $s_nT_xT_xT_x$	1 $s_nT_nT_nT_n$	2 R R R R	
		444	00150	10098	20066	

Min. temp.	Total rainfall	Initials
1 $s_nT_nT_nT_n$	2 R R R R	
10095	20000	
09—09 DATA	Max. temp.	
666	0 $s_nT_xT_xT_x$	
Snow 00 03 06 09	TOD	
3 E′E′E′E′		

READINGS	0900 GMT	2100 GMT
Rainfall (mm)	0.0	6.6
Maximum temp. °C	12.7	15.0
Minimum temp. °C	9.5	9.8
Grass minimum °C	8.1	-
Concrete minimum °C	8.5	-
Soil temp. 30 cm °C		
Soil temp. 100 cm °C		

READINGS	0900
State of ground	1
State of concrete slab	1
Depth of snow (cm)	-
Depth of fresh snow (cm)	-

PREVIOUS DAY	Sun 00—24	Hail 00—24	Thunder 00—24	Fog 09	Gale 00—24
	8.1	0	0	0	0