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Fact sheet No. 11 – Interpreting weather charts

Weather systems

On a weather chart, lines joining places with equal sea-level pressures are called isobars. Charts showing isobars are useful because they identify features such as anticyclones (areas of high pressure), depressions (areas of low pressure), troughs and ridges which are associated with particular kinds of weather.

High pressure or anticyclone

In an anticyclone (also referred to as a 'high') the winds tend to be light and blow in a clockwise direction. Also the air is descending, which inhibits the formation of cloud. The light winds and clear skies can lead to overnight fog or frost. If an anticyclone persists over northern Europe in winter, then much of the British Isles can be affected by very cold east winds from Siberia. However, in summer an anticyclone in the vicinity of the British Isles often brings fine, warm weather.

Low pressure or depression

In a depression (also referred to as a 'low'), air is rising. As it rises and cools, water vapour condenses to form clouds and perhaps precipitation. Consequently, the weather in a depression is often cloudy, wet and windy (with winds blowing in an anticlockwise direction around the depression). There are usually frontal systems associated with depressions.

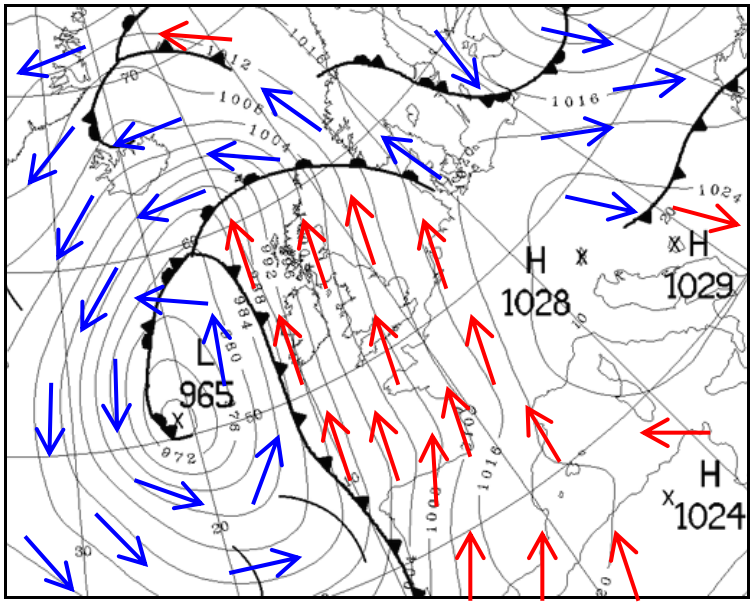


Figure 1. The above chart shows the flow of wind around a depression situated to the west of Ireland and an anticyclone over Europe.

Buys Ballot's Law

Figure 2. Buys Ballot of Utrecht

A rule in synoptic meteorology, enunciated in 1857 by Buys Ballot, of Utrecht, which states that if, in the northern hemisphere, one stands with one's back to the wind, pressure is lower on one's left hand than on one's right, whilst in the southern hemisphere the converse is true. This law implies that, in the northern hemisphere, the winds blow anticlockwise round a depression, and clockwise round an anticyclone; the converse is true in the southern hemisphere.

Isobars (lines of equal atmospheric pressure)

The lines shown on a weather map are isobars - they join points of equal atmospheric pressure.

The pressure is measured by a barometer, with a correction then being made to give the equivalent pressure at sea level. Meteorologists measure pressure in units of millibars (mb), though instruments sometimes give pressures in terms of inches of mercury. The term hectopascal (hPa) is often used instead of millibar, where 1 millibar equals 1 hectopascal. In the British Isles the average sea-level pressure is about 1013 mb (about 30 inches of mercury), and it is rare for pressure to rise above 1050 mb or fall below 950 mb.

Charts showing isobars are useful because they identify features such as anticyclones and ridges (areas of high pressure) and depressions and troughs (areas of low pressure), which are associated with particular kinds of weather. These features move in an essentially predictable way.

Also, wind speeds and directions are related to the spacing and orientation of the isobars.

Relationship between isobars and wind

There are two important relationships between isobars and winds.

- The closer the isobars, the stronger the wind.
- The wind blows almost parallel to the isobars.

These make it possible to deduce the wind flow from the isobars.

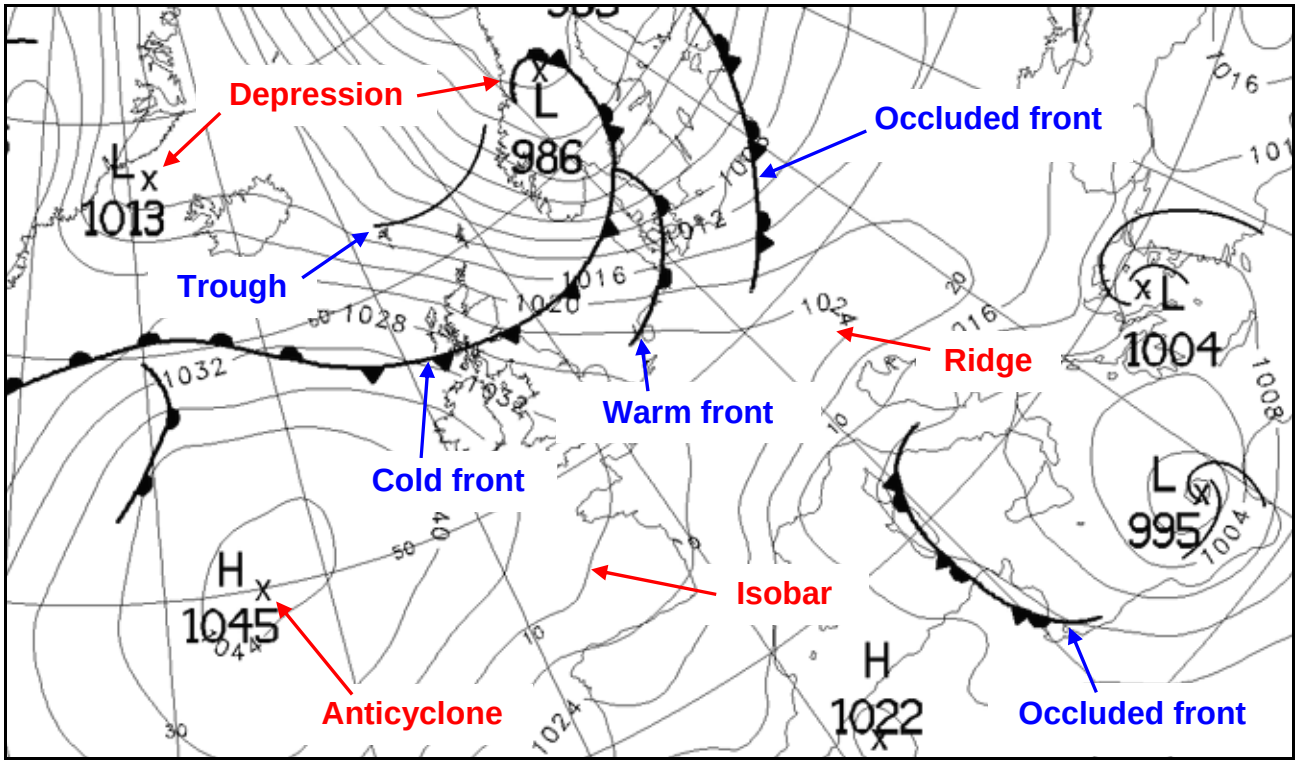


Figure 3. Shows the association between depressions, anticyclones, isobars and weather fronts.

Wind speed and direction

The direction given for the wind refers to the direction from which it comes. For example, a westerly wind is blowing from the west towards the east.

Figure 4. Anemometer and Vane

Measurements of wind strength are made at 10 metres (33 feet) above the ground. A specified height has to be used because the wind speed decreases towards the ground. In this country winds are measured in knots (nautical miles per hour). However, forecast winds are often given in miles per hour (where 1 knot is equivalent to 1.15 mph) or in terms of the Beaufort Scale. There are rapid variations in the wind - these are referred to as gusts. Gusts are higher inland than over the sea or windward coasts, although the mean wind speeds tend to be lower inland. Typically, gusts can be 60% higher than the mean speed, although in the middle of cities this can reach 100%. Northerly winds tend to be gustier than southerly ones.

Relationship between wind direction and weather

In general, the weather is strongly influenced by the wind direction, so information about the wind provides an indication of the type of weather likely to be experienced. However, this approach is effective only if the wind is blowing from the same direction for some time. A marked change in wind direction usually indicates a change in the weather.

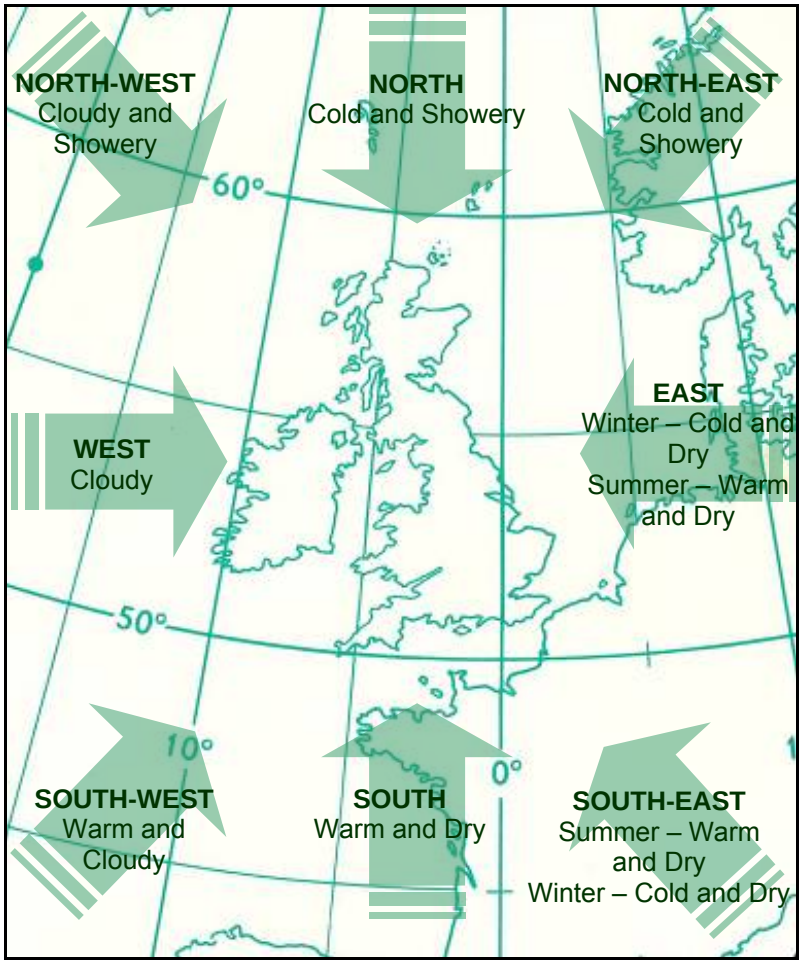


Figure 5. Chart showing the characteristic weather phenomena associated with winds affecting the British Isles from various directions.

Northerly winds tend to bring relatively cold air from polar regions to the British Isles. Similarly, southerly winds tend to bring relatively warm air from the tropics. The characteristics of the air are also affected by its approach to the British Isles. Air picks up moisture if it travels across the sea, but remains relatively dry if it comes across the land.

As cold polar air moves southwards over an increasingly warm sea, the heating of the air by the sea causes cumulus clouds to form. These clouds may grow sufficiently for showers to develop and, consequently, winds from the north-west, north or north-east usually bring cold, showery weather to the British Isles.

Warm air from the tropics moving northwards over the sea is cooled from below. Sometimes the cooling is sufficient for sea fog or a thin layer of stratus to form. The cloud can become thick enough for drizzle, especially on windward coasts and over high ground. In general, winds from the west or south-west are associated with overcast, wet weather.

Winds from the south and south-east mainly occur in summer and these bring warm, dry weather. However, southerly winds can sometimes bring hot, thundery weather.

Easterly winds in winter bring very cold air to the British Isles. The characteristics and path of the air determine whether it is cloudy (with perhaps rain, sleet or snow) or fine and sunny. In summer, an easterly wind will mean it is cool on the east coast but warm elsewhere, usually with clear skies.

Fronts

The boundary between two different types of air mass is called a front. In our latitudes a front usually separates warm, moist air from the tropics and cold, relatively dry air from Polar Regions. On a weather chart, the round (warm front) or pointed (cold front) symbols on the front point in the direction of the front's movement. Fronts move with the wind, so they usually travel from the west to the east. At a front, the heavier cold air undercuts the less dense warm air, causing the warm air to rise over the wedge of cold air.

As the air rises there is cooling and condensation, thus leading to the formation of clouds. If the cloud becomes sufficiently thick, rain will form. Consequently, fronts tend to be associated with cloud and rain. In winter, there can be sleet or snow if the temperature near the ground is close to freezing. It is convenient to distinguish between warm fronts, cold fronts and occluded fronts.

A front which is moving in such a way that the warm air is advancing to replace the cold air is called a **warm front**. As the warm front approaches, there is thickening cloud and eventually it starts to rain. The belt of rain extends 100-200 miles ahead of the front. Behind the front the rain usually becomes lighter, or ceases, but it remains cloudy. As a warm front passes, the air changes from being fairly cold and cloudy to being warm and overcast (typical of warm air from the tropics travelling over the sea). Also there is a clockwise change in wind direction, and the wind is said to 'veer'.

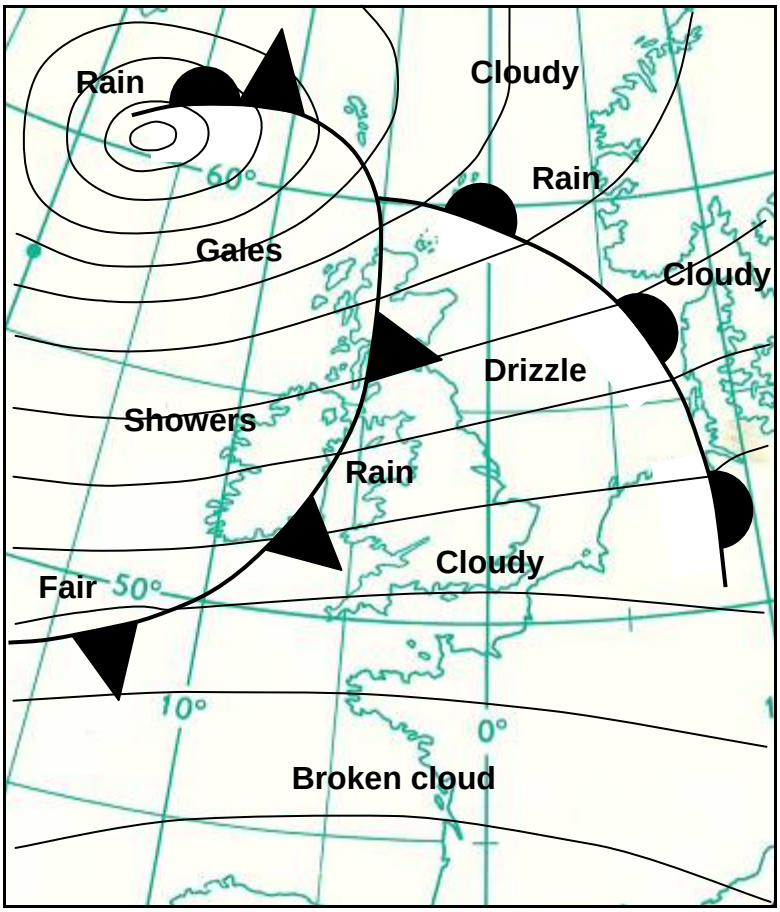


Figure 6. Weather associated with a depression

A **cold front** moves so that the cold air is advancing to replace the warm air. This means that as a cold front passes, the weather changes from being mild and overcast to being cold and bright, possibly with showers (typical of cold polar air travelling over the sea). The passage of the front is often marked by a narrow band of rain and a veer in the wind direction.

An **occluded front** can be thought of as being a result of the warm and cold fronts meeting. Consequently, ahead of an occlusion the weather is similar to that ahead of a warm front, whereas behind the occlusion it is similar to that behind a cold front.

The characteristics given for the fronts apply to active fronts. If the front is weak, the rain associated with it is light or non-existent, and the changes across the front are less marked.

Satellite imagery used to interpret weather charts

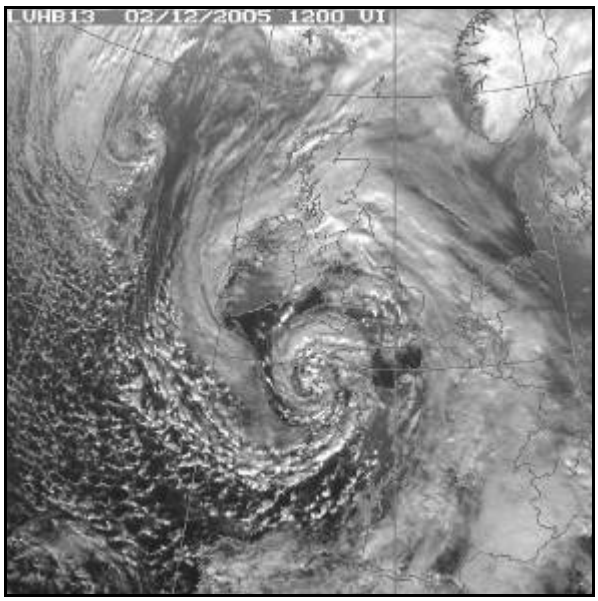


Figure 7. Visible satellite image showing a depression in the western English Channel at 1200UTC on Friday 2 December 2005

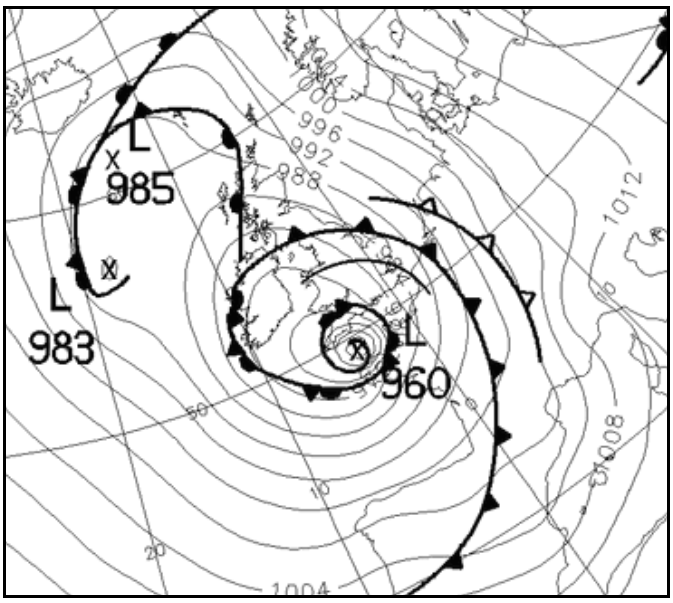


Figure 8. Surface synoptic chart showing a depression in the western English Channel at 1200UTC on Friday 2 December 2005

Satellite pictures are an invaluable tool for weather forecasters, and the various types of images that are now widely available can significantly enhance the understanding of meteorological processes and weather forecasting, especially the movement of weather systems. Figure 7 and 8 above show how valuable satellite imagery is to synoptic weather forecasting.

Figure 7 is a visible image taken at 1200 UTC on Friday 2 December 2005 when a deep depression swept up the English Channel. The midday satellite image shows a deep and well developed area of low pressure centred in the western English Channel between Brest and Plymouth. The image shows clearly the cloud structure swirling around the centre with bands of rain and also some quite heavy and blustery showers. The main frontal zone can be seen from south of Ireland extending across Scotland to the North Sea then across the continent to the western Mediterranean. Thunderstorms have developed over southeast France and northwest Italy. East of this frontal band the weather is dominated by high pressure over western Russia, extending its influence across Eastern Europe to central Germany.

Figure 8 is the midday surface synoptic chart showing a deep area of low pressure in the western English Channel with its associated occluded frontal system wrapped around it. Also depicted on this chart is a warm front across the western part of Scotland and into Northern Ireland and a trailing cold front lying from Northern Ireland, through Dumfries and Galloway, Cumbria, across the Pennines and down through East Yorkshire and away into the North sea and onwards into the near continent. Following on behind this cold front is a trough running from North Wales, across the Midlands and Southeast England then away into Northern France.

Decoding weather charts and weather summaries

The station circle

Good quality observations are one of the basic 'tools of the trade' for a weather forecaster and on a meteorological synoptic chart, the weather conditions at a given observing site are represented on this chart by a station circle plot. Figure 6 below shows a selection of station circle plots for Southwest England for the 2 December 2005.

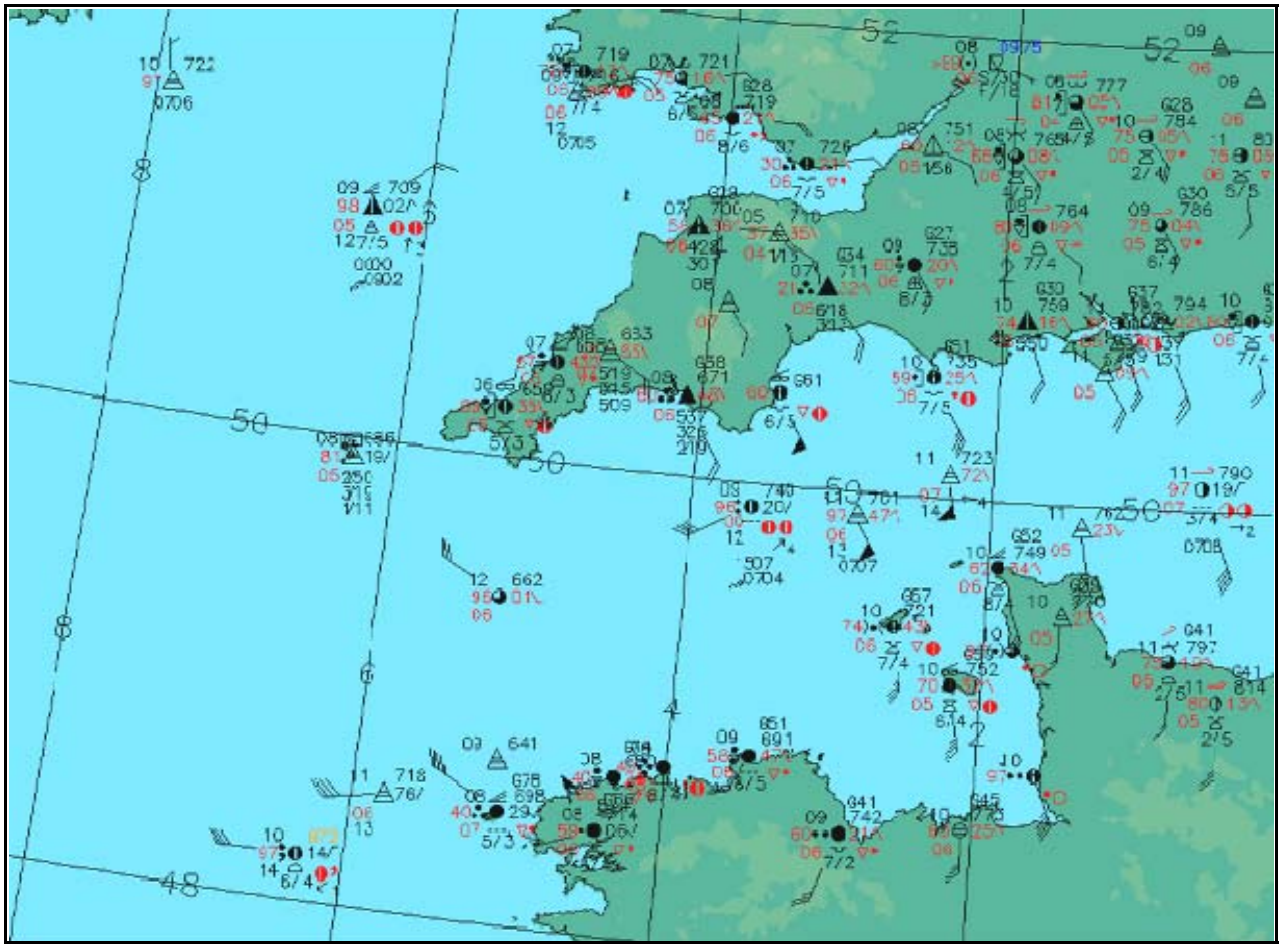


Figure 6. Surface plotted chart for Southwest England for Friday 2 December 2005.

The weather conditions at each individual station can be represented on a surface chart by means of a station circle plot. The land station circle plot can represent all the elements reported from that station, typically examples are:

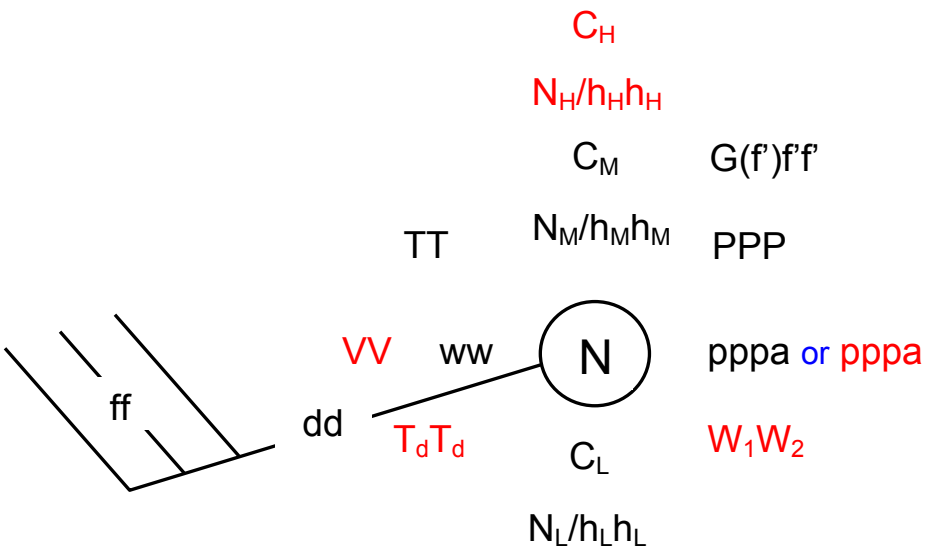
- Air temperature
- Dew-point temperature
- Wind speed
- Wind direction
- Visibility
- Cloud amounts
- Cloud types
- Cloud heights
- Present weather
- Past weather
- Atmospheric pressure and 3-hour tendency

Along with the above elements, stations at sea, such as ships, also report:

- Sea surface temperature
- Ships movement (direction and speed)
- Swell height
- Swell direction

Land station circle plot

Each element of the observation, with the exception of wind, is plotted in a fixed position around the station circle so that individual elements can be easily identified.

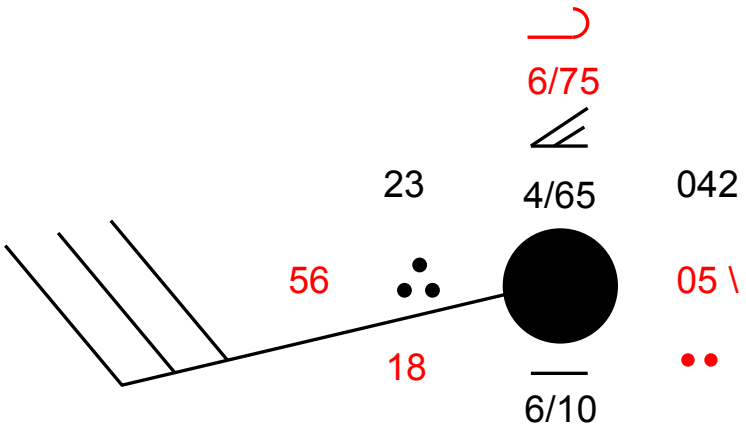


Decode of elements plotted on a land station circle (note the colour coding)

Identifier	Description
N	Total amount of cloud (in oktas)
C_L	Type of low cloud
N_L	Amount of low cloud (in oktas)
h_Lh_L	Height of low cloud (in feet)
C_M	Type of medium cloud
N_M	Amount of medium cloud (in oktas)
h_Mh_M	Height of medium cloud (in feet)
C_H	Type of high cloud
N_H	Amount of high cloud (in oktas)
h_Hh_H	Height of high cloud (in feet)
TT	Dry-bulb air temperature (in degrees Celsius)
ww	Present weather
dd	Wind direction (in degrees)
ff	Wind speed (in knots)
VV	Visibility (in metres or kilometres)
T_dT_d	Dew point temperature (in degrees Celsius)
W_1W_2	Past weather
pppa or pppa	Pressure tendency and trend (black: rising, red: falling) (in millibars)
PPP	Atmospheric pressure (in millibars)
G(f')f'f'	Wind gust (in knots)

Table 1. Decode of elements plotted on a land station circle.

Example of synoptic elements plotted on a typical land station report

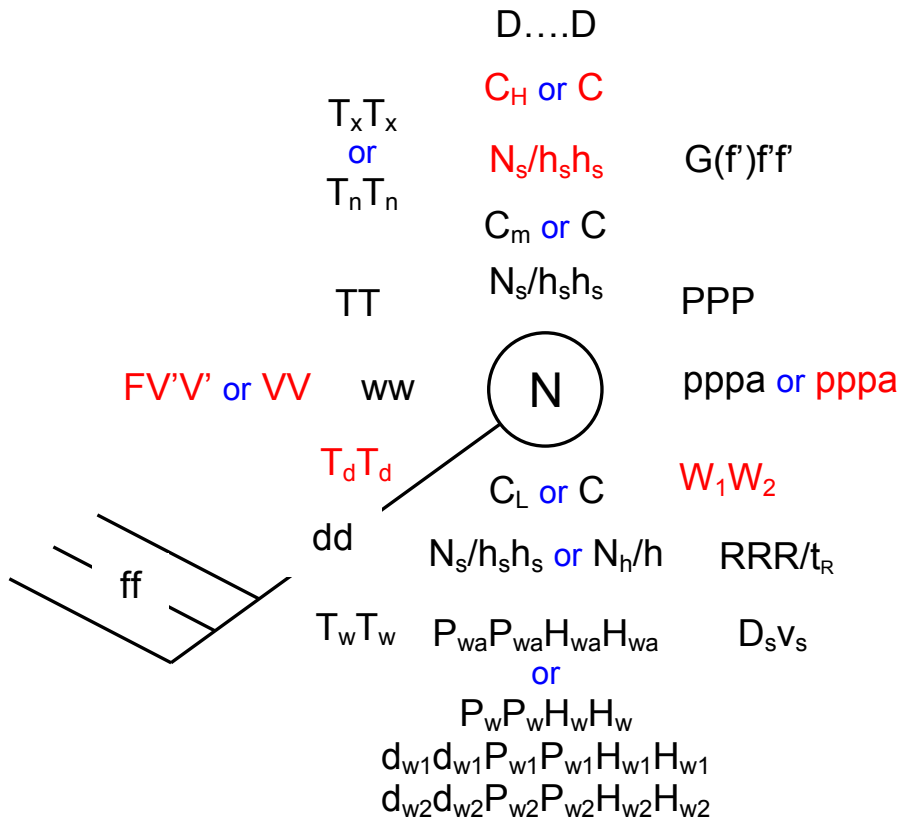


The decode of the above station plot is as follows:

Weather as observed	Code group	Description
8 oktas	**N**	Total amount of cloud (in oktas)
23 ºC	**TT**	Dry-bulb air temperature (in degrees Celsius)
Continuous moderate rain	**ww**	Present weather
260 º	**dd**	Wind direction (in degrees)
30 knots	**ff**	Wind speed (in knots)
6 km	**VV**	Visibility (in metres or kilometres)
18 ºC	**T_dT_d**	Dew-point temperature (in degrees Celsius)
Stratus (6 oktas at 1000 feet)	**C_L or C**	Type of low cloud
Rain	**W_1W_2**	Past weather
Falling 0.5mb in last 3 hours	**pppa or pppa**	Pressure tendency and trend (black: rising, red: falling) (in millibars)
1004.2mb	**PPP**	Atmospheric pressure (in millibars)
Dense altostratus (4 oktas at 15000 feet)	**C_m or C**	Type of medium cloud
Cirrus (6 oktas at 25000 feet)	**C_H or C**	Type of high cloud

Table 2. Decode of the above station circle plot.

Synoptic elements plotted on a ship report



Decode of elements plotted on a ship station circle (note the colour coding)

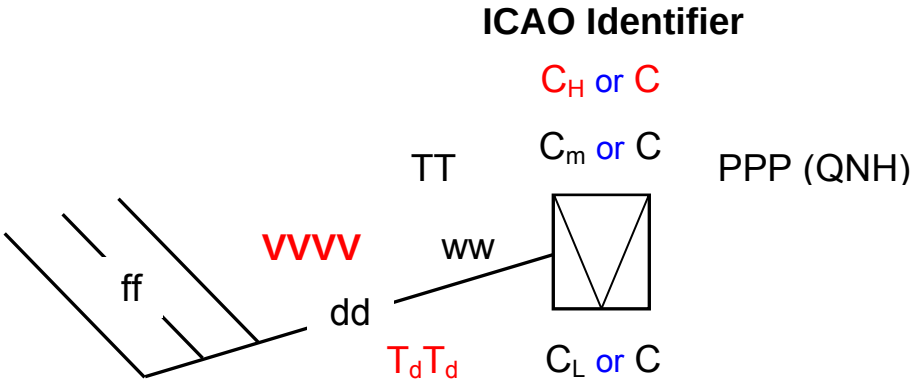
Identifier	Description
N	Total amount of cloud (in oktas)
TT	Dry-bulb air temperature (in degrees Celsius)
ww	Present weather
dd	Wind direction (in degrees)
ff	Wind speed (in knots)
FV'V' or VV	Visibility (in metres or kilometres)
T_dT_d	Dew-point temperature (in degrees Celsius)
T_wT_w	Sea water temperature (ship code only) (in degrees Celsius)
C_L or C	Type of low cloud
N_s/h_sh_s or N_h/h	Amount and height of low cloud (amount in oktas, height in feet)
$P_{wa}P_{wa}H_{wa}H_{wa}$	Wave period and height (ship code only) (period in seconds, height in metres)
$P_wP_wH_wH_w$	Wave period and height (ship code only) (period in seconds, height in metres)
D_sv_s	Vessel moving in direction D_s and speed v_s (ship code only)
RRR/t_R	Amount of rainfall (RRR) in time (t_R) (amount in millimetres, time in six hourly intervals)
W1W2	Past weather

Decode of elements plotted on a ship station circle continued...

Identifier	Description
pppa or pppa	Pressure tendency and trend (black: rising, red: falling) (in millibars)
PPP or $a_3$hhh	Atmospheric pressure (in millibars)
C_m or C	Type of medium cloud
N_s/h_sh_s	Amount and height of medium cloud (amount in oktas, height in feet)
C_H or C	Type of high cloud
N_s/h_sh_s	Amount and height of high cloud (amount in oktas, height in feet)
D….D	Ship call sign (ship code only)
G(f')f'f'	Wind gust (in knots)

Table 3. Decode of elements plotted on a ship station circle.

Synoptic elements plotted on a METAR (METeorological Aerodrome Reports)



Decode of elements plotted on a METAR station circle (note the colour coding)

Identifier	Description
TT	Dry-bulb Air Temperature (in degrees Celsius)
ww	Present Weather
dd	Wind Direction (in degrees)
ff	Wind Speed (in knots)
VVVV	Visibility (in metres or kilometres)
T_dT_d	Dew Point Temperature (in degrees Celsius)
C_L or C	Amount and Height of Low Cloud
PPP	Airfield (Atmospheric) Pressure (in millibars) - QNH
C_m or C	Amount and Height of Medium Cloud
C_H or C	Amount and Height of High Cloud

ICAO Identifiers can be found in the ICAO Location Indicators Handbook (Doc 7910/100)

Table 4. Decode of elements plotted on a METAR station circle.

Decode of elements that make up the station circle plot.

Cloud cover (N)

The total amount of the sky covered by cloud in expressed in oktas (eighths) and plotted within the station circle itself. The symbols used over the years for manned stations are as follows:

Before 1914

No symbols were used, but the Beaufort letter for the amount of cloud was plotted instead.

Beaufort letters	Description
b	Total cloud amount 0 to 2 oktas
bc	Total cloud amount 3 to 5 oktas
c	Total cloud amount 6 to 7 oktas
o	Uniform thick layer of cloud completely covering the sky (overcast)

Table 5. Beaufort letters used to describe the total amount of cloud present.

1 January 1914 to 31 December 1949

Symbol	Description	Symbol	Description
	Sky clear (0 oktas)		6 oktas covered
	2 oktas covered		Overcast sky (8 oktas)
	4 oktas covered		

Table 6. Symbols used to describe the total amount of cloud present between January 1914 and December 1949.

1 January 1950 to 30 June 1968

Symbol	Description	Symbol	Description
	Sky clear (0 oktas)		5 oktas covered
	1 okta covered		6 oktas covered
	2 oktas covered		7 oktas covered
	3 oktas covered		Entirely covered (8 oktas)
	4 oktas covered		Sky obscured

Table 7. Symbols used to describe the total amount of cloud present between January 1950 and June 1968.

1 July 1968 - present

Symbol	Description	Symbol	Description
	Sky clear (0 oktas)		6 oktas of sky covered
	1 okta or less of sky covered, but not zero		7 oktas of sky covered
	2 oktas of sky covered		8 oktas of sky covered
	3 oktas of sky covered		Sky obscured by fog or other meteorological phenomena
	4 oktas of sky covered		Cloud cover obscured for other reasons or not observed
	5 oktas of sky covered		

Table 8. Symbols used to describe the total amount of cloud present from July 1968 onwards.

Increasing, automatic weather observations are being plotted on today's charts. To differentiate between a manned observation and an observation done automatically, a triangle is used instead of the station circle. The station triangle is filled in according to the total amount of cloud observed at the station and can be represented as follows:

Symbol	Description	Symbol	Description
	Sky clear (0 oktas)		6 oktas of sky covered
	1 okta or less of sky covered, but not zero		7 oktas of sky covered
	2 oktas of sky covered		8 oktas of sky covered
	3 oktas of sky covered		No cloud data
	4 oktas of sky covered		Station plotted when a METAR (METeorological Aerodrome Report) is reported – no total cloud information is provided
	5 oktas of sky covered		

Table 9. Symbols used to describe the total amount of cloud present using the METAR code.

Cloud amount decode for METAR's

SKC or **CLR** – 0 oktas
FEW – 1 to 2 oktas
SCT – 3 to 4 oktas
BKN – 5 to 7 oktas
OVC – 8 oktas

Cloud (C_L, C_M, C_H)

- Cloud symbols used on a synoptic chart for low cloud C_L

C_L = stratocumulus (Sc), stratus (St), cumulus (Cu) and cumulonimbus (Cb)

Symbol	Code Figure	Definition
	0	No stratocumulus, stratus, cumulus or cumulonimbus.
	1	Cumulus with little vertical extent and seemingly flattened, or ragged cumulus other than of bad weather*, or both.
	2	Cumulus of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, either accompanied or not by other cumulus or by stratocumulus, all having their bases at the same level.
	3	Cumulonimbus the summits of which, at least partially, lack sharp outlines, but are neither clearly fibrous (cirriform) nor in the form of an anvil; cumulus, stratocumulus or stratus may also be present.
	4	Stratocumulus formed by the spreading out of cumulus; cumulus may also be present.
	5	Stratocumulus not resulting from the spreading out of cumulus.
	6	Stratus in a more or less continuous sheet or layer, or in ragged shreds, or both, but no stratus fractus of bad weather.
	7	Stratus fractus of bad weather* or cumulus fractus of bad weather*, or both (pannus), usually below altostratus or nimbostratus.
	8	Cumulus and stratocumulus other than that formed from the spreading out of cumulus; the base of the cumulus is at a different level from that of the stratocumulus.
	9	Cumulonimbus, the upper part of which is clearly fibrous (cirroform), often in the form of an anvil; either accompanied or not by cumulonimbus without anvil or fibrous upper part, by cumulus, stratocumulus, stratus or pannus.
	/	Stratocumulus, stratus, cumulus or cumulonimbus are invisible owing to fog, darkness or other surface phenomena.

*** "Bad weather" denotes the conditions, which generally exist during precipitation and a short time before and after.**

Table 10. Symbols used to denote the types of low level cloud present when plotted on a synoptic chart.

- Cloud symbols used on a synoptic chart for medium cloud (C_M)

C_M = Altocumulus (Ac), Altostratus (As) and Nimbostratus (Ns)

Symbol	Code Figure	Definition
	0	No altocumulus, altostratus or nimbostratus.
	1	Altostratus, the greater part of which is semi-transparent; through this part the sun or moon may be weakly visible, as through ground glass.
	2	Altostratus, the greater part of which is sufficiently dense to hide the sun or moon, or nimbostratus.
	3	Altocumulus, the greater part of which is semi-transparent; the various elements of the cloud change only slowly and are all at a single level.
	4	Patches (often in the form of almonds or fishes) of altocumulus, the greater part of which is semi-transparent; the clouds occur at one or more levels and the elements are continually changing in appearance.
	5	Semi-transparent altocumulus in bands, or altocumulus in one or more fairly continuous layers (semi-transparent or opaque), progressively invading the sky; these altocumulus clouds generally thicken as a whole.
	6	Altocumulus resulting from the spreading out of cumulus (or cumulonimbus).
	7	Altocumulus in two or more layers, usually opaque in places and not progressively invading the sky; or opaque layer of altocumulus, not progressively invading the sky; or altocumulus together with altostratus or nimbostratus.
	8	Altocumulus with sproutings in the form of small towers or battlements, or altocumulus having the appearance of cumuliform tufts.
	9	Altocumulus of a chaotic sky, generally at several levels.
	/	Altocumulus, altostratus or nimbostratus are invisible owing to fog, darkness or other surface phenomena, or because of the presence of a continuous layer of lower cloud.

Table 11. Symbols used to denote the types of medium level cloud present when plotted on a synoptic chart.

- Cloud symbols used on a synoptic chart for high cloud (C_H)

C_H = Cirrus (Ci), Cirrocumulus (Cc) and Cirrostratus (Cs)

Symbol	Code Figure	Definition
	0	No Cirrus, cirrocumulus or cirrostratus.
	1	Cirrus in the form of filaments, strands or hooks, not progressively invading the sky.
	2	Dense cirrus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of cumulonimbus; or cirrus with sproutings in the form of small turrets or battlements, or cirrus having the appearance of cumuliform tufts.
	3	Dense cirrus, often in the form of an anvil; being the remains of the upper parts of cumulonimbus.
	4	Cirrus in the form of hooks or of filaments, or both, progressively invading the sky; they generally become denser as a whole.
	5	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and cirrostratus, or cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, but the continuous veil does not reach 45º above the horizon.
	6	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and cirrostratus, or cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, the continuous veil exceeds mare that 45º above the horizon, without the sky being totally covered.
	7	Veil of cirrostratus covering the celestial dome.
	8	Cirrostratus not progressively invading the sky and not completely covering the celestial dome.
	9	Cirrocumulus alone, or cirrocumulus accompanied by cirrus or cirrostratus or both, but cirrocumulus is predominant.
	/	Cirrus, cirrocumulus or cirrostratus are invisible owing to fog, darkness or other surface phenomena, or because of the presence of a continuous layer of lower cloud.

Table 12. Symbols used to denote the types of high level cloud present when plotted on a synoptic chart.

- Cloud Symbols used on a Synoptic Chart (METAR Code C)

Symbol	Code Figure	Definition
	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)

Table 13. Symbols used to denote the types of cloud present, using the METAR code, when plotted on a synoptic chart.

Cloud heights

Cloud heights are measured in feet. For clouds at 5000 feet or below, the bases are measured in hundreds of feet, but for bases above 5000 feet, the bases are measure in multiples of 1000 feet. In the METAR code, cloud heights are measured and reported in hundreds or thousands of feet. For example:

000 is a cloud base at **less than 100 feet**

001 is a cloud base at **100 feet**

005 is a cloud base at **500 feet**

010 is a cloud base at **1,000 feet**

100 is a cloud base at **10,000 feet**

250 is a cloud base at **25,000 feet**

Using the METAR code, four oktas of cumulus cloud at 3,000 feet is coded as ***SCT030***. Also using the METAR code, specific clouds such as cumulonimbus and very large cumulus are reported. For example 6 oktas of cumulonimbus at 2,500 feet is coded as ***BKN025CB***.

On a synoptic chart, only two figures for the cloud height are plotted. As a result, a code is used to denote the cloud heights.

Actual Cloud Height (feet)	Plotted Cloud Height	Actual Cloud Height (feet)	Plotted Cloud Height	Actual Cloud Height (feet)	Plotted Cloud Height	Actual Cloud Height (feet)	Plotted Cloud Height
<100	00	1700	17	3200	32	4900	49
100	01	1800	18	3300	33	5000	50
200	02	1900	19	3400	34	6000	56
300	03	2000	20	3500	35	7000	57
400	04	2100	21	3600	36	8000	58
500	05	2200	22	3700	37	9000	59
600	06	2300	23	3800	38	10000	60
700	07	2400	24	3900	39	11000	61
800	08	2500	25	4000	40	12000	62
900	09	2600	26	4100	41		
1000	10	2700	27	4200	42		
1100	11	2800	28	4300	43		
1200	12	2900	29	4400	44		
1300	13	1700	17	4500	45		
1400	14	1800	18	4600	46		
1500	15	3000	30	4700	47		
1600	16	3100	31	4800	48	25000	75

Table 14. Cloud height codes.

Examples of cloud bases plotted on a synoptic chart.

Low Cloud

4/30

4 oktas of cumulus humilis at 3000 feet

6/25

6 oktas of stratocumulus at 2500 feet

7/02

7 oktas of stratus nebulous at 200 feet

4/15

4 oktas of cumulonimbus capillatus at 1500 feet

Medium Cloud

8/60

8 oktas of altostratus opacus at 10000 feet

6/62

6 oktas of altocumulus (type 5) at 12000 feet

4/60

4 oktas of altocumulus lenticularis at 10000 feet

7/61

7 oktas of altocumulus of a chaotic sky at 11000 feet

Medium Cloud

4/75

4 oktas of cirrus uncinus (type 1) at 25000 feet

3/70

3 oktas of dense cirrus (type 3) at 20000 feet

8/75

8 oktas of cirrostratus at 25000 feet

6/71

6 cirrocumulus at 21000 feet

Wind

The surface wind direction is indicated on the station circle by an arrow flying with the wind, the point touching the circle. Direction is measured in degrees from *true* North. The speed of the wind is given by the number of 'feathers' on the arrow. The symbols used over the years are as follows:

Wind arrows (ff) used up to 31 December 1913

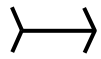
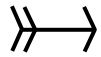
Symbol	Description	Symbol	Description
	Beaufort Force 0 - 1		Beaufort Force 8 - 10
	Beaufort Force 2 - 4		Above Beaufort Force 10
	Beaufort Force 5 - 7		

Table 15. Wind arrows used before December 1913.

Wind arrows (ff) used between 1 January 1914 and 31 December 1924

Symbol	Beaufort Force	Specifications	
		General	At sea
	0	Calm	Calm
	1	Light air	Light breeze
	2	Slight breeze	
	3	Gentle breeze	
	4	Moderate breeze	Moderate breeze
	5	Fresh breeze	
	6	Strong breeze	Strong wind
	7	High wind	
	8	Gale	Gale forces
	9	Strong gale	
	10	Whole gale	Storm forces
	11	Storm	
	12	Hurricane	Hurricane

Table 16. Wind arrows used between January 1914 and December 1924.

Wind arrows (ff) used between 1 January 1925 and 29 March 1936

Symbol	Beaufort Force	Description	Speed (mph)
	0	Calm	0
	1	Light air	2
	2	Light breeze	5
	3	Gentle breeze	10
	4	Moderate breeze	15
	5	Fresh breeze	21
	6	Strong breeze	27
	7	Moderate gale	35
	8	Fresh gale	42
	9	Strong gale	50
	10	Whole gale	59
	11	Storm	68
	12	Hurricane	Above 75

Table 17. Wind arrows used between January 1925 and 29 March 1936.

Wind arrows (ff) used between 30 March 1936 and 31 December 1954

Symbol	Beaufort Force	Wind	Speed (knots)	Symbol	Beaufort Force	Wind	Speed (knots)
	0	Calm	0		7	Moderate gale	28 - 33
	1	Light air	1 - 3		8	Fresh gale	34 - 40
	2	Light breeze	4 - 6		9	Strong gale	41 - 47
	3	Gentle breeze	7 - 10		10	Whole gale	48 - 55
	4	Moderate breeze	11 - 16		11	Storm	56 - 63
	5	Fresh breeze	17 - 21		12	Hurricane	Above 64
	6	Strong breeze	22 - 27				

Table 18. Wind arrows used between 30 March 1936 and December 1954.

Wind arrows (ff) used since 1 January 1955

Symbol	Description	Symbol	Description
	Calm		53 – 57 knots
	1 - 2 knots		58 - 62 knots
	3 - 7 knots		63 - 67 knots
	8 - 12 knots		68 - 72 knots
	13 - 17 knots		73 - 77 knots
	18 - 22 knots		78 - 82 knots
	23 - 27 knots		83 - 87 knots
	28 - 32 knots		88 - 92 knots
	33 - 37 knots		93 – 97 knots
	38 - 42 knots		98 – 102 knots
	43 - 47 knots		Wind direction variable
	48 – 52 knots		Wind direction given but wind speed missing

Table 19. Wind arrows used since January 1955.

Beaufort Letters

A code of letters indicating the state of the weather, past or present. The code was originally introduced by Admiral Beaufort for use at sea but is equally convenient for use on land. Additions have been made to the original schedule.

A fully comprehensive list of Beaufort letters follows (note the symbols used for the individual weather elements – not all Beaufort letters have a corresponding weather symbol and likewise, not all weather elements have a Beaufort letter but may have a weather symbol):

State of Sky

Beaufort letter	Symbol	Description
b		Total cloud amount 0 to 2 oktas
bc		Total cloud amount 3 to 5 oktas
c		Total cloud amount 6 to 7 oktas
o		Uniform thick layer of cloud completely covering the sky (8 oktas)

Table 20. Beaufort letters used to describe the total amount of cloud present.

Hydrometeors

Beaufort letter	Symbol	Description
r		Rain
r		Freezing rain
d		Drizzle
d		Freezing drizzle
s		Snow
h		Snow pellets
h		Diamond dust
h		Hail
h		Small hail
h		Ice pellets
sh		Snow grains
f		Fog
f		Ice fog
fe		*Wet fog
fg/fs		*Patches of shallow fog over land/sea
fg/fs		*More or less continuous shallow fog over land/sea
m		Mist
ks		Drifting and blowing snow
ks		Drifting snow
ks		Blowing snow
		Spray
w		Dew
w		Advection dew
w		White dew
x		Hoar frost
x		Advection hoar frost
		Rime
		Soft rime
		Hard rime
		Clear ice
		Glaze
		Spout

Table 21. Hydrometeors – a generic term for products of condensation and sublimation of atmospheric water vapour.

Mixed Precipitation

Beaufort letter	Symbol	Description
dr		Drizzle and rain
rs		Rain and snow (sleet)
hs		Hail and snow
hr		Hail and rain

Table 22. Beaufort letters denoting mixed precipitation.

Lithometeors

Beaufort letter	Symbol	Description
z		Haze
		Dust haze
		Smoke
		Drifting and blowing dust or sand
		Drifting dust or sand
		Blowing dust or sand
		Duststorm or sandstorm
		Wall of dust or sand
		Dust whirl or sand whirl (dust devil)

Table 23. Lithometeors – a little-used generic term for non-aqueous solid particles suspended in the air or lifted from the earth's surface.

Electrometeors

Beaufort letter	Symbol	Description
tl		Thunderstorm
l		Lightning
		St Elmo's Fire
		Polar aurora

Table 24. Electrometeors – a little-used generic term for a visible or audible manifestation of atmospheric electricity.

Photometeors

Beaufort letter	Symbol	Description
		Solar halo
		Lunar halo
		Solar corona
		Lunar corona
		Irisation
		Glory
		Rainbow
		Fog-bow
		Bishop's ring
		Mirage
		*Zodiacal light

Table 25. Photometeors – a little-used generic term for optical phenomena in the atmosphere.

Miscellaneous

Beaufort letter	Symbol	Description
j		Phenomena within sight of but not at the station
e		Wet air, without rain falling
y		Dry air (less than 60% relative humidity)
u		Ugly threatening sky
v		Abnormally good visibility
p	▽	Shower (used in combination with the type of precipitation)

Table 26. Miscellaneous meteorological phenomena.

Surface Wind

Beaufort letter	Symbol	Description
g		*Gale, mean speed 34-47 knots over a period of 10 minutes or more
G		*Storm, mean speed 48 knots or more over a period of 10 minutes or more
q		*Squall
kq		*Line squall

- **Not internationally accepted symbols**

Table 27. Beaufort letters to describe the strength of the surface wind.

Recording Beaufort letters

When recording Beaufort letters, it is helpful to give an indication as to the intensity and continuity of the weather elements being observed. More than one Beaufort letter can be used if, for example, the precipitation is in the form of showers.

The type of precipitation is indicated by the appropriate Beaufort letter, or combination of letters if there is a mixture of precipitation. For example:

Beaufort letter	Description
d	Drizzle
r	Rain
dr	Drizzle and rain

Table 28. Beaufort letters to describe the type of precipitation present.

If the precipitation is of the showery type (falling from convective cloud), the prefix ‘p’ is used in combination with the type of precipitation. For example:

Beaufort letter	Description
pr	Shower of rain
ps	Shower of snow

Table 29. Beaufort letters to describe the nature of precipitation present.

Beaufort letters can also be used to describe the intensity of the precipitation.

- Slight – by the addition of the subscript ‘o’ to a small Beaufort letter. For example:

Beaufort letter	Description
r_o	Slight rain
s_o	Slight snow
pr_o	Slight shower of rain

Table 30. Beaufort letters to describe precipitation of slight intensity.

- Moderate – by a small Beaufort letter. For example:

Beaufort letter	Description
r	Moderate rain
s	Moderate snow
pr	Moderate shower of rain

Table 31. Beaufort letters to describe precipitation of moderate intensity.

- Heavy – by a capital Beaufort letter. For example:

Beaufort letter	Description
R	Heavy rain
S	Heavy snow
pR	Heavy shower of rain

Table 32. Beaufort letters to describe precipitation of heavy intensity.

- Violent – by the addition of the subscript '2' to the capital Beaufort letter. For example:

Beaufort letter	Description
pR_2	Violent shower of rain

Table 33. Beaufort letters to describe precipitation of violent intensity.

When mixed precipitation occurs, such as drizzle and rain, or rain and snow, the intensity of each type is not given separately, but the intensity of the heaviest precipitation is used to denote the intensity of all the other types in the mixture. For example:

Beaufort letter	Description
dr	Slight drizzle and moderate rain

Table 34. Beaufort letters to describe mixed precipitation of mixed intensities.

The intensity of a thunderstorm is judged by the intensity of the thunder and lightning, whilst the intensity of the precipitation in the storm is indicated separately. For example:

Beaufort letter	Description
TLr_o	Heavy thunderstorm with slight rain
tl_oR	Slight thunderstorm with heavy rain

Table 35. Beaufort letters to describe the intensity of thunderstorms and the intensity of the precipitation falling during the thunderstorm.

When showers are reported, the qualification of intensity is given to the precipitation, but not to the shower prefix 'p'. For example:

Beaufort letter	Description
pr_o	Slight shower of rain
pr	Moderate shower of rain
pR	Heavy shower of rain

Table 36. Beaufort letters to describe the intensity of showers.

The continuity of the precipitation can also be indicated using Beaufort letters. Precipitation falling from layer cloud is described by letters referring to the continuity as well as to the type of intensity in accordance to the following rules:

1) Intermittent Precipitation – the Beaufort letters indicating the type and intensity of the precipitation are prefixed by the letter 'i'. For example:

Beaufort letter	Description
ir_o	Intermittent slight rain
iS	Intermittent heavy snow
idr	Intermittent moderate drizzle and rain

The prefix indicates that there has been a break or breaks occurring at intervals of less than one hour in the overall period of the precipitation. Note that an individual break lasting one hour or more requires subsequent precipitation to be recorded as the commencement of another period.

Table 37. Beaufort letters to describe the intermittent nature of the precipitation.

2) Continuous precipitation – the Beaufort letter(s) indicating the type and intensity of the precipitation are repeated. For example:

Beaufort letter	Description
r_or_o	Continuous slight rain
SS	Continuous heavy snow
$d_or_od_or_o$	Continuous slight drizzle and rain

The repetition indicated that the period of precipitation has lasted for at least one hour without a break.

Table 38. Beaufort letters to describe the continuous nature of the precipitation.

3) Precipitation not specified as intermittent or continuous: the Beaufort letter(s) indicating the type and intensity of the precipitation are used alone. For example:

Beaufort letter	Description
R	Heavy rain
d_o	Slight drizzle
dr	Moderate drizzle and rain

This indicates that the period of precipitation has not lasted for one hour to qualify as continuous, and that there have been no breaks to qualify it as intermittent.

Table 39. Beaufort letters to describe the intensity of the precipitation.

4) Changes of type and/or intensity. During a period of precipitation a change of type and/or intensity is indicated by successive use of letters descriptive of each new type or intensity. Repetition of letters to indicate continuity will be appropriate only when precipitation of one particular type and intensity has continued for at least one hour without a break. A change in type or intensity of continuous precipitation where the new type or intensity does not last for one hour will require the use of a single letter as

described above. At each change of type and/or intensity it is necessary to record all the appropriate letters in the order specified and a comma is placed between each group of letters. For example:

Beaufort letter	Description
cr_or_o, cr, cr_o, cd_or_o	Total cloud amount 6/8-8/8 with continuous slight rain, then total cloud amount 6/8-8/8 with moderate rain, then total cloud amount 6/8-8/8 with slight rain, then total cloud amount 6/8-8/8 with continuous slight drizzle and rain

Table 40. Beaufort letters to describe the changes in intensity of the precipitation during the reporting period.

When reporting any type of atmospheric obscurity, for example, fog or mist, it is possible to give an indication as to the thickness of this type of phenomena.

- Fog – whenever the visibility is reduced to less than 1000 metres and the obscuration is caused by fog, the letter 'f' (fog) will be used down to and including 200 metres, and the capital letter 'F' (thick fog) when the visibility is less than 200 metres. When patches of fog exist, the prefix 'i' is used to denote intermittent fog. For example:

Beaufort letter	Description
if	Fog patches with visibility below 1000 metres but at or above 200 metres
F	Thick fog with visibility below 200 metres
iF	Thick fog patches with visibility below 200 metres

Table 41. Beaufort letters to describe the thickness and/or continuous nature of fog.

- Mist – this is when the visibility is 1000 metres or more and the relative humidity is between 95 and 100 %. The Beaufort letter used is 'm'. the capital letter 'M' is never used.

- Haze – this is when the visibility is 1000 metres or more but the relative humidity is less than 95 %. The Beaufort letter used is 'z'.

When a given weather phenomena is within sight but not actually falling at the station it is possible to indicate this using Beaufort letters. The letter 'j' is used in combination with various other Beaufort letters to record phenomena occurring within sight of but not at the station. For example:

Beaufort letter	Description
jp	Precipitation within sight
jf	Fog within sight
jks	Drifting snow within sight

No qualification of intensity or indication of the type of precipitation is applied to adjacent precipitation, 'jp', even though this might be surmised.
Adjacent precipitation is not used to describe a shower which was previously reported at the station and is still visible on the horizon.

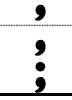
Table 42. Beaufort letters to describe the locality of the precipitation in relation to the position of the observer.

Present weather symbols used on a synoptic chart

Symbol	Code figure	Description
WW = 00 to 19 – No precipitation, 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.		
	00	Cloud development not observed or observable
	01	Clouds dissolving or becoming less developed
	02	State of sky on the whole unchanged
	03	Clouds generally forming or developing
	04	Visibility reduced by smoke haze
	05	Haze
	06	Widespread dust in suspension in the air, not raised by wind at or near station at the time of observation
	07	Dust or sand raised by the wind at or near the station at the time of observation, but not well-developed dust whirl(s), and no 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 within sight at the time of observation, or at the station during the preceding hour
	10	Mist
	11	Patches of shallow fog or ice fog
	12	More or less continuous shallow fog or ice fog less than 2m on land or 10m at sea
	13	Lightning seen, no thunder heard
	14	Precipitation within sight, not reaching the ground or 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 5km 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) at or within sight of the station during the preceding hour or at the time of observation

Characteristic state of sky during the past hour

Symbol	Code figure	Definition
WW = 20 to 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 showers
	21	Rain (not freezing), not falling as showers
	22	Snow, not falling as showers
	23	Rain and snow or ice pellets, not falling as showers
	24	Freezing drizzle or freezing rain, not falling as showers
	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)
WW = 30 to 39 – Duststorm, sandstorm, drifting or blowing snow		
	30	Slight or moderate duststorm or sandstorm, has decreased during the preceding hour
	31	Slight or moderate duststorm or sandstorm. No appreciable change during the preceding hour
	32	Slight or moderate duststorm or sandstorm, has begun or increased during the preceding hour
	33	Severe duststorm or sandstorm, has decreased during the preceding hour
	34	Severe duststorm or sandstorm. No appreciable change during the preceding hour
	35	Severe duststorm or sandstorm, has begun or increased during the preceding hour
	36	Slight or moderate drifting snow, generally low (below eye level)
	37	Heavy drifting snow, generally low (below eye level)
	38	Slight or moderate drifting snow, generally high (above eye level)
	39	Heavy drifting snow, generally high (above eye level)

Symbol	Code figure	Definition
WW = 40 to 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 obscured, has become thinner during the preceding hour
	44	Fog or ice fog, sky visible, no appreciable change during the preceding hour
	45	Fog or ice fog, sky obscured, no appreciable change during the preceding hour
	46	Fog or ice fog, sky visible, has begun or has become thicker during the preceding hour
	47	Fog or ice fog, sky obscured, has begun or has become thicker during the preceding hour
	48	Fog or ice fog, sky visible
	49	Fog or ice fog, sky obscured
WW = 50 to 59 - Drizzle		
	50	Drizzle, not freezing, intermittent – slight at the time of observation
	51	Drizzle, not freezing, continuous – slight at the time of observation
	52	Drizzle, not freezing, intermittent – moderate at the time of observation
	53	Drizzle, not freezing, continuous – moderate at the time of observation
	54	Drizzle, not freezing, intermittent – heavy (dense) at the time of observation
	55	Drizzle, not freezing, continuous – heavy (dense) at the time of observation
	56	Drizzle, freezing, slight
	57	Drizzle, freezing, moderate or heavy (dense)
	58	Drizzle and rain, slight
	59	Drizzle and rain, moderate or heavy

Symbol	Code figure	Definition
WW = 60 to 69 - Rain		
•	60	Rain, not freezing, intermittent – slight at the time of observation
••	61	Rain, not freezing, continuous – slight at the time of observation
:	62	Rain, not freezing, intermittent – moderate at the time of observation
∴	63	Rain, not freezing, continuous – moderate at the time of observation
⋮	64	Rain, not freezing, intermittent – heavy at the time of observation
⁘	65	Rain, not freezing, continuous – heavy at the time of observation
	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 to 79 – Solid precipitation not in showers		
*	70	Intermittent fall of snowflakes – slight at the time of observation
**	71	Continuous fall of snowflakes – slight at the time of observation
	72	Intermittent fall of snowflakes – moderate at the time of observation
	73	Continuous fall of snowflakes – moderate at the time of observation
	74	Intermittent fall of snowflakes – heavy at the time of observation
	75	Continuous fall of snowflakes – heavy at the time of observation
	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

Symbol	Code figure	Definition
WW = 80 to 89 – 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 and 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	Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed, moderate or heavy
	89	Shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder, slight
WW = 90 to 94 – thunderstorm during the preceding hour but not at the time of observation		
	90	Shower(s) of hail, with or without rain or rain and snow mixed, not associated with thunder, moderate or heavy
	91	Slight rain at the time of observation
	92	Moderate or heavy rain at the time of observation
	93	Slight snow, or rain and snow mixed, or hail at the time of observation
	94	Moderate or heavy snow, or rain and snow mixed, or hail at the time of observation
WW = 95 to 99 – thunderstorm at the time of observation		
	95	Thunderstorm, slight or moderate, without hail but with rain and/or snow at the time of observation
	96	Thunderstorm, slight or moderate, with hail at the time of observation
	97	Thunderstorm, heavy, without hail but with rain and/or snow at the time of observation
	98	Thunderstorm, combined with duststorm or sandstorm at the time of observation
	99	Thunderstorm, heavy, with hail at the time of observation

Table 43. Present weather code and symbols.

Weather elements used in the METAR code

Intensity	Description	Precipitation	Obscuration	Others
- Light	**MI** Shallow	**DZ** Drizzle	**BR** Mist	**PO** Well developed dust/sand whirls
Moderate	**PR** Partial	**RA** Rain	**FG** Fog	**SQ** Squalls
+ Heavy	**BC** Patches	**SN** Snow	**FU** Smoke	**FC** Funnel clouds including tornadoes or waterspouts
VC Vicinity	**DR** Low drifting	**SG** Snow grains	**VA** Volcanic ash	**SS** Sandstorm
	BL Blowing	**IC** Ice crystals	**DU** Widespread dust	**DS** Duststorm
	SH Showers	**PL** Ice pellets	**SA** Sand	
	TS Thunderstorm	**GR** Hail	**HZ** Haze	**CB** Cumulonimbus
	FZ Freezing	**GS** Small hail	**PY** Spray	**TCU** Towering cumulus
		UP Unknown		

Table 44. Present weather code and symbols used to plot a METAR observation.

Some examples of present weather codes used in a METAR

TSRA – Moderate thunderstorm with rain

RASH – Moderate rain shower(s)

VCFG – Fog in the vicinity

RASN – Rain and snow (sleet)

MIFG – Shallow fog

+RA – Heavy rain

+SNSH – Heavy snow shower(s)

-RASH – Slight rain shower(s)

METAR observations only report the weather at the time of observation. No past weather elements are reports as would be the case with the synoptic code.

Weather symbols used on early synoptic charts and early daily weather summaries (ww)

Symbol	Definition
	Rain
	Snow
	Sleet
	Hail
	Fog
	Mist
	Thunder
	Thunderstorm
	Sea disturbance - rough
	Sea disturbance - high

Table 45. Present weather symbols used on early synoptic charts.

Past weather symbols used on synoptic charts (W_1W_2)

Symbol	Code Figure	Definition
	0	Cloud cover ½ or less of the sky throughout the appropriate period
	1	Cloud cover ½ or less for part of the appropriate period and more than ½ sky for part of the period
	2	Cloud cover more than ½ of the sky throughout the appropriate period
	3	Duststorm, sand storm or blowing snow – Visibility less than 1000 metres
	4	Fog or thick haze – Visibility less than 1000 metres
	5	Drizzle
	6	Rain
	7	Snow or rain and snow mixed
	8	Shower(s)
	9	Thunder, with or without precipitation

Table 46. Past weather symbols used on synoptic charts.

Pressure tendency (*ppp*a or *ppp*a)

Symbol	Description of curve	Pressure now compared with 3 hours ago
	Rising, then Falling	Higher
	Rising, then steady	Higher
	Rising	Higher
	Falling, then Rising	Higher
	Falling, then Rising	Lower
	Falling, then steady	Lower
	Falling	Lower
	Rising, then Falling	Lower

Table 47. Pressure tendencies.

Visibility (VV)

Surface visibilities as used in Daily Weather Summaries

Code for Surface Visibility	Objects not visible at	Description
0	55 yards	Dense Fog
1	220 yards	Thick Fog
2	550 yards	Fog
3	1100 yards	Moderate Fog
4	1¼ miles	Mist or Haze
5	2½ miles	Poor Visibility
6	6¼ miles	Moderate Visibility
7	12¼ miles	Good Visibility
8	31 miles	Very Good Visibility
9	Beyond 31 miles	Excellent Visibility

Table 48. Description of visibility.

Visibility values as used on synoptic charts

1. The 90-99 decade is always employed in ship reports for the reason that horizontal visibility cannot be determined with greater accuracy at sea.
2. If the horizontal visibility is not the same in different directions, the shorter distance is coded.
3. If the observed horizontal visibility is between two of the distances given in the table, the code figure for the shorter distance is reported.
4. In the international scale the distances for all code figures are expressed in metres. The visibilities listed above are the equivalent distances in nautical miles.

For visibilities equal to and less than 5 km

Land Stations Only								
Code Figure	Distance		Code Figure	Distance		Code Figure	Distance	
	km	yards		km	yards		km	yards
00	<0.0	<110	19	1.9	2075	38	3.8	4157
01	0.1	110	20	2.0	2118	39	3.9	4266
02	0.2	220	21	2.1	2297	40	4.0	4376
03	0.3	330	22	2.2	2406	41	4.1	4485
04	0.4	440	23	2.3	2516	42	4.2	4594
05	0.5	550	24	2.4	2625	43	4.3	4737
06	0.6	660	25	2.5	2735	44	4.4	4813
07	0.7	770	26	2.6	2844	45	4.5	4923
08	0.8	880	27	2.7	2953	46	4.6	5032
09	0.9	990	28	2.8	3063	47	4.7	5141
10	1.0	1100	29	2.9	3172	48	4.8	5251
11	1.1	1210	30	3.0	3282	49	4.9	5360
12	1.2	1313	31	3.1	3391	50	5.0	5470
13	1.3	1422	32	3.2	3500	*51*	Not Used	
14	1.4	1532	33	3.3	3610	*52*		
15	1.5	1641	34	3.4	3719	*53*		
16	1.6	1750	35	3.5	3829	*54*		
17	1.7	1859	36	3.6	3938	*55*		
18	1.8	1969	37	3.7	4047			

For visibilities greater than 5 km

Land Stations						Ship Observations		
Code Figure	Distance		Code Figure	Distance		Code Figure	Distance	
	km	miles		km	miles		km	miles
56	6	3.2	73	23	12.4	90	<0.05	<0.03
57	7	3.8	74	24	13.0	91	0.05	0.0
58	8	4.3	75	25	13.5	92	0.2	0.1
59	9	4.9	76	26	14.0	93	0.5	0.3
60	10	5.4	77	27	14.6	94	1	0.5
61	11	5.9	78	28	15.1	95	2	1.1
62	12	6.5	79	29	15.7	96	4	2.2
63	13	7.0	80	30	16.2	97	10	5.4
64	14	7.6	81	35	18.9	98	20	11
65	15	8.1	82	40	21.6	99	≥50	≥27
66	16	8.6	83	45	24.3			
67	17	9.2	84	50	27.0			
68	18	9.7	85	55	29.7			
69	19	10.3	86	60	32.4			
70	20	10.8	87	65	35.1			
71	21	11.3	88	70	37.8			
72	22	11.9	89	>70	>37.8			

Table 49. Visibility codes.

Visibility reporting using the METAR code.

Visibility is recorded as a four figure group (in metres). For example:

Code	As Plotted	Description
0000	**F00**	Less than 50 metres
0200	**F02**	200 metres
1000	**10**	1000 metres
2500	**25**	2500 metres
5000	**50**	5000 metres
9000	**59**	9000 metres
9999	**>59**	Greater than or equal to 10 km

Table 50. Visibility codes used in METAR observation.

It is also possible with the METAR code to highlight visibilities in various directions. For example, if you had a visibility to the southwest of the airfield of 1000 metres yet to the north of the airfield it was 9000 metres you could indicate this in the visibility code, thus:

1000SW 9000N

When the visibility is particularly poor across a runway at an airfield, you can express this in the **Runway Visual Range** code.

Runway Visual Range is an indication of the real visibility as measured down the runway either electronically or manually. RVR is taken when the Met visibility drops below 1500 metres and it will therefore only be shown occasionally in METAR reports. RVR visibility will always be prefixed by the letter R followed by the runway for which the value has been taken. For example:

R24/1200 - RVR for runway 24 is 1200 metres

If the RVR value is below that published for the approach procedure then the aircraft CANNOT MAKE AN APPROACH. The aircraft must either remain in the holding pattern until the weather improves or it must divert.

Air temperature and dew-point

On synoptic charts and weather summaries, temperatures plotted before 1st January 1961 were plotted in Fahrenheit. The Celsius scale of temperature was adopted by the World Meteorological Organization as the standard unit of temperature measurement and was formally adopted by the Met Office on 1st January 1961. Since then all records of temperature by the Met Office have been recorded in Celsius.

A minus value is plotted on a weather chart with a '-' sign in front of it or if it is a METAR an 'M is placed in front. For example:

25/-12 = Temperature: 25°C, Dew Point: minus 12°C, or **00/M02**= Temperature: 0°C, Dew Point: -2°C.

Weather fronts, centres and isobars found on a synoptic chart

Cold front at the surface

Cold front frontogenesis – the development or marked intensification of a front

Cold front frontolysis – the disappearance or marked weakening of a front

Warm front at the surface

Warm front frontogenesis – the development or marked intensification of a front

Warm front frontolysis – the disappearance or marked weakening of a front

Occluded front at the surface

Cold front above the surface

Warm front above the surface

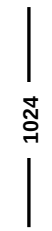
Trough

Convergence line

Ridge axis

Quasi-stationary front at the surface

Quasi-stationary front above the surface



Isobar – line of equal atmospheric pressure

L
x
978

Low pressure centre with value in millibars

H
x
1024

High pressure centre with value in millibars

Centre of tropical cyclonic circulation (maximum winds of 64 knots or more)

Centre of tropical cyclonic circulation (maximum winds of 34 to 63 knots)

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