

CODED WEATHER OBSERVATIONS

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INTRODUCTION

Weather observations in aviation are not usually written in plain English, but coded to save space. We must learn to decode these observations rapidly and accurately.

Current (actual) weather observations are known as METARs (METeorological Aerodrome Reports), and forecasts are called TAFs (Terminal Area Forecasts). The codes used for both are generally the same, although there are a few differences.

METARs

The general format for METARs is as follows:

AIRPORT CODE : TIME : WIND : VISIBILITY & RVR : PRESENT WEATHER : CLOUD : TEMPERATURE & DEW POINT : QNH : ANY TRENDS

We will look at each of these in turn:

AIRPORT CODE

All airports that report weather (and many that do not) have a four letter ICAO code. This is quite distinct from the IATA 3 letter codes that we may already be familiar with, such as LHR for London Heathrow.

These ICAO codes are not entirely random, like the IATA codes, but are designated as follows. The world is divided up into a number of regions, and each region is given a letter. For example:

K = USA C = Canada E = Northern Europe L = Southern Europe S = S America Y = Australia V = South East Asia O = The Middle East etc etc

Within each region, each country is given a letter (unless that region is just one country like the USA, Canada or Australia). So for example:

In Northern Europe, the UK is EG, Ireland is EI, Norway is EN, Germany is ED etc

In Southern Europe, France is LF, Spain is LE, Italy is LI, Greece is LG etc

The final two letters of the 4 letter code are assigned as required to each airport. Thus all airports in the UK begin with EG, all airports in France begin with LF etc.

For example, London Heathrow is EGLL, Blackbushe is EGLK, Redhill is EGKR

Paris Charles de Gaulle is LFPG, Paris Orly is LFPO

San Francisco is KSFO, Miami is KMIA etc

The 4 letter code for UK airports can be found in the AIP, on the 1:500 000 navigation charts, or in flight guides such as Pooley's.

TIME

This is written in a 6 symbol code. The first two digits are the day of the month, and the next four are the time in UTC (GMT)(Z). The Z at the end reminds us that the time is GMT. For example:

160550Z is 0550 GMT on the 16th day of the month

092245Z is 2345 GMT on the 9th day of the month

Sometimes the word AUTO is placed after the time, to indicate that the readings were taken automatically, rather than by a human observer.

WIND

This is written in a 7 or more symbol code. The first three digits are the mean or average wind direction in degrees True. Note, the wind we are used to being given by the tower is in degrees magnetic, not True. The next two are the mean or average wind strength. KT is added to tell us the strength is in knots. So for example

19008KT is a wind of 190°T at 8 knots 04034KT is a wind of 040°T at 34 knots

If the wind strength is variable, with gusts, the maximum gust value may be shown:
24023G45KT is a wind of 240°T at a mean strength of 23 knots gusting to 45 kt.

If the wind direction is variable by more than 60°, this may be shown:

12015KT 080V160 is a mean wind direction of 120°T, varying between 080°T and 160°T at a mean strength of 15 kt.

If the wind is very light (3 kt or less) and variable it can be indicated as follows:

VRB03 is variable direction at 3 kt.

00000KT indicates a calm wind.

NOTE: In some, mainly Eastern European or far East countries, wind may be expressed in metres per second. For example: **12012MPS** is 120°T at 12 m/s, or roughly 24 kts.

VISIBILITY

Unless otherwise stated this is the minimum horizontal visibility at the surface in metres with a maximum figure of 10 km.

0550 indicates a minimum horizontal visibility of 550m

9999 indicates a horizontal visibility of 10 km or more

CAVOK is special term (abbreviation for Ceiling And Visibility OK) which means all of

- Visibility 10 km or more
- No cloud below 5000' aal (or below highest minimum sector altitude)
- No Cumulonimbus or Towering Cu cloud
- No significant weather such as rain, snow, dust, hail, fog etc

When the horizontal visibility is less than 1500m, RVR (Runway Visual Range) readings from a special machine may be given. These readings are specific to each runway, and sometimes RVR readings for more than one runway may be given:

R07/0850 is the RVR for runway 07 of 850m

P before the RVR value indicates more than and M indicates less than:

R12/P1500 R30/M0050 indicates RVR for runway 12 is more than 1500m and the RVR for RW 30 is less than 50m.

The RVR trend over the last 10 minutes may also be included. U indicated the RVR is increasing, D indicates it is decreasing and N indicates no distinct change.

R27L0800D is the RVR on runway 27L of 800m, decreasing over the last 10 minutes.

PRESENT WEATHER

This is indicated by a two letter abbreviation, or if several types of weather are present, a combination of such abbreviations, the more prominent coming first. These are:

<u>PRECIPITATION</u>	<u>OBSCURATION</u>	<u>OTHER</u>
DZ Drizzle	BR Mist (1000m<vis <5km)	PO Dust Devils/Sand Whirls
RA Rain	FG Fog (vis<1000m)	SQ Squalls
SN Snow	FU Smoke	FC Funnel Clouds (Tornado)
SG Snow Grains	VA Volcanic Ash	SS Sand storm
IC Ice Crystals	DU Widespread Dust	DS Dust storm
PL Ice Pellets	SA Sand	TS Thunderstorm
GR Hail (5mm or more)	HZ Haze	
GS Small hail or snow pellets		NSW No significant weather

Unless otherwise stated, precipitation is of moderate intensity. Light intensity is indicated by – and heavy by +. For example

RA indicates moderate rain, -SN is light snow and +TS is a heavy thunderstorm.

Various other codes are used to modify the present weather:

VC In the vicinity (within 8km, but not at the aerodrome)	FZ Freezing	
MI Shallow (less than 2m)	BC Patches	PR Partial
DR Low drifting	BL Blowing	SH Showers

For example:

FZFG is Freezing Fog	SHSN is moderate snow showers
+SHRAGS is heavy showers of rain and snow pellets	BLSN is moderate blowing snow
VCSH is showers in the vicinity.	MIFG is shallow fog

CLOUD

This is indicated by both the amount and height of the cloud base above aerodrome level. Additionally, the cloud type is specified only if it is Cumulonimbus (CB) or Towering Cumulus (TCu).

To determine the amount of cloud, the sky is divided into 8 equal parts (called oktas), and the number of oktas cloud cover is estimated. It is reported as follows:

0 oktas:	SKC (Sky Clear, but not CAVOK)
1-2 oktas:	FEW
3-4 oktas:	SCT (Scattered)
5-7 oktas:	BKN (Broken)
8 oktas:	OVC (Overcast)

The cloud base height is reported in hundreds of feet:

BKN020	is Broken cloud (5-7oktas) at 2000' aal.
FEW250	is Few clouds (1-2oktas) at 25000' aal.
OVC003	is Overcast cloud (8oktas) at 300' aal.

Sometimes the abbreviation NSC is used for No Significant Cloud

If the view of the sky is obscured by say fog, then a vertical visibility in hundreds of feet is reported.

VV02 is vertical visibility of 200'

TEMPERATURE AND DEW POINT

This is reported in degrees Celsius (centigrade). An M is used to denote negative temperatures.

24/M09 is a temperature of 24°C and a dew-point of -9°C.

QNH (or QFE)

QNH is reported in hPa (mb) in most of the world. It is preceded by a Q. For example

Q0994 is a QNH of 994 hPa (mb)

QFE may be reported in hPa (mb) in the UK and some other countries. It is preceded by an F. For example

F0887 is a QFE of 887 hPa (mb)

Altimeter setting may be reported in inches of Mercury in the USA. It is preceded by an A. For example

A3006 is an Altimeter setting of 3006 Inches of Mercury.

TREND

This is used to indicate any trend in the current weather to be expected over the next 2 hours. The following abbreviations are used:

NOSIG: No significant change expected	TEMPO: Temporarily	BECMG: Becoming
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Actual examples of METARS are shown below:

EGLL 272020Z 27014KT CAVOK 09/02 Q1021 NOSIG
SBGR 272000Z 18006KT 4000 BR FEW020 BKN300 22/18 Q1015
SBGL 272000Z 22008KT 9999 FEW015 SCT040 26/22 Q1013
BIKF 272100Z 12004KT CAVOK M04/M08 Q1005
EGPO 271920Z 26015G27KT 9999 -SHRA FEW015CB SCT020 BKN050 04/01 Q1006
EGPD 272020Z 27014KT 9999 FEW040 05/M00 Q1006 NOSIG
ENBO 272050Z 23012KT 9999 -SHRA FEW010 BKN015 05/03 Q0987 TEMPO SHRA BKN012CB
VHHH 272000Z 11016KT 8000 FEW020 SCT030 BKN080 25/20 Q1013 NOSIG
WSSS 272030Z 00000KT 7000 FEW018 BKN300 25/25 Q1009 NOSIG
YPAD 272000Z 28003KT CAVOK 08/07 Q1024
YSSY 272000Z 21014KT 9999 FEW040 BKN065 14/08 Q1023
HECA 272030Z 05007KT CAVOK 22/15 Q1017 NOSIG
OMAD 300600Z 26005KT 220V300 CAVOK 37/00 Q1007
BGSF 272050Z 06008KT 9999 FEW030 BKN045 M08/M15 Q1016
EGBB 301220Z 04005KT 3800 RA FEW006 SCT009 BKN014 08/08 Q1016 REDZ
EGPF 301320Z VRB02KT 1500 R23/P1500 BR BKN001 04/04 Q1017
EGGD 301320Z 07009KT 0600 FG -RADZ SCT001 OVC002 08/08 Q1014
UAAA 272000Z 00000KT 1100 R23/P1500D FUBR BKN100 08/06 Q1019 NOSIG
VTBD 272030Z 11004KT 9999 FEW025 SCT300 25/24 Q1008 NOSIG
EDDF 272020Z 24030G40KT 9999 -SHRA FEW045CB SCT050 12/05 Q1014 NOSIG
LOWS 272050Z 30020G39KT 230V340 9999 -RA FEW050 SCT065 BKN090 15/03 Q1017 TEMPO SHRA
LOWW 272050Z 28023G39KT 260V320 9999 FEW040 SCT072 BKN110 17/08 Q1011 TEMPO 28030G50KT
LPMA 272100Z VRB01KT 9999 FEW016 20/17 Q1020
NZAA 272000Z 25021G33KT 210V280 10KM SHRA SCT020 BKN032 BKN040 12/08 Q1002 TEMPO 4000
+SHRA BKN014 FEW030CB
HELX 272000Z 16003KT 3000 DU SCT020CB 27/15 Q1015 BEMCG 6000
UBBB 272100Z 00000KT 0250 R18/0800 R16/MO350 MIFG SKC 13/13 Q1016 NOSIG
VECC 00000KT 1200 R19L/P1500 R01R/P1500 BR SKC 21/20 Q1008 NOSIG
VIDP 132250Z 00000KT 1000 RP1500 FU SKC 20/14 Q1010 NOSIG
UIII 272200Z 34003MPS 3000 -SHSN OVC015CB M04/M05 Q1022 TEMPO 1000 SHSN
SKBO 272200Z 22004KT 9000 VCSH BKN015 14/13 Q1034 NOSIG
CYYR 272216Z 07005KT 9999 -SHSN FEW017 SCT024 BKN034 OVC051
EGLL 291920Z 20006KT 090V290 9000 FEW013 BKN042 14/11 Q1010 TEMPO BKN010
EGBB 291920Z 36005KT 1800 -SHRA BR BKN001 09/09 Q1009 REDZ
EGCC 291920Z 03006KT 360V060 9999 OVC017 09/07 Q1010 NOSIG
EGNT 291920Z 00000KT 9999 FEW016 BKN022 06/05 Q1012
EGPO 291820Z 25003KT 9999 FEW016CB 01/M01 Q1013
BGSF 291950Z 04008KT 9999 SCT180 M15/M18 Q1015
BGBW 291850Z 00000KT 9999 SKC M04/M10 Q1009
BIKF 291900Z 13006KT 9999 -SHSN FEW006 BKN013CB OVC035 01/00 Q0997
UUEE 291930Z VRB04KT 5000 BR OVC004 05/05 Q0994 TEMPO 1000 BR DZ
UWOO 291900Z VRB02KT 6000 SCT070 04/03 Q1010 NOSIG
ZBAA 291900Z 31001MPS 2500 BR NSC 03/M01 Q1026 NOSIG
KMIA 041500 041453Z 31003KT 10SM FEW025 FEW170 SCT250 31/23 A2999

TAFs

The TAF begins like a METAR with the four letter airport code, and then the time the forecast was issued. There then follows a 6 digit group which defines the forecast period. For example:

[EGBB 032145Z 040012](#) is a forecast for Birmingham issued at 2145z on the 3rd, and forecasting for the period of midnight until 1200 on the 4th.

TAFs are coded in a very similar way to METARs, but may show several time periods, during which changes in the weather is forecast to occur. These time periods are shown as a 4 figure group:

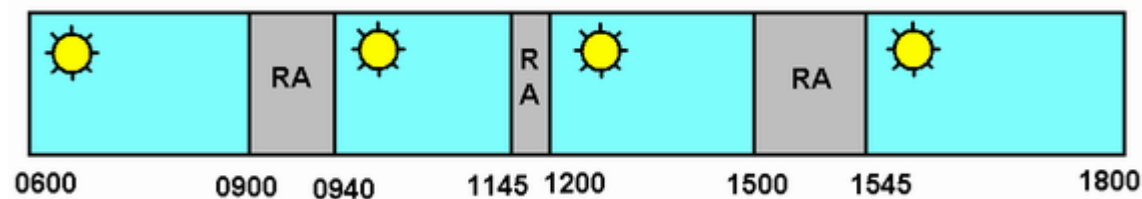
[0409 OVC080](#) means that between 0400 and 0900 it will be overcast at 8000'.

Some of the abbreviations used in METARs have special meanings in a TAF:

TEMPO: A temporary variation in the weather lasting less than 60 minutes at a time. If these temporary variations recur, then their total time is less than half of the forecast or trend period.

INTER: Intermittently

FM: From



For example the above diagram represents:

[EGFF 140227Z 140618 00000KT CAVOK TEMPO 0916 RA](#)

Probabilities are also introduced for certain events occurring. However, only probabilities of 30% and 40% are used. For example

[PROB30 1922 TS +SHRA](#) is a 30% probability between 1900z and 2200z of thunderstorms and heavy rain.

A probability less than 30% is considered too unlikely to mention, and a probability greater than 40% is considered so likely that it is stated as part of the forecast.

A full decode is shown below as an example:

[EGKB 140524Z 140618 27017G28KT 3000 -RA BKN005 BKN010 BECMG 0710 26010KT TEMPO 0711 1500 RADZ BKN002 BECMG 1013 BKN018 TEMPO 1016 9999](#)

Biggin Hill. Forecast issued on the 14th at 0524Z for the period 0600-1800Z. Wind 270°T at 17 gusting 28 kts. Visibility 3000m in light rain. Broken cloud at 500', broken cloud at 1000'. Becoming, between 0700 and 1000Z – wind 260°T at 10 kts. Temporarily between 0700 and 1100z – visibility 1500m in moderate rain and drizzle, cloud broken at 200'. Becoming between 1000 and 1300z – broken cloud at 1800'. Temporarily between 1000 and 1600z visibility 10km or greater.

Actual examples of TAFS are shown below:

EGLL 271622Z 280018 26010KT 9999 FEW025

EGKK 271622Z 280018 26010KT 9999 FEW025

EGBB 271602Z 280018 25012KT 9999 SCT025

HECA 271900Z 272106 02014KT CAVOK TEMPO 0004 VRB03KT 3000 BR SCT020

SBGR 271400Z 271818 10005KT 9999 SCT030 PROB30 2022 33010KT 6000 TS SCT020 FEW030CB PROB30
0710 1000 BR FEW010

SBGL 271500Z 271818 16010KT 9999 SCT020 PROB30 1921 30015KT 5000 TSRA SCT020 FEW030CB BECMG
2301 30005KT BECMG 0911 03003KT 5000 BR SCT015 BECMG 1214 13010KT 8000 NSW SCT020

KSFO 271728Z 271818 VRB03KT 9999 FEW200 FM2100 30012KT 9999 SCT200 BECMG 2223 27016KT
FM0400 26008KT 9999 FEW010 SCT200

EGLF 121010Z 121019 09012KT 9999 SCT018 PROB40 TEMPO 1015 6000 BKN012 PROB30 TEMPO 1519
09015G25KT 8000 BKN014

EGPF 271604Z 280018 26013KT 9999 FEW020 SCT030 PROB40 TEMPO 0018 25015G25KT 8000 SHRA
BKN020CB

EGPH 271604Z 280018 25012KT 9999 SCT030 PROB30 TEMPO 0018 24015G27KT 9000 -SHRA SCT024CB

EGHH 270710Z 270716 21026G38KT 9999 BKN035 TEMPO 0712 22032G48KT PROB30
TEMPO 0712 23045G65KT 7000 RA BKN012 BECMG 1114 27025KT TEMPO 1116 28028G40KT PROB40
TEMPO 1216 28034G50KT

EIDW 271600Z 280018 26014KT 9999 FEW025 BECMG 0912 24010KT BECMG 1518 17008KT SCT020
BKN040

EINN 271600Z 280018 25012KT 9999 FEW020 TEMPO 0003 SCT020CB BECMG 0912 20008KT SCT020
BKN040 BECMG 1215 15012KT SCT010 BKN020 TEMPO 1418 5000 RADZ BKN010

EHAM 271642Z 280018 29025G38KT 9999 SCT030 PROB30 TEMPO 0015 7000
-SHRAGS SCT018 SCT020CB BECMG 0206 29022G34KT BECMG 1417 27016KT CAVOK

SVMI 262200Z 270024 00000KT 9999 SCT013 PROB30 TEMPO 0206 09004KT
9000 DZ BKN013 FM06 00000KT 9999

TAPA 272200Z 280024 11010KT 9999 SCT020 SCT024 BKN280 TEMPO 0024 11010G20KT SHRA BKN016
SCT035 BKN260 PROB40 TEMPO 0613 VRB03KT

HUEN 272100Z 280024 35006KT 9999 SCT020 FEW022CB SCT120 TEMPO 0106 VRB07G18KT 9000 TSRA
SCT018 FEW019CB OVC100 BECMG 0811 18010KT 9999 SCT023 FEW025CB SCT140 FM16 22005KT
FEW023 FEW024CB SCT130 BECMG 2124 36004KT

YPAD 271610Z 271818 11008KT CAVOK FM03 23010KT CAVOK FM09 07010KT CAVOK

NZAA 272030Z 272018 26020G30KT 30KM -SHRA SCT020 BKN030 TEMPO 2024 4000 +SHRA BKN012 FEW025CB TEMPO 0003 6000 SHRA BKN014 TEMPO 0313 4000 +SHRA BKN012 FEW025CB BECMG 1215 26010KT TEMPO 1318 6000 SHRA BKN014

SAEZ 271700Z 271818 07005KT 9999 SCT030 BKN060 TEMPO PROB30 FEW040TCU BKN050

UAAA 272200Z 280024 02005MPS 5000 BKN100 TEMPO 0003 1200 BRFU TEMPO 1218 1000 FU

VABB 271818 04005KT 3000 FU FEW020 SCT250 TEMPO 0103 1500 HZ BECMG 0405 06008KT 4000 FU BECMG 0809 30008KT 5000 BECMG 1214 28005KT 4000 FU

UBBB 271950Z 272106 16006KT 0800 FG SCT003 TEMPO 2103 VRB04KT 3000 BR SCT010 BECMG 0304 19012KT 9999 SCT015

VECC 231617 231818 00000KT 1500 BR SKC BECMG 2123 0800 FG BECMG 0203 1500 BR FEW 20 BECMG 03004KT 4000 HZ BECMG 1314 3000 HZ BECMG 1618 1500 BR

LEMD 262300Z 270110 VRB03KT CAVOK BECMG 0002 2000 BR BKN010 PROB40 0800 BCFG BKN005

HKJK 272130Z 280024 06005KT 9999 BKN018 TEMPO 0005 00000KT 0800 FG BKN003 SCT015 BECMG 0710 06010KT 9999 BKN025 TEMPO 1216 07015KT -SHRA FEW024CB BECMG 1821 04005KT SCT018

UEEE 272157Z 280024 32006KT 1500 BR BKN006 TEMPO 0002 0500 FG BKN004 BECMG 0002 3000 -SN BR BKN010

UUEE 272145Z 280024 20010G20KT 3000 BR OVC006 TEMPO 0006 0500 FG RASN SCT002 TEMPO 0624 0900 SHRASN SCT003 SCT010CB

ZMUB 280018 17016KT 6000 SN BKN027 OVC080 OVC190 BECMG 0002 36016KT TEMPO 0004 4000 BECMG 0406 36020KT SN BLSN BECMG 1113 35014KT 9999 -SN

UNNT 272200Z 280024 VRB04KT CAVOK TEMPO 0004 0500 FZFG BKN002

EGLL 291645Z 300018 06005KT 9000 -RA SCT010 BKN020 TEMPO 0018 4000 RADZ BKN007

NZAA 292009Z 292018 36008KT 9999 -SHRA SCT025 BKN035 TEMPO 2024 6000 SHRA BKN014 FEW025CB TEMPO 0007 4000 +SHRA BKN012 SCT025CB TEMPO 0709 6000 SHRA BKN014 BECMG 0811 25010KT PROB30 TEMPO 0918 7000 SHRA

EGCC 291617Z 300018 VRB03KT 8000 SCT010 BKN030 TEMPO 0010 3000 BR PROB30 TEMPO 0209 1400 BKN004 BECMG 1013 9999

EIDW 291600Z 300018 VRB03KT 9999 SCT020 BECMG 0104 5000 BR PROB40 0310 FG OVC001 BECMG 1012 9999 NSW SCT020

EINN 291600Z 300018 02005KT 9999 SCT030 BECMG 0003 5000 BR PROB40 0310 0300 FG OVC001 BECMG 1012 9999 NSW SCT020

BGBW 081306Z 0081419 VRB08KT 6000 -RA BKN 005 OVC 010 TEMPO 1419 9999 NSW SCT010 BKN025

BIKF 291818 23010KT 9000 -SHRASN FEW015CB SCT030 BKN040 TEMPO 1803 1500 SHSNRA BKN010CB BECMG 2124 34015KT BECMG 0609 9999 SCT040

VHHH 291600Z 291818 10015KT 9000 FEW012 SCT020 BKN060 TEMPO 1824 9020G30KT 5000 -RA
TN24/22Z TX27/06Z

UNNT 291630Z 291818 VRB02MPS CAVOK TEMPO 2103 0300 FZFG BKN002

UACC 291600Z 291818 10010KT 9999 NSC PROB40 TEMPO 2201 2000 BR SCT005 BECMG 0305 14016KT
SCT100 BECMG 1214 18010KT SCT020

UAAA 291600Z 291818 18010KT 0800 BRFU SCT050CB BKN100 TEMPO 1804 0300 -RAFG OVC002 BECMG
0405 02010KT 3000 BRFU BKN030 TEMPO 1118 0500 FU

ZBAA 291621Z 291818 01004MPS 2000 BR NSC TEMPO 1801 1000 TEMPO 2318 -RA OVC040

UUWW 291600Z 291818 27005MPS 4000 RA BR BKN006 BKN010CB TEMPO 1806 0800 SHSNRA FG VV003
BECMG 0608 3007G12MPS 6000 TEMPO 0618 1100 SHSNRA SCT004

UUEE 291545Z 291818 VRB08KT 3000 BR RASN OVC004 SCT010CB TEMPO 1824 0900 FG SHSNRA SCT002
TEMPO 0018 34010G20KT 0900 SHSNRA SCT003

UEEE 291610Z 291818 VRB02MPS 3000 -SN BR BKN010 TEMPO 1824 0500 FZFG VV003

UWOO 291610Z 291818 15010KT 3000 BR RA OVC008 BKN015CB TEMPO 1804 0800 FG RA VV003 BECMG
0607 21014KT