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*Flying Operations*

# Aircrew Quick Reference to the METAR and TAF Codes



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The Aircrew Quick Reference Guide to the METAR and TAF Codes is designed to help aircrews quickly and clearly translate METAR and TAF codes into plain language. See references in Attachment 1 for a listing of source documents.

METAR codes report observed weather conditions by airfield; TAF codes report forecasted weather conditions by airfield. Both codes are lines of text made up of data groups (or just “groups”) separated by spaces. Some data groups are not discussed because they are intended for use by the weather community and are not useful for flight planning. Differences between military and civilian renderings of the code are discussed where appropriate.

Aircrews should check METAR/TAF codes thoroughly for all hazards to flying safety, including thunderstorms, icing, turbulence, wind shear, and other elements that may significantly affect their aircraft. When users have additional weather-related questions, they should contact a certified US military forecaster or MAJCOM-approved weather source for clarification. Weather briefing requirements for USAF Aircrews are spelled out in AFI 11-202, Volume 3, *General Flight Rules*.

## ***SUMMARY OF REVISIONS***

Corrections to decode tables for icing and turbulence intensity in Figures 3 and 4 made this revision necessary. Figures 1 and 2 are now presented in portrait format for user convenience. Additional edits, identified by vertical bars in the left margin, ease the interpretation of METAR and TAF codes.

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**What kind of report is this?**

**METAR** KBLV 011657Z AUTO 25015G30KT  
210V290 3/8SM R32L/1000FT FG BKN005  
01/M01 A2984 RMK A02 SLP034

**SPECI** KBLV 011715Z 25015G30KT 210V290 3SM  
BR BKN015 01/M01 A2984 RMK SLP034

**METAR** (Aviation Routine Weather Report) refers to a scheduled observation taken between 55-59 minutes past the hour (also referred to as a routine *hourly* observation).

**SPECI** (Special Report) refers to an **unscheduled observation that met a predefined criteria** (such as a change from VFR to IFR) and may be **taken at 00-54 minutes past the hour**. When SPECI criteria are met during the hourly observation time window (55-59 minutes past the hour), no special indication is made. The new weather conditions are encoded in a standard METAR report.

**How do I determine the location and the date and time of issuance?**

METAR **KBLV 011657Z** AUTO 25015G30KT  
210V290 3/8SM R32L/1000FT FG BKN005  
01/M01 A2984 RMK A02 SLP034

The 4-character ICAO identifier that follows the report type is the location identifier; **KBLV** (**Scott AFB**) is the location/station in this example.

The 7-character group following the ICAO identifier is the date and time of issuance. The first two digits are the date; the last four digits are the coordinated universal time (UTC), sometimes called “zulu time.”

In this example, **01** is the **first day of the month**, and **1657Z** is **1657 UTC**.

## What does **AUTO** and/or **COR** mean, if included?

Let's look at the meanings of AUTO and COR separately.

```
METAR KBLV 011657Z AUTO 25015G30KT 210V290  
3/8SM R32L/1000FT FG BKN005 01/M01 A2984 RMK  
A02A SLP034
```

**AUTO** refers to an **automated observation** with measurements taken by equipment such as the domestic Automated Weather Observing System (AWOS) or Automated Surface Observation System (ASOS), or the Air Force's Automated Meteorological Station (AMS), also known as AN/FMQ-19. AO1 denotes an observation taken by equipment lacking a precipitation type discriminator (rain vs. snow). AO2 denotes an observation taken by standard equipment with a full complement of sensors. **A02A** denotes an **automated observation augmented by a human observer**.

```
METAR KBLV 011657Z AUTO COR 25015G30KT  
210V290 3/8SM R32L/1000FT FG FU BKN005 01/M01  
A2984 RMK A02A SLP034 COR 1725
```

**COR** indicates a **corrected observation**. Disregard the previous transmission. **COR 1725** means that the **correction was transmitted at 1725Z**.

**How do I determine the wind speed and direction?**

METAR KBLV 011657Z AUTO **25015G30KT**  
210V290 3/8SM R32L/1000FT FG BKN005  
01/M01 A2984 RMK A02 SLP034

The data group followed by KT (knots) is the wind.

The first three digits are the true direction to the nearest 10 degrees from which the wind is blowing. The next two digits are the sustained speed. If gusts are present, the next two or three digits following the “G” are the “gust,” the maximum wind speed in the last ten minutes.

In this example, the **25015G30KT** group is the wind direction and speed. Here, the **wind is blowing from 250 degrees (true) at a sustained speed of 15 knots with 30-knot gusts.**

**How do I determine if the wind is varying between directions?**

METAR KBLV 011657Z AUTO 25015G30KT  
**210V290** 3/8SM R32L/1000FT FG BKN005  
01/M01 A2984 RMK A02 SLP034

A wind variability group will be reported if the wind is variable by 60 degrees or more and the speed is greater than 6 knots. This remark will contain the extremes of the wind directions, separated by “V.”

In this example, **210V290** are reads, “wind direction varying between 210 and 290.”



**How do I determine the prevailing visibility?**

METAR KBLV 011657Z AUTO 25015G30KT  
210V290 **3/8SM** R32L/1000FT FG BKN005  
01/M01 A2984 RMK A02 SLP034

In this example, **3/8SM** (3/8 of a statute mile) is the prevailing visibility. Prevailing visibility is the greatest horizontal visibility observed throughout at least half the horizon circle, and is not necessarily continuous.

Sector visibility will be reported in the remarks section if it differs from the prevailing visibility and is less than 3 miles. For sector visibility format, see VIS remarks in Figure 2 on page 17.

METAR EDDF 071320Z 22008KT **9999** SCT036  
SCT090 BKN280 19/10 Q1011 NOSIG

At overseas locations, visibility is reported in meters, and SM is omitted. The largest reportable metric value is **9999**. This value represents a **visibility greater than 9000 meters** (7 SM or more). To convert visibility values from meters to statute miles see Attachment 3 on page 33 or see Flight Information Handbook conversion tables.

**What if there is a group that begins with the letter “R”?**

METAR KBLV 011657Z AUTO 25015G30KT 210V290  
3/8SM **R32L/1000FT** FG BKN005 01/M01 A2984 RMK  
A02 SLP034

Runway Visual Range (RVR) follows the visibility and begins with the letter “R.” The runway heading will follow the “R,” and in this example, “32L” represents runway 32-Left (C-Center, R-Right). The last four digits report the visibility in feet.

In this example, **R32L/1000FT** reads, “runway visual range for runway 32 Left is 1,000 ft.”

At overseas locations, visibility is reported in meters, and FT is omitted from the RVR group. The same RVR at an overseas location would appear as R32L/0300 and read, “runway visual range for 32 Left is 300 meters.”

**How would I decode the formats M0600FT or P6000FT or R06L2000V4000FT (not in example above)?**

<b>M0600FT</b>	Reads, “RVR is less than 600 feet.” ( <b>M</b> = less than)
<b>P6000FT</b>	Reads, “RVR is greater than 6,000 feet.” ( <b>P</b> = greater than)
<b>R06L2000V4000FT</b>	Reads, “RVR for 6 Left is variable between 2,000 and 4,000 feet.” “ <b>V</b> ” indicates that the RVR is variable between two thresholds.

**How do I determine if there is any weather?**

METAR KBLV 011657Z AUTO 25015G30KT  
210V290 3/8SM R32L/1000FT **FG** BKN005  
01/M01 A2984 RMK A02 SLP034

If a weather element (precipitation or obstruction to visibility) is observed, it will be found in the data group following the visibility. The absence of a weather element group indicates that no precipitation or obstruction to visibility is occurring at the time of the observation. In this example, “**FG**” represents “Fog.”

To methodically decode a weather group, look for six key elements (*depending on the phenomena, one or more may be omitted*). In order, these elements are: **Intensity** (symbol preceding the code), **Proximity**, **Descriptor**, **Precipitation Description**, **Obscuration** (other than precipitation), and **Other**.

For a complete table of weather group elements, see Figure 1 on page 11.

**Figure 1. Weather/Obscuration Table**

Phenomenon Qualifiers		
Element 1: Intensity	Element 2: Proximity	Element 3: Description
<b>-</b> Light	<b>VC</b> In the vicinity	<b>BC</b> Patches
<b>none</b> Moderate	<b>none</b> On station	<b>BL</b> Blowing
<b>+</b> Heavy		<b>DR</b> Low Drifting
<i>Note: + can also mean a well-developed dust storm, sandstorm, whirl, dust devil, tornado, or waterspout</i>		<b>FZ</b> Freezing
		<b>MI</b> Shallow
		<b>PR</b> Partial (covering part of the sky)
		<b>SH</b> Shower(s)
		<b>TS</b> Thunderstorm

Types of Weather Phenomenon		
Element 4: Precipitation	Element 5: Obscuration	Element 6: Other
<b>DZ</b> Drizzle	<b>BR</b> Mist, vis. $\geq 5/8$ SM	<b>DS</b> Dust Storm
<b>GR</b> Hail, diam. $\geq 5$ mm (.25")	(or $\geq 1000$ m)	<b>FC</b> Funnel cloud(s)
<b>GS</b> Small Hail / Snow Pellets, diam. $< 5$ mm (.25")	<b>DU</b> Widespread Dust	e.g., tornado or waterspout
<b>IC</b> Ice Crystals	<b>FG</b> Fog, vis. $< 5/8$ SM	<b>PO</b> Well-developed dust/sand whirls
<b>PL</b> Ice Pellets	(or $\geq 1000$ m)	
<b>RA</b> Rain	<b>FU</b> Smoke	
<b>SG</b> Snow Grains	<b>HZ</b> Haze	<b>SQ</b> Squalls
<b>SN</b> Snow	<b>PY</b> Spray	<b>SS</b> Sandstorm
<b>UP</b> Unknown Precipitation (Automated only)	<b>SA</b> Sand	
	<b>VA</b> Volcanic Ash	

### Examples:

**+SHRASNPL** heavy rain showers, snow, ice pellets  
**TSRAGS** thunderstorm, moderate rain, small hail  
**BR HZ** mist (vis.  $\geq 5/8$ SM), haze  
**BCFG** patchy fog (vis.  $< 5/8$ SM)  
**PRFG** partial fog (sector vis.  $< 5/8$ SM)

**+DRSN** heavy snow, drifting  
**VCSH** showers in vicinity  
**FZDZ** freezing drizzle  
**BLPY** blowing spray  
**+DS** heavy dust storm

**How do I determine the layers of clouds?**

METAR KBLV 011657Z AUTO 25015G30KT 210V290  
3/8SM R32L/1000FT FG **BKN005** 01/M01 A2984 RMK  
A02 SLP034

Each observed cloud layer is encoded in a cloud group with sky coverage, altitude of the cloud base above ground level (AGL), and sometimes cloud type. The first three letters of each cloud group denote sky coverage as in the table below. In the example above, **BKN** indicates **broken cloud coverage**. Then the cloud base of each layer is reported in hundreds of feet AGL. Append two zeros to the value given. In this example, **005** represents the value **500 feet AGL**. Finally, codes for convective cloud types are appended. CB stands for cumulonimbus; TCU stands for towering cumulus.

If surface-based clouds or other surface-based obscurations (e.g., smoke, haze) are reported (i.e., cloud base is 000), then vertical visibility, where available, is also reported in hundreds of feet, following the letters, VV. When the lowest broken or overcast cloud base is indefinite, vertical visibility determines the ceiling.

**Sky coverage in eighths:**

SKC	Sky clear
FEW	Few -- 0-2 eighths
SCT	Scattered -- 3-4 eighths
BKN	* Broken -- 5-7 eighths
OVC	* Overcast -- 8 eighths

\* Constitutes a “ceiling”

## **How do I determine the current **temperature** and **dewpoint**?**

METAR KBLV 011657Z AUTO 25015G30KT  
210V290 3/8SM R32L/1000FT FG BKN005  
**01/M01** A2984 RMK A02 SLP034

The group following the sky condition is the temperature and dewpoint information in degrees Celsius. To convert temperatures from Celsius to Fahrenheit see Attachment 2 on page 32 or see Flight Information Handbook conversion tables.

In this example, **01** is the temperature in degrees Celsius (**1°C**), and **M01** is the dewpoint in degrees Celsius (**-1°C**). An “M” in the temperature field means “minus” (below zero).

**How do I determine the current altimeter setting?**

METAR KBLV 011657Z AUTO 25015G30KT  
210V290 3/8SM R32L/1000FT FG BKN005  
01/M01 **A2984** RMK A02 SLP034

The 5-character group beginning with A, following the temperature/dewpoint group is the altimeter setting in inches and hundredths of an inch of mercury (inches Hg), used in the United States and at US airfields overseas. In this example, **A2984** represents a **current altimeter setting of 29.84 inches Hg**.

METAR EDDF 071320Z 22008KT 9999 SCT036  
SCT090 BKN280 19/10 **Q1011** NOSIG

The 5-character group beginning with Q, following the temperature/dewpoint group is the altimeter setting in hectopascals (hPa), used in some overseas locations. A hectopascal is equivalent to a millibar (mb). In this example, **Q1011** represents a **current altimeter setting of 1011 hPa or 1011 mb**.

To convert altimeter settings from mb (or hPa) to inches Hg, see Attachment 4 on page 34 or Flight Information Handbook conversion tables.

**What is RMK?**

METAR KBLV 011657Z AUTO 25015G30KT 210V290  
3/8SM R32L/1000FT FG BKN005 01/M01 A2984 **RMK**  
A02 **SLP034**

In METAR reports from the United States and from overseas US military airfields, **RMK** indicates the start of the **Remarks** section, following the altimeter setting. Remarks contain any pertinent information beyond the standard fields provided, and can be either encoded or spelled out in plain language. For a partial listing of possible METAR remarks, see [Figure 2 on page 17](#). Additional abbreviations are constructed in accordance with FAA Order 7340.1, *Contractions*.

In this example, the remark, **SLP034**, is the sea level pressure in millibars (or hectopascals) to the nearest tenth. To decode, place a “10” or “9” before the first digit (use a 9 if the 3-digit value is 500 or more), and place a decimal point before the last digit. The sea level pressure remark in the above example would read “**current sea level pressure of 1003.4 millibars.**”

**Caution:** Do not confuse the **METAR** remarks “5####” group or “6####” group with the **TAF** “5#####” (turbulence) group or the **TAF** “6#####” (icing) group. Unlike TAF code usage, METAR “5” and “6” group codes indicate pressure tendency and cumulative precipitation amounts--if you need these values, contact your weather provider for decoding instructions. See [pages 27 and 28](#) for more info on decoding icing and turbulence forecasts.



## What is supplemental information?

Overseas (except at US military installations), METAR remarks are called “supplemental information.” Supplemental information follows the altimeter setting and uses remark codes like US remarks, as in [Figure 2 on page 17](#), but is not preceded by RMK.

Supplemental information can also include:

- recent weather elements, coded with a leading RE ,
- sea surface temperature in °C and sea state 0-9, coded W##/S#,
- runway state, coded as an 8-digit numerical group determined by regional air navigation agreement, and/or
- a 2-hour forecast trend as described below.

METAR EDDF 071320Z 22008KT 9999 SCT036 SCT090  
BKN280 19/10 Q1011 **NOSIG**

Overseas METAR forecast trend groups either start with BECMG or TEMPO, consistent with TAF coding conventions, or they consist entirely of **NOSIG**, which indicates that **no significant changes** in reportable weather elements **are expected during the 2 hours following the reported observation**.

METARs issued by North Atlantic Treaty Organisation (NATO) observers have, as the last data group, a color code for ceiling and visibility data:

### NATO Airfield Weather Color Code. source: AFMAN 15-111 USAFESUP1

Color Code	Color	* Ceiling at or above:	Visibility at or above:
BLU	blue	2500 feet	8000 meters
WHT	white	1500 feet	5000 meters
GRN	green	700 feet	3700 meters
YLO	yellow	300 feet	1600 meters
AMB	amber	200 feet	0800 meters
RED	red	< 200 feet	< 0800 meters
BLACK	black	<b><i>Airfield not useable for reasons other than ceiling or visibility</i></b>	

\* Belgium, France, Netherlands, and United Kingdom use scattered clouds instead of ceiling

**Figure 2. Remarks Decode Table**

**A01** – Reported by automated observation equipment that **CANNOT** distinguish between rain and snow

**A02** – Reported by automated observation equipment that **CAN** distinguish between rain and snow

**ACC W** – **AltoCumulus Castellanus** clouds **West**

**ACSL SW-S** – **AltoCumulus Standing** Lenticular clouds **SouthWest** through **South**

**CB W MOV E** – **Cumulonimbus** clouds **West** **MOVing East**

**CBMAM DSNT S** – **Cumulonimbus** **MAM**matus clouds to the **DiStAnt** **South**

**CSSL OVR MT E** – **CirroCumulus** **Standing** Lenticular clouds **OVeR** **MounTain(s)** to the **East**

**CONS LTGCA** – **CONTinuous** (more than 6 flashes per minute) **LighTninG**, **Cloud to Air**

**FROPA** – ... due to **FRONtal** **Pa**ssage

**FRQ** – **FR**equent (1-6 flashes per minute for lightning)

**IR** – **Ice** on **Runway**

**LSR** – **Loose** **S**now on **Runway**

**LTGCA** – **LighTninG**, **Cloud to Air**

**LTGCC** – **LighTninG**, **Cloud to Cloud**

**LTGCG** – **LighTninG**, **Cloud to Ground**

**LTGIC** – **LighTninG**, **In-Cloud**

**OCNL** – **OC**cassio**NaL** (less than 1 flash per minute for lightning)

**PK WND 28045/1955** – **PeaK WiND** **280** at **45** knots occurred at **1955Z**

**PK WND 34050/38** – **PeaK WiND** **340** at **50** knots occurred at **38** minutes past the hour

**PRESRR / PRESFR** – **PRES**surre **R**ising **R**apidly / **PRES**surre **F**alling **R**apidly

**PSR** – **P**acked **S**now on **R**unway

**RAB20SNB20E55** – **RA**in and **SN**ow **B**egan at **20** minutes past the hour, **E**nded at **55** min past

**RCR01** – **R**unway **C**ondition **R**eadings – values 00 to 25; higher values better for flight ops

**RCRNR** – **RCR**-equipped, but **No** **R**eport; or Base Operations closed

**RSC** – **R**unway **S**urface **C**ondition as determined by Airfield or Operations Manager

**RVRNO** – **RVR**-equipped, but **NO** report

**SFC VIS 2 1/2** – **SurFaCe** **VIS**ibility is **2 1/2** statute miles; remarked when (lower) tower visibility is reported in METAR body

**SLP015** – **S**ea **L**evel **P**ressure is **1001.5** millibars

**TCU OHD** – **T**owering **C**umulus clouds **OVeR****Head**

**TCU W** – **T**owering **C**umulus clouds to the **West**

**TSB05E30** – **Th**under**S**torm **B**egan at **05** minutes past the hour and **E**nded at **30** min past

**TWR VIS 1** – **ToWeR** **VIS**ibility is **1** statute mile; remarked when (lower) surface visibility is reported in METAR body

**VIRGA** – **VIRGA** at the station; precipitation observed but not reaching the ground

**VIRGA DSNT NE** – **VIRGA** to the **DiStAnt** **NorthEast**

**VIRGA SW** – **VIRGA** to the **SouthWest**

**VIS 1V2** – **VIS**ibility is **V**ariable between **1** and **2** miles

**VIS 2 RWY 11** – **VIS**ibility is **2** statute miles at **RunWaY 11**

**VIS N 2** – **VIS**ibility in the **N**orthern sector is **2** statute miles

**WR** – **W**et **R**unway

**WSHFT45** – **W**ind **S**hift at **45** minutes past the hour

**What type of report is this?****TAF**

KBLV 051212 14005KT 8000 BR FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 16010KT 3200 -SHRA OVC020 QNH2959INS  
TEMPO 1416 21015G30KT 1600 TSRA BKN008CB OVC020  
BECMG 1617 29008KT 3200 -RA OVC030 620304 QNH2958INS  
BECMG 1819 31012G22KT 9999 NSW SCT040 WSCONDS 520004  
QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z

**TAF** (**Terminal Aerodrome Forecast**) is a weather forecast at an airport or military base for a specific period (usually 24 hours).

**TAF**

KBLV **AMD** 051812 21015G30KT 0800 TSRA BKN008CB OVC020  
BECMG 1819 29008KT 1600 -RA OVC030 620304 QNH2958INS  
BECMG 1920 31012G22KT 9999 NSW SCT040 520004 QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z  
**AMD 1820**

**AMD** (**Amended Aerodrome Forecast**) is issued because the previous version is no longer representative of the current or expected weather. The amended TAF supersedes the previous TAF. In the above example, **AMD 1820** indicates that the forecast was **amended at 1820Z**. Always refer to the date/time group at the end of the TAF to determine the most current forecast.

**TAF**

KBLV **AMD COR** 051812 21015G30KT 0800 TSRA BKN005CB  
OVC020  
BECMG 1819 29008KT 1600 -RA OVC030 620304 QNH2958INS  
BECMG 1920 31012G22KT 9999 NSW SCT040 520004 QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z  
**COR 1925**

**COR** (**Corrected Aerodrome Forecast**) is a TAF that has been corrected. When a corrected TAF is issued, disregard previous TAFs. In the above example, **COR 1925** indicates that the amended forecast was **corrected at 1925Z**. Always refer to the date/time group at the end of the TAF for the most current forecast.

## How do I determine the **location**?

TAF

**KBLV** 051212 14005KT 8000 BR FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 16010KT 3200 -SHRA OVC020 QNH2959INS  
TEMPO 1416 21015G30KT 1600 TSRA BKN008CB OVC020  
BECMG 1617 29008KT 3200 -RA OVC030 620304  
QNH2958INS  
BECMG 1819 31012G22KT 9999 NSW SCT040 WSCONDS  
520004 QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z  
M01/11Z

The 4-character ICAO identifier that follows the report type is the location identifier. **KBLV** (**Scott AFB, IL**) is the location/station.

## How do I determine the **date** and **valid times** of the forecast?

TAF

KBLV **050606** 14005KT 8000 BR FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 16010KT 3200 -SHRA OVC020 QNH2959INS  
TEMPO 1416 21015G30KT 1600 TSRA BKN008CB OVC020  
BECMG 1617 29008KT 3200 -RA OVC030 620304 QNH2958INS  
BECMG 1819 31012G22KT 9999 NSW SCT040 WSCONDS 520004  
QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z

In a military TAF, the group following the ICAO identifier is the valid time of the forecast. Preparation date and time are not included. In this KBLV example, **050606** indicates that the forecast valid time is **from 0600Z on the 5<sup>th</sup> day of the month to 0600Z on the 6<sup>th</sup>.**

TAF

KSTL **051130Z 051212** 14008KT 5SM BR BKN030 WS010/18025KT  
TEMPO 1316 1 1/2SM BR  
FM 1600 16010KT P6SM NSW SKC  
BECMG 2224 20013G20KT 4SM SHRA OVC020  
PROB40 0006 2SM TSRA OVC008CB  
BECMG 0608 21015KT P6SM NSW SCT040

Civilian forecasters encode the date/time group differently from military forecasters. In a civilian TAF, two groupings follow the ICAO identifier: the date and time the forecast was prepared, then the date and the beginning/ending hours that the forecast is valid. In the KSTL example, **05** is the **day of the month** and **1130Z** is the **UTC time of issuance**. **051212** indicates that the forecast is valid from **1200Z on the 5<sup>th</sup> day of the month to 1200Z on the 6<sup>th</sup>.**

## **TAF**      *Time and Type of Change Expected*

**How do I determine the time and type of changes that will occur?**

TAF

KSTL 051130Z 051212 14008KT 5SM BR BKN030

WS010/18025KT

**TEMPO 1316** 1 1/2SM BR

**FM 1600** 16010KT P6SM NSW SKC

**BECMG 2224** 20013G20KT 4SM SHRA OVC020

**PROB40 0006** 2SM TSRA OVC008CB

**BECMG 0608** 21015KT P6SM NSW SCT040

Civilian and military forecasters alike encode the time and type of change expected with TEMPO, FM, and BECMG groups.

TEMPO represents a temporary condition. In this example, **TEMPO 1316** 1 1/2SM BR reads, “**Temporary condition between 1300Z and 1600Z** of 1 1/2 statute mile visibility in mist.” Only the temporary changing conditions are included in TEMPO groups.

FM means “from” and indicates a rapid weather change where all data groups in the previous line are superseded. In this example, **FM 1600** reads, “**From 1600Z ...**”

BECMG means “becoming” or a “gradual change” in meteorological conditions and becomes the predominant group by the end time listed. In this example, **BECMG 2224** reads “**Becoming from 2200Z to 2400Z.**”

PROB40 (civilian use only) represents a 40% probability or chance of conditions occurring along with associated weather conditions (wind, visibility, sky conditions).

In this example, **PROB40 0006** 2SM TSRA 0VCO08CB reads, “**40% chance between 0000Z and 0600Z** of visibility 2 statute miles in moderate thunderstorms, 800 overcast cumulonimbus clouds.”

## How do I determine the **wind speed and direction**?

TAF

KBLV 051212 **14005KT** 8000 BR FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 **16010KT** 3200 -SHRA OVC020 QNH2959INS  
TEMPO 1416 **21015G30KT** 1600 TSRA BKN008CB OVC020  
BECMG 1617 **29008KT** 3200 -RA OVC030 620304 QNH2958INS  
BECMG 1819 **31012G22KT** 9999 NSW SCT040 WSCONDS 520004  
QNH2952INS  
BECMG 2021 **30008KT** 9999 SKC QNH2950INS T08/18Z M01/11Z

The data group after the valid time and followed by KT (knots) is the forecast wind speed.

The first three digits within a wind group are the true direction to the nearest 10 degrees from which the wind will blow. The next two digits are the sustained speed. If gusts are forecasted, the next two or three digits following the “G” are the “gust,” the maximum wind speed in a ten-minute window.

In this example, **14005KT**, 16010KT, 21015G30KT, 29008KT, 31012G22KT, and 30008KT are the wind direction and speed groups.

In the first wind group, **the wind is forecasted to blow from 140 degrees (true) at a sustained speed of 05 knots. No gust is forecasted.**

## How do I determine the forecast visibility?

TAF

KBLV 051212 14005KT **8000** BR FEW030 WS010/18040KT  
 QNH2960INS  
 BECMG 1314 16010KT **3200** -SHRA OVC020 QNH2959INS  
 TEMPO 1416 21015G30KT **1600** TSRA BKN008CB OVC020  
 BECMG 1617 29008KT **3200** -RA OVC030 620304 QNH2958INS  
 BECMG 1819 31012G22KT **9999** NSW SCT040 WSCONDS 520004  
 QNH2952INS  
 BECMG 2021 30008KT **9999** SKC QNH2950INS T08/18Z M01/11Z

In the military and at overseas locations, visibility is forecasted in meters. The 4-character group following the wind is the forecast visibility. In the KBLV example, **8000**, **3200**, **1600**, **3200**, and **9999** are the **forecast visibilities in meters**. 9999 is the greatest value forecasted. A value of 9999 indicates a forecast visibility of greater than 9000 meters (7 statute miles or greater). To convert visibility values from meters to statute miles, see [Attachment 3 on p. 33](#) or see Flight Information Handbook conversion tables.

Overseas locations may use the contraction “CAVOK” (ceiling and visibility OK). **CAVOK** is used when there is **no significant weather**, the **visibility is 10 km or greater**, and the **ceilings are greater than 5,000 ft**.

TAF

KSTL 051130Z 051212 14008KT 5SM BR BKN030 WS010/18025KT  
 TEMPO 1316 1 1/2SM BR  
 FM 1600 16010KT **P6SM** NSW SKC  
 BECMG 2224 20013G20KT 4SM SHRA OVC020  
 PROB40 0006 2SM TSRA OVC008CB  
 BECOMG 0608 21015KT **P6SM** NSW SCT040

In the CONUS, civilian TAFS forecast visibility in statute miles up to 6 statute miles, beyond which **P6SM** is used to indicate **forecast visibility greater than 6 statute miles**.



## How do I determine if there is any forecast weather?

TAF

KBLV 051212 14005KT 8000 **BR** FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 16010KT 3200 **-SHRA** OVC020 QNH2959INS  
TEMPO 1416 21015G30KT 1600 **TSRA** BKN008CB OVC020  
BECMG 1617 29008KT 3200 **-RA** OVC030 620304  
QNH2958INS  
BECMG 1819 31012G22KT 9999 **NSW** SCT040 WSCONDS  
520004 QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z  
M01/11Z

The weather data group (forecast precipitation or obstruction to visibility) follows the visibility data group.

In this example, **BR** means “mist,” **-SHRA** means “light rain showers,” **TSRA** means a “thunderstorm with moderate rain,” and **-RA** means “light rain.” **NSW** (no significant weather) is used to indicate that the weather or obscuration listed in the previous group is no longer expected to occur. Absence of a weather or obscuration group means that no weather or obscuration is expected during the forecast period.

To methodically decode a weather group, look for six key elements (depending on the phenomena, one or more may be omitted). In order, these elements are: **Intensity** (symbol preceding the code), **Proximity**, **Descriptor**, **Precipitation Description**, **Obscuration** (other than precipitation) and **Other**.

For a complete table of weather group elements, [see Figure 1 on page 11](#).

## How do I determine the layers of **forecast clouds**?

TAF

KBLV 051212 14005KT 8000 BR **FEW030** WS010/18040KT  
 QNH2960INS  
 BECMG 1314 16010KT 3200 -SHRA OVC020 QNH2959INS  
 TEMPO 1416 21015G30KT 1600 TSRA **BKN008CB OVC020**  
 BECMG 1617 29008KT 3200 -RA OVC030 620304  
 QNH2958INS  
 BECMG 1819 31012G22KT 9999 NSW SCT040 WSCONDS  
 520004 QNH2952INS  
 BECMG 2021 30008KT 9999 **SKC** QNH2950INS T08/18Z  
 M01/11Z

Cloud height is always forecasted in hundreds of feet. Add two zeros to the end of the value given. In this example, **FEW030**, **BKN008CB**, **OVC020**, and **SKC** represent the values 3,000 few, 2,000 overcast, 800 broken cumulonimbus, and sky clear, respectively.

In place of cloud layers, vertical visibility in hundreds of feet will appear in a TAF cloud group when the sky is forecast to be totally obscured. For example, VV002 represents a vertical visibility of 200 feet. Vertical visibility in a TAF represents the forecast ceiling.

### Sky coverage (eighths):

SKC	Sky clear
FEW	Few -- 0-2 eighths
SCT	Scattered -- 3-4 eighths
BKN	* Broken -- 5-7 eighths
OVC	* Overcast -- 8 eighths

\* Constitutes a “ceiling”

**How do I determine if **wind shear** is in the forecast?**

TAF

KBLV 051212 14005KT 8000 BR FEW030

**WS010/18040KT** QNH2960INS

BECMG 1314 16010KT 3200 -SHRA OVC020

QNH2959INS

TEMPO 1416 21015G30KT 1600 TSRA BKN008CB

OVC020

BECMG 1617 29008KT 3200 -RA OVC030 620304

QNH2958INS

BECMG 1819 31012G22KT 9999 NSW SCT040 **WSCONDS**

520004 QNH2952INS

BECMG 2021 30008KT 9999 SKC QNH2950INS

T08/18Z M01/11Z

A wind shear group is included if non-convective low-level winds (up to 2,000 feet) will change in speed and/or direction and result in a shearing action. WS indicates forecast wind shear and is followed by a 3-digit height in hundreds of feet AGL, a slant character, “/,” and forecast wind at the height indicated. **WS010/18040KT** reads, “forecast wind shear at 1,000 feet above the station; wind at 1,000 feet is from 180 degrees (true) at 40 knots.”

The remark **WSCONDS** is used to indicate the potential for wind shear when there is **not enough information available to** reliably **predict the height, direction and speed** of the wind shear. WSCONDS is normally used beyond the first 6 hours of the TAF.

For some locations, the wind shear group will follow the minimum altimeter setting group (in the TAF remarks) instead of following the cloud group.

## How do I determine forecast icing conditions?

TAF

```
KBLV 051212 14005KT 8000 BR FEW030 QNH2960INS
BECMG 1617 29008KT 3200 -RA OVC030 620304 QNH2958INS
BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z
```

If forecasted, the icing group will be prefixed by the number 6, and follows the cloud group. To decode, follow these instructions:

1. Find the icing designator “6” following the cloud group (620304).
2. The next digit gives icing type and intensity (620304). See [Figure 3](#).
3. The next three digits give the base of the icing layer in hundreds of feet (620304).
4. The last digit provides the icing layer depth in thousands of feet (620304), so add this value to the base height to determine the top limit of the icing conditions.

In the above example, the icing forecast will read, “light rime icing (in cloud) from 3,000 to 7,000 feet.”

**Figure 3. Icing Intensity Decode Table**

CODE	DECODE
0	Trace Icing or None (see note)
1	Light Mixed Icing
2	Light Rime Icing In Cloud
3	Light Clear Icing In Precipitation
4	Moderate Mixed Icing
5	Moderate Rime Icing In Cloud
6	Moderate Clear Icing In Precipitation
7	Severe Mixed Icing
8	Severe Rime Icing In Cloud
9	Severe Clear Icing In Precipitation
<b>Note:</b> Air Force code “0” means a trace of icing, World Meteorological Organization code “0” means no icing	

## How do I determine forecast turbulence conditions?

TAF

KBLV 051212 14005KT 8000 BR FEW030 QNH2960INS  
 BECMG 1819 31012G22KT 9999 NSW SCT040 **520004** QNH2952INS  
 BECMG 2021 30008KT 9999 SKC QNH2950INS T08/18Z M01/11Z

If forecasted, the turbulence code will be prefixed by the number 5, and will follow the cloud or icing group. To decode, follow these instructions:

1. Look for the turbulence designator “5” that follows the cloud or icing group (**520004**).
2. The next digit will determine the intensity (**520004**). See [Figure 4](#).
3. The next three digits will determine the base limit of the turbulence layer in hundreds of feet AGL (**520004**).
4. The last digit will determine the turbulence layer depth in thousands of feet (**520004**), so add this value to the base height to determine the top limit of the turbulence conditions.

In the above example, the turbulence forecast will read, “**occasional moderate turbulence in clear air from the surface to 4,000 feet.**”

**Figure 4. Turbulence Intensity Decode Table**

CODE	DECODE
0	None
1	Light turbulence
2	Moderate turbulence in clear air, occasional
3	Moderate turbulence in clear air, frequent
4	Moderate turbulence in cloud, occasional
5	Moderate turbulence in cloud, frequent
6	Severe turbulence in clear air, occasional
7	Severe turbulence in clear air, frequent
8	Severe turbulence in cloud, occasional
9	Severe turbulence in cloud, frequent
X	Extreme turbulence
<b>Note:</b> Occasional is defined as occurring less than 1/3 of the time	

**How do I determine the forecast lowest altimeter setting?**

TAF

KBLV 051212 14005KT 8000 BR FEW030

WS010/18040KT **QNH2960INS**

BECMG 1314 16010KT 3200 -SHRA OVC020

**QNH2959INS**

TEMPO 1416 21015G30KT 1600 TSRA BKN008CB  
OVC020

BECMG 1617 29008KT 3200 -RA OVC030 620304

**QNH2958INS**

BECMG 1819 31012G22KT 9999 NSW SCT040

WSCONDS 520004 **QNH2952INS**

BECMG 2021 30008KT 9999 SKC **QNH2950INS**

T08/18Z M01/11Z

Forecast minimum altimeter settings are only found in military forecasts. These are near the end of the line, beginning with QNH (minimum) and ending with INS (inches). To convert altimeter settings from inches Hg to hectopascals (millibars), use Attachment 4 on page 34 or use Flight Information Handbook conversion tables.

In this example, **QNH2960INS**, **QNH2959INS**, **QNH2958INS**, **QNH2952INS**, and **QNH2950INS** are read as minimum altimeter settings of 29.60, 29.59, 29.58, 29.52, and 29.50 inches of mercury, respectively.

**How do I determine the forecast **temperatures**?**

TAF

KBLV 051212 14005KT 8000 BR FEW030 WS010/18040KT  
QNH2960INS  
BECMG 1314 16010KT 3200 -SHRA OVC020 QNH2959INS  
TEMPO 1416 21015G30KT 1600 TSRA BKN008CB OVC020  
BECMG 1617 29008KT 3200 -RA OVC030 620304  
QNH2958INS  
BECMG 1819 31012G22KT 9999 NSW SCT040 WSCONDS  
520004 QNH2952INS  
BECMG 2021 30008KT 9999 SKC QNH2950INS **TM08/18Z**  
**01/11Z**

Forecast temperatures for the forecast period are routinely found only in military TAFs. They are found on the last line, following the minimum altimeter, beginning with the designator “T,” maximum temperature first. To convert temperature units from Celsius to Fahrenheit, use Attachment 2 on page 32 or use Flight Information Handbook conversion tables.

In this example, **08/18Z** indicates a **forecast maximum temperature of 8°C at 1800Z**, and **TM01/11Z** indicates a **forecast minimum temperature of -1°C at 1100Z**.

NORMAN R. SEIP, Maj Gen, USAF  
Acting Deputy Chief of Staff  
Air and Space Operations

## **GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION**

### ***References***

AFMAN 15-111, *Surface Weather Observations*

AFMAN 15-124, *Meteorological Codes*

ICAO Document 8896AN/893/4, *Manual of Aeronautical Meteorological Practice*, ISBN 92-9194-345-2

AFMAN 15-111 USAFESUP1, *United States Air Forces in Europe Supplement to Surface Weather Observations*

FAA Order 7340.1, *Contractions*

### ***Abbreviations and Acronyms***

**AGL**—Above Ground Level

**FAA**—Federal Aviation Administration

**ICAO**—International Civil Aviation Organization

**METAR**—Aviation Routine Weather Report

**NATO**—North Atlantic Treaty Organisation

**RVR**—Runway Visual Range

**TAF**—Terminal Aerodrome Forecast

**UTC**—Coordinated Universal Time, sometimes called “zulu time”



**TEMPERATURE CONVERSION****Degrees Fahrenheit to Degrees Celsius**

°F			°F			°F			°F		
From	To	°C	From	To	°C	From	To	°C	From	To	°C
128.3	130.0	54	83.3	85.0	29	38.3	40.0	04	-4.8	-3.1	M20
126.5	128.2	53	81.5	83.2	28	36.3	38.2	03	-6.6	-4.9	M21
124.7	126.4	52	79.7	81.4	27	34.7	36.2	02	-8.4	-6.7	M22
122.9	124.6	51	77.9	79.6	26	32.9	34.6	01	-10.2	-8.5	M23
121.1	122.8	50	76.1	77.8	25	32.0	32.8	00	-12.0	-10.3	M24
119.3	121.0	49	74.3	76.0	24	31.2	31.9	M00	-13.8	-12.1	M25
117.5	119.2	48	72.5	74.2	23	29.4	31.1	M01	-15.6	-13.9	M26
115.7	117.4	47	70.7	72.4	22	27.6	29.3	M02	-17.4	-15.7	M27
113.9	115.6	46	68.9	70.6	21	25.8	27.5	M03	-19.2	-17.5	M28
112.1	113.8	45	67.1	68.8	20	24.0	25.7	M04	-21.0	-19.3	M29
110.3	112.0	44	65.3	67.0	19	22.2	23.9	M05	-22.8	-21.1	M30
108.5	110.2	43	63.5	65.2	18	20.4	22.1	M06	-24.6	-22.9	M31
106.7	108.4	42	61.7	63.4	17	18.6	20.3	M07	-26.4	-24.7	M32
104.9	106.6	41	59.9	61.6	16	16.8	18.5	M08	-28.2	-26.5	M33
103.1	104.8	40	58.1	59.8	15	15.0	16.7	M09	-30.0	-28.3	M34
101.3	103.0	39	56.3	58.0	14	13.2	14.9	M10	-31.8	-30.1	M35
99.5	101.2	38	54.5	56.2	13	11.4	13.1	M11	-33.6	-31.9	M36
97.7	99.4	37	52.7	54.4	12	9.6	11.3	M12	-35.4	-33.7	M37
95.9	97.6	36	50.9	52.6	11	7.8	9.5	M13	-37.2	-35.5	M38
94.1	95.8	35	49.1	50.8	10	6.0	7.7	M14	-39.0	-37.3	M39
92.3	94.0	34	47.3	49.0	09	4.2	5.9	M15	-40.8	-39.1	M40
90.5	92.2	33	45.5	47.2	08	2.4	4.1	M16	-42.6	-40.9	M41
88.7	90.4	32	43.7	45.4	07	0.6	2.3	M17	-44.4	-42.7	M42
86.9	88.6	31	41.9	43.6	06	-1.2	+0.5	M18	-46.2	-44.5	M43
85.1	86.8	30	40.1	41.8	05	-3.0	-1.3	M19	-48.0	-46.5	M44

## REPORTABLE VISIBILITY CONVERSION

Statute Miles (SM) to Meters (m)

STATUTE MILES	METERS	STATUTE MILES	METERS	STATUTE MILES	METERS
0	0000	1-1/8	1800	2-3/4	4400
-	0050	-	1900	-	4500
1/16	0100	1-1/4	2000	-	4600
-	0150	-	2100	-	4700
1/8	0200	1-3/8	2200	3	4800
-	0250	-	2300	-	4900
3/16	0300	1-1/2	2400	-	5000
-	0350	-	2500	4	6000
1/4	0400	1-5/8	2600	-	7000
-	0450	-	2700	5	8000
5/16	0500	1-3/4	2800	6	9000
-	0550	-	2900	7	9999
3/8	0600	1-7/8	3000	8	9999
-	0650	-	3100	9	9999
-	0700	2	3200	10	9999
-	0750	-	3300	11	9999
1/2	0800	-	3400	12	9999
-	0900	-	3500	13	9999
5/8	1000	2-1/4	3600	14	9999
-	1100	-	3700	15	9999
3/4	1200	-	3800	20	9999
-	1300	-	3900	25	9999
7/8	1400	2-1/2	4000	30	9999
-	1500	-	4100	35	9999
1	1600	-	4200	40	9999
-	1700	-	4300	Etc.	9999

Double underline marks a change in increment

## Attachment 4

### PRESSURE CONVERSION

Millibars (mb)\* to Inches of Mercury (inches Hg)

	__ _0	__ _1	__ _2	__ _3	__ _4	__ _5	__ _6	__ _7	__ _8	__ _9
094_	27.76	27.79	27.82	27.85	27.88	27.91	27.94	27.96	27.99	28.02
095_	28.05	28.08	28.11	28.14	28.17	28.20	28.23	28.26	28.29	28.32
096_	28.35	28.38	28.41	28.44	28.47	28.50	28.53	28.56	28.59	28.61
097_	28.64	28.67	28.70	28.73	28.76	28.79	28.82	28.85	28.88	28.91
098_	28.94	28.97	29.00	29.03	29.06	29.09	29.12	29.15	29.18	29.21
099_	29.23	29.26	29.29	29.32	29.35	29.38	29.41	29.44	29.47	29.50
100_	29.53	29.56	29.59	29.62	29.65	29.68	29.71	29.74	29.77	29.80
101_	29.83	29.85	29.88	29.91	29.94	29.97	30.00	30.03	30.06	30.09
102_	30.12	30.15	30.18	30.21	30.24	30.27	30.30	30.33	30.36	30.39
103_	30.42	30.45	30.47	30.50	30.53	30.56	30.59	30.62	30.65	30.68
104_	30.71	30.74	30.77	30.80	30.83	30.86	30.89	30.92	30.95	30.98
105_	31.01	31.04	31.07	31.10	31.12	31.15	31.18	31.21	31.24	31.27

\* A millibar (mb) is equal to a hectopascal (hPa)