**Weather Briefing Sources**

**Flight service station (FSS)** — FSSs are the primary source for preflight and in-flight briefings and for filing VFR and IFR flight plans. They make scheduled and unscheduled weather broadcasts and provide weather advisories to known flights in the FSS area. Available aviation weather reports and forecasts are displayed at each FSS. Continuously updated, recorded weather information is provided at selected facilities through:

1. Telephone access to the transcribed weather broadcast (TEL-TWEB).
2. Pilot's Automatic Telephone Weather Answering Service (Patwas).
3. Telephone Information Briefing Service (TIBS).

**Supplemental Weather Service Locations (SWSLs)** — Weather reports are provided by SWSL personnel for the airport at which they are located. They do not provide notams.

**National Weather Service Office (NWSO)** — Weather briefings may be provided by the NWSO in locations not served by an FSS. However, NWSO pilot briefers do not provide notams. They also do not accept flight plans. Available aviation weather reports and forecasts are displayed at each NWSO.

**Computerized weather briefing** — Computerized weather briefings are offered by a number of aviation weather vendors for a fee. However, the FAA's Direct User Access Terminal (DUAT) system is available for free.

**Weather Briefings**

**General procedures**

**Preflight** — Obtain a preflight briefing by telephone or in person. Specify whether you require a *standard, abbreviated*, or *outlook* briefing (see below for details).

**In-flight** — If you need to obtain a preflight briefing or an update to a previous briefing by radio, contact the nearest FSS to obtain this information.

**Background information** — Provide the briefer with the following information:

1. Pilot qualifications.
2. VFR or IFR flight.
3. Aircraft type and N number.
4. Departure point, proposed route, and destination.
5. Proposed altitudes.
6. Estimated time of departure (ETD) and estimated time enroute (ETE).

**Standard briefing**

Request a standard briefing anytime you have not received a previous briefing or have not received preliminary information from TWEB, Patwas, TIBS, DUAT, or other sources. A standard briefing should include the following information:

**Adverse conditions** — Significant meteorological and aeronautical information such as hazardous weather conditions, runway closures, navaid outages, etc.

**VFR flight not recommended** — The briefer will state this when VFR flight is proposed and sky conditions or visibilities are present or forecast that would make flight under visual flight rules inadvisable.

**Synopsis** — A brief statement describing the type, location, and movement of weather systems and/or air masses pertinent to the proposed flight.

**Current conditions** — Weather conditions summarized from all available sources, including surface observations (SAs), pilot reports (pireps), and radar reports (rareps). This information will not be provided, unless asked for, if the proposed time of departure is beyond two hours.

**Enroute forecast** — Forecast enroute conditions summarized from area forecasts (FAs), terminal forecasts (FTs), and weather charts.

**Destination forecast** — Forecast weather at the airport of destination for the estimated time of arrival (ETA).

**Winds aloft** — Forecast winds aloft summarized in knots and direction referenced to true north.

**Notices to airmen (notams)** — Time-critical information essential to planned enroute, terminal, or landing operations such as airport or primary runway closures, changes in the status of navigational aids, instrument landing systems, and radar service availability.

**Air traffic control delays** — Any known ATC delays and flow-control advisories that might affect the proposed flight.

**Additional information** — The following is available upon request:

1. Military training routes (MTRs) and military operations area (MOA) activity within 100 nautical miles of the facility conducting the briefing. (For flights beyond 100 nm, request updated information from enroute FSSs.)
2. A review of the *Notices to Airmen (Class II)* publication for pertinent notams and special notices (e.g., notams concerning conditions more than 400 miles distant or that have been published and are no longer automatically provided during the standard briefing).
3. Approximate density altitude data.
4. A review of such items as air traffic services and rules, immigration procedures, Air Defense Identification Zone (ADIZ) rules, and search and rescue procedures.
5. GPS and loran notams.

**Abbreviated briefing**

Request an abbreviated briefing when you need to supplement mass-disseminated data or need to update a previous briefing or when you need only one or two specific items.

**Specify —**

1. Background information.
2. The time you received the previous information.
3. Source of information.
4. Specific items needed.

**Outlook briefing**

Request an outlook briefing when your proposed time of departure is six or more hours from the time of the briefing. The briefer will provide available forecast data applicable to the proposed flight.

**Aviation Weather Reports and Forecasts**

|  |
| --- |
| [Click for larger image](http://www.aopa.org/images/members/files/handbook/symbols.gif) |
| Weather Symbols |

**ICAO Meteorological Aerodrome Report (METAR)**

METARs are issued worldwide to report aviation weather. They are the equivalent of an SA report. METARS are issued hourly in some locations, but only three or six hourly in others.

Each METAR is a series of groups arranged in a specific order. Each contains information regarding wind, visibility, runway visual range (optional), weather, cloud cover, temperature, dewpoint and surface pressure. A trend forecast may at times be included, but is optional. Supplemental data is supplied in a plain language format, if needed.

The generic format for a METAR is:

**METAR** CCCC YYGGggZ AUTO COR dddff(f)KT(dddVddd) VVVVVSM  
RDrDr/VrVrVrVrFT ww NNNhhh or VVhhh or SKC/CLR  
TT/TdTd APPPP RMK

**Where:** METAR is the routine (scheduled) report and SPECI is the non-routine (unscheduled) report

CCCC is the ICAO identifier

YYGGggZ is the day, hour and minute of the report (UCT)

AUTO or COR is the type of station report. AUTO is a fully automated station with NO human intervention

COR indicates a correction to a previous report

dddff(f)GfffKT(dddVddd) is the wind direction, speed and gusts. (dddVddd) is used if the wind Varies by 60 degrees or more and the speed is greater than 6kts

VVVVVSM is the visibility in Statute Miles

RDrDr/VrVrVrVrFT is the runway visual range in hundreds of feet

ww is present weather

NNNhhh is the cloud amount (FEW, SCT, BKN or OVC) and height of the base in hundreds of feet

The cloud type may be added manually, e.g. TCU

VVhhh would represent Vertical Visibility in hundreds of feet, or SKC/CLR is used for Clear conditions

TT is the temperature in whole degrees Celsius

Sub-zero readings are prefixed with an M

TdTd is the dewpoint temperature in whole degrees C

APPPP is the altimeter in inches of mercury

RMK Remarks that could include, Automated, Manual, Plain language, Additive and Maintenance Data

**Examples:**

KDFW 111753Z VRB03KT 10SM CLR 19/12 A3025 RMK A02 SLP240 T01890117 10189 20067 58002=

KCLE 111806Z 24013KT 10SM SCT024 BKN029 00/MO4 A3026 RMK A02 POOO1=

**The format for decoding METARs is therefore as follows:**

A. Type of Report  
B. Station identifier  
C. Date and Time of observation  
D. Report Modifier  
E. Wind direction and speed (knots)  
F. Visibility in meters  
G. RVR in feet  
H. Present weather (from table below)  
I. Sky Condition  
J. Temperature/dewpoint group in Celsius  
K. Altimeter in inches  
L. Remarks

**Expanding on these items:**

A. Reports are either METAR for routine observations, or SPECI for non-routine (special) observations.

B. Station identifiers are all 4 character ICAO identifiers.

C. Time of observation is always in UTC (formerly Greenwich).

D. Report modifier will be AUTO if fully automated with no human input. COR will indicate a correction.

E. True wind direction in tens of degrees using three digits. Speed is reported in whole knots, using two or three digits. Gusts (G)are appending to the speed if required. Group ends with KT to indicate knots. MS would indicate meters/sec. If wind direction varies by 60 degrees or more, and the speed is > 6 kts, a variable wind group is reported, e.g. 180V250. Direction may be reported VRB if speed is < or equal to 6 kts, e.g. VRB05KT. Calm winds are reported 00000KT.

F. Visibility is in Statute Miles (SM) or meters (M). Group will end with SM if in statute miles. A space divides whole miles and fractions. For AUTO only; M prefixed to value <1/4 mile, e.g. M1/4SM.

G. Runway visual range in hundreds of feet. This is reported when the prevailing visibility is less than or equal to 1 statute mile, or the RVR is < or equal to 6000ft. The group ends with FT to signify feet. For example, R06L/2000FT means RVR on runway 06 Left is 2000 feet. The RVR value may be prefixed with M or P to indicate the reading is below (M), or above (P) the reported value, e.g. R06L/P6000Ft means the RVR is about 6000FT. If the RVR is variable during the 10 minute evaluation period, the variability is reported, e.g. R06L/2000V4000FT.

H. Present weather (other than obscurations) occurring at the station are reported in the body of the METAR. Obscurations are reported if the visibility < 7 miles. Weather is reported in order of decreasing dominance. Automated stations can only report RA, SN, UP, FG, BR, FZFG, HZ, SQ without augmentation. The following table lists the codes for present weather types. A maximum of three groups will be reported.

**Qualifier for Intensity:**

- Light

Moderate (no sign)

+ Heavy

VC In the Vicinity (0SM to 10SM for precipitation, and 5SM to 10SM for non-precipitation)

**Descriptors**

|  |  |
| --- | --- |
| MI | Shallow |
| PI | Partial |
| BC | Patches |
| DR | Low Drifting |
| BL | Blowing |
| SH | Shower(s) |
| TS | Thunderstorm |
| FZ | Freezing |

**Precipitation:**

|  |  |
| --- | --- |
| DZ | Drizzle |
| RA | Rain |
| SN | Snow |
| SG | Snow Grains |
| IC | Ice Crystals |
| PE | Ice Pellets |
| GR | Hail |
| GS | Small hail/Snow Pellets |
| UP | Unknown precipitation |

**Obscuration:**

|  |  |
| --- | --- |
| BR | Mist (visibility 5/8 statute miles or more) |
| FG | Fog (visibility 1/2 mile or less) |
| FU | Smoke |
| VA | Volcanic Ash |
| DU | Widespread Dust |
| SA | Sand |
| HZ | Haze |
| PY | Spray |

**Other phenomena:**

|  |  |
| --- | --- |
| PO | Well-developed Dust/Sand Whirls |
| SQ | Squalls |
| FC | Funnel Cloud, (+FC for Tornado, or Waterspout) |
| SS | Sandstorm |
| DS | Duststorm |

I. Cloud group in the form NCChhh, where NNN is either FEW, SCT, BKN, or OVC to indicate cloud coverage. The term is immediately followed by the cloud height in hundreds of feet. The amount of coverage for each term in eights is listed below. CLR at automated stations means no clouds detected below 12,000 feet.

SKC or CLR 0/8

FEW >0 - 2/8

SCT 3/8 - 4/8

BKN 5/8 -<8/8

OVC 8/8

At manual stations, CB or TCU may be appended to the cloud height if observed.

Vertical Visibility (VV) is reported in hundreds of feet for an indefinite ceiling, e.g. VV002. Surface obscuration reported using amount (FEW, SCT, etc), followed by 000, e.g. SCT000.

**Note for International METAR reports:**

The word CAVOK can be used to replace the groups VVVVVSM RDD/VVVVFT ww NNNhhh when the following conditions apply:

Visibility 10 km or more  
No clouds below 1500 meters  
No cumulonimbus clouds  
No precipitation, thunderstorm, shallow fog or low drifting snow

J. The temperature/dewpoint group follows next with:

TT being the air temperature in degrees Celsius  
TdTd being the dewpoint temperature in degrees Celsius  
Sub-zero values are prefixed with an M, e.g., 03/M02.

K. The altimeter reading is prefixed with A indicating altimeter in inches of mercury. It is reported using four digits; tens, units, tenths, and hundredths of an inch of mercury, e.g., A2990.

L. Remarks (RMK) are divided into two categories.

1) Automated, Manual (Augmented), Plain Language (Manual only).  
2) Additive and Automated Maintenance Data.

**The following describes the order in which remarks are reported.**

Automated, Manual, Plain Language Remarks

Volcanic Eruption

Tornadic Activity

Type of Automated station (A01, A02)

Peak Wind (PK WND)

Windshift (WSHFT)

Frontal passage (FROPA)

Tower Visibility (TWR VIS)

Surface Visibility (SFC VIS)

Variable Prevailing Visibility (VIS)

Sector Visibility (VIS [DIR])

Visibility at 2nd location (VIS [LOC])

Lightning location and frequency (LTG)

Begin/end of precipitation

Begin/end of thunderstorm

Thunderstorm location

Hailstone size

Virga observation

Variable ceiling height (CIG)

Obscurations

Variable Sky Conditions

Significant Cloud Types

Ceiling height at 2nd location

Pressure Rising/Falling Rapidly (PRESRR, PRESFR)

Sea Level Pressure (SLP)

Aircraft Mishap (ACFT MSHP)

No specific reports taken (NOSPECI)

Snow increasing rapidly (SNINCR inches-hr/inches on ground)

Other significant information (agency specific, e.g. LAST)

Additive and Automated Maintenance Data

Hourly precipitation amount (Prrrr)

a trace is P000

3- and 6-Hour precipitation amount (6RRRR)

24-Hour precipitation amount (7RRRR)

Snow depth on ground (4/sss)

Water equivalent of snow on ground (933RRR)

Cloud Type (8/CCC)

Duration of sunshine (98mmm)

Hourly Temperature and Dewpoint (TsnTTTsnTdTdTd)

sn=0 if T> 0.0C; sn=1 if T <0.0C

6-Hour maximum temperature (1snTTT)

6-Hour minimum temperature (2snTTT)

24-Hour Maximum/minimum temperature (4snTTTsnTTT)

3-Hour pressure tendency (5appp)

Sensor status indicators:

RVRNO, PWINO, PNO, FZRANO, TSNO,

VISNO\_LOC, CHINO\_LOC

Maintenance Check Indicator: $

**Note:**

If an element or phenomena does not occur, is missing, or cannot be observed, the corresponding group and space are omitted (main body or remarks), except for Sea Level Pressure (SLPppp), 3-, 6-, and 24-Hour precipitation groups. At designated stations, SLPNO shall be reported in a METAR when the SLP is not available.

**Other contractions that may appear in International METARs as part of the trend forecast:**

INTER meaning intermittent (same as occasional in US format)  
TEMPO meaning temporary (same as brief in US format)  
GRADU..a gradual change over a period greater than 1/2 hour  
RAPID..a rapid change over a period less than 1/2 hour  
FRONT..same as RAPID>

**Other abbreviations**

RE...followed by a weather type indicates its occurrence within the past hour  
WX NIL..the end of thunderstorms or freezing precipitation SKC..sky is becoming clear  
PROB..probability of conditions occurring (in percent)  
NOSIG..no elements are expected to change in such a way as to require a change to be indicated.

**Pilot Weather Report (Pirep)**

|  |
| --- |
| [[Click for larger image](http://www.aopa.org/images/members/files/handbook/pirep.gif)](http://www.aopa.org/images/members/files/handbook/pirep.gif) |
| Pirep Form |

Conditions aloft reported in a prescribed format to an FSS, air route traffic control center (ARTCC), or terminal ATC facility. Pireps are appended to weather observations or transmitted as part of a group by state. "UA" precedes all pireps (UUA — urgent pirep of significant weather).

**Contains** — Information on ceilings, cloud heights, cloud amounts, visibility, weather and obstructions to vision, winds aloft, temperature in degrees Celsius, turbulence, icing, and remarks.

**Heights** — Reported in hundreds of feet. Ceilings, cloud tops, and cloud bases — msl.

**Visibility** — Reported in statute miles.

**Winds** — Direction in degrees magnetic; speed in knots.

**Times** — UTC.

**Example:**

CRW UA /OV BKW 360015-CRW/TM 1815/FL120/TP BE99/SK OVC/WX R/TA -08 /WV 290030/TB LGT-MDT/IC LGT RIME/RM MDT MXD ICG DURGC ROA NWBND FL080-100 1750

Charleston pilot report; Beckley VOR 360 radial 15 nm to Charleston VOR; time 1815Z; altitude 12,000 msl; aircraft type BE99; sky overcast; rain; air temperature -8°C; wind 290° magnetic at 30 knots; light to moderate turbulence; light rime icing; encountered moderate mixed icing during climb northwest-bound from Roanoke between 8,000 and 10,000 feet msl at 1750Z.

**How to report** — Use a pirep form available at your local FSS, or use the following format. The first five coded items are mandatory for any pirep:

Three-letter station identifier of nearest weather-reporting location.

**UA or UUA** — routine or urgent pirep.

**OV** — location of the phenomenon in relation to a VOR; a three-letter identifier and radial distance marker are provided.

**TM** — Coordinated Universal Time (UTC).

**FL** — altitude or flight level; essential for turbulence and icing reports.

**TP** — aircraft type; essential for turbulence and icing reports.

**SK** — sky cover, cloud height and coverage (scattered, broken, or overcast).

**WX** — weather conditions such as flight visibility, precipitation, restrictions to visibility, etc.

**TA** — temperature in degrees Celsius.

**WV** — wind direction in degrees *magnetic* and speed in knots.

**TB** — turbulence intensity, type, and altitude.

**IC** — icing intensity, type, and altitude.

**RM** — remarks; for reporting elements not included or to clarify previously reported items.

*Note: Type and intensity levels for icing and turbulence are explained in "Meteorology."*

**Clear Air Turbulence (CAT) Pirep** — Report the time, location, and intensity (light, moderate, severe, or extreme) according to the standards for other pireps and position reports.

**Wind Shear Pirep** — Report the loss or gain of airspeed and the altitude at which it was encountered. Avoid terms like "negative" or "positive" wind shear. Pireps of "negative wind shear on final," intended to describe loss of airspeed and lift, have been interpreted to mean that no wind shear was encountered.

*Note: Air traffic facilities are required to solicit pireps when ceilings at or below 5,000 feet agl, visibility at or below 5 sm, thunderstorms, icing, turbulence, or wind shear are either reported or forecast.*

**Radar Weather Report (Rarep or SD)**

Observation of thunderstorms and general areas of precipitation. Use the prefix *SD* when calling up a rarep using DUAT or other computer sources.

**Issued** — Hourly at 35 minutes past the hour (H + 35) and as needed.

**Contains** — Information on precipitation and thunderstorm location, type, intensity, and intensity trend. An echo pattern may be reported as a line (LN), an area (AREA), a single cell (CELL), or a layer (LYR). Remarks include reports of hail, tornadoes, and other noteworthy penomena.

**Coverage** — Reported in tenths and includes remarks regarding echo intensity. Intensity trend reported as either decreasing, no change, or increasing.

**Boundaries** — marked by points defined by magnetic bearing and nautical miles from a radar site. Pattern movement reported in knots moving *from* a magnetic heading.

**Heights** — Reported in hundreds of feet. Maximum tops — msl, located by magnetic bearing and distance in nautical miles.

**Times** — UTC.

**Example:**

HAT 1332 AREA 1TRWX2R/NC 346/195 36/160 108/120 215/130 269/245 C2220 MT 300 AT 75/67 PSBL A

Cape Hatteras radar observation at 1332Z; an area with one-tenth coverage of intense (X) thunderstorms and two-tenths of rain; no change; boundaries are 346° and 195 nm, 036° and 160 nm, 108° and 120 nm, 215° and 130 nm, 269° and 245 nm; cells moving from 220° at 20 knots; maximum top is 30,000 feet msl at 075° and 67 nm from HAT; possible hail.

**ICAO Terminal Forecast (TAF)**

Terminal forecasts for the world follow an internationally accepted format. The TAFs are issued four times daily for 24 hour periods beginning at 00Z, 06Z, 12Z, and 18Z. In the United States, TAFs are issued three times each day at roughly 08-10Z, 15-17Z and 22-00Z.

Each TAF is a series of time segment forecasts. The number of time segments varies from forecast to forecast, depending upon the expected weather conditions. A new time segment signifies a change in the weather conditions that is significant to aviation operations. These conditions are related to ceiling heights, visibilities, precipitation and other obstructions to visibility, and wind speed and direction.

**The generic format for a TAF is:**

**TAF** CCCC YYGGggZ YYHHHH dddff(f)GffKT VVVVSM [ww NNNhhh] [Wshhh/dddffKT] [TTTTT xxxx] repeated as needed

**Where:** CCCC is the ICAO identifier

YYGGggZ is the issue time

YYHHHH is the start and end time of the forecast

dddff(f)GffKT is the wind direction and speed/gusts in knots

VVVVSM is the visibility in statute miles (or M for meters)

ww is significant weather [if present]

NNN is the cloud coverage [if present]

hhh is the cloud height [if present]

TTTTT is the indicator for a change in condition [if needed]

xxxx is the start and end time of the change in [if needed] conditions. This group is followed by the group in brackets giving the change in the wind, visibility, weather and cloud types.

The format for decoding TAFs is therefore as follows:

A. Station identifier  
B. Issue time of forecast  
C. Valid time of forecast  
D. Wind direction and speed (knots)  
E. Visibility in statute miles  
F. Significant weather (from list below)  
G. Cloud coverage and height  
H. Non-convective low level wind shear  
I. Forecast Change Indicators  
J. Expected change in prevailing conditions

**Expanding on these items:**

A. Station identifiers are all ICAO identifiers.

B. Issue time is a six-digit group ending with Z. The first two digits represent the date, while the last four numbers reflect the hour and minute, using a 24-hour clock. The time is in UTC.

C. Valid time is always a 24-hour period with the first two numbers the start time, and the second two numbers the ending time of the forecast. Thus, 1212 means a forecast valid from 12Z today to 12Z tomorrow.

D. Wind is a five (or six) digit group with the first three numbers the direction in degrees and the last two (three) numbers the speed in knots. When wind gusts are expected, the gusts are listed with a G after the average wind speed forecast. For example, 33020G35KT means wind direction from 330 degrees with an average speed of 20 kts and gusts to 35 kts.

E. Visibility is in statute miles. Any visibility more than 6 miles (10 km) is coded as P6SM. International TAF's will list the visibility in meters. An easy way to convert meters into miles is to divide by 1600, the result being in miles. For example, a visibility of 300 meters is 300/1600 or 3/16 of a mile. A visibility of 2600 meters is 2600/1600 miles which is 1 and 1000/1600 miles, or 1 5/8 miles.

F. Significant weather is taken from a listing of Qualifiers and Weather Phenomena. Combinations from this list are possible.

**Qualifier for Intensity:**

- Light

Moderate (no sign)

+ heavy

VC In the vicinity (0SM to 10 SM for precipitation, and 5SM to 10 SM for non-precipitation)

**Descriptors:**

|  |  |
| --- | --- |
| MI | Shallow |
| PR | Partial |
| BC | Patches |
| DR | Low Drifting |
| BL | Blowing |
| SH | Shower(s) |
| TS | Thunderstorm |
| FZ | Freezing |

**Precipitation:**

|  |  |
| --- | --- |
| DZ | Drizzle |
| RA | Rain |
| SN | Snow |
| SG | Snow Grains |
| IC | Ice Crystals |
| PE | Ice Pellets |
| GR | Hail |
| GS | Small hail/Snow pellets |
| UP | Unknown precipitation |

**Obscuration:**

|  |  |
| --- | --- |
| BR | Mist (visibility 5/8 statute miles or more) |
| FG | Fog (visibility 1/2 mile or less) |
| FU | Smoke |
| VA | Volcanic Ash |
| DU | Widespread Dust |
| SA | Sand |
| HZ | Haze |
| PY | Spray |

**Other phenomena:**

|  |  |
| --- | --- |
| PO | Well developed Dust/Sand Whirls |
| SQ | Squalls |
| FC | Funnel Cloud, (+FC for Tornado, or Waterspout) |
| SS | Sandstorm |
| DS | Duststorm |

G. Cloud coverage and height are listed if they are expected to occur during the forecast period. The first three characters relate to the amount of the sky that is covered by clouds. The following codes and coverage amounts, in eights of the sky are the same as used in METAR reports.

SKC or CLR 0/8

FEW >0 - 2/8

SCT 3/8 - 4/8

BKN 5/8 - <8/8

OVC 8/8

VV (vertical vsby) 8/8

The height of the clouds, in hundreds of feet, immediately follows the code for cloud amount.

H. Non-convective low level wind shear will appear in the TAF when low level wind shear (up to 2000 feet above the ground), is expected. In Canadian TAF's, this group will appear immediately after the wind, while it is not given for other international locations.

**The group is coded as follows:**

WShhh/dddffKT

where WS is the indicator for the LLWS group

hhh is the forecast height of the shear, in hundreds of feet AGL

ddd is the forecast wind direction above the shear

ff is the forecast wind speed in knots above the shear

KT is the units indicator for knots

I. Forecast Change Indicators including:

FMxxxx meaning FroM to indicate a significant change from prevailing conditions. First 2-digits are the beginning hour of the period and the last two are the minutes.

TEMPO meaning TEMPOrary, with changes expected for <1 hour

xxxx and in total, < half of the 2-digit beginning and 2-digit ending period.

PROBpp meaning PROBability and 2-digit percent chance of occurrence during 2-digit hour beginning and 2-digit ending time period.

BECMG BECoMinG meaning a change expected during the 2 digit beginning and 2-digit ending time period.

J. After a forecast change indicator, there will be a listing of the weather elements that are expected to change during that period. Only the elements that are expected to change are listed, otherwise any remaining elements are expected to be the same as the previous listing.

**Other abbreviations used in some international TAFs**

WX NIL..the end of thunderstorms or freezing precipitation

CAVOK...no clouds under 5000 ft, no thunder, no precipitation and visibility 6 miles or greater

NOSIG...no elements are expected to change in such a way as to require a change to be indicated.

Example:

KSEA 121733Z 121818 16006KT P6SM SCT035 BKN045 OVC060  
TEMPO 1821 4SM -SHRA BR BKN030  
FM2100 20006KT P6SM -RA BKN035 OVC060  
TEMPO 2202 5SM RA BR BKN025  
FM0400 19006KT P6SM -SHRA BKN022 OVC045=

The above forecast for Seattle was issued on the 12th of the month at 1733Z. The valid period runs from 18Z on the 12th to 18Z on the 13th.

At 18Z, the wind is from 160 degrees at 6 knots, the visibility is greater than 6 statute miles, there is a scattered cloud layer at 3500 feet, a broken layer at 4500 feet and an overcast layer at 6000 feet.

Temporarily between 18Z and 21Z, the visibility will drop to 4 statute miles in light rain showers and mist with a broken cloud layer at 3000 feet. From 2100Z, the wind will be from 200 degrees at 6 knots, the visibility will be greater than 6 statute miles in light rain, with a broken cloud layer at 3500 feet and an overcast layer at 6000 feet.

Temporarily between 22Z and 02Z, the visibility will drop to 5 statute miles in moderate rain and mist with a broken layer at 2500 feet.

From 0400Z the wind will be from 190 degrees at 6 knots, the visibility will be greater than 6 statute miles, with light rain showers. There will be a broken layer at 2200 feet and an overcast layer at 4500 feet.

**Area Forecast (FA)**

Expected general weather conditions over an area the size of several states. Sigmets or airmets may amend an area forecast.

**Issued** — Three times daily (contiguous states and Alaska); four times daily (Hawaii).

**Valid** — An 18-hour synopsis period, a 12-hour forecast period, plus a six-hour categorical outlook.

**Contains** — General details of cloud, weather, and frontal conditions for an area including several states. It comprises two sections: hazards/flight precautions (H) and synopsis and VFR clouds/weather (C).

**Heights** — Reported in hundreds of feet. Cloud tops — msl; ceiling heights — agl; cloud bases — msl, unless otherwise indicated.

**Visibility** — Included when 6 sm or less.

**Winds** — Included when forecast to be 20 knots or greater; peak gusts are specified when they exceed sustained wind speed by 10 knots or more. Direction reported true north. The contraction "WND" in the outlook signifies forecast winds of 20 knots or greater.

**Times** — UTC.

**Example:**

BOSH FA 130845 — Hazards report for BOS area issued on the thirteenth day of the month at 0845Z.

HAZARDS VALID UNTIL 132100 — Valid until 21Z (12-hour period). ME NH VT MA RI CT NY LO NJ PA LE OH WV MD DC DE VA AND CSTL WTRS — States and geographical area that make up the BOS FA.

FLT PRCTNS…IFR…ME NH VT MA CT RI LO NY LE PA NJ OH WV VA MD DE AND ADJ CSTL WTRS…MTN OBSCN…ME NH VT CT NY PA WV VA MD…TURBC…ME NH VT NY…TSTMS…ME NH VT MA CT RI LO NY PA NJ AND CSTL WTRS — Outline of hazards and the areas affected. Conditions listed meet or are expected to meet airmet, sigmet, or convective sigmet criteria.

TSTMS IMPLY SVR OR GTR TURBC SVR ICG LLWS AND IFR CONDS. — Found in all FAs to remind of hazards associated with thunderstorms. They are therefore not spelled out in the body of the FA. NON MSL HGTS NOTED BY AGL OR CIG. — Found in all FAs as a reminder that heights are normally indicated msl.

BOSC FA 130845  
SYNOPSIS AND VFR CLDS/WX  
SYNOPSIS VALID UNTIL 140300  
CLDS/WX VALID UNTIL 132100…OTLK VALID 132100-140300

SYNOPSIS…CDFNT EXTDS FM OH INTO CNTRL NM MOVG SLOLY EWD. NRLY STNRY WRMFNT EXTDS FM OH INTO SERN VA. — Brief summary of location and movement of fronts and pressure systems. Valid for an 18-hour period.

ME NH VT MA CT RI AND ADJ CSTL WTRS. SEE AIRMET SIERRA FOR IFR CONDS AND FOR MTN OBSCN. FROM CAR TO YSJ TO 150E ACK TO BDR TO 60NW MPV TO CAR. TOPS 200-250. ISOLD TRW-PSBLY EMBDD. CB TOPS 300. OTLK…IFR CIG R F. — Report of clouds, weather, and visibility that are MVFR or better. Weather significant to flight operations such as precipitation, low visibility, thunderstorms, and winds of 20 knots or greater are included when forecast. Breakdown may be by states and geographical areas or in reference to location and movement of a pressure system or front. Valid for a 12-hour period. Categorical outlook valid for the following six-hour period.

*Note: When airmets are in effect or are expected to be issued during the forecast valid time, the appropriate airmet bulletin is listed (i.e.,* Sierra *for IFR conditions and mountain obscuration;* Tango *for turbulence, strong surface winds, and low-level wind shear; and* Zulu *for icing and freezing levels).*

**Categorical Outlook**

Expected ceiling and visibility conditions defined as LIFR, IFR, MVFR, and VFR due to ceiling and/or visibility restrictions.

**LIFR** — Ceiling less than 500 feet agl and/or visibility less than 1 sm.

**IFR** — Ceiling 500 to less than 1,000 feet agl and/or visibility 1 to less than 3 sm.

**MVFR** — Ceiling 1,000 to 3,000 feet agl and/or visibility 3 to 5 sm, inclusive.

**VFR** — Ceiling greater than 3,000 feet agl and visibility greater than 5 sm; includes clear sky.

**Winds** — When winds or gusts of 25 knots or greater (TAF) or 20 knots or greater (FA) are forecast for the outlook period, the word "WIND" or contraction "WND" is included for all categories, including VFR.

**Example:**

LIFR CIG — Low IFR due to low ceiling.

IFR F — IFR due to visibility restricted by fog.

MVFR CIG H K — Marginal VFR due to *both* low ceiling and visibility restricted by haze and smoke.

IFR CIG R WIND — IFR due to *both* low ceiling and visibility restricted by rain; wind expected to be 30 knots or greater.

**Convective Outlook (AC)**

Expected thunderstorm activity during a 24-hour period. The AC is carried in the FA and defines the areas affected with weather reporting station identifiers; draw a line on a chart connecting the identifiers to find the affected area.

**Issued** — At 08Z and 15Z (between February 1 and August 31 also at 1930Z).

**Valid** — Until 12Z the following day.

**Contains** — Areas for which there is a slight, moderate, or high risk of severe thunderstorm activity. Severe thunderstorms may contain winds greater than or equal to 50 knots at the surface, hail greater than or equal to three-fourths-inch diameter at the surface, and tornadoes.

**Times** — UTC.

**Example:**

MKC AC 031500  
VALID 031500-041200Z

THERE IS A MDT RISK OF SVR TSTMS THIS AFTN AND EVE PTNS ERN AL…ERN TN…ERN KY…WV…PA…NY…VT…NH…MA…CT…NJ…DE…MD…VA…NC…SC…GA. AREA IS TO RT OF LN FM DHN MGM HSV LOZ HTS PIT SYR MPV PSM BOS GON ACY SBY RDU AGS ABY DHN.

GEN TSTM ACTVY TO RT OF LN FM PBT MLU MEM OWB TOL…CONTD JAX CTY. UPR LVL LOW NR MLI WITH TROF EXTNDG SWD INTO ERN TX EXPCD TO MOV NEWD. — Contractions are self-explanatory.

**Winds (and Temperatures) Aloft Forecast (FD)**

Forecasts winds and temperatures aloft for specific locations and altitudes or flight levels.

**Issued** — Two times daily (based on 00Z and 12Z data).

**Valid** — Time and duration are specified.

**Contains** — Wind direction in tens of degrees true north and wind speed in knots. Temperatures aloft are given in degrees Celsius (temperatures above FL240 are assumed to be negative). A four-digit group indicates wind direction (first two digits) and speed (next two digits); a six-digit group includes temperature (last two digits).

**Winds** — When velocities of 100 to 199 knots are forecast, direction is coded by adding 50, and velocity is coded minus 100 (e.g., 230° at 119 knots is 7319). At 200 knots or greater, velocity is coded as 199 (e.g., 270° at 199 knots or greater is 7799). Light and variable winds (less than 5 knots) are indicated by the code 9900 instead of direction and velocity.

**Times** — UTC.

**Example:**

FD KWBC 151640  
BASED ON 151200Z DATA  
VALID 151800Z FOR USE 1700-2100Z TEMPS NEG ABV 24000

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FT (msl) | 3000 | 6000 | 9000 | 12000 | 18000 |
| STL | 2113 | 2325+07 | 2332+02 | 2339-04 | 2356-16 |
|  |  |  |  |  |  |
| FT (msl) | 24000 | 30000 | 34000 | 39000 |  |
| STL | 2373-27 | 239440 | 730649 | 731960 |  |

At St. Louis International Airport, the wind at 3,000 feet is from 210° at 13 knots; at 6,000 feet from 230° at 25 knots with a temperature of +7°; etc.

**In-Flight Weather Advisories**

The National Weather Service issues the following in-flight weather advisories: severe weather forecast alert (AWW) followed by severe weather watch bulletin (WW), airmet (WA), sigmet (WS), convective sigmet (WST), and center weather advisory (CWA). These advisories are issued individually and are also included in the area forecast. If issued subsequently to the FA, they will amend the FA.

**Severe Weather Forecast Alert (AWW)**

This is a preliminary message to alert users that a severe weather watch bulletin (WW) is being issued.

**Issued** — As required.

**Contains** — Outline of areas of possible severe thunderstorms or tornado activity.

**Times** — UTC.

**Example:**

MKC AWW 161755 — Severe weather forecast alert issued on the sixteenth day of the month at 1755Z.

WW 279 SEVERE TSTM NY PA NJ 161830Z-17000Z AXIS…70 STATUTE MILES EITHER SIDE OF LINE…10W MSS.20E ABE  
HAIL SURFACE AND ALOFT…2 INCHES.  
WIND GUSTS…65 KNOTS.  
MAX TOPS TO 540. MEAN WIND VECTOR 19020. REPLACES WW 278…OH PA NY. — Contractions are self-explanatory.

*Note: The AWW is followed by the severe weather watch bulletin (WW). The WW prompts an immediate broadcast of type of severe weather, area, valid time, and other watch information. The bulletin includes phenomena, intensities, hail size, wind speeds in knots, maximum CB tops, and estimated cell movement.*

**Airman's Meteorological Information (Airmet) (WA)**

In-flight advisory for six areas corresponding to the FA areas. Airmets warn of weather potentially hazardous to all aircraft. Weather conditions are lower in intensities than those that trigger sigmets. *If conditions are adequately forecast in the FA, an airmet will not be issued.*

**Issued** — Every six hours; amendments issued as needed.

**Valid** — Six-hour period.

**Contains** — Reports of moderate icing, moderate turbulence, sustained wind of 30 knots or more at the surface, widespread areas of ceilings below 1,000 feet and/or visibilities below 3 sm, and extensive mountain obscuration. Hazardous weather areas are defined by VOR location identifiers or well-known geographical areas. A phenomenon is identified by a letter: *Sierra* for IFR conditions and mountain obscuration; *Tango* for turbulence, strong surface winds, and low-level wind shear; and *Zulu* for icing and freezing levels.

**Heights** — Ceiling heights — agl; all other heights — msl.

**Times** — UTC.

**Example:**

SLCS WA 191345 — Airmet Sierra for SLC area issued on the nineteenth day of the month at 1345Z.  
AIRMET SIERRA FOR IFR AND MTN OBSCN VALID UNTIL 192000 — Valid until 20Z (six-hour period).

AIRMET IFR…WY CO NE — States and geographical area for which IFR conditions are reported.  
FROM 70ENE GCC TO GLD TO FMN TO 60N JAC TO 70ENE GCC OCNL CIGS BLO 10 AND OR VSBYS BLO 3 IN PCPN AND FOG. CONDS CONTG BYD 2000Z AND GRDLY DMSHG. — Outline of conditions and the areas affected. Conditions that are expected to persist beyond six hours are included and described.

AIRMET MTN OBSCN…ID MT WY UT CO — States and geographical area for which mountain obscuration is reported.  
FROM YXC TO YXH TO AKO TO TBE TO FMN TO LKT TO YXC MTNS OCNL OBSCD IN CLDS/PCPN. CONDS CONTG BYD 2000Z. — Outline of conditions and the areas affected. Conditions that are expected to persist beyond six hours are included and described.

OTLK VALID 2000-0200Z…MTN OBSCN MT WY CO — Outlook valid for the next six-hour period.  
CONDS CONTG BYD 0200Z IN WY/CO BUT ENDING IN MT BTWN 2200-0200Z.  
….  
NNNN

*Note: Airmets Tango and Zulu follow the same format as Sierra. Only an example is given here. Contractions are self-explanatory.*BOST WA 191345  
AIRMET TANGO FOR TURBC…STG SFC WINDS AND LLWS VALID UNTIL 192000

…SEE SIGMET PAPA SERIES FOR SVR TURBC AREA…

AIRMET TURBC…ME NH  
FROM CAR TO YSJ TO CON TO YSC TO CAR OCNL MDT TURBC BLO 80 WITH STG UDDFS VCNTY MTNS DUE TO MDT NWLY WIND. CONDS CONTG BYD 2000Z.  
LLWS POTENTIAL ME AND NH ASSOCD WITH CDFNT.  
….  
NNNN  
DFWZWA 190145  
AIRMET ZULU FOR ICG AND FRZLVL VALID UNTIL 190800

NO SGFNT ICG XPCD.

FRZLVL…90-120 E OF DYR-MSL-ATL LN SLPG TO 120-140 OVR RMDR.  
….  
NNNN

**Significant Meteorological Information (Sigmet) (WS)**

In-flight advisory for six areas corresponding to the FA areas. Sigmets warn of significant weather potentially hazardous to all aircraft. Intensity and extent of weather conditions are greater than those of the airmet. *Sigmets are issued whether or not conditions are forecast in the FA.*

**Issued** — As needed; if conditions persist beyond forecast period, the sigmet will be updated and reissued.

**Valid** — Maximum four-hour period.

**Contains** — Reports of severe or extreme turbulence, clear air turbulence, and severe icing not associated with thunderstorms; widespread dust- or sandstorms that lower visibilities below 3 sm; and volcanic eruption. Hazardous weather areas are defined by VOR location identifiers or well-known geographical areas. A phenomenon is identified by a letter (November through Romeo and Uniform through Yankee) and number. Subsequent advisories of the same phenomenon are sequentially numbered and retain the alphabetic designator until the phenomenon ends.

**Heights** — Ceiling heights — agl; all other heights — msl.

**Times** — UTC.

**Example:**

SFOX WX 030130 — Sigmet Xray for the SFO area issued on the third day of the month at 0130Z.

SIGMET XRAY 2 VALID UNTIL 030530 — Second Sigmet Xray issued for the SFO area valid until 0530Z (four-hour period).

OR WA — States and geographical area for which the phenomenon is reported.

FROM SEA TO PDX TO EUG TO ONP TO HQM TO SEA MDT TO OCNL SVR TURBC BTWN 280 AND 350 XPCD DUE TO WINDSHEAR ASSOCD WITH JTSTR. CONDS BGNG AFT 0200Z CONTG BYD 0530Z AND SPRDG OVER CNTRL ID BY 0400Z. — Outline of conditions and the areas affected. Conditions that are expected to persist beyond four hours are included and described.

**Convective Sigmet (WST)**

In-flight advisory made up of one or more individually numbered convective sigmet bulletins. (Three bulletins are issued that each cover a specified geographic area in the eastern [E], central [C], and western [W] portions of the United States.) Convective sigmets warn of any convective situation that may be hazardous to all aircraft. They imply severe or greater turbulence, severe icing, and the potential for low-level wind shear.

**Issued** — Hourly at 55 minutes past the hour (H + 55) and special bulletins as needed.

**Valid** — Two hours (each hourly issuance supersedes and cancels the remainder of the previous issuance).

**Contains** — Reports of severe thunderstorms (surface winds of 50 knots or more, large hail, or tornadoes), embedded thunderstorms, lines of thunderstorms, and thunderstorms greater than or equal to level four affecting 40 percent or more of an area at least 3,000 square miles. The WST also includes a convective sigmet outlook for thunderstorm conditions beyond the two-hour valid period.

**Heights** — Ceiling heights — agl; all other heights — msl.

**Times** — UTC.

**Example:**

MKCC WST 221855 — Convective sigmet for the central region issued on the twenty-second day of the month at 1855Z.

CONVECTIVE SIGMET 20C — Issuance number 20 for the central region.

VALID UNTIL 2055Z — Valid until 2055Z (two-hour period).

ND SD — States or geographical areas affected.

FROM 90W MOT-GFK-ABR-90W MOT INTSFYG AREA SVR TSTMS MOVG FROM 2445. TOP ABV 450. WIND GUSTS TO 60KT RPRTD. TORNADOES…HAIL TO 2 IN…WIND GUSTS TO 65KT PSBL ND PTN. — Contractions are self-explanatory.

**Center Weather Advisory (CWA)**

In-flight advisory for conditions expected to begin within the next two hours. It is used to anticipate and avoid adverse weather conditions in the enroute and terminal areas.

**Issued** — As required to supplement a sigmet, convective sigmet, airmet, or area forecast.

**Valid** — Two hours.

**Example:**

ZFW3 CWA 03 032140-2340 — Center advisory phenomena 3, third issuance on the third day of the month, valid from 2140Z to 2340Z.

ISOLD SVR TSTM OVR MLU MOVG SWWD 10 KTS. TOP 610. WND GUSTS TO 55 KTS. HAIL TO 1 INCH RPRTD AT MLU. SVR TSTM CONTG BYND 2340. — Contractions are self-explanatory.

**In-Flight Weather Advisory Broadcast**

**Flight service stations** — Broadcast severe weather forecast alerts, airmets, sigmets, convective sigmets, and center weather advisories during their valid periods when they pertain to the area within 150 nm of the FSS as follows:

**WA** — Upon receipt and at 30-minute intervals;

**WS** — Upon receipt and at 30-minute intervals;

**CWA** — Upon receipt and at 30-minute intervals;

**WST** — Upon receipt and at 15-minute intervals;

**AWW** — Upon receipt and at 15-minute intervals.

Thereafter, a summarized alert notice is broadcast at 15 minutes and 45 minutes past the hour.

**ARTCCs and terminal control facilities** — Broadcast a sigmet and convective sigmet alert message once on all nonemergency frequencies when the area is within 150 nm of the airspace under their jurisdictions. These broadcasts contain a brief description of the weather activity and the general area affected.

**Hazardous In-Flight Weather Advisory Service (Hiwas)**

A continuous broadcast of in-flight weather advisories, including summarized severe weather advisory alerts, sigmets, convective sigmets, airmets, and urgent pireps over selected VORs. In those areas where hiwas is commissioned, ARTCC, terminal ATC, and FSS facilities have discontinued the broadcast of in-flight advisories as described in the preceding paragraph.

**Frequency** — Locations and frequencies for hiwas service are identified in the Airport/Facility Directory listings and on aeronautical charts.

**Flight service stations** — Broadcast a hiwas update announcement once on all except emergency frequencies upon completion of recording an update to the hiwas broadcast.

**Example:**

"Attention all aircraft, monitor hiwas or contact Flight Watch or flight service for new convective sigmet information."

**ARTCC and terminal facilities** — Broadcast a hiwas alert once on all except emergency frequencies. The broadcast will include an alert announcement, frequency instructions, number, and type of advisory updated such as severe weather advisory alerts, sigmets, or convective sigmets.

**Example:**

"Attention all aircraft, monitor hiwas or contact a flight service station on frequency one-two-two point zero or one-two-two point two for new Convective Sigmet Two-Seven Eastern [area] information."

**Unscheduled Broadcasts**

FSSs may at random times broadcast on VORs and selected VHF frequencies special weather reports, pireps, notams, and other information relevant to the safety and efficiency of flight. These broadcasts will begin with the announcement "aviation broadcast," followed by identification of the data.

**Alaskan Scheduled Broadcasts**

Some FSSs in Alaska that have voice capability on VORs or NDBs broadcast weather reports and notams at 15 minutes past each hour from reporting points within approximately 150 nm of the broadcast station.

**Transcribed Weather Broadcast (TWEB)**

Generally, TWEBs contain route-oriented data with specially prepared NWS forecasts, in-flight advisories, and winds aloft, plus preselected current information such as weather reports, notams, and special notices.

**Broadcast time** — Continually.

**Frequency** — Selected low-frequency (190- to 535-kHz) navigational aids and VORs. Locations and frequencies are identified on aeronautical charts.

*Note: In some locations, the information is broadcast over the local VOR only and is limited to such items as the hourly weather for the parent station and up to five immediately adjacent stations, local notam information, the FT for the parent station, adverse conditions extracted from in-flight advisories, and other potentially hazardous conditions.*

**Enroute Flight Advisory Service (EFAS)**

Flight Watch, or EFAS, provides in-flight weather information along prominent and heavily traveled flyways. Routine weather information and pilot weather reports, including current reports on the location of thunderstorms and other hazardous weather as observed and reported by pilots or observed on weather radar, are provided.

**Available** — Seven days a week, 6 a.m. to 10 p.m. local time.

**Frequencies** — use 122.0 MHz at and above 5,000 feet agl to 17,500 feet msl. Frequencies to be used at 18,000 feet msl to FL450 can be found in the A/FD. (Locations of Flight Watch control stations [FWCSs] and their communications outlets are shown on the inside back cover of the A/FD. Locations and frequencies for high-altitude EFAS outlets are also provided.)

**How to use EFAS** — Call on 122.0 MHz, and use the name of the controlling FSS, followed by the words "flight watch." If the controlling FSS is unknown, simply call "flight watch" and give your aircraft's identification and position.

*Note: The frequency may* not *be used for filing flight plans, routine position reporting, or for preflight weather briefings.*

**Automated Terminal and Weather Observation Services**

**Automatic Terminal Information Service (ATIS)**

A continuous broadcast of recorded information for flights arriving at and departing from airports with high levels of traffic activity. ATIS serves to relieve frequency congestion on approach control, ground control, and local control frequencies.

**Broadcast time** — Continually.

**Valid** — Updated upon receipt of official weather report or changes in other pertinent data.

**Frequency** — ATIS broadcasts on the voice feature of a terminal VOR or VOR/vortac located on or near the airport or on a discrete VHF/UHF include the frequencies at airports where ATIS is provided.

**Telephone numbers** — At some airports, ATIS information can be obtained by telephone as well as by radio. Telephone numbers are included in the A/FD and *AOPA's Airport Directory*.

**Contains** — Information on ceilings, visibility, obstructions to visibility, temperature, dew point, wind direction, wind speed, altimeter setting, remarks, and instrument approach(es) and runway(s) in use. The departure runway will only be given if different from the landing runway, except at locations that have a separate ATIS for departure. When information on ceiling, sky condition, or visibility is not reported, it indicates a ceiling or cloud layers at or above 5,000 feet and visibility of 5 sm or better.

**Heights** — Ceiling heights — agl.

**Visibility** — Included when less than 5 sm.

**Winds** — Direction in degrees magnetic; speed in knots.

**Times** — UTC.

**Example:**

"Dulles International information Sierra. One-three-zero-zero Zulu weather. Measured ceiling three-thousand feet overcast. Visibility three miles, smoke. Temperature six-eight. Wind three-five-zero at eight. Altimeter two-niner-niner-two. ILS Runway One-right approach in use. Landing Runway One-right and -left. Departure Runway Three-zero. Armel Vortac out of service. Advise you have Sierra."

**Automated Weather Observing System (AWOS)**

Automated weather reporting systems, generically referred to as AWOSs, are operationally classified into four basic levels: AWOS-A, AWOS-1, AWOS-2, and AWOS-3.

**Broadcast time** — Most devices transmit a 20- to 30-second weather message once each minute.

**Frequency** — AWOS information is transmitted over the radio frequency of a local navaid. It is receivable at 3,000 feet agl to at least 25 nm from the AWOS site and, in many cases, on the surface of the airport. There is no two-way communication. Aeronautical charts, the A/FD, and *AOPA's Airport Directory* include the frequencies at airports where AWOS is operational.

**Telephone numbers** — Most AWOSs also incorporate a telephone call-in capability. Telephone numbers are included in *AOPA's Airport Directory*.

**Contains** — AWOS-A reports altimeter setting only. AWOS-1 reports altimeter setting, wind data, usually temperature and dew point in degrees Fahrenheit, and density altitude (when it exceeds field elevation by more than 1,000 feet). AWOS-2 provides the information provided by AWOS-1, plus visibility. AWOS-3 provides the information provided by AWOS-1, plus visibility and cloud/ceiling data (below 12,000 feet agl).

**Heights** — Ceiling heights — agl.

**Visibility** — Reported in statute miles. Visibility greater than 10 sm not reported.

**Winds** — Direction in degrees magnetic; speed in knots.

**Remarks** — Includes density altitude, variable visibility, variable wind direction, and remarks augmented by observer (precipitation type and intensity, thunderstorm intensity and direction, and obstructions to vision when visibility is 3 sm or less).

**Times** — UTC.

**Example:**

"Bremerton National Airport automated weather observation, one-four-five-six Zulu. Ceiling one-thousand overcast, visibility 3 miles, precipitation, temperature three-zero, dew point missing, wind calm, altimeter three-zero-zero-one."

**Automated Surface Observing System (ASOS)**

|  |
| --- |
| [Click for larger image](http://www.aopa.org/images/members/files/aim/7-1-7.gif) |
| [Click for larger image](http://www.aopa.org/images/members/files/aim/7-1-8.gif) |
| Key to Decode an ASOS (METAR) Observation (Front and Back) |

Automated surface observation systems are similar to AWOS and are being implemented at some locations. The system is also providing test observations at certain locations for future implementation.

**Frequencies and telephone numbers** — Frequencies and telephone numbers for ASOSs that are fully operational are included in the A/FD and *AOPA's Airport Directory*. Frequencies are also included on aeronautical charts.

**Contains** — ASOS reports altimeter setting, wind data, temperature and dew point in degrees Fahrenheit, density altitude (when it exceeds field elevation by more than 1,000 feet), visibility, and cloud/ceiling data (below 12,000 feet agl).

**Heights** — Ceiling heights — agl.

**Visibility** — Reported in statute miles. Obstructions to vision reported only when visibility is less than 7 sm.

**Winds** — Direction in degrees magnetic; speed in knots.

**Remarks** — Includes density altitude, variable cloud/ceiling heights, variable visibility, variable wind directions, precipitation type and intensity, precipitation beginning and ending times, precipitation accumulation in hundredths of an inch, rapid pressure changes and pressure tendency, wind shifts, and remarks augmented by observer (runway visual range in hundredths of feet, volcanic ash, and virga within 10 sm of station).

**Times** — UTC.

**Notes regarding AWOS and ASOS:**

1. Neither system is currently equipped to detect and report roll clouds, funnel clouds, virga, and thunderstorm and lightning activity (although some ASOS prototypes can detect and report lightning activity). It can only "see" clouds directly above the observation site. At locations where the automated system coexists with an NWS observing site, an observer will add the thunderstorm notation to the report. At tower-controlled fields, tower personnel will be assigned this task. Human observations are signified by the suffix "A" (augmented) to the report. NWS expects to eventually employ satellite and radar imagery in conjunction with lightning detection systems to complement the surface observations of the automated system.
2. Many current surface observation reports will eventually be replaced by the AWOS and ASOS observation. That data in turn will generate terminal forecast and other predictive information.

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|  | **KEY to AERODROME FORECAST (TAF) and AVIATION ROUTINE WEATHER REPORT  (METAR) (FRONT)** |  |

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| --- | --- | --- |
|  |  |  |
|  | **TAF** KPIT 091730Z 091818 15005KT 5SM HZ FEW020 WS010/31022KT |  |
|  | FM 1930 30015G25KT 3SM SHRA OVC015 TEMPO 2022 1/2SM +TSRA |  |
|  | OVC008CB |  |
|  | FM0100 27008KT 5SM SHRA BKN020 OVC040 PROB40 0407 1SM -RA BR |  |
|  | FM1015 18005KT 6SM -SHRA OVC020 BECMG 1315 P6SM NSW SKC |  |
|  | **METAR** KPIT 091955Z COR 22015G25KT 3/4SM R28L/2600FT TSRA OVC010CB |  |
|  | 18/16 A2992 RMK SLP045 T01820159 |  |
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|  |  |  |  |  |
|  | F**ORECAST** | E**XPLANATION** | **REPORT** |  |
|  | **TAF** | Message type : TAF-routine or TAF AMD-amended forecast,  METAR-hourly, SPECI-special or TESTM-non-commissioned  ASOS report | **METAR** |  |
|  | **KPIT** | ICAO location indicator | **KPIT** |  |
|  | **091730Z** | Issuance time: ALL times in UTC "Z", 2-digit date, 4-digit time | **091955z** |  |
|  | **091818** | Valid period: 2-digit date, 2-digit beginning, 2-digit ending times |  |  |
|  |  | In U.S. **METAR**: CORrected of; or AUTOmated ob for automated  report with no human intervention; omitted when observer logs on | **COR** |  |
|  | **15005KT** | Wind: 3 digit true-north direction , nearest 10 degrees (or VaRiaBle);  next 2-3 digits for speed and unit, KT (KMH or MPS); as needed, Gust  and maximum speed; 00000KT for calm; for **METAR,** if direction varies  60 degrees or more, Variability appended, e.g. 180V260 | **22015G25KT** |  |
|  | **5SM** | Prevailing visibility; in U.S., Statute Miles & fractions; above 6 miles in  **TAF** Plus6SM. (Or, 4-digit minimum visibility in meters and as required,  lowest value with direction) | **3/4SM** |  |
|  |  | Runway Visual Range: R; 2-digit runway designator Left, Center, or  Right as needed; "/", Minus or Plus in U.S., 4-digit value, FeeT in U.S.,  (usually meters elsewhere); 4-digit value Variability 4-digit value (and  tendency Down, Up or No change) | **R28L/2600FT** |  |
|  | **HZ** | Significant present, forecast and recent weather: see table (on back) | **TSRA** |  |
|  | **FEW020** | Cloud amount, height and type: Sky Clear 0/8, FEW >0/8-2/8,  SCaTtered 3/8-4/8, BroKeN 5/8-7/8, OVerCast 8/8; 3-digit height in  hundreds of ft; Towering Cumulus or CumulonimBus in **METAR**; in  **TAF**, only CB. Vertical Visibility for obscured sky and height "VV004".  More than 1 layer may be reported or forecast. In automated **METAR**  reports only, CLeaR for "clear below 12,000 feet" | **OVC 010CB** |  |
|  |  | Temperature: degrees Celsius; first 2 digits, temperature "/" last 2  digits, dew-point temperature; Minus for below zero, e.g., M06 | **18/16** |  |
|  |  | Altimeter setting: indicator and 4 digits; in U.S., A-inches and  hundredths; (Q-hectoPascals, e.g. Q1013) | **A2992** |  |

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|  | **KEY to AERODROME FORECAST (TAF) and AVIATION ROUTINE WEATHER REPORT (METAR) (BACK)** |  |

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| --- | --- | --- | --- | --- |
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|  | F**ORECAST** | E**XPLANATION** | **REPORT** |  |
|  | **WS010/31022KT** | In U.S. **TAF**, non-convective low-level (<= 2,000 ft) Wind Shear;  3-digit height (hundreds of ft); "/"; 3-digit wind direction and 2-3  digit wind speed above the indicated height, and unit, KT |  |  |
|  |  | In **METAR**, ReMarK indicator & remarks. For example: Sea- Level Pressure in hectoPascals & tenths, as shown: 1004.5 hPa;  Temp/dew-point in tenths °C, as shown: temp. 18.2°C, dew-point  15.9°C | **RMK SLP045 T01820159** |  |
|  | **FM1930** | FroM and 2-digit hour and 2-digit minute **beginning** time:  indicates significant change. Each FM starts on a new line,  indented 5 spaces |  |  |
|  | **TEMPO 2022** | TEMPOrary: changes expected for <1 hour and in total, < half of  2-digit hour **beginning** and 2-digit hour **ending** time period |  |  |
|  | **PROB40 0407** | PROBability and 2-digit percent (30 or 40): probable condition  during 2-digit hour **beginning** and 2-digit hour **ending** time  period |  |  |
|  | **BECMG 1315** | BECoMinG: change expected during 2-digit hour **beginning**  and 2-digit hour **ending** time period |  |  |
|  |  |  |  |  |

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|  |  | Table of Significant Present, Forecast and Recent Weather- Grouped in categories and used in the  order listed below; or as needed in TAF, No Significant Weather. | | | | | | |  |
|  | **QUALIFIER** | |  |  |  |  |  |  |  |
|  | **INTENSITY OR PROXIMITY** | | |  |  |  |  |  |  |
|  | `-' Light |  | "no sign" Moderate | | `+' Heavy | |  |  |  |
|  | VC Vicinity: but not at aerodrome; in U.S. **METAR**, between 5 and 10SM of the point(s) of  observation; in U.S. **TAF,** 5 to 10SM from center of runway complex (elsewhere within 8000m) | | | | | | |  |  |
|  | **DESCRIPTOR** | |  |  |  |  |  |  |  |
|  | MI | Shallow | BC | Patches | PR | Partial | TS | Thunderstorm |  |
|  | BL | Blowing | SH | Showers | DR | Drifting | FZ | Freezing |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **WEATHER PHENOMENA** | | |  |  |  |  |  |  |
|  | **PRECIPITATION** | |  |  |  |  |  |  |  |
|  | DZ | Drizzle | RA | Rain | SN | Snow | SG | Snow grains |  |
|  | IC | Ice Crystals | PL | Ice Pellets | GR | Hail | GS | Small hail/snow |  |
|  | UP | Unknown precipitation in automated observations | | | |  |  | pellets |  |
|  | **OBSCURATION** | |  |  |  |  |  |  |  |
|  | BR | Mist (>=5/8SM) | FG | Fog (<5/8SM) | FU | Smoke | VA | Volcanic ash |  |
|  | SA | Sand | HZ | Haze | PY | Spray | DU | Widespread dust |  |
|  | **OTHER** | |  |  |  |  |  |  |  |
|  | SQ | Squall | SS | Sandstorm | DU | Duststorm | PO | Well developed |  |
|  | FC | Funnel cloud | +FC | tornado/waterspout | |  |  | dust/sand whirls |  |