

AVIATION WEATHER SERVICES (chapter 5)

WEATHER BRIEFINGS

When requesting a telephone weather briefing, you should identify

- a. Yourself as a pilot
 - b. Your intended route
 - c. Your intended destination
 - d. Whether you are flying VFR or IFR
 - e. Type of aircraft
 - f. Proposed departure time and time en route
2. A Standard briefing should be obtained before every flight. This briefing will provide all the necessary information for a safe flight.
 3. An outlook briefing is provided when it is 6 or more hours before proposed departure time.
 4. An abbreviated briefing will be provided when the user requests information to
 - a. Supplement mass disseminated data
 - b. Update a previous briefing, or
 - c. Be limited to specific information.

AVIATION ROUTINE WEATHER REPORT (METAR)

1. Aviation routine weather reports (METARs) are actual weather observations at the time indicated on the report. There are two types of reports.
 - a. **METAR** is a routine weather report.
 - b. **SPECI** is a nonroutine weather report.
2. Following the type of report are the elements listed below:
 - a. The four-letter ICAO station identifier
 - 1) In the contiguous 48 states, the three-letter domestic identifier is prefixed with a "K."
 - b. Date and time of report. It is appended with a "Z" to denote Coordinated Universal Time (UTC) .
 - c. Modifier (if required)
 - d. Wind. Wind is reported as a five-digit group (six digits if the wind speed is greater than 99 kt.). It is appended with the abbreviation KT to denote the use of knots for wind speed.
 - 1) If the wind is gusty, it is reported as a "G" after the speed, followed by the highest gust reported.
 - 2) EXAMPLE: **11012G18KT** means wind from 110° true at 12 kt. with gusts to 18 kt.
 - e. Visibility. Prevailing visibility is reported in statute miles with "SM" appended to it.
 - 1) EXAMPLE: **1 1/2SM** means visibility 1 1/2 SM.
 - f. Runway visual range
 - g. Weather phenomena
 - 1) **RA** is used to indicate rain.

h. Sky conditions

- 1) The ceiling is the lowest broken or overcast layer, or vertical visibility into an obscuration.
- 2) Cloud bases are reported with three digits in hundreds of feet AGL.

a) EXAMPLE: **OVC007** means overcast cloud layer at 700 ft. AGL.

i. Temperature/dew point. They are reported in a two-digit form in whole degrees Celsius separated by a solidus, "/."

j. Altimeter

k. Remarks (RMK)

1) **RAB35** means rain began at 35 min. past the hour.

3. EXAMPLE: METAR KAUS 301651Z 12008KT 4SM -RA HZ BKN010 OVC023 21/17 A3005 RMK RAB25

a. **METAR** is a routine weather observation.

b. **KAUS** is Austin, TX.

c. **301651Z** means the observation was taken on the 30th day at 1651 UTC (or 2).

d. **12008KT** means the wind is from 120° true at 8 kt.

e. **4SM** means the visibility is 4 statute miles.

f. **-RA HZ** means light rain and haze.

g. **BKN010 OVC023** means ceiling 1,000 ft. broken, 2,300 ft. overcast.

h. **21/17** means the temperature is 21°C and the dew point is 17°C.

i. **A3005** means the altimeter setting is 30.05 in. of Hg.

j. **RMK RAB25** means remarks, rain began at 25 min. past the hour, i.e., 1625 UTC.

PILOT WEATHER REPORT (PIREP)

1. No observation is more timely or needed than the one you make from the cockpit.

2. All heights are given as MSL. To determine AGL, subtract the field height from the given height.

3. Turbulence is reported as

a. Light = LGT

b. Moderate = MOT

c. Severe = SVR

4. Icing is reported as

a. Clear = CLR

b. Rime = RIME

5. Cloud layers are reported with heights for bases, tops, and layer type if available. "No entry" means that information was not given.

a. EXAMPLE: SK 024 BKN 032/042 BKN-OVC decoded means a broken layer 2,400 ft. MSL to 3,200 ft. MSL. A second layer is broken to overcast starting at 4,200 ft. MSL.

6. Wind direction and velocity are given as a six-digit code (e.g., **/WV 270045** means 270° at 45 kt.).

7. Air temperature is expressed in degrees Celsius (OC).

8. PIREPs are transmitted in a format illustrated below.

Encoding Pilot Weather Reports (PIREP)

1. **UA** - Routine PIREP, **UUA** - Urgent PIREP
2. **/OV** - **Location:** Use 3-letter NAVAID idents only.
 - a. Fix: /OV ABC, /OV ABC 090025.
 - b. Fix to fix: /OV ABC-DEF, /OV ABC-DEF 120020, /OV ABC 045020-DEF 120005, /OV ABC-DEF-GHI.
3. **/TM** - **Time:** 4 digits in GMT: /TM 0915.
4. **/FL** - **Altitude/Flight Level:** 3 digits for hundreds of feet. If not known, use UNKN: /FL095, /FL310, /FLUNKN.
5. **/TP** - **Type aircraft:** 4 digits maximum. If not known use UNKN: /TP L329, /TP B727, /TP UNKN.
6. **/SK** - **Cloud layers:** Describe as follows:
 - a. Height of cloud base in hundreds of feet. If unknown, use UNKN.
 - b. Cloud cover symbol.
 - c. Height of cloud tops in hundreds of feet.
 - d. Use solidus (/) to separate layers.
 - e. Use a space to separate each sub element.
 - f. Examples: /SK 038 BKN, /SK 038 OVC 045, /SK 055 SCT 073/085 BKN 105, /SK UNKN OVC
7. **/WX** - **Weather:** Flight visibility reported first. Use standard weather symbols, intensity is not reported: /WX FV02 R H, /WX FV01 TRW.
8. **/TA** - **Air temperature in Celsius:** If below zero, prefix with a hyphen: /TA 15, /TA -06.
9. **/WV** - **Wind:** Direction and speed in six digits. /WV 270045, /WV 280110.
10. **/TB** - **Turbulence:** Use standard contractions for intensity and type (use CAT or CHOP when appropriate). Include altitude only if different from /FL. /TB EXTRM, /TB LGT-MDT BLO-090.
11. **/IC** - **Icing:** Describe using standard intensity and type contractions. Include altitude only if different than /FL: /IC LGT-MDT RIME, /IC SVR CLR 028-045.
12. **/RM** - **Remarks:** Use free form to clarify the report. Most hazardous element first: /RM LLWS -15KT SFC-003 DURGC RNWY 22 JFK. Refer to FAAH 7110.10 for expanded explanation of TEI coding.

Examples of Completed PIREPs

UA /OV RFD 170030/TM 1315/FL160/TP PA60 /SK 025 OVC 095/180 OVC /TA -21/WV 270048

UA /OV DHT 360015-AMA-CDS/TM 2116/FL050/TP PA32 /SK UNKN OVC/WX FV03 R /TB LGT/TA 04/RM HVY RAIN

★ U.S. GPO: 1985-461-823/21543

PIREP FORM

Pilot Weather Report		→ = Space Symbol
3-Letter SA Identifier		
1. UA →	UUA →	Routine Report Urgent Report
2. /OV →	Location:	
3. /TM →	Time:	
4. /FL	Altitude/Flight Level:	
5. /TP →	Aircraft Type:	
Items 1 through 5 are mandatory for all PIREPs		
6. /SK →	Sky Cover:	
7. /WX →	Flight Visibility and Weather:	
8. /TA →	Temperature (Celsius):	
9. /WV →	Wind:	
10. /TB →	Turbulence:	
11. /IC →	Icing:	
12. /RM →	Remarks:	

FAA FORM 7110-2 (1-80) Supersedes Previous Edition

*AVIATION AREA FORECAST

1. Aviation area forecasts (FA) are for several states and/or portions of states. They can be used to interpolate conditions at airports, which have no terminal forecasts. FAs are issued three times a day and consist of
 - a. A 12-hr. forecast
 - b. An additional 6-hr. categorical outlook
2. FA weather format. An example is presented on page 214 for questions 26 through 29. It is presented in abbreviations. You will see this same FA utilizing abbreviations on your pilot knowledge test.
3. The order of topics in the FA for this test, each being on a separate line or in a separate paragraph, is
 - a. Heading
 - b. Forecast area
 - c. Height statement (i.e., feet MSL or AGL)
 - d. Flight precaution statement
 - e. Synopsis
 - f. Clouds and weather, plus categorical outlook
 - g. Icing and freezing level
 - h. Turbulence
 - i. AIRMETs and SIGMETs

TERMINAL AERODROME FORECAST (TAF)

1. Terminal aerodrome forecasts (TAFs) are weather forecasts for selected airports throughout the country.
2. The elements of a TAF are listed below:
 - a. Type of report
 - 1) **TAF** is a routine forecast.
 - 2) **TAF AMD** is an amended forecast.
 - b. ICAO station identifier
 - c. Date and time the forecast is actually prepared
 - d. Valid period of the forecast
 - e. Forecast meteorological conditions. This is the body of the forecast and includes the following:
 - 1) Wind
 - 2) Visibility 3) Weather
 - 4) Sky condition
 - a) Cumulonimbus clouds (CB) are the only cloud type forecast in TAFs.

3. EXAMPLE:

TAF . KBRO 300545Z 300606 VRB04KT 3SM SCT040 OVC150 TEMPO 2124 SHRA / FM0200 1001 OKT P6SM OVC020 BECMG0305 NSW BKN020=

- a. **TAF** is a routine forecast.
- b. **KBRO** is Brownsville, TX.
- c. **300545Z** means the forecast was prepared on the 30th day at 0545 UTC.
- d. **300606** means the forecast is valid from the 30th day at 0600 UTC until 0600 UTC the following day.
- e. **VRB04KT 3SM SCT040 OVC150 TEMPO 2124 SHRA** means the forecast from 0600 until 1400 UTC is wind variable in direction at 4 kt., visibility 3 SM, scattered cloud layer at 4,000 ft., ceiling 15,000 ft. overcast, with occasional rain showers between 2100 and 2400 UTC.
- f. **FM0200 1001 OKT P6SM OVC020 BECMG0306 NSW BKN020=** means the forecast from 0200 until 0300 is wind 100° true at 10 kt., visibility greater than 6 SM, ceiling 2,000 ft. overcast then becoming no significant weather, ceiling 2,000 ft. broken between 0300 to 0600 UTC.
 - 1) Note that, since the becoming group (BECMG) did not forecast wind and visibility, they are the same as the previous forecast group, i.e., wind 100° true at 10 kt, visibility greater than 6 SM.

WEATHER DEPICTION CHARTS

1. A weather depiction chart is an outline of the United States depicting sky conditions at the time stated on the chart based on METAR reports.

a. Reporting stations are marked with a little circle.

1) If the sky is clear, the circle is open; if overcast, the circle is solid; if scattered, the circle is 1/4 solid; if broken, the circle is 3/4 solid. If the sky is obscured, there is an "X" in the circle.

2) The height of clouds is expressed in hundreds of feet above ground level, e.g., 120 means 12,000 ft. AGL.

2. Areas with ceilings below 1,000 ft. and/or visibility less than 3 SM, i.e., below VFR, are bracketed with solid black contour lines and are shaded.

a. Visibility is indicated on the circle; e.g., 2 stands for 2 SM visibility.

b. Areas of marginal VFR with ceilings of 1,000 to 3,000 ft. and/or visibility at 3 to 5 SM are bracketed by solid black contour lines and are unshaded.

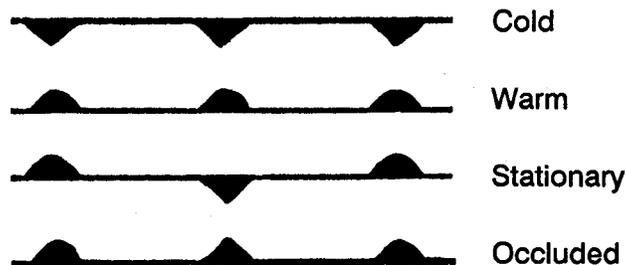
c. Ceilings greater than 3,000 ft. and visibility greater than 5 SM are not indicated by contour lines on weather depiction charts.

3. Significant weather is indicated by the following symbols:

	SHOWER		FOG OR GROUND FOG		ICE PELLETS
	THUNDERSTORM		HAZE		SNOW
	CLOUDS TOPPING RIDGES		SMOKE		RAIN
			DRIZZLE		FREEZING DRIZZLE
					FREEZING RAIN

4. The weather depiction chart quickly shows pilots where weather conditions reported are above or below VFR minimums.

5. The weather depiction chart displays recent positions of frontal systems and indicates the type of front by symbols.

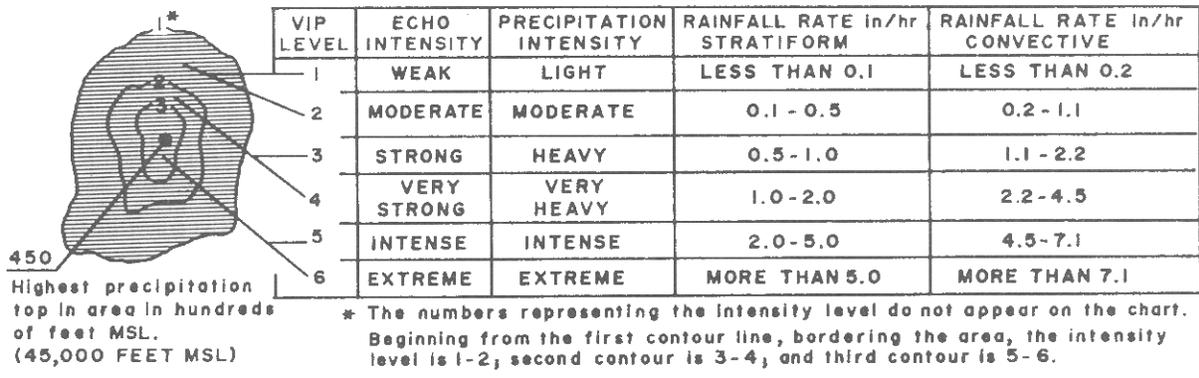


RADAR SUMMARY CHARTS

1. Radar summary charts graphically display a collection of radar reports concerning the type, intensity, and movement of precipitation, e.g., squall lines, specific thunderstorm cells, and other areas of hazardous precipitation.

a. Lines and cells of hazardous thunderstorms can be seen on radar summary charts and are not shown on other weather charts.

2. The following symbols are used on radar summary charts.



SYMBOL MEANING		SYMBOL MEANING		SYMBOL MEANING	
R	RAIN	+	INTENSITY INCREASING OR NEW ECHO		LINE OF ECHOES
RW	RAIN SHOWER	-	INTENSITY DECREASING		8/10 OR GREATER COVERAGE IN A LINE
HAIL	HAIL	NO SYMBOL	NO CHANGE IN INTENSITY	WS999	SEVERE THUNDERSTORM WATCH
S	SNOW		CELL MOVEMENT TO NE AT 35 KNOTS	WT999	TORNADO WATCH
IP	ICE PELLETS		LINE OR AREA MOVEMENT TO EAST AT 20 KNOTS	LEWP	LINE ECHO WAVE PATTERN
SW	SNOW SHOWER	LM	LITTLE MOVEMENT	HOOK	HOOK ECHO
L	DRIZZLE	MA	ECHOES MOSTLY ALOFT		
T	THUNDERSTORM	PA	ECHOES PARTLY ALOFT		
ZR,ZL	FREEZING PRECIPITATION				
NE	NO ECHOES OBSERVED				
NA	OBSERVATIONS UNAVAILABLE				
OM	OUT FOR MAINTENANCE				
STC	STC ON - all precipitation may not be seen				
ROBEPS	RADAR OPERATING BELOW PERFORMANCE STANDARDS				
RHINO	RANGE HEIGHT INDICATOR NOT OPERATING				

RAINFALL RATES SHOULD BE USED WITH CAUTION

EN ROUTE FLIGHT ADVISORY SERVICE (EFAS)

- En Route Flight Advisory Service (EFAS) provides weather advisories on 122.0 MHz below FL 180. It is called Flight Watch.
 - Generally, service is available from 6 a.m. to 10 p.m. local time.
 - EFAS provides information regarding actual weather and thunderstorm activity along a proposed route.
- It is designed to be a continual exchange of information on winds, turbulence, visibility, icing, etc., between pilots and weather briefers.

WINDS AND TEMPERATURES ALOFT FORECASTS (FD)

- Forecast winds and temperatures are provided at specified altitudes for specific locations in the United States.
- A four-digit group (used when temperatures are not forecast) shows wind direction with reference to true north and the wind speed in knots.
 - The first two digits indicate the wind direction after a zero is added.
 - The next two digits indicate the wind speed.
 - No temperature is forecast for the 3,000-ft. level or for a level within 2,500 ft. AGL of the station.
- A six-digit group includes the forecast temperature aloft.

- a. The last two digits indicate the temperature in degrees Celsius.
 - b. Plus or minus is indicated before the temperature, except at higher altitudes (above 24,000 ft. MSL) where it is always below freezing.,
4. When the wind speed is less than 5 kt., the forecast is coded 9900, which means that the wind is light and variable.
 5. When the wind speed is over 100 kt., the forecaster adds 50 to the direction and subtracts 100 from the speed. To decode, you must reverse the process. For example, 730649 = 230° (73-50) at 106 kt. (100 + 06) and -49° (above 24,000 ft.).
 6. An example forecast is provided on page 223 for questions 56 through 60.

SIGNIFICANT WEATHER PROGNOSTIC CHARTS

1. Significant Weather Prognostic Charts contain four charts (panels).
 - a. The two upper panels forecast significant weather from the surface up to 24,000 ft: one for 12 hr. and the other for 24 hr. from the time of issuance.
 - b. The two lower panels forecast surface conditions: one for 12 hr. and the other for 24 hr. from time of issuance.
2. The top panels show
 - a. Ceilings less than 1,000 ft. and/or visibility less than 3 SM (IFR) by a solid line around the area;
 - b. Ceilings 1,000 to 3,000 ft. and/or visibility 3 to 5 SM (MVFR) by a scalloped line around the area.
 - c. Moderate or greater turbulence by a broken line around the area; and
 - 1) A peaked hat-A- indicates moderate turbulence.
 - 2) Altitudes are indicated on the chart; e.g., 1.e.Q means from surface to 18,000 ft.
 - d. Freezing levels, given by a dashed line corresponding to the height of the freezing level.
3. The bottom panels show the location of
 - a. Highs, lows, fronts
 - b. Other areas of significant weather
4. These charts are used to determine areas to avoid (freezing levels and turbulence).
5. Movement of each pressure center is indicated by an arrow showing direction and a number indicating speed in kt.

TRANSCRIBED WEATHER BROADCASTS

1. TWEBs are continuous recordings of meteorological and aeronautical information broadcast on certain NDB and VOR facilities.
 - a. Generally, they are based on specific routes of flight.

AIRMETS AND SIGMETS

1. SIGMETs and AIRMETS are issued to notify pilots en route of the possibility of encountering hazardous flying conditions.

2. SIGMET advisories include weather phenomena, which are potentially hazardous to all aircraft.

a. Convective SIGMETs include

- 1) Tornadoes
- 2) Lines of thunderstorms
- 3) Embedded thunderstorms
- 4) Thunderstorm areas greater than or equal to thunderstorm intensity level 4 with an area coverage of 40% or more
- 5) Hail greater than or equal to 3/4 in. diameter

b. SIGMETs include

- 1) Severe or extreme turbulence or clear air turbulence (CAT) not associated with thunderstorms
- 2) Severe icing not associated with thunderstorms
- 3) Duststorms, sandstorms, or volcanic ash lowering visibility to less than 3 SM
- 4) Volcanic eruption

3. AIRMETs apply to light (e.g., small single-engine) aircraft to notify of

- a. Moderate icing
- b. Moderate turbulence
- c. Visibility less than 3 SM or ceilings less than 1,000 ft.
- d. Sustained winds of 30 kt. or more at the surface
- e. Extensive mountain obscurement