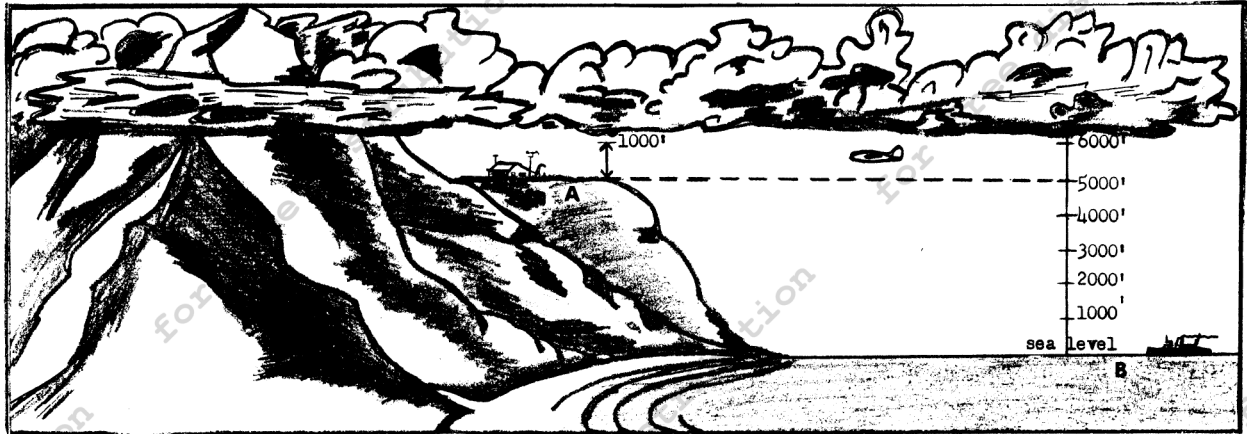


Department of Transportation  
FEDERAL AVIATION ADMINISTRATION  
VFR PILOT EXAM-O-GRAM\* NO. 20

CEILING & VISIBILITY



An analysis of common mistakes on written examinations indicates that many applicants are improperly interpreting the ceilings and visibilities reported on hourly weather reports (sequence reports).

How about you? Do you really know what a ceiling is - what visibility is - and how both are reported??

A. CEILING:

1. Is defined as the "lowest layer of clouds or obscuring phenomena aloft that is reported as 'broken' (.6 to .9 coverage), or 'overcast' (more than .9 coverage) and not classified as 'thin'; or the height ascribed to surface-based obscuring phenomena not classified as 'partial.'" This simply means that -
  - a. The lowest cloud coverage reported as broken or overcast constitutes a ceiling except when a minus sign precedes the cloud layer contraction (-BKN, -OVC). When this occurs, that particular layer does not constitute a ceiling.
  - b. If the sky is reported as completely obscured (X) by a phenomena extending to the surface (e.g., fog, dust, heavy precipitation), the ceiling is the vertical visibility into the obscuration.
  - c. If the sky is partially obscured (-X) it does not constitute a ceiling and no height will be given for this partial obscuration.  
Example: OKC -X 18 SCT M35 OVC, etc.
  - d. Scattered clouds (SCT) do not constitute a ceiling.
2. For practical purposes, ceiling is the lowest height above the surface at which the total cloudiness between that level and the surface (as seen by a ground observer) covers more than half the sky.

NOTE: The contractions CLR, SCT, BKN, and OVC have replaced the symbols ○, ⊙, ⊕, and ⊕.

\* Exam-O-Grams are non-directive in nature and are issued solely as an information service to individuals interested in Airman Written Examinations.

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3. Ceiling may be classified in several ways. This classification is shown by a letter which precedes the ceiling height. Some of the more important of these letters are:

M = measured E = estimated W = indefinite

If one of these letter symbols does not precede the cloud contraction or if thin broken or overcast clouds, or a partial obscuration exists, there is no ceiling.

Example: CBI -X 1 $\emptyset$  SCT 14 -BKN 14 $\emptyset$  -OVC 5H, etc. means that no official ceiling exists at Columbia, Missouri.

#### B. CLOUDS:

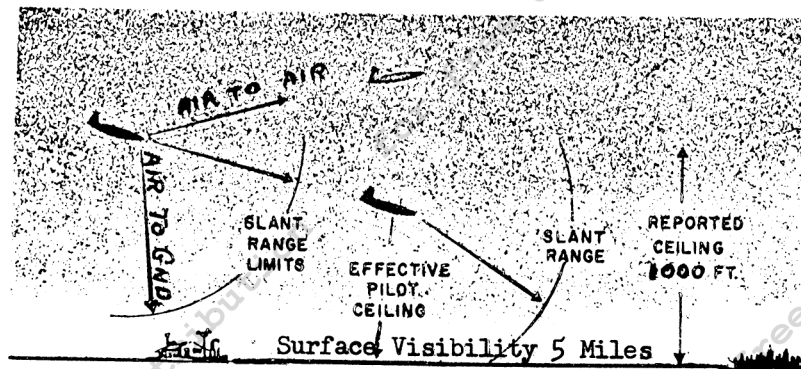
1. In sequence reports the heights of cloud-base levels are given in feet above the ground, not above sea level. Note that the clouds are at approximately 1000 feet at station "A" and 6000 feet at station "B" in the illustration on the first page.
2. The figure for the height of the cloud base above the surface precedes each sky coverage contraction.
3. The last two digits of the cloud height are omitted; i. e., 1 means 100 feet, 14 means 1400 feet, and 140 means 14,000 feet.
4. Clouds are reported in ascending order of height whether or not they constitute a ceiling.
5. Surface-based total obscurations (phenomena other than clouds such as fog, precipitation, dust, smoke, or haze) are not reported as clouds since this would be misleading but they are reported with a height value.

Example: BUF W15 X 3/4S-F, etc., means that at Buffalo there is a vertical visibility of 1500 feet into a total obscuration. A definite cloud base cannot be seen from the ground.

#### C. VISIBILITY:

1. Visibility is the greatest distance on the earth's surface at which prominent objects can be seen and identified. This distance is not always the same in all directions. Therefore, the value for prevailing visibility (which is a ground visibility only) is based on surface observations and is stated in the hourly sequence reports. Prevailing visibility is always reported in statute miles and is the greatest surface visibility attained or surpassed throughout at least one-half of the horizon circle, but not necessarily continuous or for all of the horizon circle.

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Types of Visibility in Aviation

All pilots should clearly understand that sequence report visibility may be much greater than either air to air, or slant range visibility, particularly when low ceilings and/or obscurations prevail.

2. Fractional values for visibility such as  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $2\frac{1}{2}$ , etc., appear as 1 1/4, 1 1/2, 2 1/2, on the hourly sequence report because the teletype machines do not have fractions.

Example: CLE M12 BKN 20 OVC 2 1/2R-F 071/39/37/0000/974

3. It is not always possible to look at the visibility as reported in the main body of the teletype report and obtain complete information concerning surface visibility at the station because:

- a. If, in some direction from the station, there is a significant variation from the prevailing visibility, this variation will be found only in the remarks section.

Example: PIT E18 OVC 4S-K 031/32/30/0000/962/VSBY N 1 means that the reported visibility is reduced to 1 mile to the north.

4. Weather occurring at the time of observation is also reported through use of letter symbols. These symbols follow the visibility as reported in statute miles. Some of the more common of these symbols are:

R=Rain; S=Snow; T=Thunderstorm; RW=Rain showers; A=Hail; IP=Ice pellets

5. Except for thunderstorms, hail, and ice crystals, the intensity of weather is shown by:

- a. A plus sign (+) following the symbol to indicate "heavy".
- b. A minus sign (-) following the symbol to indicate "light".
- c. A double minus sign (--) following the symbol to indicate "very light".
- d. The absence of any sign indicates the intensity is "moderate".

Example: STL 5 SCT E10 OVC 2R--S-K etc., which indicates that St. Louis has very light rain, light snow, and smoke. Note that these signs apply only to the weather and not to the obstructions to vision.

QUESTIONS AND ANSWERS

LAX -4 -SCT 14 -BKN 250 -OVC 4HK 196/66/63/0000/011/VSBY N 2

A. Based on the above report --

1. IS THERE A PARTIAL OBSCURATION AT 400 FEET OR SCATTERED CLOUDS AT 400 FEET?  
Ans. No. Height values are not assigned to partial obscurations, and the figures for cloud heights above the ground precede the sky coverage contraction for those clouds; therefore, the figure 4 must refer to the scattered clouds.
2. WHAT IS THE CEILING? Ans. There is no official ceiling. No letter precedes the cloud contractions and all cloud coverage is reported as thin (-).
3. WHAT IS THE VISIBILITY? Ans. Prevailing surface visibility is 4 statute miles with haze and smoke, but to the north visibility is only 2 statute miles.
4. SHOULD A PILOT EXPECT HIS SLANT RANGE AIR TO GROUND VISIBILITY TO BE 4 MILES AT LOS ANGELES? Ans. No. Under the circumstances of obscuration, partial haze and smoke, it is probably less.

DEN 10 SCT M30 BKN 80 OVC 2VFK 031/75/65/1105/962/VSBY 1V3

B. Based on the above report --

1. WHAT IS THE CEILING? Ans. Measured 3000 feet above the surface.
2. AT 7500 FEET MEAN SEA LEVEL OVER DENVER, COLORADO, WOULD THE PILOT BE ABOVE OR BELOW THE CLOUDS REPORTED AT 3000 FEET? Ans. Below the clouds. At 7500 feet MSL he is approximately 2200 feet above the ground at Denver.
3. SHOULD A PILOT INTERPRET THIS REPORT TO MEAN THAT HE WILL FIND .9 OR MORE CLOUD COVER AT 8000 FEET ABOVE THE SURFACE? Ans. No. While it is possible that this situation actually exists, it is also true that such may not be the case at all. If there actually exists, visible from the ground, .5 coverage at 1000 feet, .4 coverage at 3000 feet, and .1 coverage at 8000 feet, it would be reported as 10 SCT M30 BKN 80 OVC. The combination of clouds at various levels may make it impossible for the ground observer to determine the actual percentage of cloud cover for all except the lowest level.

C. WHY SHOULD A PILOT BE EXTREMELY CAREFUL IN INTERPRETING CEILING VALUES, PARTICULARLY IN MOUNTAINOUS AREAS? Ans. If he does not he may "booby trap" himself into expecting an adequate ceiling when it does not exist! He must always relate surface elevation at the reporting station to terrain elevation along his flight route. The diagram on Page 1 illustrates what can happen to a 6000-foot ceiling when the surface elevation changes. He must also be aware that there are wide enroute variations from the reported ceilings (and visibility) even if there is no significant change in terrain elevation.

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FAA Aeronautical Center  
Flight Standards Technical Division  
Operations Branch  
P. O. Box 25082  
Oklahoma City, Oklahoma 73125

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