APPENDIX D
WEATHER INFORMATION

This appendix continues the coverage of Part II Chapter I, Preflight Preparation, Task C: Weather Information.

b. Surface analysis chart.

1) The surface analysis chart is a computer-generated chart that depicts the observed weather conditions that existed at the valid time shown on the chart.

a) The surface analysis chart displays the following weather information for specific locations in the form of multiple “station circles” (i.e., a group of symbols representing the observed weather at a specific location):

i) Surface wind direction and speed
ii) Surface temperature and dew point
iii) Total sky cover
iv) Obstructions to vision
v) Precipitation type
vi) Predominant type of low, middle, and high clouds
vii) Sea level pressure
viii) Pressure change during the past 3 hours
ix) Precipitation recorded during the past 6 hours

b) The chart also displays the following large-scale weather phenomena:

i) Position and type of fronts
ii) Position of highs and lows
iii) Position of ridges and troughs
iv) Isobars (lines of constant pressure)

2) Additional reading: For a more detailed discussion of surface analysis charts, refer to Part III, Study Unit 8, Surface Analysis Charts, in Aviation Weather and Weather Services.

c. Radar summary chart.

1) A radar summary chart graphically displays a collection of automated radar weather reports (SD/ROBs).

a) The chart displays the type of precipitation echoes, their intensity, configuration, coverage, echo tops and bases, and movement.

i) Severe weather watches are plotted if they are in effect when the chart is valid.

2) Radar primarily detects particles of precipitation size within a cloud or falling from a cloud.

a) The type of precipitation can be determined by the radar operator from the scope presentation in combination with other sources.
3) The intensity is obtained from the Doppler radar and is indicated on the chart by **contours**. The six intensity levels are paired and combined into three contours.
   a) The contours are coded as follows:
      i) The outermost contour indicates precipitation of light or moderate intensity.
      ii) The second contour indicates precipitation of heavy or very heavy intensity.
      iii) The innermost contour indicates precipitation of intense or extreme intensity.
   b) Note that all three contours will not always be present; e.g., if all precipitation in a given area is of light to moderate intensity, only one contour will be shown.

4) Additional reading: For a more detailed discussion of radar summary charts, refer to the following sections of *Aviation Weather and Weather Services* and *Pilot Handbook*:
   a) Part III, Study Unit 9, Radar Summary Chart, in *Aviation Weather and Weather Services*, or
   b) Chapter 8, Aviation Weather Services, Module 8.10, Radar Summary Chart, in *Pilot Handbook*.

d. **Winds and temperature aloft chart.**

1) There are two types of computer-generated winds and temperatures aloft charts:
   a) Forecast winds and temperatures aloft charts are prepared for eight levels ranging from 6,000 ft. MSL to 39,000 ft. MSL on eight separate panels.
      i) Each station that prepares a winds and temperatures aloft forecast is represented on the panel by a station circle.
         • This station circle indicates wind speed and direction in the form of an arrow that is aligned with the wind direction. Barbs and pennants on the upwind end of the arrow indicate speed.
         • Temperature is shown in degrees Celsius above and to the right of the station circle.
         • A calm or light and variable wind is shown by “99” entered to the lower left of the station circle.
      ii) There is also a textual version of the forecast winds and temperatures aloft chart called a winds and temperatures aloft forecast (FB).
   b) Observed winds and temperatures aloft charts are prepared for four levels ranging from approximately 2,000 ft. AGL to 34,000 ft. MSL
      i) Information collected at each reporting station is shown by a station circle using symbols that are similar to the forecast winds and temperatures aloft chart.

2) Additional reading: For a more detailed discussion of winds and temperatures aloft charts, refer to Part III, Study Unit 25, Winds and Temperatures Aloft Charts, in *Aviation Weather and Weather Services*. 
e. Surface prognostic and significant weather charts.

1) Short-Range Surface Prognostic (PROG) Charts provide a forecast of surface pressure systems, fronts, and precipitation for a 2-day period.
   a) The forecast area covers the 48-contiguous states, the coastal waters, and portions of Canada and Mexico.
   b) The forecasted conditions are divided into four forecast periods: 12, 24, 36, and 48 hours.
      i) Each chart depicts a “snapshot” of weather elements expected at the specified valid time.
   c) PROGS plot pressure systems, frontal boundaries, and precipitation.

2) PROGs are very similar to surface analysis charts.
   a) All of the symbols depicted on both charts are the same.
   b) The primary difference between the two charts is that PROGs are forecast charts, whereas the surface analysis chart is a “current conditions” chart.
      i) Additionally, the PROG charts do not feature station model plots.
   c) Think of the PROG as a “future” version of the surface analysis chart.

3) For more information about PROG charts, refer to Part III, Study Unit 26, Short-Range Surface Prognostic (PROG) Charts, in *Aviation Weather and Weather Services*.

4) Significant weather (SIGWX) charts exist for three altitude ranges.
   a) Low-Level SIGWX Charts range from the surface to FL240.
   b) Mid-Level SIGWX Charts range from 10,000 feet MSL to FL450.
   c) High-Level SIGWX Charts range from FL250 to FL630.
   d) Each chart depicts slightly different data, but all present information that can be hazardous to flight within the valid altitude range of the chart.
   e) This overview will focus primarily on the Low-Level SIGWX Charts because these are most likely to be used by pilots of piston-engine airplanes.

5) Low-Level SIGWX Charts are issued four times per day.
   a) Two charts are issued: a 12-hour and a 24-hour chart.
   b) Charts become valid at 0000Z, 0600Z, 1200Z, and 1800Z.

6) Low-Level SIGWX Charts depict weather flying categories, turbulence, and freezing levels. Icing is not specifically forecast.
   a) **Flying Categories**
      i) Instrument Flight Rules (IFR) areas are outlined with a solid, red line.
      ii) Marginal Visual Flight Rules (MVFR) areas are outlined with a scalloped, blue line.
      iii) Visual Flight Rules (VFR) areas are not depicted but are assumed to be located wherever other areas are not depicted.
b) **Turbulence**
   i) Areas of moderate or greater turbulence are enclosed by bold, dashed, yellow lines.
   ii) Turbulence intensity is depicted using chevron-shaped symbols. One chevron represents moderate turbulence, two represents severe, and three represents extreme.
   iii) Turbulence height is depicted by two numbers separated by a solidus (/).
   iv) Turbulence associated with thunderstorms is not depicted on the chart.

c) **Freezing Levels**
   i) If the freezing level is at the surface, it is depicted by a blue, saw-toothed symbol.
   ii) Freezing levels above the surface are depicted by fine, green, dashed lines labeled in hundreds of feet MSL beginning at 4,000 feet using 4,000-foot intervals.
   iii) If multiple freezing levels exist, these lines are drawn to the highest freezing level.
   iv) The lines are discontinued where they intersect the surface.
   v) The freezing level for locations between lines is determined by interpolation.

7) For a more detailed discussion of significant weather charts, refer to the following sections of *Aviation Weather and Weather Services*:
   a) Part III, Study Unit 27, Low-Level Significant Weather (SIGWX) Charts
   b) Part III, Study Unit 28, Mid-Level Significant Weather (SIGWX) Charts
   c) Part III, Study Unit 29, High-Level Significant Weather (SIGWX) Charts

f. **Convective outlooks.**

1) A Convective Outlook (AC) is a forecast containing the area(s) of expected thunderstorm occurrence and expected severity over the contiguous United States, issued several times daily by the Storm Prediction Center (SPC). The terms listed in the report (slight risk, moderate risk, and high risk) are used to describe severe thunderstorm potential.
   a) The AC is a textual translation of the images provided in the Convective Outlook Chart.
   b) The Convective Outlook and the Convective Outlook Chart are usually presented as a single unit, with the chart available to be used as a reference to the text and vice-versa.

2) The SPC issues narrative and graphical convective outlooks to provide the contiguous U.S. NWS Weather Forecast Offices (WFOs), the public, the media, and emergency managers with the potential for severe and non-severe convection and specific severe weather threats during the following eight days.
   a) **Severe** is defined as the expected occurrence of
      i) A tornado,
      ii) Wind gusts 50 knots or greater, or
      iii) Hail of 3/4 inch diameter size or greater.
The Day 1, Day 2, and Day 3 outlooks are considered to be the most accurate, given that the predictability of severe weather decreases the further into the future a forecaster looks.

A severe weather area depicted in the Day 4-8 period indicates a 30% or higher probability that severe thunderstorms will occur within 25 miles of any point.

If the predictability of thunderstorms is too uncertain during the Day 4-8 period, the narrative and the chart will indicate this to the user and not provide any forecast information.

The Convective Outlook defines areas of slight risk (SLGT), moderate risk (MDT), or high risk (HIGH) of severe thunderstorms for a 24-hour period beginning at 1200 UTC.

The Day 1 and Day 2 Convective Outlooks depict areas of general thunderstorms (GEN TSTMS).

The Day 1, Day 2, and Day 3 Convective Outlooks may use SEE TEXT for areas where convection may approach or slightly exceed severe criteria.

For a more detailed discussion of convective outlooks, refer to Part III, Study Unit 19, Additional Products for Convection, in *Aviation Weather and Weather Services*.

g. AWOS, ASOS, and ATIS reports.

Definitions:

a) AWOS—Automated Weather Observing System: This is an older automated reporting system that may provide only basic observed weather information for an airport (e.g., an altimeter setting), or it may be capable of generating a complete automated METAR. AWOS capabilities vary from location to location.

b) ASOS—Automated Surface Observing System: This automated weather reporting system is more advanced than AWOS and is gradually replacing the older system. All ASOS stations are capable of providing at least the following information:

i) Altimeter setting
ii) Wind speed and direction
iii) Temperature and dewpoint
iv) Density altitude
v) Visibility
vi) Cloud cover and ceiling height
vii) Precipitation
viii) Remarks

c) ATIS—Automatic Terminal Information Service: ATIS is a continuous broadcast of recorded information in selected terminal areas. In addition to providing current observed weather information, ATIS broadcasts also reduce controller workload by including recorded airport information such as runways/approaches in use or local NOTAMs.

You should listen to the appropriate AWOS, ASOS, or ATIS broadcast prior to entering the pattern at any airport at which you intend to make a landing, if one is available.

This will help you to anticipate the weather conditions you can expect, as well as which runway is in use.
b) In addition, when flying cross-country under VFR, you can periodically update your altimeter setting using broadcasts from airports along your route.

3) Be aware that the information contained in AWOS, ASOS, and especially ATIS reports may be up to 1 hour old, so conditions at the airport may differ from those reported.

4) Additional reading: For a more-detailed discussion of AWOS and ASOS, refer to Part III, Study Unit 3, Aviation Routine Weather Reports (METAR), in *Aviation Weather and Weather Services*.

2. **Make a competent “go/no-go” decision based on the available weather information.**

   a. In a well-equipped plane with a proficient pilot flying, any ceiling and visibility within legal weather minimums should be flyable. In a poorly equipped airplane or with a new or rusty pilot, marginal VFR (MVFR) should be avoided.

   b. Another factor to consider in your go/no-go decision is the weather. MVFR in smooth air caused by a stalled front is considerably different from heavy turbulence ahead of a strong front or in a squall line. The following forecast conditions may lead to a no-go decision:
      1) Thunderstorms
      2) Embedded thunderstorms
      3) Lines of thunderstorms
      4) Fast-moving fronts or squall lines
      5) Flights that require you to cross strong or fast-moving fronts
      6) Reported turbulence that is moderate or greater (Remember, moderate turbulence in a Boeing 727 is usually severe in a Cessna 152.)
      7) Icing
      8) Fog (Unlike when in a ceiling, you usually cannot maintain visual references with ground fog. This is especially important if sufficient fuel may be a concern.)
      9) Wind shear

   c. These factors must be considered in relation to the equipment to be flown. Thunderstorms are less of a problem in a radar-equipped airplane. The only way to fly safely is to be able to weigh each factor against the other. This is done only by using common sense and gaining experience.

   d. Flying is a continuing process of decision-making throughout the whole flight. You must use your certificate to gain experience, but you must also temper the pursuit of experience so you do not get in beyond your capabilities or the capabilities of your airplane.

   e. A final factor to be considered in the go/no-go decision is your physical and mental condition. Are you sick, tired, upset, depressed, etc.? These factors greatly affect your ability to handle normal and abnormal problems.

**END OF TASK**