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Availability and Operational Use of Weather Information by En Route and Terminal Controllers

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16. Abstract

Future air traffic control concepts include many new roles and responsibilities among controllers, air traffic management, pilots, and flight dispatchers. An important aspect of future concepts specifically aims at mitigating operational constraints caused by adverse weather conditions. Therefore, it is important to evaluate the current weather information available to these operators to assess future weather requirements for National Airspace System operations and safety. In the present paper, I compare and contrast the procedural requirements in Federal Aviation Administration Order 7110.65R that en route and terminal controllers follow when they use weather-related information. I summarize what weather information is available at the controller workstation and outline how controllers use this information operationally.

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Executive Summary

Future Air Traffic Control (ATC) concepts include many new roles and responsibilities among controllers, air traffic management, pilots, and flight dispatchers. An important aspect of future concepts specifically aims at mitigating operational constraints caused by adverse weather conditions. Therefore, it is important to evaluate the current weather information available to these operators to assess future weather information needs for National Airspace System operations and safety.

Federal Aviation Administration Order (FAAO) 7110.65R describes ATC procedures and phraseology for use by persons providing ATC services. Some of these control procedures encompass the use of weather-related information by en route and terminal controllers. In the present paper, I compare and contrast the procedural requirements in FAAO 7110.65R that en route and terminal controllers follow when they use weather-related information. I summarize what weather information is available at the controller workstation, and I outline how controllers use this information operationally.

In general, en route and terminal controllers follow the same basic procedures when using weather-related information. For example, the FAAO 7110.65R procedures for providing pilots with timely information about airport conditions apply to both en route and terminal controllers. In other instances, the basic procedures are the same but there is a minor difference or minor extension of a procedure that only applies to one of the domains. For example, en route and terminal controllers follow the same basic procedure for providing pertinent information on weather and chaff areas to pilots, but en route controllers do not describe radar-derived weather to pilots for light precipitation.

Future concept work needs to bridge the gap between controllers', pilots', and flight-deck operators' weather information to enhance common weather situation awareness. Part of this task is to ensure that controllers have direct access to operationally useful information. The present paper can play a role in highlighting the current weather procedures for en route and terminal ATC operations, thereby providing an overview of similarities and differences in weather information requirements.

1. INTRODUCTION

Adverse weather creates safety hazards for pilots, constrains the usable airspace for Air Traffic Control (ATC), and reduces the overall capacity of the National Airspace System (NAS). To mitigate these effects, NAS operators use weather information to optimize routes and runways, improve planning, and furnish weather advisories to pilots.

Throughout the NAS, different operators have access to a variety of weather information sources (Ahlstrom, 2003). For example, most pilots have on-board weather radar systems, flight dispatch and ATC traffic management may have advanced weather analysis and forecasting tools, and air traffic controllers have access to wind and precipitation information. In the present paper, I specifically address the weather information sources available to en route and terminal controllers and the operational procedures that guide the use of this information.

The comparison of operational procedures is important because the future NAS concept entails a common workstation platform for en route and Terminal Radar Approach Control (TRACON) controllers. Implementing this concept requires a thorough assessment of weather information and operational requirements for these controllers. Furthermore, because of a consolidation of more sources of weather information at the workstation, there is a need for an assessment that can refine and optimize information. Controller weather requirements also play an important part in understanding the overall role of weather information in NAS operations and safety. Here, there is a need to evaluate the weather information sources available to traffic management, controllers, pilots, and flight dispatchers to align information with future roles and responsibilities and operational concepts.

1.1 Purpose

The primary purpose of the present paper is to compare and contrast the procedural requirements from Federal Aviation Administration Order (FAAO) 7110.65R (FAA, 2006a) that en route and terminal controllers follow when they use weather information. A secondary purpose is to compare the types of weather information currently available at the en route and terminal workstations. The goal is to summarize what weather information is currently available to the controllers and how they use this information operationally. The present paper does not provide a summary of weather information sources available to en route and terminal supervisors/traffic management.

2. METHOD

FAAO 7110.65R stipulates ATC procedures and phraseology for use by persons providing ATC services. Included in these provisions are procedures that encompass the use of weather information. In the present paper, I have included all the sections in FAAO 7110.65R that I believe are relevant for a comparison of the use of weather-related information between en route and terminal controllers.

In Sections 4 and 5 of this paper, I have included the FAAO 7110.65R provisions that define the purpose of the ATC system and state the controllers' duty and operational priorities.

In Sections 6 through 20, I provide a short description of each weather-related provision followed by the actual text from FAAO 7110.65R. The text includes procedures and

phraseology as well as examples and references. The reason for this inclusion is two-fold. First, many of the FAAO 7110.65R weather procedures contain several conditional statements. As a consequence, it is difficult to make a simple summary of a particular procedure because the controllers' actions depend on and vary with stated conditions. Second, by including the original FAAO 7110.65R text in this paper, the reader has immediate access to procedural requirements and examples, which alleviates the need to access an external version of FAAO 7110.65R when reading this paper.

Section 21 provides a comparison of FAAO 7110.65R procedural requirements for en route and terminal controllers regarding how they use weather-related information. This section contains the provisions outlined in Sections 6 through 20 without procedures and phraseology. The purpose of this section is to provide a simple overview of the procedural differences between en route and terminal controllers regarding weather information.

Finally, in Section 22, I compare the weather information sources available to en route and terminal controllers. I outline the weather information sources and where the controllers can access this information, and I provide examples of how controllers use this information operationally.

3. GENERAL CONTROL – PURPOSE OF THE ATC SYSTEM

3.1 ATC Service

The primary purpose of the ATC system is to prevent a collision between aircraft and to organize and expedite the flow of traffic. Controllers also perform additional services, conditions permitting, but controllers do not separate aircraft from weather.

> (From FAAO 7110.65, page 2-1-1.)
> The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic. In addition to its primary function, the ATC system has the capability to provide (with certain limitations) additional services. The ability to provide additional services is limited by many factors, such as the volume of traffic, frequency congestion, quality of radar, controller workload, higher priority duties, and the pure physical inability to scan and detect those situations that fall in this category. It is recognized that these services cannot be provided in cases in which the provision of services is precluded by the above factors. Consistent with the aforementioned conditions, controllers shall provide additional service procedures to the extent permitted by higher priority duties and other circumstances. The provision of additional services is not optional on the part of the controller, but rather is required when the work situation permits. Provide air traffic control service in accordance with the procedures and minima in this order except when:
> **a.** A deviation is necessary to conform with ICAO Documents, National Rules of the Air, or special agreements where the U.S. provides air traffic control service in airspace outside the U.S. and its possessions or:
> ***NOTE*** *− Pilots are required to abide by CFRs or other applicable regulations regardless of the application of any procedure or minima in this order.*
> **b.** Other procedures/minima are prescribed in a letter of agreement, FAA directive, or a military document, or:
> ***NOTE*** *− These procedures may include altitude reservations, air refueling, fighter interceptor operations, law enforcement, etc.*
> ***REFERENCE*** *− FAAO 7110.65, Procedural Letters of Agreement, Para 1−1−9.*
> **c.** A deviation is necessary to assist an aircraft when an emergency has been declared.

3.2 Duty Priority

Controllers first perform the action, which is most critical from a safety standpoint.

(From FAAO 7110.65, page 2-1-1.)
a. Give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment shall be used in prioritizing all other provisions of this order based on the requirements of the situation at hand.
REFERENCE − *FAAO 7110.65, Safety Alert, Para 2−1−6.*
NOTE − *Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit, and when more than one action is required, controllers shall exercise their best judgment based on the facts and circumstances known to them. That action which is most critical from a safety standpoint is performed first.*
b. Provide additional services to the extent possible, contingent only upon higher priority duties and other factors including limitations of radar, volume of traffic, frequency congestion, and workload.

3.3 Operational Priority

Controllers provide ATC service to aircraft on a "first come, first served" basis. One exception is that controllers provide priority in assisting civilian air ambulance flights to avoid areas of significant weather and turbulent conditions.

(From FAAO 7110.65, page 2-1-2.)
Provide air traffic control service to aircraft on a "first come, first served" basis as circumstances permit, except the following:
NOTE − It is solely the pilot's prerogative to cancel an IFR flight plan. However, a pilot's retention of an IFR flight plan does not afford priority over VFR aircraft. For example, this does not preclude the requirement for the pilot of an arriving IFR aircraft to adjust his/her flight path, as necessary, to enter a traffic pattern in sequence with arriving VFR aircraft.
a. An aircraft in distress has the right of way over all other air traffic.
REFERENCE − *14 CFR Section 91.113(c)*.
b. Provide priority to civilian air ambulance flights "LIFEGUARD." Air carrier/taxi usage of the "LIFEGUARD" call sign, indicates that operational priority is requested. When verbally requested, provide priority to military air evacuation flights (AIR EVAC, MED EVAC) and scheduled air carrier/air taxi flights. Assist the pilots of air ambulance/evacuation aircraft to avoid areas of significant weather and turbulent conditions. When requested by a pilot, provide notifications to expedite ground handling of patients, vital organs, or urgently needed medical materials.

3.4 Supervisory Notification

Controllers ensure that supervisor/controller-in-charge is aware of weather conditions that impact sector/position operations.

(From FAAO 7110.65, page 2-1-12.)
Ensure supervisor/controller-in-charge (CIC) is aware of conditions, which impact sector/position operations including, but not limited to, the following:
a. Weather.
b. Equipment status.
c. Potential sector overload.
d. Emergency situations.
e. Special flights/operations.

4. ATC WEATHER PROCEDURES DEFINED IN FAAO 7110.65R

FAAO 7110.65R stipulates ATC procedures and phraseology for use by persons providing ATC services. It requires controllers to be familiar with the provisions of this order that pertain to their operational responsibilities and to exercise their best judgment if they encounter situations not covered by FAAO 7110.65R. For the present paper, I focus solely on provisions that deal with procedures and phraseology related to the use of weather information.

NOTE – In FAAO 7110.65R, the use of the word "shall" means that a procedure is mandatory for the controllers. It uses the word "should" when a procedure is recommended. The wording may or need not mean that a procedure is optional.

5. WEATHER INFORMATION

5.1 Familiarization

Controllers need to maintain weather situation awareness.

> (From FAAO 7110.65, page 2-6-1.)
> Become familiar with pertinent weather information when coming on duty, and stay aware of current weather information needed to perform ATC duties.

5.2 Hazardous Inflight Weather Advisory Service

FAAO 7110.65R requires controllers to advise pilots of hazardous weather that may impact operations within 150 NM of their sector. Tower cab and approach facilities may opt to broadcast hazardous weather information only when any part of the area described is within 50 NM of the airspace.

> (From FAAO 7110.65, page 2-6-1.)
> Controllers shall advise pilots of hazardous weather that may impact operations within 150 NM of their sector or area of jurisdiction. Hazardous weather information contained in HIWAS broadcasts includes Airmen's Meteorological Information (AIRMET), Significant Meteorological Information (SIGMET), Convective SIGMET (WST), Urgent Pilot Weather Reports (UUA), and Center Weather Advisories (CWA). Facilities shall review alert messages to determine the geographical area and operational impact for hazardous weather information broadcasts. The broadcast is not required if aircraft on your frequency(s) will not be affected.
> **a**. Controllers within commissioned HIWAS areas shall broadcast a HIWAS alert on all frequencies, except emergency frequency, upon receipt of hazardous weather information. Controllers are required to disseminate data based on the operational impact on the sector or area of control jurisdiction.
> **NOTE** − The inclusion of the type and number of weather advisory responsible for the HIWAS advisory is optional.
> **PHRASEOLOGY**− ATTENTION ALL AIRCRAFT. HAZARDOUS WEATHER INFORMATION (SIGMET, Convective SIGMET, AIRMET, Urgent Pilot Weather Report (UUA), or Center Weather Advisory (CWA), Number or Numbers) FOR (geographical area) AVAILABLE ON HIWAS, FLIGHT WATCH, OR FLIGHT SERVICE FREQUENCIES.
> **b**. Controllers outside of commissioned HIWAS areas shall:
>
> > 1. Advise pilots of the availability of hazardous weather advisories. Pilots requesting additional information should be directed to contact the nearest Flight Watch or Flight Service.
> > 2. Apply the same procedure when HIWAS outlets, or outlets with radio coverage extending into your sector or airspace under your jurisdiction, are out of service.
> > **PHRASEOLOGY** − ATTENTION ALL AIRCRAFT. HAZARDOUS WEATHER INFORMATION FOR (geographical area) AVAILABLE FROM FLIGHT WATCH OR FLIGHT SERVICE.

c. Terminal facilities have the option to limit hazardous weather information broadcasts as follows: Tower cab and approach control facilities may opt to broadcast hazardous weather information alerts only when any part of the area described is within 50 NM of the airspace under their jurisdiction.
REFERENCE − *AIM, Chapter 7, Section 1, Meteorology, Para* 7−1−5 *through Para* 7−1−9.

5.3 Pilot Report Information

FAAO 7110.65R requires en route and terminal controllers to solicit and disseminate significant Pilot Report (PIREP) information when requested or under certain conditions as follows:

(From FAAO 7110.65, page 2-6-1.)
Significant PIREP information includes reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, volcanic eruptions and volcanic ash clouds, and other conditions pertinent to flight safety.
REFERENCE − *FAAO 7110.65, Low Level Wind Shear/Microburst Advisories, Para* 3−1−8. *FAAO 7210.3, Handling of SIGMETs, CWAs, and PIREPs, Para* 6−3−1. *AIM, Flight Operations in Volcanic Ash, Para* 7−5−9. *FAAO 7210.3, SIGMET and PIREP Handling, Para* 10−3−1.

a. Solicit PIREPs when requested or when one of the following conditions exists or is forecast for your area of jurisdiction:

1. Ceilings at or below 5,000 feet. These PIREPs shall include cloud base/top reports when feasible.
   TERMINAL. Ensure that at least one descent/climbout PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour.
   EN ROUTE. When providing approach control services, the requirements stated in TERMINAL above apply.
2. Visibility (surface or aloft) at or less than 5 miles.
3. Thunderstorms and related phenomena.
4. Turbulence of moderate degree or greater.
5. Icing of light degree or greater.
6. Wind shear.
7. Volcanic ash clouds.
   NOTE − Pilots may forward PIREPs regarding volcanic activity using the format described in the Volcanic Activity Reporting Form (VAR) as depicted in the AIM, Appendix 2.
8. **TERMINAL**. Braking Action Advisories are in effect.
   REFERENCE − *FAAO 7110.65, Braking Action Advisories, Para* 3−3−5. *P/CG Term− Braking Action Advisories*.

b. Record with the PIREPs:

1. Time.
2. Aircraft position.
3. Type aircraft.
4. Altitude.
5. When the PIREP involves icing include:
   (a) Icing type and intensity.
   (b) Air temperature in which icing is occurring.

c. Obtain PIREPs directly from the pilot, or if the PIREP has been requested by another facility, you may instruct the pilot to deliver it directly to that facility.
PHRASEOLOGY − REQUEST/SAY FLIGHT CONDITIONS.
Or if appropriate, REQUEST/SAY (specific conditions; i.e., ride, cloud, visibility, etc.) CONDITIONS. If necessary, OVER (fix), or ALONG PRESENT ROUTE, or BETWEEN (fix) AND (fix).
d. Handle PIREPs as follows:

1. Relay pertinent PIREP information to concerned aircraft in a timely manner.
2. **EN ROUTE**. Relay all operationally significant PIREPs to the facility weather coordinator.
3. **TERMINAL**. Relay all operationally significant PIREPs to:
   (a) The appropriate intrafacility positions.
   (b) The AFSS/FSS serving the area in which the report was obtained.

NOTE − The AFSS/FSS is responsible for long line dissemination.
(c) Other concerned terminal or en route ATC facilities, including non−FAA facilities.
(d) Use the word gain and/or loss when describing to pilots the effects of wind shear on airspeed.
EXAMPLE − "Delta Seven Twenty−one, a Boeing Seven Twenty−seven, previously reported wind shear, loss of Two Five knots at Four Hundred feet." "U.S. Air Seventy−six, a D−C Niner, previously reported wind shear, gain of Twenty−Five knots between Niner Hundred and Six Hundred feet, followed by a loss of Five Zero knots between Five Hundred feet and the surface."
REFERENCE − *AIM, Wind Shear PIREPs, Para* 7−1−25.

5.4 Weather and Chaff Services

Controllers issue weather information that is significant to the safety of aircraft. If requested by the pilot, controllers provide navigational guidance and/or approve deviations around weather.

NOTE – There is an amendment to FAAO 7110.65R (i.e., Notice N7110.441), which contains standardization for communicating precipitation information among controllers and between controllers and pilots (see FAA, 2006b). As a result of this standardization, there is a change in the FAAO 7110.65R phraseology for describing radar-derived weather to pilots. En route controllers now use three precipitation levels defined as **MODERATE** (dBZ levels 30-40), **HEAVY** (> 40-50 dBZ), and **EXTREME** (>50 dBZ). Terminal facilities capable of displaying six levels of precipitation describe level 1 as **LIGHT** (dBZ levels of < 30), level 2 as **MODERATE** (dBZ levels of 30-40), levels 3 and 4 as **HEAVY** (dBZ levels of > 40-50), and levels 5 and 6 as **EXTREME** (dBZ levels of > 50).

Due to the amendment of paragraph 2-6-4 in FAAO 7110.65R, Weather and Chaff Services, the next update of FAAO 7110.65R will include a change that deletes the reference to weather echo levels. There is also an update to the examples in this paragraph. Furthermore, the new paragraph states that controllers shall use the term "precipitation" when describing radar-derived weather.

(From FAAO 7110.65, page 2-6-2.)
a. Issue pertinent information on observed/ reported weather or chaff areas. Provide radar navigational guidance and/or approve deviations around weather or chaff areas when requested by the pilot. Do not use the word "turbulence" in describing radar-derived weather.

1. Issue weather and chaff information by defining the area of coverage in terms of azimuth (by referring to the 12−hour clock) and distance from the aircraft or by indicating the general width of the area and the area of coverage in terms of fixes or distance and direction from fixes.
2. Issue the level of echo intensity when that information is available.
3. When equipment limitations exist, controllers shall, at a minimum, ensure that the highest available level of echo intensity within their area of jurisdiction is displayed.
4. When a deviation cannot be approved as requested and the situation permits, suggest an alternative course of action.

b. In areas of significant weather, plan ahead and be prepared to suggest, upon pilot request, the use of alternative routes/altitudes.
NOTE − Weather significant to the safety of aircraft includes such conditions as tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, microbursts, moderate to extreme turbulence (including CAT), and light to severe icing.
c. Inform any tower for which you provide approach control services if you observe any weather echoes on radar which might affect their operations.

PHRASEOLOGY − WEATHER/CHAFF AREA BETWEEN (number) O'CLOCK AND (number) O'CLOCK (number) MILES, or (number) MILE BAND OF WEATHER/CHAFF FROM (fix or number of miles and direction from fix) TO (fix or number of miles and direction from fix), or LEVEL (number(s)) WEATHER ECHO BETWEEN (number) O'CLOCK AND (number) O'CLOCK, (number) MILES. MOVING (direction) AT (number) KNOTS, TOPS (altitude), or DEVIATION APPROVED, (restrictions if necessary), ADVISE WHEN ABLE TO: RETURN TO COURSE, or RESUME OWN NAVIGATION or FLY HEADING (heading) or PROCEED DIRECT TO (name of NAVAID). UNABLE DEVIATION (state possible alternate course of action).

EXAMPLE −

1. "Level five weather echo between eleven o'clock and one o'clock, one zero miles. Moving east at two zero knots, tops flight level three niner zero."
2. "Level four weather echo between ten o'clock and two o'clock, one five miles. Weather area is two five miles in diameter."
3. "Level four and five weather echoes between ten o'clock and two o'clock, one five miles. Weather area is two five miles in diameter."
4. "Level two through four weather echoes between ten o'clock and two o'clock, one five miles. Weather area is two five miles in diameter."

NOTE − Phraseology using level number(s) is only applicable when the radar weather echo intensity information is determined by NWS radar equipment or digitized radar equipment.

REFERENCE − *P/CG Term− Radar Weather Echo Intensity Levels*.

d. The supervisory traffic management coordinator− in−charge/operations supervisor/controller−in− charge shall verify the digitized radar weather information by the best means available (e.g., pilot reports, local tower personnel, etc.) if the weather data displayed by digitized radar is reported as questionable or erroneous. Errors in weather radar presentation shall be reported to the technical operations technician and the air traffic supervisor shall determine if the digitized radar derived weather data is to be displayed and a NOTAM distributed.

NOTE − Anomalous propagation (AP) is a natural occurrence affecting radar and does not in itself constitute a weather circuit failure.

5.5 Calm Wind Conditions

Terminal controllers describe the wind as calm when the wind velocity is less than three knots.

(From FAAO 7110.65, page 2-6-3.)

TERMINAL. Describe the wind as calm when the wind velocity is less than three knots.

REFERENCE − *FAAO 7110.65, Tailwind Components, Para* 3−5−3. *FAAO 7110.65, Intersecting Runway Separation, Para* 3−10−4.

5.6 Reporting Weather Conditions

Controllers report visibility conditions from observations.

(From FAAO 7110.65, page 2-6-4.)

a. When the prevailing visibility at the usual point of observation, or at the tower level, is less than 4 miles, tower personnel shall take prevailing visibility observations and apply the observations as follows:

1. Use the lower of the two observations (tower or surface) for aircraft operations.
2. Forward tower visibility observations to the weather observer.
3. Notify the weather observer when the tower observes the prevailing visibility decrease to less than 4 miles or increase to 4 miles or more.

b. Forward current weather changes to the appropriate control facility as follows:

1. When the official weather changes to a condition which is below 1,000−foot ceiling or below the highest circling minimum, whichever is greater, or less than 3 miles visibility, and when it improves to a condition which is better than those above.

2. Changes which are classified as special weather observations during the time that weather conditions are below 1,000−foot ceiling or the highest circling minimum, whichever is greater, or less than 3 miles visibility.

c. Towers at airports where military turbo-jet en route descents are routinely conducted shall also report the conditions to the ARTCC even if it is not the controlling facility.

d. If the receiving facility informs you that weather reports are not required for a specific time period, discontinue the reports. The time period specified should not exceed the duration of the receiving controller's tour of duty.

e. **EN ROUTE**. When you determine that weather reports for an airport will not be required for a specific time period, inform the AFSS/FSS or tower of this determination. The time period specified should not exceed the duration of receiving controller's tour of duty.

REFERENCE − *FAAO 7110.65, Forwarding Approach Information by Nonapproach Control Facilities, Para* 3−10−2.

5.7 Disseminating Weather Information

Terminal controllers disseminate observed elements of weather. Controllers may transmit general weather information (e.g., large breaks in the overcast) directly to pilots or ATC facilities. For transmission of specific weather values, they must meet certain conditions as follows:

(From FAAO 7110.65, page 2-6-4.)

TERMINAL. Observed elements of weather information shall be disseminated as follows:

a. General weather information, such as "large breaks in the overcast," "visibility lowering to the south," or similar statements which do not include specific values, and any elements derived directly from instruments, pilots, or radar may be transmitted to pilots or other ATC facilities without consulting the weather reporting station.

b. Specific values, such as ceiling and visibility, may be transmitted if obtained by one of the following means:

1. You are properly certificated and acting as official weather observer for the elements being reported.

NOTE − USAF controllers do not serve as official weather observers.

2. You have obtained the information from the official observer for the elements being reported.
3. The weather report was composed or verified by the weather station.
4. The information is obtained from an official Automated Weather Observation System (AWOS) or an Automated Surface Observation System (ASOS).

c. Differences between weather elements observed from the tower and those reported by the weather station shall be reported to the official observer for the element concerned.

6. RUNWAY VISIBILITY REPORTING - TERMINAL

6.1 Furnish Runway Visual Range/Runway Visibility Values

Terminal controllers furnish Runway Visual Range (RVR) values for the runway in use.

(From FAAO 7110.65, page 2-8-1.)

Where RVR or RVV equipment is operational, irrespective of subsequent operation or nonoperation of navigational or visual aids for the application of RVR/RVV as a takeoff or landing minima, furnish the values for the runway in use in accordance with para 2−8−3, Terminology.

NOTE − Readout capability of different type/model RVR equipment varies. For example, older equipment minimum readout value is 600 feet. Newer equipment may have minimum readout capability as low as 100 feet. Readout value increments also may differ. Older equipment have minimum readout increments of 200 feet. New equipment increments below 800 feet are 100 feet.

REFERENCE − *FAAO 6560.10, Runway Visual Range (RVR). FAAO 6750.24, Instrument Landing System (ILS) and Ancillary Electronic Component Configuration & Perf. Req*.

6.2 Arrival/Departure Runway Visibility

Terminal controllers disseminate RVR/RVV for runways in use. The dissemination is contingent upon several specific conditions as follows:

(From FAAO 7110.65, page 2-8-1.)
a. Issue current touchdown RVR/RVV for the runway(s) in use:

1. When prevailing visibility is 1 mile or less regardless of the value indicated.
2. When RVR/RVV indicates a reportable value regardless of the prevailing visibility.
NOTE − Reportable values are: RVR 6,000 feet or less; RVV 11/2 miles or less.
3. When it is determined from a reliable source that the indicated RVR value differs by more than 400 feet from the actual conditions within the area of the transmissometer, the RVR data is not acceptable and shall not be reported.
NOTE − A reliable source is considered to be a certified weather observer, automated weather observing system, air traffic controller, flight service specialist, or pilot.
4. When the observer has reliable reports, or has otherwise determined that the instrument values are not representative of the associated runway, the data shall not be used.

b. Issue both mid-point and roll-out RVR when the value of either is less than 2,000 feet and the touchdown RVR is greater than the mid−point or roll−out RVR.
c. Local control shall issue the current RVR/RVV to each aircraft prior to landing or departure in accordance with subparas a and b.

7. AUTOMATIC TERMINAL INFORMATION SERVICE PROCEDURES

7.1 Application

Terminal controllers use the Automatic Terminal Information Service (ATIS) to provide advance noncontrol airport/terminal area and meteorological information to aircraft.

(From FAAO 7110.65, page 2-9-1.)
Use the ATIS, where available, to provide advance noncontrol airport/terminal area and meteorological information to aircraft.
a. Identify each ATIS message by a phonetic letter code word at both the beginning and the end of the message. Automated systems will have the phonetic letter code automatically appended. Exceptions may be made where omissions are required because of special programs or equipment.

1. Each alphabet letter phonetic word shall be used sequentially, except as authorized in subpara a2, beginning with "Alpha," ending with "Zulu," and repeated without regard to the beginning of a new day. Identify the first resumed broadcast message with "Alpha" or the first assigned alphabet letter word in the event of a broadcast interruption of more than 12 hours.
2. Specific sequential portions of the alphabet may be assigned between facilities or an arrival and departure ATIS when designated by a letter of agreement or facility directive.
REFERENCE − *FAAO 7210.3, Automatic Terminal Information Service (ATIS), Para* 10−4−1.

b. The ATIS recording shall be reviewed for completeness, accuracy, speech rate, and proper enunciation before being transmitted.
c. Arrival and departure messages, when broadcast separately, need only contain information appropriate for that operation.

7.2 Operating Procedures

Terminal controllers maintain ATIS messages that reflect the most current arrival and departure information.

(From FAAO 7110.65, page 2-9-1.)
Maintain an ATIS message that reflects the most current arrival and departure information.
a. Make a new recording when any of the following occur:

1. Upon receipt of any new official weather regardless of whether there is or is not a change in values.
2. When runway braking action reports are received that indicate runway braking is worse than that which is included in the current ATIS broadcast.
3. When there is a change in any other pertinent data, such as runway change, instrument approach in use, new or canceled NOTAMs/PIREPs/HIWAS update, etc.

b. When a pilot acknowledges that he/she has received the ATIS broadcast, controllers may omit those items contained in the broadcasts if they are current. Rapidly changing conditions will be issued by ATC, and the ATIS will contain the following:

EXAMPLE − "Latest ceiling/visibility/altimeter/wind/(other conditions) will be issued by approach control/tower."

c. Broadcast on all appropriate frequencies to advise aircraft of a change in the ATIS code/message.

d. Controllers shall ensure that pilots receive the most current pertinent information. Ask the pilot to confirm receipt of the current ATIS information if the pilot does not initially state the appropriate ATIS code. Controllers shall ensure that changes to pertinent operational information is provided after the initial confirmation of ATIS information is established. Issue the current weather, runway in use, approach information, and pertinent NOTAMs to pilots who are unable to receive the ATIS.

EXAMPLE − "Verify you have information ALPHA." "Information BRAVO now current, visibility three miles." "Information CHARLIE now current, Ceiling 1500 Broken." "Information CHARLIE now current, advise when you have CHARLIE."

7.3 Content

The following section specifies the content of the ATIS broadcast. This includes weather information regarding wind direction and velocity, visibility, obstructions to vision, present weather, sky condition, temperature, dew point, and altimeter.

(From FAAO 7110.65, page 2-9-2.)

Include the following in ATIS broadcast as appropriate:

a. Airport/facility name, phonetic letter code, time of weather sequence (UTC). Weather information consisting of wind direction and velocity, visibility, obstructions to vision, present weather, sky condition, temperature, dew point, altimeter, a density altitude advisory when appropriate and other pertinent remarks included in the official weather observation. Wind direction, velocity, and altimeter shall be reported from certified direct reading instruments. Temperature and dew point should be reported from certified direct reading sensors when available. Always include weather observation remarks of lightning, cumulonimbus, and towering cumulus clouds.

NOTE − ASOS/AWOS is to be considered the primary source of wind direction, velocity, and altimeter data for weather observation purposes at those locations that are so equipped. The ASOS Operator Interface Device (OID) displays the magnetic wind as "MAG WND" in the auxiliary data location in the lower left−hand portion of the screen. Other OID displayed winds are true and are not to be used for operational purposes.

b. Man−Portable Air Defense Systems (MANPADS) alert and advisory. Specify the nature and location of threat or incident, whether reported or observed and by whom, time (if known), and notification to pilots to advise ATC if they need to divert.

EXAMPLE −

1. "MANPADS alert. Exercise extreme caution. MANPADS threat reported by TSA, Chicago area." "Advise on initial contact if you want to divert."
2. "MANPADS alert. Exercise extreme caution. MANPADS attack observed by tower one−half mile northwest of airfield at one−two−five−zero Zulu." "Advise on initial contact if you want to divert."

REFERENCE −

FAAO 7110.65, MANPADS Alert, Para 10−2−13. *FAAO 7210.3, Handling MANPADS Incidents, Para* 2−1−9.

c. The ceiling/sky condition, visibility, and obstructions to vision may be omitted if the ceiling is above 5,000 feet and the visibility is more than 5 miles.

EXAMPLE − A remark may be made, "The weather is better than five thousand and five."
d. Instrument/visual approach/s in use. Specify landing runway/s unless the runway is that to which the instrument approach is made.
e. Departure runway/s (to be given only if different from landing runway/s or in the instance of a "departure only" ATIS).
f. Taxiway closures which affect the entrance or exit of active runways, other closures which impact airport operations, other NOTAMs and PIREPs pertinent to operations in the terminal area. Inform pilots of where hazardous weather is occurring and how the information may be obtained. Include available information of known bird activity.
REFERENCE − *FAAO 7110.65, Bird Activity Information, Para* 2−1−22.
g. Runway braking action or friction reports when provided. Include the time of the report and a word describing the cause of the runway friction problem.
PHRASEOLOGY − RUNWAY (number) MU (first value, second value, third value) AT (time), (cause).
EXAMPLE − "Runway Two Seven, MU forty−two, forty−one, twenty−eight at one zero one eight Zulu, ice."
REFERENCE − *FAAO 7110.65, Braking Action Advisories, Para* 3−3−5.
h. Other optional information as local conditions dictate in coordination with ATC. This may include such items as VFR arrival frequencies, temporary airport conditions, LAHSO operations being conducted, or other perishable items that may appear only for a matter of hours or a few days on the ATIS message.
i. Low level wind shear/microburst when reported by pilots or is detected on a wind shear detection system.
REFERENCE − *FAAO 7110.65, Low Level Wind Shear/Microburst Advisories, Para* 3−1−8.
j. A statement which advises the pilot to read back instructions to hold short of a runway. The air traffic manager may elect to remove this requirement 60 days after implementation provided that removing the statement from the ATIS does not result in increased requests from aircraft for read back of hold short instructions.
k. Instructions for the pilot to acknowledge receipt of the ATIS message by informing the controller on initial contact.
EXAMPLE − "Boston Tower Information Delta. One four zero zero Zulu. Wind two five zero at one zero. Visibility one zero. Ceiling four thousand five hundred broken. Temperature three four. Dew point two eight. Altimeter three zero one zero. ILS−DME Runway Two Seven Approach in use. Departing Runway Two Two Right. Hazardous Weather Information for (geographical area) available on HIWAS, Flight Watch, or Flight Service Frequencies. Advise on initial contact you have Delta."

8. TEAM POSITION RESPONSIBILITIES

This section specifies the responsibilities for the en route, terminal, and tower team positions. It also specifies the position responsible for requesting/receiving, observing, and reporting weather information. There are no absolute divisions of responsibilities regarding position operations. Completing the ATC tasks remain the same whether one, two, or three controllers are working positions within a given sector.

The en route team consists of the following positions:

(1) *Radar Position* (*R*) - the position which is in direct communication with the aircraft and which uses radar information as the primary means of separation,
(2) *Radar Associate* (*RA*) - the position sometimes referred to as "D-Side" or "Manual Controller,"
(3) *Radar Coordinator Position* (*RC*) - the position sometimes referred to as "Coordinator," "Tracker," or "Handoff Controller,"
(4) *Radar Flight Data* (*FD*) - the position commonly referred to as "Assistant Controller" or "A-Side" position, and

(5) *Nonradar Position* (*NR*) - the position which is usually in direct communication with the aircraft and which uses nonradar procedures as the primary means of separation. For the en route team, the *FD* position is responsible for requesting/receiving and disseminating weather information.

The terminal radar/nonradar positions are:

(1) *R* - the position which is in direct communication with the aircraft and which uses radar information as the primary means of separation,
(2) *RA* - the position commonly referred to as "Handoff Controller" or "Radar Data Controller,"
(3) *RC* - the position commonly referred to as "Coordinator," "Tracker," "Sequencer," or "Overhead,"
(4) *FD* - the position commonly referred to as "Flight Data," and
(5) *NR* - the position which is usually in direct communication with the aircraft and which uses nonradar procedures as the primary means of separation. For the terminal radar/nonradar team, FAAO 7110.65R does not specify a responsibility for observing/receiving and disseminating weather information.

The tower team positions are:

(1) *Tower Position*(s) (*LC* or *GC*) - the position which is in direct communications with the aircraft and ensures separation of aircraft in/on the area of jurisdiction,
(2) *Tower Associate Position*(s) - the position commonly referred to as "Local Assist," "Ground Assist," "Local Associate," or "Ground Associate,"
(3) *Tower Cab Coordinator Position* (*CC*) - the position commonly referred to as "Coordinator,"
(4) *Flight Data* (*FD*) - the position commonly referred to as "Flight Data," and
(5) *Clearance Delivery* (*CD*) - the position commonly referred to as "Clearance." For the tower team, it is the *Flight Data* position that is responsible for observing and reporting weather information.

(From FAAO 7110.65, page 2-10-1.)
EN ROUTE SECTOR TEAM POSITION RESPONSIBILITIES
4. **Radar Flight Data**:
(a) Operate interphone.
(b) Assist Radar Associate Position in managing flight progress strips.
(c) Receive/process and distribute flight progress strips.
(d) Ensure flight data processing equipment is operational, except for URET capabilities.
(e) Request/receive and disseminate weather, NOTAMs, NAS status, traffic management, and Special Use Airspace status messages.
(f) Manually prepare flight progress strips when automation systems are not available.

TOWER TEAM POSITION RESPONSIBILITIES
4. **Flight Data**:
(a) Operate interphones.
(b) Process and forward flight plan information.
(c) Compile statistical data.
(d) Assist tower cab in meeting situation objectives.
(e) Observe and report weather information.
(f) Utilize alphanumerics.

9. AIRPORT TRAFFIC CONTROL – TERMINAL

9.1 Low Level Wind Shear/Microburst Advisories

FAAO 7110.65R requires Terminal controllers to issue an alert to arriving and departing aircraft when pilots report or weather systems detect wind shear or microburst. Several conditional requirements apply, as follows:

(From FAAO 7110.65, page 3-1-3.)
TERMINAL.
a. When low level wind shear/microburst is reported by pilots, Integrated Terminal Weather System (ITWS), or detected on wind shear detection systems such as LLWAS NE++, LLWAS−RS, WSP, or TDWR, controllers shall issue the alert to all arriving and departing aircraft. Continue the alert to aircraft until it is broadcast on the ATIS and pilots indicate they have received the appropriate ATIS code. A statement shall be included on the ATIS for 20 minutes following the last report or indication of the wind shear/microburst.
REFERENCE − *FAAO 7110.65, PIREP Information, Para* 2−6−3. *FAAO 7110.65, Content, Para* 2−9−3. *FAAO 7110.65, Landing Information, Para* 3−10−1.
PHRASEOLOGY − LOW LEVEL WIND SHEAR (or MICROBURST, as appropriate) ADVISORIES IN EFFECT.
b. At facilities without ATIS, ensure that wind shear/microburst information is broadcast to all arriving and departing aircraft for 20 minutes following the last report or indication of wind shear/microburst.

1. At locations equipped with LLWAS, the local controller shall provide wind information as follows:
NOTE − The LLWAS is designed to detect low level wind shear conditions around the periphery of an airport. It does not detect wind shear beyond that limitation.
REFERENCE − *FAAO 7210.3, Low Level Wind Shear/Microburst Detection Systems, Para* 10−3−3.

(a) If an alert is received, issue the airport wind and the displayed field boundary wind.
PHRASEOLOGY − WIND SHEAR ALERT. AIRPORT WIND (direction) AT (velocity). (Location of sensor) BOUNDARY WIND (direction) AT (velocity).
(b) If multiple alerts are received, issue an advisory that there are wind shear alerts in two/several/all quadrants. After issuing the advisory, issue the airport wind in accordance with para 3−9−1, Departure Information, followed by the field boundary wind most appropriate to the aircraft operation.
PHRASEOLOGY − WIND SHEAR ALERTS TWO/SEVERAL/ALL QUADRANTS. AIRPORT WIND (direction) AT (velocity). (Location of sensor) BOUNDARY WIND (direction) AT (velocity).
(c) If requested by the pilot, issue specific field boundary wind information even though the LLWAS may not be in alert status.
NOTE − The requirements for issuance of wind information remain valid as appropriate under this paragraph, para 3−9−1, Departure Information and para 3−10−1, Landing Information.

2. Wind shear detection systems, including TDWR, WSP, LLWAS NE++ and LLWAS−RS provide the capability of displaying microburst alerts, wind shear alerts, and wind information oriented to the threshold or departure end of a runway. When detected, the associated ribbon display allows the controller to read the displayed alert without any need for interpretation.

(a) If a wind shear or microburst alert is received for the runway in use, issue the alert information for that runway to arriving and departing aircraft as it is displayed on the ribbon display.
PHRASEOLOGY − (Runway) (arrival/departure) WIND SHEAR/ MICROBURST ALERT, (windspeed) KNOT GAIN/LOSS, (location).
EXAMPLE − 17A MBA 40K − 3MF

PHRASEOLOGY − RUNWAY 17 ARRIVAL MICROBURST ALERT 40 KNOT LOSS 3 MILE FINAL.
EXAMPLE − 17D WSA 25K+ 2MD
PHRASEOLOGY − RUNWAY 17 DEPARTURE WIND SHEAR ALERT 25 KNOT GAIN 2 MILE DEPARTURE.
(b) If requested by the pilot or deemed appropriate by the controller, issue the displayed wind information oriented to the threshold or departure end of the runway.
PHRASEOLOGY − (Runway) DEPARTURE/THRESHOLD WIND (direction) AT (velocity).
(c) LLWAS NE++ or LLWAS−RS may detect a possible wind shear/microburst at the edge of the system but may be unable to distinguish between a wind shear and a microburst. A wind shear alert message will be displayed, followed by an asterisk, advising of a possible wind shear outside of the system network.
NOTE − LLWAS NE++ when associated with TDWR can detect wind shear/microbursts outside the network if the TDWR fails.
PHRASEOLOGY − (Appropriate wind or alert information) POSSIBLE WIND SHEAR OUTSIDE THE NETWORK.
(d) If unstable conditions produce multiple alerts, issue an advisory of multiple wind shear/ microburst alerts followed by specific alert or wind information most appropriate to the aircraft operation.
PHRASEOLOGY − MULTIPLE WIND SHEAR/MICROBURST ALERTS (specific alert or wind information).
(e) The LLWAS NE++ and LLWAS−RS are designed to operate with as many as 50 percent of the total sensors inoperative. When all three remote sensors designated for a specific runway arrival or departure wind display line are inoperative then the LLWAS NE++ and LLWAS−RS for that runway arrival/departure shall be considered out of service. When a specific runway arrival or departure wind display line is inoperative and wind shear/microburst activity is likely; (e.g.; frontal activity, convective storms, PIREPs), a statement shall be included on the ATIS, "WIND SHEAR AND MICROBURST INFORMATION FOR RUNWAY (runway number) ARRIVAL/DEPARTURE NOT AVAILABLE."
NOTE − The geographic situation display (GSD) is a supervisory planning tool and is not intended to be a primary tool for microburst or wind shear.

10. AIRPORT CONDITIONS

10.1 Landing Area Condition

Controllers observe and report conditions that affect the safe use of a landing area. This includes issuing reports to aircraft about the accumulation of precipitation on the runway surface.

(From FAAO 7110.65, page 3-3-1.)
If you observe or are informed of any condition which affects the safe use of a landing area:
NOTE −
1. The airport management/military operations office is responsible for observing and reporting the condition of the landing area.
2. It is the responsibility of the agency operating the airport to provide the tower with current information regarding airport conditions.
3. A disabled aircraft on a runway, after occupants are clear, is normally handled by flight standards and airport management/military operations office personnel in the same manner as any obstruction; e.g., construction equipment.
a. Relay the information to the airport manager/military operations office concerned.
b. Copy verbatim any information received and record the name of the person submitting it.

c. Confirm information obtained from other than authorized airport or FAA personnel unless this function is the responsibility of the military operations office.
NOTE − Civil airport managers are required to provide a list of airport employees who are authorized to issue information concerning conditions affecting the safe use of the airport.
d. If you are unable to contact the airport management or operator, issue a NOTAM publicizing an unsafe condition and inform the management or operator as soon as practicable.
EXAMPLE − "DISABLED AIRCRAFT ON RUNWAY. "

NOTE −

1. Legally, only the airport management/military operations office can close a runway.
2. Military controllers are not authorized to issue NOTAMs. It is the responsibility of the military operations office.

e. Issue to aircraft only factual information, as reported by the airport management concerning the condition of the runway surface, describing the accumulation of precipitation.
EXAMPLE − "ALL RUNWAYS COVERED BY COMPACTED SNOW SIX INCHES DEEP."
REFERENCE − *FAAO 7110.65, Airport Conditions, Para* 4−7−12.

10.2 Timely Information

Controllers need to issue information (e.g., volcanic ash on airport surface and braking conditions caused by ice, snow, slush, or water) to pilots in a timely manner.

(From FAAO 7110.65, page 3-3-1.)
Issue airport condition information necessary for an aircraft's safe operation in time for it to be useful to the pilot. Include the following, as appropriate:
a. Construction work on or immediately adjacent to the movement area.
b. Rough portions of the movement area.
c. Braking conditions caused by ice, snow, slush, or water.
d. Snowdrifts or piles of snow on or along the edges of the area and the extent of any plowed area.
e. Parked aircraft on the movement area.
f. Irregular operation of part or all of the airport lighting system.
g. Volcanic ash on any airport surface area and whether the ash is wet or dry (if known).
NOTE − Braking action on wet ash may be degraded. Dry ash on the runway may necessitate minimum use of reverse thrust.
h. Other pertinent airport conditions.
REFERENCE − *FAAO 7110.65, Airport Conditions, Para* 4−7−12. *FAAO 7110.65, Reporting Essential Flight Information, Para* 2−1−9. *FAAO 7110.65, Altitude Restricted Low Approach, Para* 3−10−10.

10.3 Braking Action

Controllers furnish the quality of braking action to all aircraft.

(From FAAO 7110.65, page 3-3-2.)
Furnish quality of braking action, as received from pilots or the airport management, to all aircraft as follows:
a. Describe the quality of braking action using the terms "good," "fair," "poor," "nil," or a combination of these terms. If the pilot or airport management reports braking action in other than the foregoing terms, ask him/her to categorize braking action in these terms.
NOTE − The term "nil" is used to indicate bad or no braking action.
b. Include type of aircraft or vehicle from which the report is received.
EXAMPLE − "Braking action fair to poor, reported by a heavy D−C Ten." "Braking action poor, reported by a Boeing Seven Twenty−Seven."
c. If the braking action report affects only a portion of a runway, obtain enough information from the pilot or airport management to describe the braking action in terms easily understood by the pilot.

EXAMPLE − "Braking action poor first half of runway, reported by a Lockheed Ten Eleven." "Braking action poor beyond the intersection of runway two seven, reported by a Boeing Seven Twenty−Seven."
NOTE − Descriptive terms, such as the first or the last half of the runway, should normally be used rather than landmark descriptions, such as opposite the fire station, south of a taxiway, etc. Landmarks extraneous to the landing runway are difficult to distinguish during low visibility, at night, or anytime a pilot is busy landing an aircraft.
d. Furnish runway friction measurement readings/values as received from airport management to aircraft as follows:

1. Furnish information as received from the airport management to pilots on the ATIS at locations where friction measuring devices, such as MU−Meter, Saab Friction Tester (SFT), and Skiddometer are in use only when the MU values are 40 or less. Use the runway followed by the MU number for each of the three runway segments, time of report, and a word describing the cause of the runway friction problem. Do not issue MU values when all three segments of the runway have values reported greater than 40.
EXAMPLE − "Runway two seven, MU forty−two, forty−one, twenty−eight at one zero one eight Zulu, ice."
2. Issue the runway surface condition and/or the Runway Condition Reading (RCR), if provided, to all USAF and ANG aircraft. Issue the RCR to other aircraft upon pilot request.
EXAMPLE − "Ice on runway, RCR zero five, patchy."

NOTE −
1. USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of the RCR code is dependent upon the pilot's having a "stopping capability chart" specifically applicable to his/her aircraft.
2. USAF offices furnish RCR information at airports serving USAF and ANG aircraft.
REFERENCE − *FAAO 7110.65, Airport Conditions, Para* 4−7−12. *FAAO 7110.65, Braking Action Advisories, Para* 3−3−5.

10.4 Braking Action Advisories

Controllers issue braking action advisories and solicit PIREPs of runway braking action.

(From FAAO 7110.65, page 3-3-2.)
a. When runway braking action reports are received from pilots or the airport management which include the terms "poor" or "nil" or whenever weather conditions are conducive to deteriorating or rapidly changing runway conditions, include on the ATIS broadcast the statement "Braking Action Advisories are in effect."
REFERENCE − *FAAO 7210.3, Automatic Terminal Information Service (ATIS), Para* 10−4−1.
b. During the time Braking Action Advisories are in effect, take the following action:

1. Issue the latest braking action report for the runway in use to each arriving and departing aircraft early enough to be of benefit to the pilot. When possible, include reports from heavy jet aircraft when the arriving or departing aircraft is a heavy jet.
2. If no report has been received for the runway of intended use, issue an advisory to that effect.
PHRASEOLOGY − NO BRAKING ACTION REPORTS RECEIVED FOR RUNWAY (runway number).
3. Advise the airport management that runway braking action reports of "poor" or "nil" have been received.
REFERENCE − *FAAO 7210.3, Letters of Agreement, Para* 4−3−1.
4. Solicit PIREPs of runway braking action.
REFERENCE − *FAAO 7110.65, PIREP Information, Para* 2−6−3.

c. Include runway friction measurement/values received from airport management on the ATIS. Furnish the information when requested by the pilot in accordance with para 3−3−4, Braking Action.
REFERENCE − *FAAO 7110.65, Content, Para* 2−9−3. *FAAO 7110.65, Departure Information, Para* 3−9−1. *FAAO 7110.65, Landing Information, Para* 3−10−1. *FAAO 7110.65, Airport Conditions, Para* 4−7−12.

11. RUNWAY SELECTION – TAILWIND COMPONENT

(From FAAO 7110.65, page 3-5-1.)
When authorizing use of runways and a tailwind component exists, always state both wind direction and velocity.
NOTE − *The wind may be described as "calm" when appropriate*.
REFERENCE − *FAAO 7110.65*, *Calm Wind Conditions, Para* 2−6−5.

12. LANDING INFORMATION

Controllers provide current landing information to arriving aircraft, including ceiling and visibility conditions and wind shear and microburst advisories.

(From FAAO 7110.65, page 3-10-1.)
Provide current landing information, as appropriate, to arriving aircraft. Landing information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue landing information by including the following:
NOTE − Pilot use of "have numbers" does not indicate receipt of the ATIS broadcast.
a. Specific traffic pattern information (may be omitted if the aircraft is to circle the airport to the left).
PHRASEOLOGY − ENTER LEFT/RIGHT BASE. STRAIGHT−IN. MAKE STRAIGHT−IN. STRAIGHT−IN APPROVED. RIGHT TRAFFIC. MAKE RIGHT TRAFFIC. RIGHT TRAFFIC APPROVED. CONTINUE.
b. Runway in use.
c. Surface wind.
d. Altimeter setting.
REFERENCE − *FAAO 7110.65, Current Settings, Para* 2−7−1.
e. Any supplementary information.
f. Clearance to land.
g. Requests for additional position reports. Use prominent geographical fixes which can be easily recognized from the air, preferably those depicted on sectional charts. This does not preclude the use of the legs of the traffic pattern as reporting points.
NOTE − At some locations, VFR checkpoints are depicted on sectional aeronautical and terminal area charts. In selecting geographical fixes, depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.
h. Ceiling and visibility if either is below basic VFR minima.
i. Low level wind shear or microburst advisories when available.
REFERENCE − *FAAO 7110.65, Low Level Wind Shear/Microburst Advisories, Para* 3−1−8.
j. Issue braking action for the runway in use as received from pilots or the airport management when Braking Action Advisories are in effect.
REFERENCE − *FAAO 7110.65, Braking Action Advisories, Para* 3−3−5.

13. ARRIVAL PROCEDURES

13.1 Weather Information

Controllers transmit weather reports and changes classified as special weather observations to arriving aircraft.

(From FAAO 7110.65, page 4-7-3.)
EN ROUTE.
When an available official weather report indicates weather conditions are below a 1,000−foot (USAF: 1,500−foot) ceiling or below the highest circling minimum, whichever is higher, or less than three-miles visibility for the airport concerned, transmit the weather report and changes classified as special weather observations to an arriving aircraft prior to or as part of the approach clearance when:

a. It is transmitted directly to the pilot via center controller-to-pilot communications.
b. It is relayed through a communications station other than an air carrier company radio or through a nonapproach control facility. You may do this by telling the station or nonapproach control facility to issue current weather.

13.2 Below Minima Report by Pilot

Controllers issue appropriate instructions (hold or proceed to another airport) to arriving aircraft that reports weather conditions are below their landing minima.

(From FAAO 7110.65, page 4-7-4.)
If an arriving aircraft reports weather conditions are below his/her landing minima:
NOTE − Determination that existing weather/visibility is adequate for approach/landing is the responsibility of the pilot/aircraft operator.
a. Issue appropriate instructions to the aircraft to hold or proceed to another airport.
b. Adjust, as necessary, the position in the landing sequence of any other aircraft desiring to make approaches and issue approach clearances accordingly.

13.3 Approach Information

En route and terminal approach controls provide current approach information (includes weather information) to aircraft for which they provide approach control services.

(From FAAO 7110.65, page 4-7-4.)
a. Both en route and terminal approach control sectors shall provide current approach information to aircraft destined to airports for which they provide approach control services. This information shall be provided on initial contact or as soon as possible thereafter. Approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. For pilots destined to an airport without ATIS, items 3−5 below may be omitted after the pilot advises receipt of the automated weather; otherwise, issue approach information by including the following:

1. Approach clearance or type approach to be expected if two or more approaches are published and the clearance limit does not indicate which will be used.
2. Runway if different from that to which the instrument approach is made.
3. Surface wind.
4. Ceiling and visibility if the reported ceiling at the airport of intended landing is below 1,000 feet or below the highest circling minimum, whichever is greater, or the visibility is less than 3 miles.
5. Altimeter setting for the airport of intended landing.

REFERENCE − *FAAO 7110.65, Chapter 2, Section 7, Altimeter Settings*.

b. Upon pilot request, controllers shall inform pilots of the frequency where automated weather data may be obtained and, if appropriate, that airport weather is not available.
PHRASEOLOGY − (Airport) AWOS/ASOS WEATHER AVAILABLE ON (frequency).

1. ASOS/AWOS shall be set to provide one minute weather at uncontrolled airports that are without ground−to−air weather broadcast capability by a CWO, NWS or FSS observer.
2. Controllers will consider the long−line disseminated weather from an automated weather system at an uncontrolled airport as trend information only and shall rely on the pilot for the current weather information for that airport.
3. Controllers shall issue the last long−line disseminated weather to the pilot if the pilot is unable to receive the ASOS/AWOS broadcast.

NOTE − Aircraft destined to uncontrolled airports, which have automated weather data with broadcast capability, should monitor the ASOS/AWOS frequency to ascertain the current weather at the airport. The pilot should advise the controller when he/she has received the broadcast weather and state his/her intentions.

c. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS code.
d. Advise pilots when the ILS/MLS on the runway in use is not operational if that ILS/MLS is on the same frequency as an operational ILS/MLS serving another runway.
EXAMPLE − "*Expect visual approach runway two five right, runway two five right I−L−S not operational*."
REFERENCE − *FAAO 7110.65, Altimeter Setting Issuance Below Lowest Usable FL, Para 2−7−2. FAAO 7110.65, Approach Information, Para 5−10−2. 14 CFR Section 91.129 Operations in Class D Airspace, Subpara (d)(2).*
e. **TERMINAL.** If multiple runway transitions are depicted on a STAR procedure, advise pilots of the runway assignment on initial contact or as soon as possible thereafter.

13.4 Airport Conditions

Controllers inform aircraft about abnormal operation of landing aids and airport conditions (including weather conditions) that might restrict an approach or landing.

(From FAAO 7110.65, page 4-7-5.)
a. **EN ROUTE**. Before issuing an approach clearance or en route descent, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing.
b. **TERMINAL**. On first contact or as soon as possible thereafter, and subsequently as changes occur, inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing. This information may be omitted if it is contained in the ATIS broadcast and the pilot states the appropriate ATIS code.
REFERENCE − *FAAO 7110.65, Chapter 3, Section 3, Airport Conditions*.
c. **TERMINAL**. Where RCRs are provided, transmit this information to USAF and ANG aircraft in accordance with one of the following. Issue the RCR to other aircraft upon pilot request.

1. Before or when an approach clearance is issued.
2. Before an en route descent clearance is issued.
3. Prior to departure.
4. As soon as possible after receipt of any subsequent changes in previously issued RCR information.

NOTE −
1. USAF has established RCR procedures for determining the average deceleration readings of runways under conditions of water, slush, ice, or snow. The use of RCR code is dependent upon the pilot having a "stopping capability chart" specifically applicable to his/her aircraft.
2. USAF offices furnish RCR information at airports serving USAF and ANG aircraft.
REFERENCE − *FAAO 7110.65, Landing Area Condition, Para* 3−3−1.

14. APPROACH CLEARANCE PROCEDURES

14.1 Relayed Approach Clearance

(From FAAO 7110.65, page 4-8-5.)
TERMINAL. Include the weather report, when it is required and available, when an approach clearance is relayed through a communication station other than an air carrier company radio. You may do this by telling the station to issue current weather.

15. RADAR ARRIVALS

15.1 Parallel Dependent ILS/MLS Approaches

(From FAAO 7110.65, page 5-9-7.)
TERMINAL. Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.
REFERENCE − *FAAO 7110.65*, *Final Approach Course Interception, Para* 5−9−2.

15.2 Simultaneous Independent ILS/MLS Approaches – Dual and Triple

(From FAAO 7110.65, page 5-9-8.)
TERMINAL. Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight when simultaneous ILS, MLS, or ILS and MLS approaches are being conducted to parallel runways. Factors include but are not limited to wind direction/velocity, wind-shear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use.
REFERENCE − *FAAO 7110.65*, *Radar Service Termination, Para* 5−1−13. *FAAO 7110.65*, *Final Approach Course Interception, Para* 5−9−2.

16. RADAR APPROACHES - TERMINAL

16.1 Approach Information

Controllers issue information to an aircraft that is conducting a radar approach. Depending on conditions, they might include information about altimeter, ceiling, and visibility. Controllers also advise pilots when weather information is available via AWOS/ASOS.

(From FAAO 7110.65, page 5-10-1.)
a. Issue the following information to an aircraft that will conduct a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items listed below, except for subpara 3 may be omitted after the first approach if repeated approaches are made and no change has occurred. Transmissions with aircraft in this phase of the approach should occur approximately every minute.
REFERENCE − *FAAO 7110.65, Approach Information, Para* 4−7−10.

1. Altimeter setting.

2. If available, ceiling and visibility if the ceiling at the airport of intended landing is reported below 1,000 feet or below the highest circling minimum, whichever is greater, or if the visibility is less than 3 miles. Advise pilots when weather information is available via the Automated Weather Observing System (AWOS)/Automated Surface Observing System (ASOS) and, if requested, issue the appropriate frequency.

NOTE − *Automated weather observing systems may be set to provide one minute updates. This one minute data may be useful to the pilot for possible weather trends. Controllers provide service based solely on official weather, i.e., hourly and special observations.*

3. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.

4. Pertinent information on known airport conditions if they are considered necessary to the safe operation of the aircraft concerned.

5. Lost communication procedures as specified in para 5−10−4, Lost Communications.

b. Before starting final approach:
NOTE − **1.** *ASR approach procedures may be prescribed for specific runways, for an airport/heliport, and for helicopters only to a "point-in-space" (i.e., a MAP from which a helicopter must be able to proceed to*

the landing area by visual reference to a prescribed surface route). **2.** *Occasionally, helicopter PAR approaches are available to runways where conventional PAR approaches have been established. In those instances where the two PAR approaches serve the same runway, the helicopter approach will have a steeper glide slope and a lower decision height. By the controllers designating the approach to be flown, the helicopter pilot understands which of the two approaches he/she has been vectored for and which set of minima apply.*

1. Inform the aircraft of the type of approach, runway, airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport.

PHRASEOLOGY − *THIS WILL BE A P−A−R/SURVEILLANCE APPROACH TO: RUNWAY (runway number), or (airport name) AIRPORT, RUNWAY (runway number), or (airport name) AIRPORT/HELIPORT. THIS WILL BE A COPTER P−A−R APPROACH TO: RUNWAY (runway number), or (airport name) AIRPORT, RUNWAY (runway number), or (airport name) AIRPORT/HELIPORT.*

2. For surveillance approaches, specify the location of the MAP in relation to the runway/ airport/heliport.

PHRASEOLOGY − *MISSED APPROACH POINT IS (distance) MILE(S) FROM RUNWAY/AIRPORT/HELIPORT, or for a point-in-space approach, A MISSED APPROACH POINT (distance) MILE(S) (direction from landing area) OF (airport name) AIRPORT/HELIPORT.*

EXAMPLE − *Helicopter point-in-space approach: "Army copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."*

REFERENCE − *FAAO 7110.65, Elevation Failure, Para* 5−12−10.

c. Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.

PHRASEOLOGY − *NO TRAFFIC OR LANDING RUNWAY INFORMATION AVAILABLE FOR THE AIRPORT.*

REFERENCE − *FAAO 7110.65, Altimeter Setting Issuance Below Lowest Usable FL, Para* 2−7−2. *FAAO 7110.65, Final Approach Course Interception, Para* 5−9−2.

16.2 Lost Communications

If weather reports indicate that an aircraft is likely to encounter IFR weather conditions during the approach, FAAO 7110.65R requires controllers to take action.

(From FAAO 7110.65, page 5-10-2.)

When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the following action as soon as possible after establishing radar identification and radio communications (may be omitted after the first approach when successive approaches are made and the instructions remain the same):

NOTE − *Air traffic control facilities at U.S. Army and U.S. Air Force installations are not required to transmit lost communications instructions to military aircraft. All military facilities will issue specific lost communications instructions to civil aircraft when required.*

a. If lost communications instructions will require the aircraft to fly on an unpublished route, issue an appropriate altitude to the pilot. If the lost communications instructions are the same for both pattern and final, the pattern/vector controller shall issue both. Advise the pilot that if radio communications are lost for a specified time interval (not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach to:

1. Attempt contact on a secondary or a tower frequency.

2. Proceed in accordance with visual flight rules if possible.

3. Proceed with an approved nonradar approach, or execute the specific lost communications procedure for the radar approach being used.

NOTE − *The approved procedures are those published on the FAA Forms 8260 or applicable military document.*

PHRASEOLOGY − *IF NO TRANSMISSIONS ARE RECEIVED FOR (time interval) IN THE PATTERN OR FIVE/FIFTEEN SECONDS ON FINAL APPROACH, ATTEMPT CONTACT ON (frequency), AND if the possibility exists, PROCEED VFR. IF UNABLE: if approved, PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/ NAVAID/APPROACH PROCEDURE, or (alternative instructions).*
PHRASEOLOGY − **USN.** *For ACLS operations using Mode I, IA, and II, IF NO TRANSMISSIONS ARE RECEIVED FOR FIVE SECONDS AFTER LOSS OF DATA LINK, ATTEMPT CONTACT ON (frequency), AND if the possibility exists, PROCEED VFR. IF UNABLE: if approved, PROCEED WITH (nonradar approach), MAINTAIN (altitude) UNTIL ESTABLISHED ON/OVER FIX/NAVAID/APPROACH PROCEDURE, or (alternative instructions).*

b. If the final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, they shall be issued by the final controller.

c. If the pilot states that he/she cannot accept a lost communications procedure due to weather conditions or other reasons, request the pilot's intention.

NOTE − *The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.*

REFERENCE − *FAAO 7110.65, Final Approach Course Interception, Para* 5−9−2. *FAAO 7110.65, Approach Information, Para* 5−10−2. *FAAO 7110.65, Elevation Failure, Para* 5−12−10.

16.3 Missed Approach

Controllers issue missed approach procedures to aircraft if weather reports indicate that any portion of the final approach will be conducted in IFR conditions.

(From FAAO 7110.65, page 5-10-4.)

Before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted.

PHRASEOLOGY − *YOUR MISSED APPROACH PROCEDURE IS (missed approach procedure).*

NOTE − **1.** *The specific missed approach procedure is published on FAA Form 8260−4 or applicable military document.* **2.** ***USAF.*** *At locations where missed approach instructions are published in base flying regulations, controllers need not issue missed approach instructions to locally assigned/attached aircraft.*

REFERENCE − *FAAO 7110.65, Final Approach Course Interception, Para* 5−9−2. *FAAO 7110.65, Elevation Failure, Para* 5−12−10.

17. APPROACHES – VECTORS FOR VISUAL APPROACH

Controllers can initiate vectors for visual approach to an airport if the ceiling is at least 500 feet above the Minimum Vectoring Altitude (MVA)/Minimum IFR Altitude (MIA) and the visibility is 3 miles or greater.

(From FAAO 7110.65, page 7-4-1.)

A vector for a visual approach may be initiated if the reported ceiling at the airport of intended landing is at least 500 feet above the MVA/MIA and the visibility is 3 miles or greater. At airports without weather reporting service there must be reasonable assurance (e.g. area weather reports, PIREPs, etc.) that descent and flight to the airport can be made visually, and the pilot must be informed that weather information is not available.

PHRASEOLOGY − *(Ident) FLY HEADING OR TURN RIGHT/LEFT HEADING (degrees) VECTOR FOR VISUAL APPROACH TO (airport name). (If appropriate) WEATHER NOT AVAILABLE.*

NOTE − *At airports where weather information is not available, a pilot request for a visual approach indicates that descent and flight to the airport can be made visually and clear of clouds.*

REFERENCE − *FAAO 7110.65, Vectors to Final Approach Course, Para* 5−9−1. *FAAO 7110.65, Visual Separation, Para* 7−2−1. *FAAO 7110.65, Clearance for Visual Approach, Para* 7−4−3. *FAAO 7110.65, Approaches to Multiple Runways, Para* 7−4−4. *FAAO 7110.65, Sequencing, Para* 7−6−7. *FAAO 7110.65, Separation, Para* 7−7−3.

18. NORTH ATLANTIC ICAO REGION – PROCEDURES FOR WEATHER DEVIATIONS IN NORTH ATLANTIC AIRSPACE

Weather deviation requests take priority over routine requests, and controllers can issue a clearance to deviate from the track or use vertical separation.

(From FAAO 7110.65, page 8-7-2.)
Aircraft must request an ATC clearance to deviate. Since aircraft will not fly into known areas of weather, weather deviation requests should take priority over routine requests. If there is no traffic in the horizontal dimension, ATC shall issue clearance to deviate from track; or if there is conflicting traffic in the horizontal dimension, ATC separates aircraft by establishing vertical separation. If there is conflicting traffic and ATC is unable to establish the required separation, ATC shall:
a. Advise the pilot unable to issue clearance for requested deviation;
b. Advise the pilot of conflicting traffic; and
c. Request pilot's intentions.
PHRASEOLOGY − UNABLE (requested deviation), TRAFFIC IS (call sign, position, altitude, direction), ADVISE INTENTIONS.

NOTE −
1. The pilot will advise ATC of intentions by the most expeditious means available.
2. In the event that pilot/controller communications cannot be established or a revised ATC clearance is not available, pilots will follow the procedures outlined in the Regional Supplementary Procedures, ICAO Doc. 7030.

19. PACIFIC ICAO REGION – PROCEDURES FOR WEATHER DEVIATIONS AND OTHER CONTINGENCIES IN OCEANIC CONTROLLED AIRSPACE

Weather deviation requests take priority over routine requests, and controllers can issue a clearance to deviate from the track or use vertical separation.

(From FAAO 7110.65, page 8-9-3.)
Aircraft must request an ATC clearance to deviate. Since aircraft will not fly into known areas of weather, weather deviation requests should take priority over routine requests. If there is no traffic in the horizontal dimension, ATC shall issue clearance to deviate from track; or if there is conflicting traffic in the horizontal dimension, ATC separates aircraft by establishing vertical separation. If there is conflicting traffic and ATC is unable to establish standard separation, ATC shall:
a. Advise the pilot unable to issue clearance for requested deviation;
b. Advise the pilot of conflicting traffic; and
c. Request pilot's intentions.
PHRASEOLOGY − UNABLE (requested deviation), TRAFFIC IS (call sign, position, altitude, direction), SAY INTENTIONS.

NOTE −
1. The pilot will advise ATC of intentions by the most expeditious means available.
2. In the event that pilot/controller communications cannot be established or a revised AT clearance is not available, pilots will follow the procedures outlined in the Regional Supplementary Procedures, ICAO Doc 7030 and Chart Supplements.

20. EMERGENCY ASSISTANCE

20.1 Visual Flight Rules Aircraft in Weather Difficulty

If a Visual Flight Rules (VFR) aircraft requests assistance when it encounters IFR weather conditions, controllers determine the facility best able to provide service.

(From FAAO 7110.65, page 10-2-2.)
a. If VFR aircraft requests assistance when it encounters or is about to encounter IFR weather conditions, determine the facility best able to provide service. If a frequency change is necessary, advise the pilot of the reason for the change, and request the aircraft contact the appropriate control facility.
Inform that facility of the situation. If the aircraft is unable to communicate with the control facility, relay information and clearances.
b. The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of Code 7700:

1. **TERMINAL**. Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.
2. **EN ROUTE**. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.

20.2 Radar Assistance to VFR Aircraft in Weather Difficulty

If a VFR aircraft requests radar assistance when it encounters IFR weather conditions, and the pilot states that he/she is qualified for and capable of conducting IFR flight, the controller requests the pilot to file an IFR flight plan and then issues a clearance to a destination airport.

(From FAAO 7110.65, page 10-2-3.)
a. If a VFR aircraft requests radar assistance when it encounters or is about to encounter IFR weather conditions, ask the pilot if he/she is qualified for and capable of conducting IFR flight.
b. If the pilot states he/she is qualified for and capable of IFR flight, request him/her to file an IFR flight plan and then issue clearance to destination airport, as appropriate.
c. If the pilot states he/she is not qualified for or not capable of conducting IFR flight, or if he/she refuses to file an IFR flight plan, take whichever of the following actions is appropriate:

1. Inform the pilot of airports where VFR conditions are reported, provide other available pertinent weather information, and ask if he/she will elect to conduct VFR flight to such an airport.
2. If the action in subpara 1 above is not feasible or the pilot declines to conduct VFR flight to another airport, provide radar assistance if the pilot:
    (a) Declares an emergency.
    (b) Refuses to declare an emergency and you have determined the exact nature of the radar services the pilot desires.
3. If the aircraft has already encountered IFR conditions, inform the pilot of the appropriate terrain/obstacle clearance minimum altitude. If the aircraft is below appropriate terrain/obstacle clearance minimum altitude and sufficiently accurate position information has been received or radar identification is established, furnish a heading or radial on which to climb to reach appropriate terrain/obstacle clearance minimum altitude.

d. The following shall be accomplished on a Mode C equipped VFR aircraft which is in emergency but no longer requires the assignment of Code 7700:

1. **TERMINAL**. Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.
2. **EN ROUTE**. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.

21. COMPARISON OF WEATHER PROCEDURES FOR EN ROUTE AND TERMINAL CONTROLLERS

Table 1 provides a comparison of FAAO 7110.65R procedural requirements for en route and terminal controllers regarding how they use weather-related information. The purpose of the table is to provide a quick and simplified comparison of the detailed procedural requirements specified in Sections 6 through 20 of this paper. For this comparison, I have omitted phraseology examples and references. In the left column of Table 1, I present the relevant paragraphs along with their section number (i.e., the sections in this paper) and FAAO 7110.65R page number (e.g., 2-6-1). The middle column shows how the FAAO 7110.65R procedures apply to the en route domain, and the right column shows how these same procedures apply to the terminal domain. I highlight differences between the en route and terminal domain by displaying the relevant text in bold/italics. An empty cell implies that FAAO 7110.65R does not specify any information for that particular procedure and that particular domain. I present the paragraphs in the same chronological order as they appear in FAAO 7110.65R. Finally, for Weather and Chaff services (FAAO 7110.65R, page 2-6-2), I have included information from the amended paragraph as defined in Notice N7110.441 because the effective date for these changes was May 11, 2006.

Table 1. A Comparison of FAAO 7110.65R Procedural Requirements for En Route and Terminal Controllers

7110.65R section	En route	Terminal
3.3 **Operational priority,** 2-1-2.	Provide priority in assisting civilian air ambulance flights to avoid areas of significant weather and turbulent conditions.	*Same procedure as en route*.
3.4 **Supervisory notification**, 2-1-12.	Ensure that supervisor/ controller-in-charge is aware of weather conditions that impact sector/position operations.	*Same procedure as en route*.
5.2 **Hazardous inflight weather advisory service**, 2-6-1.	Advise pilots of hazardous weather that may impact operations within 150 NM of the sector.	*Same procedure as en route*. ***Tower and approach control facilities may opt to broadcast hazardous weather information alerts only when any part of the area described is within 50 NM of the airspace***.

7110.65R section	En route	Terminal
5.3 **PIREP information**, 2-6-1.	Solicit PIREPs when requested or when one of the following conditions exists: 1. Ceilings at or below 5,000 feet. These PIREPs shall include cloud base/top reports when feasible. ***When providing approach control services***: Ensure that at least one descent/climbout PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour. 2. Visibility at or less than 5 miles. 3. Thunderstorms. 4. Turbulence of moderate degree or greater. 5. Icing of light degree or greater. 6. Wind shear. 7. Volcanic ash clouds. Relay pertinent PIREP information to concerned aircraft in a timely manner. Relay all operationally significant PIREPs to the facility weather coordinator.	*Same procedure as en route*. ***Ensure that at least one descent/climbout PIREP, including cloud base/s, top/s, and other related phenomena, is obtained each hour***. ***Relay all operationally significant PIREPs to:*** **(a) The appropriate intrafacility positions**. **(b) The AFSS/FSS serving the area in which the report was obtained.**
5.4 **Weather and chaff services**, 2-6-2.	Issue pertinent information on observed/reported weather and chaff areas.	*Same procedure as en route*.

7110.65R section	En route	Terminal
	When requested by the pilot, provide radar navigational guidance and/or approve deviations around weather or chaff areas. In areas of significant weather, plan ahead and be prepared to suggest, upon pilot request, the use of alternative routes/altitudes. Inform any tower for which you provide approach control services of observed precipitation on radar, which is likely to affect their operations. Use the term "precipitation" when describing radar-derived weather. Issue the precipitation intensity from the lowest descriptor (LIGHT) to the highest descriptor (EXTREME) when that information is available. 1. LIGHT 2. MODERATE 3. HEAVY 4. EXTREME ***NOTE – Display System Replacement (DSR) Weather and Radar Processor (WARP) does not display LIGHT intensity.*** *When issuing ARSR precipitation intensity, describe the lowest displayable intensity as MODERATE and the highest displayable intensity as HEAVY to EXTREME.*	

7110.65R section	En route	Terminal
	When operational/equipment limitations exist, controllers shall ensure that the highest available level of precipitation intensity within their area of jurisdiction is displayed.	
5.5 **Calm wind conditions**, 2-6-3.	*No procedure specified in FAAO 7110.65R.*	Describe the wind as calm when the wind velocity is less than three knots.
5.6 **Reporting weather conditions**, 2-6-4.	***Inform the AFSS/FSS or tower when you determine that weather reports for an airport will not be required for a specific time period. The time period specified should not exceed the duration of receiving controller's tour of duty.***	When the prevailing visibility at the usual point of observation, or at the tower level, is less than 4 miles, tower personnel shall take prevailing visibility observations and apply the observations as follows: (1) Use the lower of the two observations for aircraft operations. Forward tower visibility observations to the weather observer. Notify the weather observer when the tower observes the prevailing visibility decrease to less than 4 miles or increase to 4 miles or more. Forward current weather changes to the appropriate control facility (a) when the official weather changes to a condition which is below 1,000-foot ceiling or below the highest circling minimum, whichever is greater, or less than 3 miles visibility, and when it improves to a condition which is better than those above, (b) changes, which

7110.65R section	En route	Terminal
		are classified as special weather observations during the time that weather conditions are below1,000-foot ceiling or the highest circling minimum, whichever is greater, or less than 3 miles visibility.
5.7 **Disseminating weather information**, 2-6-4.	*No procedure specified in FAAO 7110.65R.*	Disseminate observed elements of weather. General weather information (e.g., "large breaks in the overcast") may be transmitted directly to pilots or ATC facilities. Specific values, such as ceiling and visibility, may be transmitted if obtained by a certified and acting official weather observer, or the weather report was composed or verified by the weather station, or the information was obtained from the AWOS or ASOS systems.
6.1 **Furnish RVR/RVV values**, 2-8-1.	*No procedure specified in FAAO 7110.65R.*	Furnish runway visual range/runway visibility values for the runway in use.
6.2 **Arrival/departure runway visibility**, 2-8-1.	*No procedure specified in FAAO 7110.65R.*	Issue current touchdown RVR/RVV for runway(s) in use: 1. When prevailing visibility is 1 mile or less regardless of the value indicated. 2. When RVR/RVV indicates a reportable value regardless of the value indicated.

7110.65R section	En route	Terminal
		Local control shall issue the current RVR/RVV to each aircraft prior to landing or departure.
7.1 **ATIS Application**, 2-9-1.	*No procedure specified in FAAO 7110.65R.*	Use the ATIS to provide advance noncontrol airport/terminal area and meteorological information to aircraft. The ATIS recording shall be reviewed for completeness, accuracy, speech rate, and proper enunciation before being transmitted.
7.2 **ATIS Operating procedures**, 2-9-1.	*No procedure specified in FAAO 7110.65R.*	Maintain an ATIS message that reflects the most current arrival and departure information. When a pilot acknowledges that he/she has received the ATIS broadcast, controllers may omit those items contained in the broadcast if they are current. Controllers shall ensure that pilots receive the most current pertinent information. Ask the pilot to confirm receipt of the current ATIS information if the pilot does not initially state the appropriate ATIS code.

7110.65R section	En route	Terminal
7.3 **ATIS Content**, 2-9-2.	*No procedure specified in FAAO 7110.65R.*	Include in the official weather observation information about airport/facility name, phonetic letter code, time of weather sequence, wind direction and velocity, visibility, obstructions to vision, present weather, sky condition, temperature, dew point, and altimeter. The ceiling/sky condition, visibility, and obstructions to vision may be omitted if the ceiling is above 5,000 feet and the visibility is more than 5 miles.
8. **Team position responsibilities**, 2-10-1.	Radar Flight Data position: Request/receive and disseminate weather, NOTAMs, NAS status, traffic management, and Special Use Airspace status messages.	***Flight Data position: Observe and report weather information.***
9.1 **Low level wind shear/ microburst advisories**, 3-1-3.	*No procedure specified in FAAO 7110.65R.*	Issue an alert to arriving and departing aircraft when wind shear or microburst has been detected by pilots, ITWS, LLWAS, WSP, or TDWR. A statement shall be included on the ATIS for 20 minutes following the last report or indication of the wind shear/microburst.
10.1 **Landing area condition**, 3-3-1.	*No procedure specified in FAAO 7110.65R.*	Issue the accumulated runway precipitation to aircraft.

7110.65R section	En route	Terminal
10.2 **Timely information**, 3-3-1.	Issue airport condition information (necessary for an aircraft's safe operation) in time for it to be useful to the pilot. Include information (as appropriate) about braking conditions caused by ice, snow, slush, water, and volcanic ash.	*Same procedure as en route*.
10.3 **Braking action**, 3-3-2.	Furnish quality of braking action, as received from pilots or airport management, to all aircraft. Describe the quality of braking action using the terms *good*, *fair*, *poor*, and *nil*, or a combination of these terms.	*Same procedure as en route*.
10.4 **Braking action advisories**, 3-3-2.	***Solicit PIREPs on runway braking action.***	Include on the ATIS broadcast the statement "Braking Action Advisories are in effect" when braking action reports include the term *poor* or *nil*. Include runway friction measurement/values received from airport management on the ATIS. Solicit PIREPs on runway braking action.
11. **Runway selection – Tailwind components,** 3-5-1.	*No procedure specified in FAAO 7110.65R*.	State both wind direction and velocity when authorizing the use of runways where a tailwind component exists.
12. **Landing information**, 3-10-1.	Provide current landing information, as appropriate, to arriving aircraft (these can include surface wind, ceiling,	*Same procedure as en route*.

7110.65R section	En route	Terminal
	and visibility if either is below basic VFR minima, and low level wind shear or microburst advisories when available).	
13.1 **Arrival procedures – Weather information**, 4-7-3.	Transmit the weather report and changes classified as special weather observations to an arriving aircraft prior to or as part of the approach clearance when an official weather report indicates weather conditions are below a 1,000-foot ceiling or below the highest circling minimum, whichever is higher, or less than 3 miles visibility for the airport concerned.	*No procedure specified in FAAO 7110.65R.*
13.2 **Below minima report by pilot**, 4-7-4.	Issue appropriate instructions to the aircraft to hold or proceed to another airport. Adjust, as necessary, the position in the landing sequence of any other aircraft. **NOTE** – Determination that existing weather/visibility is adequate for approach/landing is the responsibility of the pilot/aircraft operator.	*Same procedure as en route.*
13.3 **Approach information**, 4-7-4.	Provide current approach information to aircraft destined to airports for which you provide approach control services. This information shall be provided on initial contact or as soon as possible thereafter.	*Same procedure as en route.* ***If multiple runway transitions are depicted on a STAR procedure, advise pilots of the runway assignment on initial contact or as soon as possible thereafter.***

7110.65R section	En route	Terminal
	Inform pilots (upon pilot request) of the frequency where automated weather data may be obtained. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS code.	
13.4 **Airport conditions**, 4-7-5.	***Inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing before issuing an approach clearance or en route descent.***	Inform an aircraft of any abnormal operation of approach and landing aids and of destination airport conditions that you know of which might restrict an approach or landing on first contact or as soon as possible thereafter, and subsequently as changes occur. (This information may be omitted if it is contained in the ATIS broadcast and the pilot states the appropriate ATIS code.) Where RCRs are provided, transmit this information to USAF and ANG aircraft. Issue RCR to other aircraft upon pilot request.
14.1 **Approach clearance procedures – Relayed approach clearance**, 4-8-5.	*No procedure specified in FAAO 7110.65R.*	Include the weather report, when it is required and available when an approach clearance is relayed through a communication station other than an air carrier company radio. You may do this by telling the station to issue current weather.

7110.65R section	En route	Terminal
15.1 **Parallel dependent ILS/MLS approaches**, 5-9-7.	*No procedure specified in FAAO 7110.65R.*	Monitor closely weather activity that could impact the final approach course. Consider given factors that may in any way affect the safety of the instrument approach phase of flight, such as surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc.
15.2 **Simultaneous independent ILS/MLS approaches – Dual and triple**, 5-9-8.	*No procedure specified in FAAO 7110.65R.*	Monitor closely weather activity that could impact the final approach course. Consider known factors that may in any way affect the safety of the instrument approach phase of flight when simultaneous approaches are being conducted to parallel runways. Factors include, but are not limited to, surface wind direction and velocity, wind shear alerts/reports, severe weather activity, etc.
16.1 **Approach information**, 5-10-1.	*No procedure specified in FAAO 7110.65R.*	Issue information on altimeter, ceiling, visibility, and special weather observations to an aircraft that is conducting a radar approach. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code.

7110.65R section	En route	Terminal
		Inform an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport.
16.2 **Lost communications**, 5-10-2.	*No procedure specified in FAAO 7110.65R*.	Take action (as appropriate) as soon as possible after establishing radar identification and radio communications when weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach. Advise the pilot of actions to take if radio communications are lost for a specified time interval.
16.3 **Missed approach**, 5-10-4.	*No procedure specified in FAAO 7110.65R*.	Issue a specific missed approach procedure approved for the radar approach being conducted before an aircraft starts final descent for a full stop landing and weather reports indicate that any portion of the final approach will be conducted in IFR conditions.
17. **Vectors for visual approach**, 7-4-1.	Initiate a vector for a visual approach if the reported ceiling at the airport of intended landing is at least 500 feet above the MVA/MIA and the visibility is 3 miles or greater.	*Same procedure as en route*.

7110.65R section	En route	Terminal
18. **North Atlantic ICAO region – Procedures for weather deviations in NAT airspace**, 8-7-2.	Issue clearance to deviate from the track if there is no traffic in the horizontal dimension. Separate aircraft by establishing vertical separation if there is conflicting traffic in the horizontal dimension. (Aircraft must request an ATC clearance to deviate. Since aircraft will not fly into known areas of weather, weather deviation requests should take priority over routine requests.)	*No procedure specified in FAAO 7110.65R*.
19. **Pacific ICAO region – Procedures for weather deviations and other contingencies in oceanic controlled airspace**, 8-9-3.	Issue clearance to deviate from the track if there is no traffic in the horizontal dimension. Separate aircraft by establishing vertical separation if there is conflicting traffic in the horizontal dimension. (Aircraft must request an ATC clearance to deviate. Since aircraft will not fly into known areas of weather, weather deviation requests should take priority over routine requests.)	*No procedure specified in FAAO 7110.65R*.
20.1 **Emergency assistance – VFR aircraft in weather difficulty**, 10-2-2.	Determine the facility best able to provide service if VFR aircraft requests assistance when it encounters or is about to encounter IFR weather conditions. If a frequency change is necessary, advise the pilot of the reason for the change, and request the aircraft contact the appropriate control facility.	*Same procedure as en route*.

7110.65R section	En route	Terminal
	Make an appropriate keyboard entry to ensure en route MSAW (EMSAW) alarm processing.	***Assign a beacon code that will permit terminal MSAW alarm processing.***
20.2 **Radar assistance to VFR aircraft in weather difficulty**, 10-2-3.	Ask the pilot if he/she is qualified for and capable of conducting IFR flight if a VFR aircraft requests radar assistance. If the pilot is qualified and capable of IFR flight, request the pilot to file an IFR flight plan and then issue clearance to destination airport. Otherwise, inform pilot of airports where VFR conditions are reported and provide pertinent weather information. Provide radar assistance if the pilot declares an emergency. An appropriate keyboard entry shall be made to ensure en route MSAW (EMSAW) alarm processing.	*Same procedure as en route.* ***Assign a beacon code that will permit terminal minimum safe altitude warning (MSAW) alarm processing.***

22. WEATHER INFORMATION AT THE CONTROLLER WORKSTATION

22.1 En Route

En route controllers have direct access to several sources of weather information at their workstation. Figure 1 shows an illustration of what information is available, and how the controller can access this information.

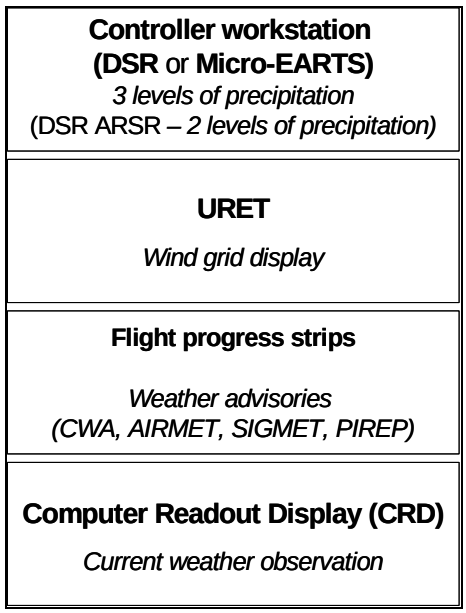

Figure 1. Weather information available at the en route controller workstation.

22.1.1 Precipitation information

Controllers have access to precipitation information provided to the DSR via the WARP using Next Generation Weather Radar data. The precipitation display can show three levels of precipitation assigned to different colors: Royal Blue, Checkered Cyan, and Cyan. The Royal Blue represents **MODERATE** intensity (30-40 dBZ), the Checkered Cyan represents **HEAVY** intensity (40-50 dBZ), and the Cyan represents **EXTREME** intensity (50> dBZ). In addition, controllers have the option to show precipitation intensities at different altitude strata. Four strata are available: 0-60000 ft, 0-24000 ft, 24000-33000 ft, and 33000-60000 ft. If the controller is displaying primary Air Route Surveillance Radar (ARSR) precipitation on the DSR, only two precipitation intensities are available. Similar to the DSR WARP, the Micro En Route Automated Radar Tracking System (Micro-EARTS), which is used by some en route controllers, also displays three levels of precipitation.

Controllers use the precipitation display when guiding pilots around weather and when informing pilots of basic precipitation coverage and height. Controllers also use the precipitation display when suggesting headings and routes to keep aircraft clear of weather areas.

22.1.2 Weather advisories

En route controllers receive weather advisories like the Center Weather Advisory (CWA), Significant Meteorological information, Airman's Meteorological information (AIRMET), Convective SIGMET (WST), and Urgent Pilot Weather Reports (UUA) on flight progress strips.

Controllers use weather advisories when broadcasting important weather conditions to pilots.

22.1.3 Current weather observations

Controllers can access current weather observations (i.e., surface observations) from the Computer Readout Display (CRD). These Meteorological Aerodrome Reports (METARs) usually come from airports. In general, these reports are generated once an hour but if weather conditions change significantly, they are updated in special reports (SPECIs). METARs contain information about winds, visibility, present weather and obscurations, sky conditions, temperature and dew points, and altimeter/pressures.

If the controller is providing approach control services, he/she uses weather observations to advise pilots on current weather conditions before an approach clearance. On pilots' requests, controllers provide weather observations for destinations that are outside the range of the pilots' ability to obtain the local AWOS/ATIS information, usually due to frequency limitations.

22.1.4 Wind and temperature information

The User Request Evaluation Tool (URET) provides a visual representation of forecast winds and temperatures at selected altitudes. The wind grid display shows the wind data overlaid on a sector map, which includes boundaries and fixes. Arrows indicate wind direction and a number indicates the wind speed.

Controllers use the wind information to plan vectors, taking into account the speed and direction of the wind.

22.1.5 Pilot reports

PIREPs are direct observations of various weather conditions that pilots encounter during flight. These reports usually include information about turbulence, icing conditions, height of cloud layers, and inflight visibility. PIREPs are highly useful for establishing where hazardous aviation weather conditions are occurring. En route controllers receive PIREPs via radio communications with pilots or as information disseminated from other controllers or the facility weather coordinator.

Controllers use PIREPs to relay pertinent information to concerned aircraft.

22.2 Terminal

Figure 2 shows a general description of weather information available at the TRACON controller workstation. Because the terminal domain employs several different ATC systems, the specific configuration is not available at all terminal facilities (see Figure 2). However, the weather information sources are, in one form or another, available to the TRACON controller.

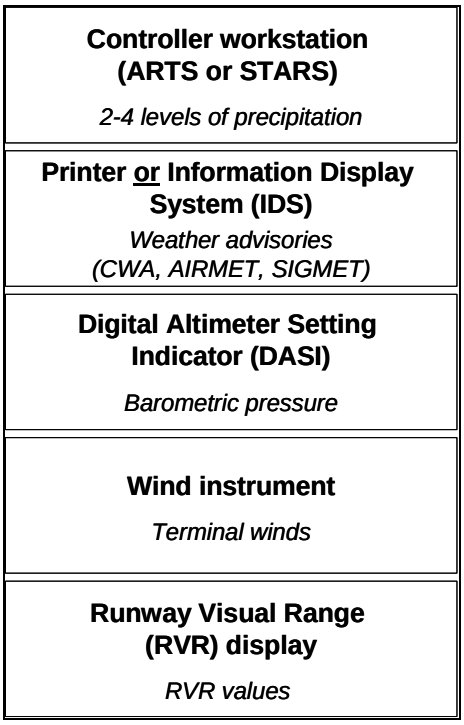

Figure 2. Weather information available at the terminal controller workstation.

22.2.1 Precipitation information

Terminal controllers have access to precipitation information at their workstation. Currently, newer systems like the Standard Terminal Replacement System (STARS) can display six levels of precipitation, whereas other older systems are limited to displaying two levels simultaneously. However, as stated previously, Notice N7110.441 introduced a change to FAAO 7110.65R concerning the display of precipitation information (see FAA 2006b). Terminal facilities capable of displaying six levels of precipitation will get a future software update that will change the precipitation display to show only four levels. Terminal controllers are now describing level 1 as **LIGHT** (dBZ levels of < 30), level 2 as **MODERATE** (dBZ levels of 30-40), levels 3 and 4 as **HEAVY** (dBZ levels of > 40-50), and levels 5 and 6 as **EXTREME** (dBZ levels of > 50).

Controllers use the precipitation display when guiding pilots around weather and when informing pilots on basic precipitation coverage. Controllers also use the precipitation display when suggesting headings and routes to keep aircraft clear of weather areas. In addition, controllers use the precipitation display for planning traffic flows and possible runway changes.

22.2.2 Weather advisories

Terminal controllers receive weather advisories like the CWA, AIRMET, SIGMET, and WST from a printer. If the facility is equipped with an Information Display System (IDS), this system can display these advisories.

Controllers use weather advisories when broadcasting important weather conditions to pilots.

22.2.3 Current weather observations

Current weather observations contain information about winds, visibility, present weather and obscurations, sky condition, temperature and dew point, and altimeter/pressure. In general, the IDS or some other display provides this information.

Controllers use these weather observations to advise pilots on current weather conditions.

22.2.4 Barometric pressure

The Digital Altimeter Setting Indicator (DASI) system computes and displays Altimeter Setting Indication for terminal controllers. The DASI system measures the atmospheric pressure and converts the measured pressure value into the actual sea level pressure based on the U.S. Standard Atmosphere Table.

Controllers use the DASI to ensure that pilots have the correct altimeter setting for approach and departure. In addition to being important for approach/departure operations, a correct altimeter setting is vital for vertical separation assurance.

22.2.5 Terminal winds

The wind instrument display provides the controller with terminal wind information.

Controllers use wind information when relaying hazardous inflight weather advisories to pilots. Controllers also use wind information for providing runway selection, for providing current landing information to arriving aircraft, for providing departure information to pilots, and for providing information about tailwind components. Furthermore, controllers use wind information for the ATIS content.

22.2.6 Runway visual range

The RVR display provides the controller with the range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.

Controllers relay RVR values to pilots in order to ensure that pilots comply with approach minimum restrictions, thereby ensuring that pilots can make a safe landing or departure.

22.2.7 Pilot reports

PIREPs are direct observations of various weather conditions that pilots encounter during flight. These reports usually include information about the height of cloud layers, inflight visibility, icing conditions, and turbulence. PIREPs are highly useful for establishing where hazardous aviation weather conditions are occurring. Terminal controllers receive PIREPs via radio communications with pilots or as information disseminated from other controllers.

Controllers use PIREPs to relay pertinent information to concerned aircraft.

23. CONCLUSION

The FAAO 7110.65R describes ATC procedures and phraseology for use by persons providing ATC services. A number of these control procedures encompass the use of weather-related information. Some FAAO 7110.65R sections are specifically tailored to procedures and

phraseology for using weather information; however, many of these procedures are integrated in various sections throughout the order. Because the weather procedures are interspersed throughout the document, disentangling the terminal and en route procedures is not straightforward. This document summarizes and compares the procedural requirements in FAAO 7110.65R that en route and terminal controllers follow when they use weather-related information.

In general, en route and terminal controllers follow the same basic procedures when using weather-related information. For example, the FAAO 7110.65R procedures for providing pilots with timely information about airport conditions apply to both en route and terminal controllers. In other instances, the basic procedures are the same but there is a minor difference or minor extension of a procedure that only applies to one of the domains. For example, en route and terminal controllers follow the same basic procedure for providing pertinent information on weather and chaff areas to pilots, but en route controllers do not describe radar-derived weather to pilots for light precipitation. Unlike some terminal systems, the DSR WARP does not display light precipitation intensity on the en route workstation. The DSR WARP display only shows moderate, heavy, and extreme levels of precipitation.

There are also procedures that only apply to one domain. Specifically, there are a large number of weather-related procedures that only apply to the terminal domain. This is not too surprising because weather is critical to aircraft in close proximity to the ground. Examples of terminal procedures are the furnishing of RVR/RVV values and the monitoring of weather conditions during parallel dependent ILS/MLS approaches. The regulations for weather deviations in oceanic controlled airspace are another example that only applies to one domain.

While following the FAAO 7110.65R weather procedures, en route and terminal controllers use information available at their workstation. Overall, both domains use weather information sources that are very similar in nature. However, whereas the information sources are similar, the information displays are tailored for use in the respective domain. For example, the displays for terminal ATC show light precipitation areas because this information is relevant for terminal operations. On the other hand, for en route operations, light precipitation is less relevant and therefore not used during ATC operations. Similarly, en route controllers have a greater need for upper-level wind information, and terminal controllers have a greater need for low-level wind information.

As stated in the introduction, the present paper does not include a summary of weather information provided to controllers by supervisors, traffic management, or auxiliary displays in the area of operation. In the en route domain, controllers have access to additional sources of weather information displayed on the Enhanced Status Information System (ESIS) in their area of specialization. However, although each area of specialization has an ESIS display, the weather information is tailored to meet the specific operational needs dictated by sector characteristics, traffic flows, and local weather patterns. Similarly, in some terminal facilities, controllers are forwarded weather information that supervisors and traffic management receive from the ITWS or the Medium-Intensity Airport Weather System. However, unlike the en route facilities, terminal facilities display a large variety in operational systems and auxiliary weather displays (see Ahlstrom, 2004, for a review).

Finally, I should note that the FAAO 7110.65R only provides procedural and phraseology requirements for the use of weather information. The order does not provide rules or guidance for how controllers can best make use of weather information that is available at their workstation. For example, there are no guidelines for the use of the precipitation display during various weather conditions. Likewise, the FAAO 7110.65R does not provide any information or guidance for action during different weather conditions, and there are no guidelines for the potential impact on en route and terminal operations.

Future concept work needs to bridge the gap between controllers', pilots', and flight-deck operators' weather information to enhance common weather situation awareness. Part of this task is to ensure that controllers have direct access to operationally useful information. The present paper can play a role in highlighting the current weather procedures for en route and terminal ATC operations, thereby providing an overview of similarities and differences in weather information requirements. This overview of information requirements can be used as a basis of new ATC collaboration/roles described in future concepts of operations during uncertainty of weather (Joint Planning and Development Office, 2006). For future concepts like super density operations in terminal airspace, it is almost certain that research is needed to define and evaluate new weather information for controllers, pilots, and automation systems. Understanding current and future weather information needs can contribute to an operational concept that will allow increased collaboration to handle increased traffic during adverse weather conditions while maintaining safety and efficiency.

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Acronyms

AFSS	Automated Flight Service Station
AIRMET	Airman's Meteorological Information
ANG	Air National Guard
ARSR	Air Route Surveillance Radar
ASOS	Automated Surface Observing System
ATC	Air Traffic Control
ATIS	Automated Terminal Information Service
AWOS	Automated Weather Observing System
CWA	Center Weather Advisory
DASI	Digital Altimeter Setting Indicator
DSR	Display System Replacement
EMSAW	En-Route Minimum Safe Altitude Warning
ESIS	Enhanced Status Information System
FAA	Federal Aviation Administration
FAAO	Federal Aviation Administration Order
FSS	Flight Service Station
HIWAS	Hazardous Inflight Weather Advisory Service
ICAO	International Civil Aviation Organization
IDS	Information Display System
IFR	Instrument Flight Rules
ILS	Instrument Landing System
ITWS	Integrated Terminal Weather System
LLWAS	Low Level Wind shear Alert System
METAR	Meteorological Aerodrome Report
MIA	Minimum IFR Altitude
Micro-EARTS	Micro En Route Automated Radar Tracking System
MLS	Microwave Landing System
MSAW	Minimum Safe Altitude Warning
MVA	Minimum Vectoring Altitude
NAS	National Airspace System
NAT	North Atlantic

NOTAM	Notice to Airmen
PIREP	Pilot Report
RCR	Runway Condition Reading
RVR	Runway Visual Range
RVV	Runway Visibility Value
SIGMET	Significant Meteorological Information
STAR	Standard Terminal Arrival Route
STARS	Standard Terminal Replacement System
TDWR	Terminal Doppler Weather Radar
TRACON	Terminal Radar Approach Control
URET	User Request Evaluation Tool
USAF	United States Air Force
UUA	Urgent Pilot Weather Reports
VFR	Visual Flight Rules
WARP	Weather and Radar Processor
WSP	Weather Systems Processor
WST	Convective SIGMET