CHANGE U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

7900.5B CHG 1

12/1/05

SUBJ: SURFACE WEATHER OBSERVING

1. PURPOSE. This change transmits revised pages to Federal Aviation Administration (FAA) Order 7900.5B, Surface Weather Observing, and the Briefing Guide.

2. DISTRIBUTION. This order is distributed to select offices in Washington Headquarters; Air Traffic Organization – Terminal Service Areas, Office of Operations Planning, NAS Weather Office, Flight Standards Service, The Mike Monroney Aeronautical Center, The William J. Hughes Technical Center, the USCG Elizabeth City Facility, the Department of Defense, all terminal air traffic field facilities, all Alaska flight service stations, FAA-contract weather, and the National Weather Service (NWS).

3. EFFECTIVE DATE. December 1, 2005.

4. EXPLANATION OF CHANGES. See paragraph 1-5, Explanation of Changes.

5. DISPOSITION OF TRANSMITTAL. Retain this transmittal until superseded by a new basic order.

6. REQUEST FOR INFORMATION. See the Page Control Chart attachment.

David B. Johnson
Vice President, Terminal Services

Distribution: A-W(AT/TO/TX/TA/RS/RU/RW/RN/FS)-2; A-X(AT)-2; A-Y(AY)-2; A-FAT-LTD(Less FAT 5/6); ZAT-464 DOD; NWS; USCG Elizabeth City Facility

Initiated By: ATO-T

PAGE CONTROL CHART
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October 18, 2005

Remove Pages	Dated	Insert Pages	Dated
1	5/11/01	1	10/18/05
2	5/11/01	2	5/11/01
3 (and 4)	5/11/01	3 (and 4)	10/18/05
5	5/11/01	5	10/18/05
6	5/11/01	6	5/11/01
9	5/11/01	9	10/18/05
10	5/11/01	10	5/11/01
19	5/11/01	19	10/18/05
20	5/11/01	20	5/11/01
23	5/11/01	23	5/11/01
24	5/11/01	24	10/18/05
25	5/11/01	25	5/11/01
26	5/11/01	26	5/11/01
157	5/11/01	157	10/18/05
158	5/11/01	158	5/11/01
173	5/11/01	173	10/18/05
174	5/11/01	174	10/18/05
B-1 (and B-2)	5/11/01	B-1 (and B-2)	10/18/05
D-1	5/11/01	D-1	10/18/05
D-2	5/11/01	D-2	5/11/01

CHAPTER 1. INTRODUCTION

1-1. PURPOSE

This order prescribes aviation surface weather observing procedures and practices applicable to all FAA and FAA-contract personnel engaged in taking and reporting aviation surface observations, including Limited Aviation Weather Reporting Stations (LAWRS) personnel, Non-Federal Observation (NF-OBS) Program personnel, as well as United States Coast Guard (USCG) personnel as a component of the Department of Homeland Security (DHS). This order includes practices and procedures for both manual and automated observation locations. Also included are practices and procedures for augmentation of automated observations and backup information in the event of system failure, erroneous or non-representative data. These procedures and practices are intended to provide a framework for identifying meteorological phenomena of importance to aviation and reporting their occurrence.

1-2. DISTRIBUTION.

This order is distributed to select offices in Washington Headquarters; Air Traffic Organization – Terminal Service Areas, Office of Operations Planning, NAS Weather Office, Flight Standards Service, The Mike Monroney Aeronautical Center, The William J. Hughes Technical Center, the USCG Elizabeth City Facility, the Department of Defense, all terminal air traffic field facilities, all Alaska flight service stations, FAA-contract weather, and the National Weather Service (NWS).

1-3. CANCELLATION

Order 7900.5A, Surface Weather Observing - METAR, dated July 1, 1996, is canceled.

1-4. EFFECTIVE DATE

This order is effective December 1, 2005.

1-5. EXPLANATION OF CHANGES

This change incorporates revisions that have occurred since the order was last revised on May 11, 2001. This change:

a. Updates the office of primary responsibility.

b. Updates distribution in accordance with the new Air Traffic Organization.

c. Updates the USCG to a component of DHS.

d. Revises the frequency of snow depth measurements.

e. Clarifies what is used to determine water equivalency of snow.

1-6. ABBREVIATIONS AND ACRONYMS

Appendix A, Abbreviations and Acronyms, contains abbreviations and acronyms used within this order.

1-7. RELATIONSHIP TO FMH-1 AND OTHER DOCUMENTS

a. **Federal Meteorological Handbook No. 1, Surface Weather Observations and Reports (FMH-1).** FMH-1 prescribes surface weather observing standards applicable to all federal agencies engaged in taking and reporting surface aviation observations. FMH-1 also

prescribes the standard reporting and coding procedures used in the surface aviation observation. Order 7900.5B prescribes the procedures and practices to be followed by FAA, FAA-contract and NF-OBS personnel for the observing, reporting, and coding of surface observations which meet the federal standards. A brief description of the NF-OBS program is provided in Appendix B, Non-Federal Observation (NF-OBS) Program. This order complements, but does not change, the standards contained in FMH-1.

b. The NWS Observing Handbook No. 7, Surface Observations, (WSOH-7). WSOH-7 provides procedures and practices for NWS and NWS-contract personnel which are similar to those in this order.

c. Automated Weather Observing Systems Handbooks. A partial listing of the applicable handbooks necessary to operate the various automated weather observing systems includes:

(1) Federal Aviation Administration, Operator Instructions, Automated Weather Observing System (AWOS), August 1, 1994, U.S. Department of Transportation, Washington, D.C.

(2) Federal Aviation Administration, ASOS Ready Reference Guide (latest versions).

1-8. APPLICABILITY OF PROCEDURES AND PRACTICES

a. Applicability. Except for LAWRS, the procedures and practices in this order apply to all facilities which have the capability to comply with the stated procedure or practice. Some procedures and practices vary at LAWRS sites. These differences are indicated throughout the order where applicable. LAWRS observers shall comply with all the standard procedures and practices, except for these specifically indicated differences. Those sections which are not applicable to LAWRS are marked **NA LAWRS** in bold type after the section title. Similarly, sections which apply only to LAWRS are indicated with **ONLY LAWRS**. LAWRS requirements are excerpted in Appendix C, LAWRS Requirements. At an automated site ranked as Service Level C, the basic weather observing requirements are the same as a LAWRS observation. LAWRS observers are not required to back up the observation if measuring or observing equipment is not available.

b. Conflicting Information. In case of conflicting information, the procedures and practices in this order take precedence. However, any applicable FAA air traffic orders take precedence over any procedures or practices in this order which are in conflict. Such conflicts should be brought to the attention of the originator of this order.

c. Terminology. Throughout this order, the following terminology applies:

(1) "Shall" indicates a procedure or practice which is mandatory at all applicable facilities.

(2) "Should" indicates a procedure or practice which is recommended at all applicable facilities.

(3) "May" indicates a procedure or practice which is optional.

(4) "Will" indicates futurity; it is not a requirement to be applied to current practices.

d. Unforeseen Requirements. No set of procedures and practices can cover all possibilities in weather observing. The observer shall use good judgment, adhering as closely as possible to this order, to describe phenomena not adequately covered by specific instructions. Suggestions for possible changes in procedures and practices to cover such situations may be made through appropriate channels.

e. Designated Stations and Service Standards. Throughout this order the phrase "designated stations" appears. This refers to facilities that have been instructed by the FAA to perform a specified task that is not required to be performed at all facilities. In many cases, a facility may be designated to perform a specified task based on the service standards set for an airport. See Appendix D, Service Standards.

f. Regional, Field Office and Facility Procedures. The procedures in this order are the minimum requirements. Needs at the service area office and especially at the local level may dictate additional requirements. Service area or field offices may coordinate these additional requirements with the Terminal Services, Safety Operations and Support, Contract Weather Observation, (ATO-T), although it is not required.

1-9. USER RESPONSIBILITIES

Employee participation in directive writing and upkeep activities is encouraged. Any user who finds a subject matter conflict, an error, obsolete information or who would like to make recommendations or suggestions should notify Safety Operations and Support, in writing. FAA Form 1320-19, Directive Feedback Information, is available for this purpose. If clarification or correction is urgently needed, you may call Safety Operations and Support for guidance, but you should also use the FAA Form 1320-19 as a follow-up to verbal conversation.

1-10. CHANGING THE ORDER

Changes, additions, deletions, and corrections will be issued as necessary. These changes will be issued by the Director of Terminal Safety and Operations Support, Contract Weather Observation, Attn: ATO-T, FAA.

1-11. MAINTAINING THE ORDER

Each facility shall maintain a copy of the order, complete with changes and supplements for reference purposes. When inserting changes to the order, enter the number, effective date, initials, and date entered on the inside cover of this order.

CHAPTER 2. GUIDELINES

2-1. INTRODUCTION

This chapter describes the types of aviation surface weather observing facilities for which the FAA may have responsibility or oversight. This chapter also describes the various types of surface weather reports, including the Aviation Routine Weather Report (METAR) and Aviation Selected Special Weather Report (SPECI), and FAA guidelines regarding the content of each of these types. Also presented are general guidelines regarding augmentation and backup of automated observations. Lastly, this chapter presents FAA guidelines on the certification of observers.

2-2. TYPES OF STATIONS

The generic types of stations that take aviation weather observations are defined as follows:

a. Automated Station. A facility equipped with an automated surface weather observing system that prepares the observation without a certified observer on duty. The various types of automated stations are described in Chapter 4, General Procedures at Automated Weather Stations.

b. Augmented Station. A facility with an automated surface weather observing system that prepares the METAR/SPECI with a certified observer on duty capable of adding operationally significant weather information to the observation. The observer is completely responsible for the observation, even though the automated weather observing system generates the report. At facilities where augmentation is not available full time, the facility is classed as automated during the non-augmented periods.

c. Manual Station. A facility where certified weather observers are responsible for observing, evaluating and preparing the METAR/SPECI. At these facilities, various degrees of automated sensors and/or other automated equipment may be available. However, the observer is completely responsible for the METAR/SPECI.

d. Towered Station. Any facility with an air traffic control tower operated by the FAA or operated under an FAA contract.

e. Non-Towered Station. Any facility without an FAA or FAA contract air traffic control tower.

f. Limited Aviation Weather Reporting Station (LAWRS). A facility where observations are taken prepared and transmitted by certified FAA or FAA-contract control tower personnel or Flight Service Station personnel on a limited basis to support aviation requirements. At these facilities, various degrees of automated sensors and/or other automated equipment may be available. However, when the facility is open, the LAWRS observer is completely responsible for the METAR/SPECI. At an automated site ranked as Service Level C, the basic weather observing requirements are the same as a LAWRS observation.

g. Flight Service Station. Throughout this order, the term Flight Service Station (FSS) refers to any Flight Service Station, Automated Flight Service Station (AFSS), Auxiliary Flight Service Station, or former FSS airport facility which has been directed by FAA headquarters or service area office to provide the observing, augmentation or backup service indicated.

h. Supplementary Aviation Weather Reporting Station (SAWRS). This program is maintained by the NWS. To obtain more information, contact the nearest NWS Weather Forecast office.

i. Non-Federal Observing (NF-OBS) Station. A program in which Non-Federal observers such as Non-Federal control tower (NFCT) controllers, airline personnel or fixed base operator (FBO) personnel may enter into an agreement with the appropriate FAA region to provide backup and augmentation of the Automated Surface Observing System (ASOS). NF-OBS observers are certified by NWS. At these facilities, various degrees of automated sensors and/or other automated equipment may be available. However, when on duty, the NF-OBS observer shall provide backup and augmentation in accordance with their NF-OBS agreement. Program establishment is contained in Appendix B, Non-Federal Observing (NF-OBS) Program, and responsibilities are described in Chapter 4, General Procedures at Automated Weather Stations.

j. A-Paid Station. A facility where contract observers take only hourly observations (METAR). SPECI observations are not taken at these facilities.

2-3. GENERAL TYPES OF OBSERVATIONS

There are two general types of surface observations:

a. Automated Observation. Any observation which has been evaluated, prepared and transmitted by an automated observing system without human intervention. The automated observing systems to which this order applies include only Automated Surface Observing Systems (ASOS) and the Automated Weather Observing Systems (AWOS).

(1) Augmentation. Any automated observation to which additional weather information has een manually added that is beyond the capabilities of the automated weather observing system and/or is deemed operationally significant. The guidelines concerning augmentation are presented in paragraph 2-4.

(2) Backup. A method of providing an observation, part of an observation, documentation, or communication of an observation at selected sites when the primary method is unavailable or non-representative. The guidelines concerning manually provided backup information are presented in paragraph 2-5, Backup Requirements.

b. Manual Observation. Any observation for which the human observer observes, evaluates, prepares, records, and transmits the observation without the use of an automated observing system. The guidelines for manual observations are presented in Chapter 7, General Procedures for Manual Observations.

2-4. AUGMENTATION REQUIREMENTS

Certified observers are responsible for the completeness and accuracy of the weather observation. Automated weather observing systems are, by design, viewing a smaller area than a human observer. Therefore, the observer is responsible for providing additional information that covers a larger area, when operationally significant. Augmentation of automated observations shall be provided in accordance with the guidelines presented in the following subsections and as specified for the station's service level standard (Appendix D, Service Standards). Separate guidelines are

present weather sensor(s) is/are accurately reporting conditions in the vicinity of the sensor, but those conditions are not representative of prevailing conditions for the operating areas of the airport and are considered operationally significant. When this occurs, provide manual backup. Outage notification is not required.

b. Level of Support. The information specified in these guidelines is the minimum required for each of the situations discussed in the following subsections. The FAA may specify additional information beyond this minimum. The observer is encouraged to add any other appropriate remarks. Procedures and practices to provide the required backup information are presented in Chapter 6, Backup Requirements at Automated Weather Stations.

d. Equipment for Backup Observations. Weather observing equipment should be maintained to allow certified observers to perform backup responsibilities in the event of an automated sensor failure. Air Traffic managers shall coordinate with the Service Area Office, local Technical Operations SMO, and the appropriate NWS regional office prior to initiating action to decommission weather observing equipment.

2-6. LONG-LINE BACKUP REQUIREMENTS

Details on the procedures to provide backup are in Chapter 6, Backup Requirements at Automated Weather Stations. This paragraph specifies the type of minimum backup for various types of facilities.

a. LAWRS Towers. At LAWRS towers, certified air traffic control specialists (ATCS) shall provide the backup information for long-line transmission which is listed in this section. The required information shall be entered into the automated weather observing system via the operator interface device. The following information shall be provided at a minimum:

(1) Wind

(2) Visibility to 10 miles

(3) Present weather and obstructions to vision (see Figure 6-6 for required elements)

(4) Sky condition to 12,000 feet

(5) Temperature/Dew Point

(6) Altimeter setting

(7) Required remarks and operationally significant remarks as deemed appropriate (Note: Precipitation of unknown form may be reported only if the automated sensor is operational and is reporting precipitation of unknown form. However, if the observer can determine the type of precipitation, it should be reported using the allowable elements listed in Figure 6-6, Backup and Augmentation Weather and Obscurations.)

b. Non-LAWRS Towers with a Surface-Based Observer. At non-LAWRS towers with a surface-based observer, the surface-based observer shall provide at a minimum the backup information for long-line transmission according to the requirements contained in the Service Standards for the service level of the airport. Backup shall also include required remarks and operationally significant remarks as deemed appropriate by the observer. At these facilities, tower personnel shall routinely provide tower visibility information to the surface-based observer as required.

c. Non-Towered Facilities with a Surface-Based Observer. At all non-towered facilities, the surface-based observer shall provide the backup information required by the Service Standards for the service level of the airport. At all facilities with an operator interface device, the required information shall be entered into the automated weather observing system via the operator interface device. Backup shall also include required remarks and operationally significant remarks as deemed appropriate by the observer.

2-7. CERTIFICATION OF PERSONNEL AND CURRENCY REQUIREMENTS

Prior to assuming full responsibility for taking any type of surface observation or any part thereof, each person shall be certified. The NWS is responsible for certifying all civilian weather observers in one or more of the following observer types:

a. NWS and FAA observers

b. LAWRS observer

c. Tower visibility observer

d. SAWRS observer

e. A-paid observer

Definitions of these types are presented in paragraph 4-2, Definitions. Currency requirements are in Order 3120.4, Air Traffic Technical Training.

2-8. TYPES AND CONTENT OF METAR/SPECI OBSERVATIONS

The METAR is the primary code format used in the United States to satisfy requirements for reporting surface meteorological data. The METAR may be prepared by automated weather observing systems (with or without augmentation) or by certified weather observers. These data are primarily reported in an alphanumeric coded format for aviation users. A complete METAR contains the type of report, station identifier, date/time of observation, and whether the report is automated (AUTO) or corrected (COR). Weather phenomena in the METAR include wind, visibility, runway visual range (RVR) (at designated sites), present weather, sky condition, temperature, dew point, and altimeter setting (collectively referred to as "the body of the report"). In addition, significant information elaborating on data reported in the body of the report, or coded and plain language data not included in the body of the report, may be appended to the report in a section referred to as "remarks." However, the content varies according to the type of weather station and the automated weather observing system used. (See Figure 15-1, Content of METAR/SPECI.) Many parts of the remarks section are not required at FAA facilities. The METAR is a scheduled observation. At manual stations, it is taken between 45 and 59 minutes past the hour. METARs are scheduled on the hour at ASOS sites and every 20 minutes at AWOS sites starting at H+00. A SPECI is an unscheduled

c. Time Entries on Recorder Charts. Time entries (such as those for time checks) on recorder charts shall be made to the nearest minute LST, except at LAWRS sites, where UTC time is entered.

d. Time Checks on Recorder Charts. Time checks on the recorder chart of recording-type instruments shall be made as follows:

(1) At the beginning and end of each chart roll.

(2) When notified of an aircraft mishap.

(3) For each disruption or discontinuity in the trace; e.g., upon return of equipment to service following an outage or periodic maintenance.

(4) At the time of the first observation at facilities not operating 24 hours per day.

e. Time Adjustments on Recorder Charts. When a recorder is adjusted to the correct time, the observer shall indicate the adjustment on the chart by entering an arrow at the point of the adjustment and writing the time of the adjustment near the arrow.

f. Power and Equipment Failures. The observer shall indicate power and equipment failures on recording-type instruments by entering on the recorder chart at the point of the failure the term POWER FAILURE or EQUIPMENT FAILURE and the time of the failure. When the equipment is returned to service, the observer shall, if necessary, adjust the chart to the correct time and enter a time check.

3-12. DOCUMENTATION OF OBSERVING LOCATION AND FACILITIES

An accurate Station Information File shall be maintained at the FAA service area office. This file shall document the equipment (including automated weather observing systems equipment), instrumentation, and the observing program at the facility. The file shall contain, as a minimum, the information specified in the FMH-1 (see Figure 3-1). It is each service area office's responsibility to ensure that a copy of the Station Information File for each observing location is sent to the National Climatic Data Center (NCDC), Attn: Code EF1100, of the National Oceanic and Atmospheric Administration (NOAA). A copy of the file shall be sent when a station is established, when any data listed in the file changes or is corrected, and when a station closes. This file shall become a part of that station's archived record.

Physical Characteristics		
Station Name	Latitude/Longitude	Type of Station
Airport Name	Climatological Elevation	Description of Significant
Station Identifier	Field Elevation	Topography
WMO Index Number	Ground Elevation	
Time Zone	Station Elevation	
Observation Schedule		
Types of Reports	Schedule for Reports	Hours of Operation
Observation Program		
Elements Observed	SPECI	
Long-Line Communications Circuits	Transmitted (Y/N)	
Sensor Data		
System Configuration	Location of Sensors	Non-standard Sensor Siting
Types of Sensors		

Figure 3-1. Station Information File

(e) AWOS-3P: AWOS-3P contains all the AWOS-3 sensors, plus a precipitation identification sensor.

(f) AWOS-3T: AWOS-3T contains all the AWOS-3 sensors, plus a thunderstorm/lightning reporting capability.

(g) AWOS-3P/T: AWOS-3P/T contains all the AWOS-3 sensors plus a precipitation identification sensor and a thunderstorm/lightning reporting capability.

(h) AWOS-4: AWOS-4 contains all the AWOS-3 sensors, plus precipitation occurrence, type and accumulation; freezing rain; thunderstorm; and runway surface condition sensors.

(4) Many AWOSs were installed at airports without previous weather observations, so personnel may not be available to augment or back up the automated weather observations. The most common type of AWOS observation is the AWOS-3. It is identified by AUTO (automated report) in the body of the report and AO1 (automated station without precipitation discriminator) in the remarks section if it is a fully automated report. If it is being augmented/backed up by an observer, it will *not* have AUTO in the body of the report and it will have AO1 in the remarks section. (See examples in Figure 5-2, Examples of Augmented Observations.)

b. Non-FAA Stations. In addition to the systems described above, there are various NWS, DOD and non-federal automated weather observing systems. All non-federal automated weather observing systems to be used for aviation must be certified and commissioned by the FAA in accordance with the most current version of FAA Advisory Circular AC 150/5220-16, Automated Weather Observing Systems (AWOS) for Non-Federal Applications.

4-4. CERTIFICATION

All FAA and contract personnel, including LAWRS personnel, responsible for providing weather observations, augmentation information, tower visibility observations or backup weather information shall be certified at least to the level commensurate with current duties. Certification shall be in accordance with the provisions of paragraph 2-7, Certification of Personnel.

4-5. GENERAL PROCEDURES

At automated weather observing locations, the specified weather information shall be taken, recorded and disseminated in accordance with the procedures and practices in this order. Operator procedures for recording and disseminating augmentation and backup information are summarized in Figure 4-1, Operator Procedures for Providing Augmentation and Backup Information. Weather information taken and reported should reflect only those conditions seen, or reported by a reliable source, from the usual point of observation and, unless otherwise specified, must have occurred at the time of the observation.

4-6. GENERAL EQUIPMENT PROCEDURES

General equipment operating instructions to perform the duties associated with automated weather observing systems are contained in the following publications:

a. For all federal and non-federal AWOS systems manufactured by Qualimetrics, Inc., the AWOS Operator Instructions.

b. For non-federal AWOS systems manufactured by AAI/SMI, Inc.; Vaisala Inc., Handar Business Unit; the appropriate AWOS user manual as approved by the FAA.

c. For ASOS, the ASOS Software User's Manual or Ready Reference Guide.

d. For future automated weather observing systems as may be approved by the FAA, the appropriate operations manual or quick reference guide.

4-7. PROCEDURES AT NON-FEDERAL OBSERVATION (NF-OBS) SITES

Upon request from a non-federal entity, a written agreement to provide augmentation and backup of the ASOS at a commissioned ASOS site will be executed between the Service Area Office and the NF-OBS provider. The agreement shall be site-specific and shall contain the hours and the service level at which service will be provided. The minimum level of augmentation shall be the FAA-validated aviation service standard level for that site. Service may be provided at a higher level; however the NF-OBS provider must provide that higher level during all hours of operation. As Service Level D is a stand alone ASOS site, NF-OBS providers operating at these sites shall provide a minimum of level C service.

4-8. PROCEDURES AT NON-FEDERAL AWOS SITES

FAA facilities shall negotiate a letter of agreement (LOA) with the airport management or appropriate authority at locations where a non-federal AWOS is installed at an airport with an operating control tower. The LOA shall define responsibilities, equipment and coordination requirements, identify special operating conditions, and define local requirements. ATCSs may disseminate only those non-federal weather observations that are obtained through the weather message switching center or other equivalent documented means. Pilots who want non-federal AWOS information from sites that do not include automatic long-line dissemination should be provided the appropriate frequency and/or telephone number, if known.

4-9. PROCEDURES FOR HANDLING AIRCRAFT MISHAPS AT AUTOMATED SITES

The requirement to record the present weather following an aircraft mishap remains valid at automated sites. At a minimum, a mishap requires weather data from 1 hour before to 1 hour after the mishap occurs. ASOS observations should be archived by the observer or by calling the ASOS Operations and Monitoring Center (AOMC) (1-800-242-8194). The AOMC has the capability to archive the 5-minute observations from the previous 12 hours of weath er observation data from attended and unattended locations. The supervisor or controller-in-charge shall ensure that the 5-minute observations are archived following notification of an aircraft mishap at a location where an ASOS is operational. AOMC requests must be made within 10 hours of the incident. Archive AWOS data in accordance with the procedures in the AWOS Operator Instructions or by calling the AWOS Central Monitoring Center at 1-800-322-0433 or 801-320-2184.

4-10. GENERAL REQUIREMENTS FOR RECORD KEEPING

Automated weather observation data and operator terminal entries are archived on site. No further action is required by

FAA, FAA-contract or NF-OBS facilities. If the automated weather observing system is completely inoperative, follow the record-keeping procedures for manual stations.

OPERATOR PROCEDURES FOR AUGMENTATION AND BACKUP INFORMATION		
CONDITION	**LONG-LINE**	**LOCAL**
AWOS w/o Operator Terminal		
AUGMENTATION	not possible	local procedures
BACKUP INFORMATION:		
Sensor Failure	Manual observation provided to designated office	local procedures
OT/communications failure	Manual observation provided to designated office	local procedures
Erroneous/Non-representative data	Manual observation provided to designated office	local procedures
AWOS with Operator Terminal		
AUGMENTATION	Mode 3[1]	Mode 3
BACKUP INFORMATION:		
Sensor Failure	Mode 3/4[2]	Mode 3/4
OT/communications failure	Manual observation provided to designated office	local procedures
Erroneous/Non-representative data	Mode 4	Mode 4
ASOS (all locations)		
AUGMENTATION	Enter data via OID	Enter data via OID
BACKUP INFORMATION:		
Sensor Failure	Edit data via OID	Edit data via OID
OID/communications failure	Provide to designated office[3]	Local procedures
Erroneous/Non-representative data	Edit data via OID	Edit data via OID

LEGEND: OID/OT - any automated weather observing system operator interface device

FOOTNOTES: 1. Enter augmentation in remarks preceded by the code, "WEA:".
2. Enter the complete observation manually via OT. Partial editing is not possible.
3. Any available communication may be used (For non-LAWRS towers, information is provided only if requested).

Figure 4-1. Operator Procedures for Providing Augmentation and Backup Information

reports include additional data and are known as 6-hourly reports. At designated stations, the 0300, 0900, 1500, and 2100 UTC METAR reports are known as 3-hourly reports and also contain additional information.

15-5. CODING MISSING DATA IN METAR AND SPECI REPORTS

When an element or phenomenon does not occur, or cannot be observed, the corresponding group and preceding space are omitted from that particular report. However, at designated stations where sea-level pressure is normally reported, when sea-level pressure is not available it shall not be omitted, but shall be coded as SLPNO.

15-6. CODING THE BODY OF THE METAR OR SPECI REPORT

Figure 15-1, Content of METAR/SPECI, indicates the applicability of the elements in the body of the surface observation. References in the figure indicate the sections where the elements are discussed and explained. The figure also indicates whether or not the element shall be included in METAR and SPECI reports.

15-7. TYPE OF REPORT (METAR OR SPECI)

The type of report, METAR or SPECI, shall be included in all reports. The type of report shall be separated from elements following it by a space. When SPECI criteria are met at the time of a routine report (METAR), the type of the report shall be METAR.

15-8. STATION IDENTIFIER (CCCC)

The station identifier, **CCCC**, shall be included in all reports to identify the station to which the coded report applies. The station identifier shall consist of four alphabetic-only characters if the METAR/SPECI is transmitted long-line. A list of approved identifiers can be found in the latest version of FAA Order 7350.7, Location Identifiers. The station identifier shall be separated from elements following it with a space.

15-9. DATE AND TIME OF REPORT (YYGGggZ)

The date, **YY**, and time, **GGgg**, shall be included in all reports. The time shall be the actual time of the report or when the criteria for a SPECI is met or noted. If the report is a correction to a previously disseminated report, the time of the corrected report shall be the same time used in the report being corrected. The date and time group always ends with a "Z" indicating the use of UTC. For example, METAR KDCA 210855Z would be the 0900 scheduled report from station KDCA taken at 0855 UTC on the 21st of the month.

15-10. REPORT MODIFIER (AUTO or COR)

The Report Modifier can be either of two elements:

a. "AUTO" further identifies the type of report as a fully automated report with no human intervention. The report modifier group does not appear in all reports; the absence of AUTO indicates that the report is either a manual report or an automated report with an observer "logged on" to the system.

b. "COR" shall be entered into the report modifier group when a corrected METAR or SPECI is transmitted.

c. AUTO and **COR** will not be seen in the same observation. If the term **COR** is used, the observation cannot be **AUTO**, because an observer is correcting it.

15-11. WIND GROUP ((dddff(f)G$f_m f_m(f_m)$KT)_($d_n d_n d_n V d_x d_x d_x$)

The true direction, **ddd**, from which the wind is blowing shall be coded in tens of degrees using three figures. Directions less than 100 degrees shall be preceded by a "0", for example, a wind direction of 90° is coded as "090". The wind speed, **ff(f)**, shall be entered as a two or three digit group immediately following the wind direction. The speed shall be coded in whole knots using the hundreds digit (if not zero) and the tens and units digits. The wind group always ends with **KT** to indicate that wind speeds are reported in knots. Speeds of less than 10 knots shall be coded using a leading zero. For example, a wind speed of 8 knots shall be coded 08KT. A wind speed of 112 knots shall be coded 112KT.

a. Gust. Wind gusts shall be coded in the format, **G$f_m f_m(f_m)$**. The wind gust shall be coded in two or three digits immediately following the wind speed. The wind gust shall be coded, in whole knots, using the units and tens digits and, if required, the hundreds digit. For example, a wind from due west at 20 knots with gusts to 35 knots would be coded "27020G35KT".

b. Variable Wind Direction (Speeds 6 Knots or Less). The wind direction may be reported as **VRB** (variable) in place of the **ddd** whenever the wind speed is 6 knots or less. For example, if the wind is variable at three knots, it would be coded as "VRB03KT".

c. Variable Wind Direction (Speeds Greater than 6 Knots). Variable wind direction with wind speed greater than 6 knots shall be coded in the format, **$d_n d_n d_n V d_x d_x d_x$**. The variable wind direction group shall immediately follow the wind group preceded by a blank space. The directional variability shall be coded in a clockwise direction. For example, if the wind is variable from 180° to 240° at 10 knots, it would be coded "21010KT 180V240".

d. Calm Wind. Calm wind shall be coded as "00000KT".

15-12. VISIBILITY GROUP (VVVVVSM)

The surface visibility, **VVVVVSM**, shall be coded in statute miles using the values listed in Figure 15-3, Reporting Visibility Values. A space shall be coded between whole numbers and fractions of reportable visibility values. For example, a visibility of one and a half miles would be coded as "1 1/2SM". The visibility group always ends in **SM** to indicate that visibilities are in statute miles. Only automated stations may use an "M" to indicate "less than" when reporting visibility, e.g., "M1/4SM" means a visibility less than one-quarter SM as reported by an automated station.

transmitted (0300, 0600, 0900, 1200, 1500, 1800, 2100 and 0000 UTC). When this remark is included in the ASOS software, it will most likely be encoded immediately following the hourly ice accretion amount, and before the 3- and 6-hour precipitation amount.

c. 6-Hourly Ice Accretion Amount (I6nnn). This remark provides the ice accretion amount during the last six hours, and is included in the reports taken at the synoptic times of 0600, 1200, 1800, and 0000 UTC. The accretion of ice over the past six hour time period in one-hundredths of an inch (0.01 in.) would have the format: "I6nnn"; where "I" is the icing indicator for the group, "6" is the reported time period (six hours), and "nnn" is the thickness accumulated to the nearest one-hundredth of an inch (0.01 in.), during the reported time period (six hours). This remark shall be reset immediately after the mandatory synoptic METAR is transmitted (0600, 1200, 1800, and 0000 UTC). When this remark is included in the ASOS software, it will most likely be encoded immediately following the hourly ice accretion amount, and before the 3- and 6-hour precipitation amount.

d. **Missing Data.** If the freezing rain sensor is inoperative for more than 25percent of the reporting period, the icing remark shall be considered missing. Missing groups shall be encoded as I1///, I3///, or I6///, as appropriate. If no icing is detected, then the groups shall not be encoded. Note that an automated icing event will always report at least 0.01 in. of ice accretion.

15-49. 3- AND 6-HOUR PRECIPITATION AMOUNT (6RRRR) (NA LAWRS)

At designated stations, the 3- and 6-hourly precipitation group shall be coded in the above format, where **6** is the group indicator and **RRRR** is the amount of precipitation. The amount of precipitation (water equivalent) accumulated in the past 3 hours shall be reported in the 3-hourly report and the amount accumulated in the past 6 hours shall be reported in the 6-hourly report. The amount of precipitation shall be coded in inches, using the ten, units, tenths, and hundredths digits of the amount. When an indeterminable amount of precipitation has occurred during the period, **RRRR** shall be coded "6////". For example, 2.17 inches of precipitation would be coded "60217". A trace shall be coded "60000".

15-50. 24-HOUR PRECIPITATION AMOUNT ($7R_{24}R_{24}R_{24}R_{24}$) (NA LAWRS)

At designated stations, the 24-hour precipitation amount shall be coded in the above format, where **7** is the group indicator and $\mathbf{R_{24}R_{24}R_{24}R_{24}}$ is the 24-hour amount of precipitation included in the 1200 UTC (or other agency-designated time) report whenever more than a trace of precipitation (water equivalent) has fallen in the past 24 hours. The amount of precipitation shall be coded by using the tens, units, tenths, and hundredths of inches (water equivalent) for the 24-hour period. If more than a trace (water equivalent) has occurred and the amount cannot be determined, the group shall be coded "7////". For example, 1.25 inches of precipitation (water equivalent) in the past 24 hours shall be coded "70125".

15-51. SNOW DEPTH ON GROUND (4/sss) (NA LAWRS)

At designated stations, the total snow depth on ground group shall be coded in the 0000, 0600, 1200 and 1800 UTC observations whenever there is more than a trace of snow on the ground.

The remark shall be coded in the format **4/sss**, where **4/** is the group indicator and **sss** is the snow depth in whole inches using three digits. For example, a snow depth of 21 inches shall be coded as "4/021".

15-52. WATER EQUIVALENT OF SNOW ON GROUND (933RRR) (NA LAWRS) At designated manual stations, the water equivalent of snow on ground group is reported each day in the 1800 UTC report if the average snow depth is 2 inches or more. The remark shall be coded in the format **933RRR**, where **933** is the group indicator and **RRR** is the water equivalent of snow, i.e., snow, snow pellets, snow grains, ice pellets, ice crystals, hail, on the ground. The water equivalent shall be reported in tens, units, and tenths of inches, using three digits. Do not code the group if it consists entirely of hail. A water equivalent of snow of 3.6 inches would be coded as "933036" and a water equivalent of 12.5 would be coded as "933125". This value is never estimated, ratios (e.g. 10 to 1) or temperature/snow water equivalent tables are not to be used to determine water equivalency of snow for this group.

15-53. CLOUD TYPES ($8/C_LC_MC_H$) (NA LAWRS)
At designated manual stations, this group shall be reported and coded in 3- and 6-hourly reports when clouds are observed. The predominant low cloud (C_L), middle cloud (C_M), and high cloud (C_H) shall be identified in accordance with the WMO International Cloud Atlas, Volumes I and II, the WMO Abridged International Cloud Atlas, or other agency observing aids for cloud identification. A "0" shall be coded for the low, middle, or high cloud type if no cloud is present at that classification. A solidus (/) shall be coded for layers above an overcast. For example, a report of "8/6//" would indicate an overcast layer of stratus clouds; a report of "8/903" would indicate cumulonimbus type low clouds, no middle clouds, and dense cirrus high clouds.

15-54. DURATION OF SUNSHINE (98mmm) (NA LAWRS)
At designated manual stations, the duration of sunshine shall be coded in the 0800 UTC report. If the station is closed at 0800 UTC, the group shall be coded in the first 6-hourly METAR after the station opens. The duration of sunshine shall be coded in the format **98mmm**, where **98** is the group indicator and **mmm** is the total minutes of sunshine. The minutes of sunshine that occurred the previous calendar day is coded by using the hundreds, tens, and units digits. For example, 96 minutes of sunshine would be coded "98096". If no sunshine occurred, the group would be coded "98000".

15-55. HOURLY TEMPERATURE AND DEW POINT ($Ts_nT'T'T's_nT'_dT'_dT'_d$) (NA LAWRS)
At designated stations, the hourly temperature and dew point group shall be coded in the above format, where **T** is the group indicator, $\mathbf{s_n}$ is the sign of the temperature, **T'T'T'** is the temperature, and $\mathbf{T'_dT'_dT'_d}$ is the dew point. The sign of the temperature and dew point shall be coded as **1** if the value is below 0^oC and **0** if the value is 0^oC or higher. The temperature and dew point shall be reported in tens, units, and tenths of degrees Celsius. There shall be no spaces between the entries. For example, a temperature of 2.6^oC and dew point of -1.5^oC would be reported in the body of the report as "03/M01" and the $Ts_nT'T'T's_nT'_dT'_dT'_d$ group as "T00261015". If dew point is missing, report the temperature; if the temperature is missing, do not report the temperature/dew point group.

15-56. 6-HOURLY MAXIMUM TEMPERATURE ($1s_nT_xT_xT_x$) (NA LAWRS)
At designated stations, the 6-hourly maximum temperature group shall be coded in the above format, where **1** is the group indicator, $\mathbf{s_n}$ is the

APPENDIX B. NON-FEDERAL OBSERVING (NF-OBS) PROGRAM

Paragraph 1-7a describes how the Non-Federal Observing (NF-OBS) Program's procedures and practices must meet federal standards.

The Non-Federal Observing (NF-OBS) Program was developed to enable local aviation entities such as non-federal control towers (NFCTs), airport personnel or fixed base operators (FBOs) to assist with the backup and augmentation of the ASOS. The program is service area office-driven with oversight provided by FAA Headquarters and is meant to be at no cost to the Government.

Upon request by a potential NF-OBS provider, each FAA service area office may enter into a cooperative agreement with the provider. Agreements shall define the hours of operation for the NF-OBS and the service level at which the operation will be conducted. They also contain provisions that the NF-OBS provider will provide and train observers, provide suitable storage for instruments and equipment, and provide required backup equipment. Observers shall be certified by the National Weather Service and shall make all observations in accordance with applicable regulations.

Further information about this program can be obtained from the NAS Weather Office, Operations Planning Services, (ATO-P).

APPENDIX D. SERVICE STANDARDS

Paragraph 1-8e describes how Service Standards provide specific guidance regarding the level of tasks performed at all facilities.

1. DESCRIPTION

The term Service Standards refers to four levels of detail in weather observations at sites where there is a commissioned ASOS. The first category, known as Service Level D, is completely automated service in which the ASOS observation constitutes the entire observation, i.e., no additional weather information is added by a human observer. A large number of airfields that receive level D service have never had weather information available. Service Level D provides information on wind, visibility, precipitation/obstruction to vision, cloud height and sky cover, temperature/dewpoint, altimeter, and in some cases freezing rain and lightning reporting capability.

The second category, known as Service Level C, consists of all the elements of Service Level D, in addition to a human observer, who adds information to the automated observation. This is referred to as "augmentation". The augmented information includes, as a minimum, such weather phenomena as thunderstorms, tornadoes, hail, virga, volcanic ash, and tower visibility. Service Level C also includes "backup" of ASOS elements in the event of an ASOS malfunction or an unrepresentative ASOS report. In the backup mode, the controller inserts the correct or missing value for the automated ASOS elements. Service Level C is provided at all airports with a properly sited, fully qualified Federal facility during facility hours of operation. During hours that the facility is closed, the airport reverts to stand-alone ASOS or Service Level D as described above. Although this category is listed as tower augmented, the service may be provided by Flight Service Station personnel (Alaska Only), NWS observers, or contract weather observers.

To enhance air traffic control efficiency and increase system capacity, additional detail beyond Service Level C was required at some airports. These airports were divided into two categories. The highest category, referred to as Service Level A, includes major aviation hubs and high traffic volume airports with average or worse weather. The remaining group of airports (smaller hubs or special airports in other ways, that have worse than average bad weather operations for thunderstorms and/or freezing/frozen precipitation, and/or that are remote airports) are referred to as Service Level B airports.

Service Level B consists of all the elements of Service Levels C and D plus long-line Runway Visual Range (RVR), where appropriate, freezing drizzle versus freezing rain, ice pellets, and remarks for snow depth and snow increasing rapidly, thunderstorm/lightning location, and observed significant weather not at the station.

Service Level A airports will receive, in addition to the services described above, 10 minute long-line RVR or additional visibility increments of 1/8, 1/16 and 0. If observed, the following elements will be added to the observation; sector visibility, variable sky condition, cloud layers above 12,000 feet and cloud types, widespread dust, sand and other obscurations, and volcanic eruptions. Figure D-1, Service Standard Levels

lists the available capabilities in each Service Level.

2. DETERMINING LEVEL OF SERVICE

In order to determine which airports would receive a particular service level of weather support, airports were ranked according to their scores in three areas: (1) occurrence of significant weather weighted by traffic counts; (2) distance to the nearest suitable alternate airport; and (3) critical airport characteristics. These criteria produced a score which determined the airport's level of service.

The significant weather score is calculated by taking into consideration the percentage of times that the airport is impacted by bad weather such as low visibility, thunderstorms, and freezing precipitation. This percentage is then multiplied by the total number of operations at the airport. For sites that did not have climatological weather information available, an alternate method was devised which assigned weather information from the nearest airport with similar weather.

The score for distance to the nearest suitable alternate airport gave credit to airports for which the nearest suitable alternate was a greater distance away.

The airport characteristics score was based upon the tower level of the airport, whether or not the airport is considered a hub, the category qualification of the airport, and other characteristic factors.

The scores from the three areas described above were added together and each airport was assigned a composite score and ranked accordingly. The overall ranking determined the airport's Service Standard Level.

3. PROCEDURES

Augmentation and backup at A, B, and C locations is provided by a combination of Federal and non-Federal personnel and existing contract weather observers through implementation of an ASOS basic weather watch. During a basic weather watch, the observer may be required to perform other duties as their observing workload permits. Because of this and other restrictions (station location, structural design, etc.) which limit the observer's capability to continuously view and evaluate weather conditions, observers performing a basic weather watch cannot be expected to detect and report all weather changes as they occur. In addition to taking and disseminating required observations, facilities performing a basic weather watch shall recheck weather conditions to determine if a new observation (SPECI) is required when advised by any reliable source (e.g. tower controller) that existing conditions differ from those reported in the last disseminated observation. For ASOS augmentation and backup, the observer should augment routine hourly observations in accordance with the appropriate service level standards, periodically check the current observation to determine if a special has been generated requiring augmentation or backup, and conduct a timely evaluation of the representativeness and accuracy of the current observations when advised by any reliable source that existing conditions differ from those being reported.