and recommendations will be made to accept as written, rewrite all or the specific part(s) of the document, or to obtain a compliance deviation. The verification rating scale will be (1) pass, (2) pass with exceptions, or (3) fail.

4.4.2 Test (T).

4.4.2.1 Hardware. Hardware test (T) is defined as a method of verification wherein performance is measured during or after the controlled application of functional and/or environmental stimuli. Measurements require the use of laboratory equipment, procedures, items and/or services.

4.4.2.2 Software. Software test (T) is an activity that employs technical means, including evaluation of functional operation by use of special equipment or instrumentation, simulation techniques, and the application of established principles and procedures, to determine compliance with requirements. Test performance is the means of creating data for detailed analysis. The analysis of data derived from test is an integral part of the activity.

4.4.2.3 Technical Data and Documentation (TD&D). Certain TD&D(s) will be candidates for testing with both contractor and operational personnel. Items such as fixed response time procedures that are controlled by a technical document or directive will be candidates for verification by testing. The quantitative measures for the TD&D tests will be time, errors, and deviations from the material order. These tests will be used to verify the TD&D or the proficiency level of the personnel.

4.4.3 Demonstration (D).

4.4.3.1 Hardware. Hardware demonstration (D) is defined as a method of verification denoting the qualitative determination of properties of an end-item or component by observation. Demonstration is used without special test equipment or instruction to verify such characteristics as operational performance, human engineering features, service, access features, and transportability. Demonstrations are used to indicate "pass/fail" conditions.

4.4.3.2 Software. Software demonstration (D) is an activity that is limited to a readily observable functional operation to determine compliance with requirements (i.e. the proper response at a site as a result of a specified interrogation or command to be processed by the program). Demonstration (D) is primarily used for activities where data gathering is not appropriate, such as CRT display verification. Demonstrations are used to indicate "pass/fail" conditions.

4.4.3.3 Technical Data and Documentation (TD&D). Verification by demonstration of TD&D will consist of contractor and/or operational personnel

being observed using the TD&D to perform the tasks for which the TD&D was generated. The rating scale for this technique will be a pass, pass with qualifications, or fail judgement regarding the successful completion of the tasks by the personnel utilizing the TD&D.

4.4.4 Analysis (A).

4.4.4.1 Hardware. There are three methods of hardware analysis:

(a) Engineering analysis (A). This type of analysis is usually an engineering design function and involves study, calculation, or modeling of the known or potential failure modes and reaction or interactions of the specified parts, material, and processes, and the design configuration with the known function, performance and/or probable effects of the operational environments. This analysis is normally used to verify margin when it is not desirable to test to failure.

(b) Similarity (S) analysis. Similarity analysis is a method applied to end-items or components that are identical in design and manufacturing processes to end-items or components that have been previously qualified to equivalent or more stringent requirements.

(c) Validation (V) of records analysis. Validation of records analysis is a method of verification wherein manufacturing records are used to verify compliance of concealed construction features or processes of manufacturing (e.g., vendor items).

4.4.4.2 Software. Software analysis (A) is an activity taking the form of the processing of accumulated results and conclusions, intended to provide proof that the verification of a requirement(s) has been accomplished. The analytical results may be composed of interpretation of existing information or derived from lower level tests, demonstrations, analysis, or examinations.

4.5 Verification Phases. This paragraph provides further definition of the three verification levels referenced in the Verification Requirements Traceability Matrix (VRTM) (see Table 4-1). These levels, Subsystem Acceptance Testing, System Integration Testing and Site Acceptance Testing, are used to emphasize the level of testing during which specific requirements are to be verified and the method of verification to be applied.

4.5.1 Subsystem Acceptance Testing. This level of testing is usually accomplished at the factory. Verification is comparable to DT&E level testing and is usually conducted at the contractor's facility. It culminates in the acceptance testing of a configuration end item. NAS subsystem requirements should be verified to the maximum extent practical at this level to avoid the

more costly correction of design flaws discovered later during NAS System Integration testing.

4.5.2 System Integration Testing. This level of testing is usually accomplished at the FAATC or Key Sites. Verification is that testing conducted during OT&E to determine that the hardware/software to be deployed for site installation will perform in a NAS environment, in accordance with system level operational and performance requirements. This level of testing does not include the integration testing conducted at a subsystem level during DT&E. Individual contractors are responsible for this verification as identified by their Statement of Work (SOW), assuring that their hardware/software functions as specified with simulated and/or actual inputs. NAS System Integration Testing involves the operational verification of a NAS subsystem after it is placed in its intended NAS environment. It is conducted at the FAATC and/or the Key Site. A subset of Key Site testing may be used for commissioning all other sites. Subsystems that require this level of testing are identified in the NAS Program Master Schedule Baseline.

4.5.3 Site Acceptance Testing. This level of testing is usually done at the site. The test portion of the installation and test level emphasizes the demonstration of overall system performance requirements. Demonstration and inspection are the methods most often employed during this level, which includes end item site final acceptance testing.

4.6 Quality Conformance Inspections. Compliance with the requirements of Section 3 of this ICD shall be in accordance with Table 4-1, Verification Requirements Traceability Matrix.

4.6.1 Subsystem Acceptance. Unless otherwise specified, subsystem acceptance criteria shall be consistent with this ICD and the NAS Verification Plan.

4.7 Verification Characteristics. Testing facilities for various layers of standard information transfer protocols are in place or being implemented by the National Institute of Standards and Technology (NIST). However, NIST approved conformance tests for the HDLC data link protocol do not exist. Therefore, successful performance of the following data link communication scenarios shall demonstrate subsystem conformance with the HDLC protocol subset (Class UN with option 13) to be implemented at the link layer.

4.7.1 Protocol. ISO 7809, Class UN with option 13. Stations operate in a Normal Response Mode Two-Way Alternate (NRM-TWA) configuration.

4.7.1.1 HDLC. General demonstration of protocol conformance using a commercial protocol analyzer for HDLC test scenarios. ADAS as a NRM primary station; AWOS as a NRM secondary station.

Table 4-1. Verification Requirements Traceability Matrix

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
3.	INTERFACE CHARACTERISTICS				TITLE
3.1	General Design Characteristics				DESCRIPTION
3.2	Functional Characteristics	X	X	X	
3.2.1	Application Process				DESCRIPTION
3.2.1.1	Application Data Units (ADUs)	T	T	X	
3.2.1.1.1	Data Transfer	I	I	I	
3.2.1.1.1a	AWOS Format Message, without Alerts	T	T	X	
3.2.1.1.1b	AWOS Format Message, with Alerts	T	T	X	
3.2.1.1.1c	SAO Format Weather Message				DESCRIPTION
3.2.1.1.1d	Lightning Activity Data	T	T	X	
3.2.1.1.1e	Test Messages	D	D	D	
3.2.1.1.1f	Date/Time	T-D	T-D	D	
3.2.1.1.1g	SHEF Message	T	T	X	
3.2.1.1.1h	Daily and Monthly Summary Messages	T	T	X	
3.2.1.1.1i	Metar Format Weather Message	T	T	X	
3.2.1.1.2	Data Request	T	T	X	
3.2.1.1.2a	Current Weather	T	T	X	
3.2.1.1.2b	Test Message Request	D	D	D	
3.2.1.1.2c	Date/Time Request	T-D	T-D	D	
3.2.1.1.3	Error Condition	T-A	T-A	X	
3.2.1.1.4	Data Extension	T	T	X	
3.2.1.2	Weather Message Formats	I	I	X	
3.2.1.2.1	AWOS Format Weather Message				SEE 10.
3.2.1.2.2	SAO Format Weather Message				DESCRIPTION
3.2.1.2.3	Lightning Activity Data (LAD) Message				SEE 30.
3.2.1.2.4	SHEF Weather Message				SEE 70.
3.2.1.2.5	Daily and Monthly Summary Messages				SEE 90.
3.2.1.2.6	Metar Format Weather Message				SEE 90.
3.2.1.3	Non-Weather Message Formats				SEE 40.
3.2.2	Presentation Layer	X	X	X	
3.2.3	Session Layer	X	X	X	
3.2.4	Transport Layer	X	X	X	
3.2.5	Network Layer	X	X	X	
3.2.6	Data Link Layer	T	T	X	SEE 50.
3.2.6.1	Classes of Procedures and Options	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
3.2.6.2	Addressing	X	X	D	
3.2.7	Physical Layer	T-I-A	T-I-A	I	
3.2.7.1	Functional Pin Assignment	I	I	I	
3.2.7.2	Electrical	T	T	X	
3.2.7.3	Signaling and Timing	T	T	X	
3.2.7.4	Distance	T	T	X	
3.2.7.5	Cable	I-A	I	I	
3.2.7.6	Connectors	I	I	I	
3.2.7.7	Interface Protection	T	X	X	
3.3	Physical Characteristics				TITLE
3.3.1	Mechanical Characteristics	T-I	T-I	X	
3.3.1.1	Installation	A	I	I	
3.3.1.1.1	Interchangeability	D	D	D	
3.3.1.1.2	Surface Finish	I	I	I	
3.3.1.1.3	Location and Orientation	I	I	I	
3.3.1.1.4	Holes	X	X	X	
3.3.1.1.5	Fasteners	I	I	I	
3.3.1.1.6	Bonding	T-I	I	I	
3.3.1.1.7	Weight and Center of Gravity	X	X	X	
3.3.1.1.8	Materials	I	I	I	
3.3.1.1.9	Markings	I	I	I	
3.3.1.2	Connectors	I	I	I	
3.3.1.3	Fluids (Gases and Liquids)	X	X	X	
3.3.1.4	Transportation and Handling	X	X	X	
3.3.2	Electrical/Electronic Characteristics				SEE 3.2.7
3.3.2.1	Electrical/Electronic Block Diagrams	X	X	X	
3.3.2.2	System Description	X	X	X	
3.3.2.3	Schematics	X	X	X	
3.3.2.4	Interface Wiring Diagrams	X	X	X	
3.3.2.5	Power Capacity	X	X	X	
3.3.3	Environmental Characteristics				DESCRIPTION
3.3.3.1	Thermal	T-A	X	X	
3.3.3.1.1	Passive Heat Transfer	X	X	X	
3.3.3.1.2	Cooling	X	X	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
3.3.3.2	Electromagnetic	T-A-I	T-A-I	I	
3.3.3.3	Dynamic	X	X	X	
3.3.4	Envelope Characteristics	I-A	I-A	I-A	
	APPENDIX I				
10.	AWOS FORMAT WEATHER MESSAGE				TITLE
10.1	Purpose				DESCRIPTION
10.1.1	Applicability				APPLICABILITY
10.2	General Conventions and Criteria				TITLE
10.2.1	Source Data and Systems	I	I	I	
10.2.2	Application Data Unit				SEE 3.2.1
10.2.3	Encoding Convention	T-I	T-I	X	
10.2.4	AWOS Message Type	I	I	X	
10.2.5	Reporting Criteria	T	T	X	
10.2.6	Operator Input				TITLE
10.2.6.1	ASOS and AOS	D-A	D-A	D	
10.2.6.2	Federal and Non-federal AWOS	D-A	D-A	D	
10.2.7	Missing Data			X	
10.2.7.1	Sensor Data Status Field	T-A	T-A	X	
10.2.7.2	Data Field	T-A	T-A	X	
10.3	Content and Format	T-D-A	T-D-A	X	
10.3.1	Site ID	T	T	X	
10.3.2	Site Configuration Number	T	T	X	
10.3.3	Date and Time	T	T	X	
10.3.4	Alert Data	T	T	X	
10.3.5	Cloud Layer and Amount	T	T	X	
10.3.6	Horizontal Visibility	T	T	X	
10.3.7	Observed Precipitation	T	T	X	
10.3.8	Ambient Temperature	T	T	X	
10.3.9	Dew Point Temperature	T	T	X	
10.3.10	Wind Direction	T	T	X	
10.3.11	Wind Speed and Gust	T	T	X	
10.3.12	Atmospheric Pressure	T	T	X	
10.3.13	Runway Visual Range	T	T	X	
10.3.14	Reserved for Expansion	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
10.3.15	Lightning Activity	T	T	X	
10.3.15.1	Special	T	T	X	
10.3.15.2	Availability	T	T	X	
10.3.15.3	Lightning	T	T	X	
10.3.15.4	Reserved	T	T	X	
10.3.16	Site Status	T	T	X	
10.3.17	Sensor and Sensor Data Status	T	T	X	
10.3.18	Parameter Activation Status	T	T	X	
10.3.19	Automated Remarks Status	T	T	X	
10.3.20	Automated Remarks	T	T	X	
10.3.20.1	Automated Lightning Remark	T	T	X	
10.3.20.2	Variable Visibility	T	T	X	
10.3.20.3	Variable Wind	T	T	X	
10.3.20.4	Variable Ceiling Condition	T	T	X	
10.3.20.5	Visibility at Second Location	T	T	X	
10.3.20.6	Ceiling Height at Second Location	T	T	X	
10.3.21	Operator Remarks	D-A	D-A	D	
	APPENDIX III				
30	LIGHTNING ACTIVITY DATA MESSAGE				TITLE
30.1	Purpose				DESCRIPTION
30.2	General Conventions and Criteria				TITLE
30.2.1	Source Data and Systems	I	I	I	
30.2.2	Application Data Unit				SEE 3.2.1
30.2.3	Encoding Convention	T-I	T-I	I	
30.2.4	LAD Message Type	I	I	I	
30.2.5	Reporting Criteria	T	T	X	
30.2.6	Operator Input	X	X	X	
30.3	Format and Content				DESCRIPTION
30.3.1	AWOS Site ID	T	T	X	
30.3.2	Lightning Information	T	T	X	
30.3.2.1	Special	T	T	X	
30.3.2.2	Availability	T	T	X	
30.3.2.3	Lightning	T	T	X	
30.3.2.4	Reserved	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
30.3.3	Automated Lightning Remark	T	T	X	
30.3.3.1	Text Remark	T	T	X	
30.3.3.2	Voiced Remark	T	T	X	
30.4	AWOS Lightning Processing	T	T	X	
30.4.1	Lightning Not Available	T	T	X	
30.4.2	Lightning Available	T	T	X	
	APPENDIX IV				
40.	NON-WEATHER MESSAGES				TITLE
40.1	Purpose				DESCRIPTION
40.1.1	Applicability				APPLICABILITY
40.2	General Conventions and Criteria				TITLE
40.2.1	Source Data and Systems	I	I	I	
40.2.2	Application Data Unit	T-I	T-I	I	
40.2.3	Non-Weather Message Types	I	I	I	
40.2.3.1	Test Message				DESCRIPTION
40.2.3.2	Date/Time Message				DESCRIPTION
40.2.3.3	Error Message				DESCRIPTION
40.2.4	Encoding Convention				TITLE
40.2.4.1	Test Message	D	D	D	
40.2.4.2	Date/Time Message	T-D	T-D	D	
40.2.4.3	Error Message	T-A	T-A	X	
40.2.5	Reporting Scenarios				TITLE
40.2.5.1	Test Message	D	D	D	
40.2.5.2	Date/Time Message	T-D	T-D	D	
40.2.5.3	Error Message	T-A	T-A	T-A	
40.2.6	Operator Input				TITLE
40.2.6.1	Test Message	D	D	D	
40.2.6.2	Date/Time Message	D-I	D-I	D	
40.2.6.3	Error Message	I	I	I	
40.2.7	Missing Data	T-D	T-D	D	
40.3	Content and Format				TITLE
40.3.1	Test Messages	D	D	D	
40.3.1.1	AWOS Test Message	D	D	D	
40.3.1.1.1	Site ID	D	D	D	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
40.3.1.1.2	Site Configuration Number	D	D	D	
40.3.1.1.3	System Identifier	D	D	D	
40.3.1.1.4	Date and Time	D	D	D	
40.3.1.1.5	Site Location	D	D	D	
40.3.1.1.6	Magnetic Variation	D	D	D	
40.3.1.1.7	Elevation	D	D	D	
40.3.1.1.8	AWOS Software Version	D	D	D	
40.3.1.1.9	Reserved	X	X	X	
40.3.1.2	ADAS Test Message	D	D	D	
40.3.1.2.1	Site ID	D	D	D	
40.3.1.2.2	Date and Time	D	D	D	
40.3.1.2.3	ADAS Software Version	D	D	D	
40.3.2	Date/Time Message	T-D	T-D	D	
40.3.2.1	Site ID	T	T	X	
40.3.2.2	Site Configuration Number	T	T	X	
40.3.2.3	Date and Time	T	T	X	
40.3.2.4	Offset: UTC to LST	T	T	X	
40.3.3	Error Message	T-A	T-A	X	
40.3.3.1	Site ID	T	T	X	
40.3.3.2	Site Configuration Number	T	T	X	
40.3.3.3	Date and Time	T	T	X	
40.3.3.4	Error Position Indicator	T	T	X	
40.3.3.5	Data Stream In Error	T	T	X	
	APPENDIX V				
50.	DATA LINK LAYER				TITLE
50.1	Purpose				DESCRIPTION
50.1.1	Applicability				APPLICABILITY
50.2	General Conventions and Criteria				TITLE
50.2.1	Protocol	T	T	X	
50.2.2	Station Type	T	T	X	
50.2.3	Link Configuration	T	T	X	
50.2.4	Operating Mode	T	T	X	
50.2.5	Frame Structure				DESCRIPTION
50.2.5.1	Order of Transmission				DESCRIPTION

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
50.2.5.2	Flag Field				DESCRIPTION
50.2.5.3	Address Field	T	T	X	
50.2.5.4	Control Field	T	T	X	
50.2.5.4.1	Information (I) Frames				DESCRIPTION
50.2.5.4.2	Supervisory (S) Frames				DESCRIPTION
50.2.5.4.3	Unnumbered (U) Frames				DESCRIPTION
50.2.5.5	Information Field				DESCRIPTION
50.2.5.6	Frame Check Sequence (FCS)	T	T	X	
50.2.6	Commands and Responses				DESCRIPTION
50.2.6.1	Information Transfer (I)				DESCRIPTION
50.2.6.2	Receive Ready (RR)				DESCRIPTION
50.2.6.3	Receive Not Ready (RNR)				DESCRIPTION
50.2.6.4	Set Normal Response Mode (SNRM)				DESCRIPTION
50.2.6.5	Disconnect (DISC)				DESCRIPTION
50.2.6.6	Unnumbered Acknowledgement (UA)				DESCRIPTION
50.2.6.7	Disconnect Mode (DM)				DESCRIPTION
50.2.6.8	Frame Reject (FRMR)				DESCRIPTION
50.2.6.9	Request Disconnect (RD)				DESCRIPTION
50.2.7	Code Transparency	T	T	X	
50.2.8	Command and Response				DESCRIPTION
50.2.8.1	Start-up Procedure	T	T	X	
50.2.8.2	ADAS Poll and AWOS Response	T	T	X	
50.2.8.3	ADAS Information Transfer to AWOS	T	T	X	
50.2.9	Link Parameters				DESCRIPTION
50.2.9.1	Timers	T	T	X	
50.2.9.2	Counters	T	T	X	
50.2.10	Exception Condition Reporting and Recovery				DESCRIPTION
50.2.10.1	No Response				DESCRIPTION
50.2.10.2	Busy Condition				DESCRIPTION
50.2.10.3	FRMR Condition				DESCRIPTION
50.2.10.4	N(S) Sequence Errors				DESCRIPTION
50.2.11	Link Constraints	X	X	X	
	APPENDIX VII				
70.	SHEF MESSAGE				TITLE

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
70.1	Purpose				DESCRIPTION
70.2	General Conventions and Criteria				TITLE
70.2.1	Source Data and Systems	I	I	I	
70.2.2	Application Data Unit				
70.3	Content and Format				
	APPENDIX VIII				
80.	ASOS/AOS DAILY AND MONTHLY SUMMARY MESSAGES				TITLE
80.1	Purpose				DESCRIPTION
80.2	General Conventions and Criteria				TITLE
80.2.1	Source Data and Systems	I	I	I	
80.2.2	Application Data Unit				
80.2.3	ASOS/AOS Summary Message Types				
80.2.4	Operator Input				
80.2.5	Storage Requirements				
80.2.6	Missing Data				
80.3	Content and Format				
80.3.1	Daily Summary Message				
80.3.1.1	Primary Daily Summary Message				
80.3.1.1.1	Reporting Criteria				
80.3.1.2	Intermediate Daily Summary Message				
80.3.1.2.1	Reporting Criteria				
80.3.2	Monthly Summary Message				
80.3.2.1	Reporting Criteria				
80.4	Encoding Convention				
	APPENDIX IX				
90.	METAR FORMAT WEATHER MESSAGE				TITLE
90.1	Purpose				DESCRIPTION
90.1.1	Applicability to ASOS and AOS				APPLICABILITY
90.1.2	Applicability to ADAS				APPLICABILITY
90.2	General Conventions and Criteria				TITLE
90.2.1	Source Data and Constraints	I	I	I	
90.2.1.1	ADU Headers	T	T	X	
90.2.1.2	AWOS Modes	A	A	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.2.1.3	AWOS Alert Data	A	A	X	
90.2.2	Encoding Convention	T-I	T-I	X	
90.2.3	Message Types	I	I	I	
90.2.3.1	Aviation Routine Weather Reports (METAR)	T	T	X	
90.2.3.2	Aviation Special Weather Reports (SPECI)	T	T	X	
90.2.3.2.1	Ceiling	T	T	X	
90.2.3.2.2	Sky Condition	T	T	X	
90.2.3.2.3	Visibility	T	T	X	
90.2.3.2.4	(deleted)	-	-	-	
90.2.3.2.5	Wind Shift	T	T	X	
90.2.3.2.6	Lightning Activity	T	T	X	
90.2.3.2.7	Precipitation	T	T	X	
90.2.3.2.8	Runway Visual Range (RVR)	T	T	X	
90.2.3.2.9	Urgent Weather	T	T	X	
90.2.3.3	Special Reports Based on Local Thresholds	T	T	X	
90.2.3.3.1	Ceiling	T	T	X	
90.2.3.3.2	Sky Condition	T	T	X	
90.2.3.3.3	Visibility	T	T	X	
90.2.4	REMARKS	T-A	T-A	X	
90.2.4.1	Automated REMARKS	T-A	T-A	X	
90.2.4.1.1	Urgent Weather	T	T	X	
90.2.4.1.1.A	Station Type	T	T	X	
90.2.4.1.2	Wind Shift	T	T	X	
90.2.4.1.3	Variable Visibility	T	T	X	
90.2.4.1.4	Automated Lightning	T	T	X	
90.2.4.1.5	Present Weather Begin/End	T	T	X	
90.2.4.1.6	Pressure Fall/Rise	T	T	X	
90.2.4.1.7	Sea-Level Pressure	T	T	X	
90.2.4.2	Plain Language REMARKS	T	T	X	
90.2.4.3	Additive Data REMARKS	T-A	T-A	X	
90.2.4.3.1	1-Hour Precipitation	T	T	X	
90.2.4.3.2	3- and 6-Hour Precipitation	T	T	X	
90.2.4.3.3	24-hour Precipitation	T	T	X	
90.2.4.3.4	6-Hour Maximum Temperature	T	T	X	
90.2.4.3.5	6-Hour Minimum Temperature	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.2.4.3.6	24-Hour Max/Min Temperature	T	T	X	
90.2.4.3.7	3-Hour Pressure Tendency	T	T	X	
90.2.4.3.8	PWINO	T	T	X	
90.2.4.3.8.A	PNO	T	T	X	
90.2.4.3.9	FZRANO	T	T	X	
90.2.4.3.10	TSNO	T	T	X	
90.2.4.3.11	RVRNO	T	T	X	
90.2.5	Missing Weather Data	T-A	T-A	X	
90.3	Content and Format				DESCRIPTION
90.3.1	General Structure				TITLE
90.3.1.1	Message Fields	T-D-A	T-D-A	X	
90.3.1.2	Message Length	T-D-A	T-D-A	X	
90.3.2	Field Components				DESCRIPTION
90.3.2.1	REPORT TYPE				TITLE
90.3.2.1.1	Reporting Criteria	T	T	X	
90.3.2.1.2	Source Data	T	T	X	
90.3.2.1.3	Encoding Convention	T	T	X	
90.3.2.2	LOCATION INDICATOR				TITLE
90.3.2.2.1	Reporting Criteria	T	T	X	
90.3.2.2.2	Source Data	T	T	X	
90.3.2.2.3	Encoding Convention	T	T	X	
90.3.2.3	DATE/TIME				TITLE
90.3.2.3.1	Reporting Criteria	T	T	X	
90.3.2.3.2	Source Data	T	T	X	
90.3.2.3.3	Encoding Convention	T	T	X	
90.3.2.4	SYSTEM IDENTIFIER				TITLE
90.3.2.4.1	Reporting Criteria	T	T	X	
90.3.2.4.2	Source Data	T	T	X	
90.3.2.4.3	Encoding Convention	T	T	X	
90.3.2.5	WIND				TITLE
90.3.2.5.1	Reporting Criteria	T	T	X	
90.3.2.5.2	Source Data	T	T	X	
90.3.2.5.3	Encoding Convention	T	T	X	
90.3.2.6	VISIBILITY				TITLE
90.3.2.6.1	Reporting Criteria	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.3.2.6.2	Source Data	T	T	X	
90.3.2.6.3	Encoding Convention	T	T	X	
90.3.2.7	RVR				TITLE
90.3.2.7.1	Reporting Criteria	T	T	X	
90.3.2.7.2	Source Data	T	T	X	
90.3.2.7.3	Encoding Convention	T	T	X	
90.3.2.8	WEATHER GROUP				TITLE
90.3.2.8.1	Reporting Criteria	T	T	X	
90.3.2.8.2	Source Data	T	T	X	
90.3.2.8.3	Encoding Convention	T	T	X	
90.3.2.9	SKY COVER				TITLE
90.3.2.9.1	Reporting Criteria	T	T	X	
90.3.2.9.2	Source Data	T	T	X	
90.3.2.9.3	Encoding Convention	T	T	X	
90.3.2.10	TEMPERATURE/DEWPOINT				TITLE
90.3.2.10.1	Reporting Criteria	T	T	X	
90.3.2.10.2	Source Data	T	T	X	
90.3.2.10.3	Encoding Convention	T	T	X	
90.3.2.11	ALTIMETER SETTING				TITLE
90.3.2.11.1	Reporting Criteria	T	T	X	
90.3.2.11.2	Source Data	T	T	X	
90.3.2.11.3	Encoding Convention	T	T	X	
90.3.2.12	REMARKS	T-I	T-I	X	
90.3.2.12.1	Automated REMARKS	T-I	T-I	X	
90.3.2.12.1.1	Urgent Weather				TITLE
90.3.2.12.1.1.1	Reporting Criteria	T	T	X	
90.3.2.12.1.1.2	Source Data	T	T	X	
90.3.2.12.1.1.3	Encoding Convention	T	T	X	
90.3.2.12.1.1.A	Station Type				TITLE
90.3.2.12.1.1.A.1	Reporting Criteria	T	T	X	
90.3.2.12.1.1.A.2	Source Data	T	T	X	
90.3.2.12.1.1.A.3	Encoding Convention	T	T	X	
90.3.2.12.1.2	Wind Shift				TITLE
90.3.2.12.1.2.1	Reporting Criteria	T	T	X	
90.3.2.12.1.2.2	Source Data	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.3.2.12.1.2.3	Encoding Convention	T	T	X	
90.3.2.12.1.3	Variable Visibility				TITLE
90.3.2.12.1.3.1	Reporting Criteria	T	T	X	
90.3.2.12.1.3.2	Source Data	T	T	X	
90.3.2.12.1.3.3	Encoding Convention	T	T	X	
90.3.2.12.1.4	Automated Lightning				TITLE
90.3.2.12.1.4.1	Reporting Criteria	T	T	X	
90.3.2.12.1.4.2	Source Data	T	T	X	
90.3.2.12.1.4.3	Encoding Convention	T	T	X	
90.3.2.12.1.5	Present Weather: Begin/End				TITLE
90.3.2.12.1.5.1	Reporting Criteria	T	T	X	
90.3.2.12.1.5.2	Source Data	T	T	X	
90.3.2.12.1.5.3	Encoding Convention	T	T	X	
90.3.2.12.1.6	Pressure Falling/Rising Rapidly				TITLE
90.3.2.12.1.6.1	Reporting Criteria	T	T	X	
90.3.2.12.1.6.2	Source Data	T	T	X	
90.3.2.12.1.6.3	Encoding Convention	T	T	X	
90.3.2.12.1.7	SEA-LEVEL PRESSURE				TITLE
90.3.2.12.1.7.1	Reporting Criteria	T	T	X	
90.3.2.12.1.7.2	Source Data	T	T	X	
90.3.2.12.1.7.3	Encoding Convention	T	T	X	
90.3.2.12.2	Plain Language REMARKS				TITLE
90.3.2.12.2.1	Reporting Criteria	T	T	X	
90.3.2.12.2.2	Source Data	T	T	X	
90.3.2.12.2.3	Encoding Convention	T-D	T-D	D	
90.3.2.12.3	Additive Data REMARKS				TITLE
90.3.2.12.3.1	1-Hour Precipitation				TITLE
90.3.2.12.3.1.1	Reporting Criteria	T	T	X	
90.3.2.12.3.1.2	Source Data	T	T	X	
90.3.2.12.3.1.3	Encoding Convention	T	T	X	
90.3.2.12.3.2	3- and 6-Hour Precipitation				TITLE
90.3.2.12.3.2.1	Reporting Criteria	T	T	X	
90.3.2.12.3.2.2	Source Data	T	T	X	
90.3.2.12.3.2.3	Encoding Convention	T	T	X	
90.3.2.12.3.3	24-Hour Precipitation				TITLE

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.3.2.12.3.3.1	Reporting Criteria	T	T	X	
90.3.2.12.3.3.2	Source Data	T	T	X	
90.3.2.12.3.3.2	Encoding Convention	T	T	X	
90.3.2.12.3.4	6-Hour Maximum Temperature				TITLE
90.3.2.12.3.4.1	Reporting Criteria	T	T	X	
90.3.2.12.3.4.2	Source Data	T	T	X	
90.3.2.12.3.4.3	Encoding Convention	T	T	X	
90.3.2.12.3.5	6-Hour Minimum Temperature				TITLE
90.3.2.12.3.5.1	Reporting Criteria	T	T	X	
90.3.2.12.3.5.2	Source Data	T	T	X	
90.3.2.12.3.5.3	Encoding Convention	T	T	X	
90.3.2.12.3.6	24-Hour Maximum/Minimum Temperature				TITLE
90.3.2.12.3.6.1	Reporting Criteria	T	T	X	
90.3.2.12.3.6.2	Source Data	T	T	X	
90.3.2.12.3.6.3	Encoding Convention	T	T	X	
90.3.2.12.3.7	3-Hour Pressure Tendency				TITLE
90.3.2.12.3.7.1	Reporting Criteria	T	T	X	
90.3.2.12.3.7.2	Source Data	T	T	X	
90.3.2.12.3.7.3	Encoding Convention	T	T	X	
90.3.2.12.3.8	PWINO				TITLE
90.3.2.12.3.8.1	Reporting Criteria	T	T	X	
90.3.2.12.3.8.2	Source Data	T	T	X	
90.3.2.12.3.8.3	Encoding Convention	T	T	X	
90.3.2.12.3.8.A	PNO				TITLE
90.3.2.12.3.8.A.1	Reporting Criteria	T	T	X	
90.3.2.12.3.8.A.2	Source Data	T	T	X	
90.3.2.12.3.8.A.3	Encoding Convention	T	T	X	
90.3.2.12.3.9	PZRANO				TITLE
90.3.2.12.3.9.1	Reporting Criteria	T	T	X	
90.3.2.12.3.9.2	Source Data	T	T	X	
90.3.2.12.3.9.3	Encoding Convention	T	T	X	
90.3.2.12.3.10	TSNO				TITLE
90.3.2.12.3.10.1	Reporting Criteria	T	T	X	
90.3.2.12.3.10.2	Source Data	T	T	X	
90.3.2.12.3.10.3	Encoding Convention	T	T	X	

Table 4-1. Verification Requirements Traceability Matrix (Continued)

D=Demonstration I=Inspection A=Analysis T=Test X=Not Applicable

REQUIREMENTS PARAGRAPH REFERENCE FOR DOCUMENT AWOS/ADAS ICD	DESCRIPTION	VERIFICATION PHASE AND METHOD			REMARKS
		SUBSYS LEVEL	INTEG LEVEL	SITE LEVEL	
90.3.2.12.3.11	RVRNO				TITLE
90.3.2.12.3.11.1	Reporting Criteria	T	T	X	
90.3.2.12.3.11.2	Source Data	T	T	X	
90.3.2.12.3.11.3	Encoding Convention	T	T	X	

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5. PREPARATION FOR DELIVERY. N/A.

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6. NOTES

6.1 Glossary of Terms. This Glossary includes brief definitions of working terms within their specific application to the ADAS/AWOS Interface. Terms defined elsewhere within this document (e.g., Commands and Responses, Section 50.2.6) are not repeated here. Acronyms are included where terms are both unfamiliar and are frequently abbreviated in this document; more general acronyms that are less likely to require explanation are listed in Section 6.2.

Acknowledge	To confirm an action or request with a protocol message.
Additive Data	A portion of the Metar Format Weather Message containing data groups specified in NCP 17445.
Alert	A critical atmospheric condition detected by AWOS, and warranting special notification of the aviation community. See 10.3.4.
Application Connection	Resource allocation between application process entities, established by exchange of Application Data Units (ADUs).
Application Data Unit (ADU)	A set of octets comprised of a header (containing information and/or data characteristics) and an information field carrying the data.
ADU Header	First two octets of the application data unit (ADU) that indicate the characteristic of the following information field.
Application Layer	Highest layer of OSI communications interface model, not implemented for the ADAS and AWOS.
Application Process	An element within an open system which performs the information processing for a particular application.
Automated Remark	A standard weather remark produced automatically by AWOS when certain pre-specified conditions are met, e.g. variable wind condition.
Automated Remark Status	A data field in the AWOS Format Weather Message used to indicate presence of remarks automatically generated by the AWOS.

Automated Surface Observing System (ASOS)	The automated weather observing system being developed by NWS. Requirements for ASOS are specified in the Department of Commerce contract 50-SANW-1-00050.
Automated Weather Observing System (AWOS)	In this ICD the acronym AWOS is used in two distinct contexts. First, alone as a generic term for any automated observing system (i.e, federal AWOS, non-federal AWOS, DoD AOS, or ASOS) when system specific requirements or characteristics are not germane to the current context. Second, when FAA requirements or characteristics are specifically relevant to federal or non-federal AWOS. Requirements for federal and non-federal AWOS are provided in FAA Advisory Circular: FAA-AC-150/5220-16.
AWOS Format Weather Message	Weather data generated automatically by AWOS and optionally supplemented by an authorized operator. Each AWOS Format Weather Message is made up of a fixed length segment of octets generated for each reporting cycle, and a variable length segment comprised of automated remarks and/or operator supplement that is added as conditions warrant.
Binary Code	The magnitude of the encoded bit sequence equals the binary value.
Bit	Binary Digit, 0 or 1.
Byte	An integral group of 8 bits processed as a single entity only.
Character	A group of 7 or 8 bits encoded following U.S. ASCII convention.
Command	In HDLC, a frame transmitted by the primary station (ADAS).
Connection	Allocation of resources to an exchange between protocol entities.
Control Field	One of the six primary components of an HDLC frame used to identify and characterize it and regulate its handling.

Counter	System environment software function that causes an indication or interrupt in control flow when a prespecified count has been reached.
Daily (DSM) and Monthly (MSM) Summary Messages	A class of messages generated and transmitted by the ASOS and AOS to the ADAS conveying summarized weather information.
Data Extension ADU	An ADU used over the AWOS/ADAS interface to transmit that portion of an application data stream ≥ 255 octets following the first.
Data Link Connection	Allocation of resources between Link Service Access Points for the duration of an exchange.
Data Link Layer	Second OSI layer, providing error-free transmission of bits between Link Service Access Point entities.
Data Request ADU	An ADU used over the AWOS/ADAS interface that is used to request specific application data.
Data Transfer	Protocols providing for duplication of bit strings from one site to another.
Data Transfer ADU	An ADU used over the AWOS/ADAS interface that is used to transmit specific application data.
Date/Time Message	Non-weather message used over the AWOS/ADAS interface to transmit current station time.
Decode	To convert a coded bit stream from a conventional representation to its binary equivalent.
Delimiter	Special character or control code that indicates the termination of a data stream.
Encode	To convert a binary bit stream into a conventional representation.
Error Condition ADU	An ADU used over the AWOS/ADAS interface to transmit a message containing a detected error back to the originator.
Error detection	Algorithm providing for notification of incorrect bit values in delivered data units.

Error Position Indicator	A parameter used in the Error Message to indicate the location of an error in the subsequent data field. A count is given in octets.
Error recovery	Algorithm providing for transparent reconstruction of correct bit values upon error detection.
Field	A single octet or group of octets that contain related information.
Field Elevation	The elevation above mean sea level of the highest point on any of the runways of an airport. This is included in the AWOS Test Message.
Fixed Length Segment	The first 68 octets of the AWOS Format Weather Message that is always generated.
Flag	In the HDLC protocol, a 01111110 bit sequence used to indicate the start or end of a frame.
Format Type	A segment the ADU Header used over the AWOS interface that indicates the specific character of the associated ADU.
Format ID	A segment the ADU Header used over the AWOS interface that indicates the general character of the associated ADU.
Frame Check Sequence	The next to last field of the HDLC frame consisting of 16-bit sequence used for error detection at the link layer.
Frame	The transmission unit of the data link layer. An HDLC frame is made up of a start flag, an address field, a control field, an optional information field, a frame check sequence and an end flag.
Full Duplex	Simultaneous two-way independent transmission in both directions.
Header	Portion of a protocol data unit that is added at the beginning ("prepended") of the data provided by the protocol's user.

Hubber	A term used in the communications industry for a "port sharing device" that is used to transmit data received on multiple communications channels into a serial data stream over a single line. A hubber can only serve one channel at a time.
Information Frame	An HDLC frame used on the AWOS/ADAS interface to transfer application data (e.g., weather messages) between the primary (ADAS) and secondary (AWOS) stations.
Information Field	1. At the application, the field dedicated to application (user) data. The I-field immediately follows the length indicator (LI). A zero length information field is permitted on the AWOS/ADAS interface. 2. At the data link layer, the field in the HDLC frame containing the ADU. The I-field follows the Control field and can also be of zero length.
Length Indicator	The second octet of the ADU used over the AWOS/ADAS interface that indicates the length, in octets, of the ADU information field.
Least Significant Bit (LSB)	Low order binary digit in a specific bit sequence, e.g., an octet.
Lightning Activity Data (LAD)	Lightning information computed by ADAS from LDD and supplied by ADAS to AWOS.
Lightning Detection Data (LDD)	Lightning information supplied to the ADAS by the National Lightning Detection Network (NLDN).
Link Address	The address of a secondary station at the link layer.
Magnetic Variation	The difference between magnetic and true north observed at a particular location and time. This parameter is included in the AWOS Test Message.
Message	An application data stream transmitted over the communications interface. In the context of this ICD, messages can be encoded in ASCII or binary.
Most Significant Bit (MSB)	The high order bit in a specific bit sequence such as an octet.

Multiplexing	Provision by protocol of more than one simultaneous logical connection over a single physical connection.
Multiplexor	A communications device that concentrates data input received on multiple channels and transmits it in parallel over a single line.
National Lightning Detection Network (NLDN)	The contracted commercial system supplying lightning information to the AWOS via the ADAS.
Network Layer	Third OSI layer, providing transmission of fixed-length data units across one or more physical/data link connections. The Network Layer is not implemented on the AWOS/ADAS link.
Normal Response Mode (NRM)	An operational mode of data communication under the International Standards in which the secondary station may initiate transmission only as the result of receiving explicit permission from the primary station.
Null Byte	A byte having all 8 bits set to zero (0).
Observation Cycle	Discrete period during which observations are made, and a weather message is prepared and delivered.
Octet	A group of 8 bits, each bit of which may be processed independently.
Open Systems Interconnection (OSI)	Worldwide effort to establish uniform agreements on protocols for full interoperability of data processing equipment and networks. Coordinated by CCITT and ISO.
Operator	In the context of this ICD, an operator is a Qualified Weather Observer who is permitted to edit AWOS or Metar Format Weather Messages.
Operator Supplement	Comments by onsite operator encoded with automated segments of either the AWOS Format or Metar Format Weather Messages.
Option	Variant of a protocol function.

Overhead	Octets in a communications data stream over and above actual user data (e.g. LAD Message) needed to characterize or control that data stream.
Parameter Activation Status	The 20th field in the AWOS Format Weather Message used to indicate the capability of the precipitation and visibility sensors and/or the algorithms used at the AWOS.
Physical Connection	Allocation of resources between physical end systems; i.e. the physical connection to network endpoint, with proper electrical signals present.
Physical Layer	First OSI layer, providing logical and physical interface between interface software components and electrical interface equipment.
Poll	In HDLC, a frame transmitted by the primary station that permits the secondary station (upon receipt of it) to respond (transmit information) to the primary. I-frames, in concert with Data Request ADUs, are used by ADAS on the AWOS/ADAS interface to poll for weather data on a 1-minute cycle.
Presentation Layer	Sixth OSI layer, providing transformations between data formats (and corresponding actions) required by different end systems. The Presentation Layer is not implemented on the AWOS/ADAS link.
Remarks	Automated or observer comments used to enhance either an AWOS Format or a Metar Format Weather Message. The number, type, and character of remarks can differ between AWOS and Metar Format Messages.
Response	In HDLC, a frame transmitted by the secondary station (AWOS, ASOS, AOS).
Retransmission	Error recovery procedure involving repeated transmission of a data unit.
Serial	Physical transmission method in which bits are represented by electrical signals sequentially in time on a single wire; cf. "parallel", where they are represented simultaneously on separate wires.

Session Layer	Fifth OSI layer, providing continuous connection between peers during interruptions in connection at lower layers. The Session Layer is not implemented on the AWOS/ADAS link.
Site ID	AWOS identifier assigned by the FAA and incorporated in the AWOS Format Weather Message and other non-weather messages generated over the interface.
Software Version	An identification of the software currently approved and used operationally at AWOS or ADAS. Software Version is included in the AWOS and ADAS Test Messages.
Standard Hydrometeorological Exchange Format (SHEF)	A message generated and transmitted by the ASOS and AOS to the ADAS conveying cumulative precipitation information.
Station Elevation	The officially designated height above mean sea level to which station pressure pertains. It is generally the same as field elevation at an airport station.
Station Type	In HDLC, either primary or secondary stations are designated, for Normal Response Mode and an unbalanced link configuration.
Stream (Data or Bit)	The aggregate of bits comprising the AWOS message and multilevel protocols.
Supplement	Operator comments inserted into the variable length segment of the AWOS Weather Message. Operator comments are freely formatted and encoded in ASCII.
Synchronous	Physical transmission method in which bits are evaluated ("sampled") only at certain instants of time defined by a separate "clock" signal, i.e. "synchronous" with the clock.
Test Message	Non-weather message transmitted by AWOS or ADAS when a Test Message Request ADU is received.
Timer	System environment software function that causes an indication or interrupt in control flow when a prespecified time has elapsed.

Transit delay	Time elapsed between transmission and reception of a protocol data unit.
Transparent	Protocol property that permits ignorance, e.g. of the values of data bits in a protocol data unit or of the details of intermediate systems, in a complex network.
Transport Layer	Fourth OSI layer, providing end-to-end transparent transmission of arbitrary data units, with a high quality of service. The Transport Layer is not implemented on the AWOS/ADAS link.
Two-Way Alternate (TWA)	In the HDLC protocol, frames may only be transmitted from the secondary station when given the permission (via the P-bit frame) from the primary station.
Type	A term that describes the characteristic of an encoded bit stream, e.g., ASCII or binary.
Unbalanced	Protocol permitting only one primary station to both originate and respond. Secondary stations only permitted to communicate after polling by primary station.
Underscore	ASCII character "_", 95D, used in this ICD to represent blank spaces in Metar Format Weather Message examples.
Variable Length Segment	The Remarks portion of the AWOS Format Weather Message.
Zero Bit Insertion	A method used in the HDLC data link protocol that ensures that non-flag octets of the frame are not interpreted as start or end flags.

6.2 Abbreviations and Acronyms

1sTTT	6-Hour Maximum Temperature
2sTTT	6-Hour Minimum Temperature
4sTTTsTTT	24-Hour Maximum and Minimum temperature
5appp	3-Hour Pressure Tendency
6RRRR	3- and 6-hour precipitation
7RRRR	24-hour precipitation
A	Analysis (Verification Technique)
ADAS	AWOS Data Acquisition System
ADU	Application Data Unit
AFD	Airport/Facility Directory
AGL	Above ground level
ALP	Airport Location Point
AOS	Automated Observing System
ARTCC	Air Route Traffic Control Center
ASCII	American Standard Code for Information Interchange
ASOS	Automated Surface Observing System
AWIPS	Automated Weather Information Processing System
AWOS	Automated Weather Observing System
B	Begin
BKN	Broken
BLDU	Blowing Dust
BLPY	Blowing Spray
BLSA	Blowing Sand

BLSN	Blowing Snow
bps	Bits per Second
BR	Mist
C	Celsius
C	Center
C/R	Command/Response
CHI	Cloud Height Indicator
CHINO	Sky Condition At Secondary Location Not Available
CIG	Ceiling
CLDS	Clouds
CLR	Clear
CRT	Cathode Ray Tube
CTS	Coded Time Source
D	Decimal
D	Demonstration
DCE	Data Circuit Terminating Equipment
DISC	Disconnect
DLP	Data Link Processor
DM	Disconnect Mode
DOC	Department of Commerce
DoD	Department of Defense
DOT	Department of Transportation
DPD	Dew Point Depression
DSM	Daily Summary Message

DT&E	Development Test and Evaluation
DTE	Data Terminal Equipment
DU	Dust
DZ	Drizzle
E	East
E	End
EIA	Electronic Industries Association
F	Fahrenheit
FAA	Federal Aviation Administration
FAATC	FAA Technical Center
FC	Tornado, Funnel Cloud, and Waterspout
FCC	Federal Communications Commission
FCS	Frame Check Sequence
FEW	Few Clouds Observed
FLS	Fixed Length Segment
FG	Fog
FMH-1	Federal Meteorological Handbook No. 1
FRMR	Frame Reject
ft	Feet
FU	Smoke
FZDZ	Freezing Drizzle
FZRA	Freezing Rain
FZRANO	Freezing Rain Information Not Available
G	Gust

GR	Hail
GS	Small Hail and/or Snow Pellets
H or h	Hexidecimal
HDLC	High-Level Data Link Control
HZ	Haze
I	Information frame
I	Inspection
I/O	Input/Output
IC	Ice Crystals
ICD	Interface Control Document
ICST	Institute for Computer Science and Technology
ID	Identification
IF	Ice Fog
inHg	Inches of Mercury
ISO	International Standards Organization
K1	No Response Retry counter
K3	Outstanding Frames counter
KNOT	Nautical Mile per Hour
KT	Nautical Mile per Hour
L	Left
LAD	Lightning Activity Data
LDD	Lightning Detection Data
LI	Length Indicator
LSB	Least Significant Bit/Byte

LST	Local Standard Time
LWR	Lower
M	Minus (a Metar formatting convention)
M	Missing
mb	millibar
Metar	Aviation Routine Weather Report (formatting convention for weather messages)
METAR	Aviation Routine Weather Report (periodic report in Metar Format)
MIFG	Ground Fog
MSB	Most Significant Bit/Byte
MSM	Monthly Summary Message
N	North
N	Sensor Not Installed
N/A	Not Applicable
N(R)	Receive frame sequence number
N(S)	Send frame sequence number
NAS	National Airspace System
NCP	NAS Change Proposal
NDM	Normal Disconnect Mode
NE	Northeast
NICS	National Interfacility Communications System
NIST	National Institute of Standards and Technology
NLDN	National Lightning Detection Network
NOAA	National Oceanic and Atmospheric Administration

NOS	National Oceanic Survey; National Ocean Service
nm	Nautical miles
NDM	Normal Disconnect Mode
NRM	Normal Response Mode
NW	Northwest
NWS	National Weather Service
OID	Operator Interface Device (ASOS and AOS only)
OSI	Open System Interconnection
OT&E	Operational Test and Evaluation
OVC	Overcast
P	Plus or Positive (a Metar formatting convention)
P	Hourly Precipitation Accumulation
P/F	Poll/Final bit
PAT&E	Production Acceptance Test and Evaluation
PE	Ice Pellets
PNO	Precipitation Accumulator Information Not Available
PRESFR	Pressure Falling Rapidly
PRESRR	Pressure Rising Rapidly
PWINO	Present Weather Information Not Available
QA	Quality Assurance
R	Runway
R	Response
R	Right
RA	Rain; Moderate Rain

RD	Request Disconnect
RMM	Remote Maintenance Monitoring
RNR	Receive Not Ready
RR	Receive Ready
RVR	Runway Visual Range
RVRNO	No RVR data
RWY	Runway
S	Supervisory format frame
S	Similarity (Verification Technique)
S	South
SCT	Scattered
SE	Southeast
SG	Snow Grains
SN	Snow
SHEF	Standard Hydrometeorological Exchange Format
SLP	Sea-Level Pressure
SNRM	Set Normal Response Mode
SOW	Statement of Work
SPECI	Aviation Selected Special Weather Report (Metar Format)
STD	Standard
SW	Southwest
T	Test
T1	No Response timer
T3	Busy Response timer

TBD	To Be Determined
TBS	To Be Specified
TD&D	Technical Data and Documentation
TDM	Time Division Multiplexing
TS	Thunderstorm (at airport)
TSNO	Thunderstorm Information Not Available
TWA	Two-Way Alternate
U	Un-numbered frame
UA	Un-numbered Acknowledgement
UN	Unbalanced Normal
UP	Precipitation (of indefinite type)
UTC	Coordinated Universal Time
V	Validation (Verification Technique)
V	Variable
VA	Volcanic Ash
VCTS	Thunderstorm (in vicinity)
VHF	Very High Frequency
VIS	Visibility
VOR	VHF Omnidirectional Ranging
VR	Visual Range
VRTM	Verification Requirements Traceability Matrix
W	West
W	Western Hemisphere
WARP	Weather and Radar Processor

WD	Wind Direction
WMSCR	Weather Message Switching Center Replacement
WND	Wind
WS	Wind Speed
WSHFT	Wind Shift

APPENDIX I

10. AWOS FORMAT WEATHER MESSAGE

10.1 Purpose. The AWOS Format Weather Message is generated to provide a compilation of 1-minute surface meteorological observations made at an AWOS site for distribution and use throughout the NAS.

10.1.1 Applicability. It shall be mandatory for all AWOS interfacing the ADAS to implement the data products specified in this appendix insofar as the defined sensor configuration of a given AWOS permits. When sensors are not available, the condition shall be indicated within the message as specified within this appendix.

10.2 General Conventions and Criteria.

10.2.1 Source Data and Systems. Federal and non-federal AWOS, ASOS, and AOS shall generate AWOS Format Weather Messages.

10.2.2 Application Data Unit. The ADU containing the AWOS Format Weather Message shall consist of a two-octet header and the variable length message (see Figure 10-1). Values for the Format ID and Format Type are given in Table 3-1.

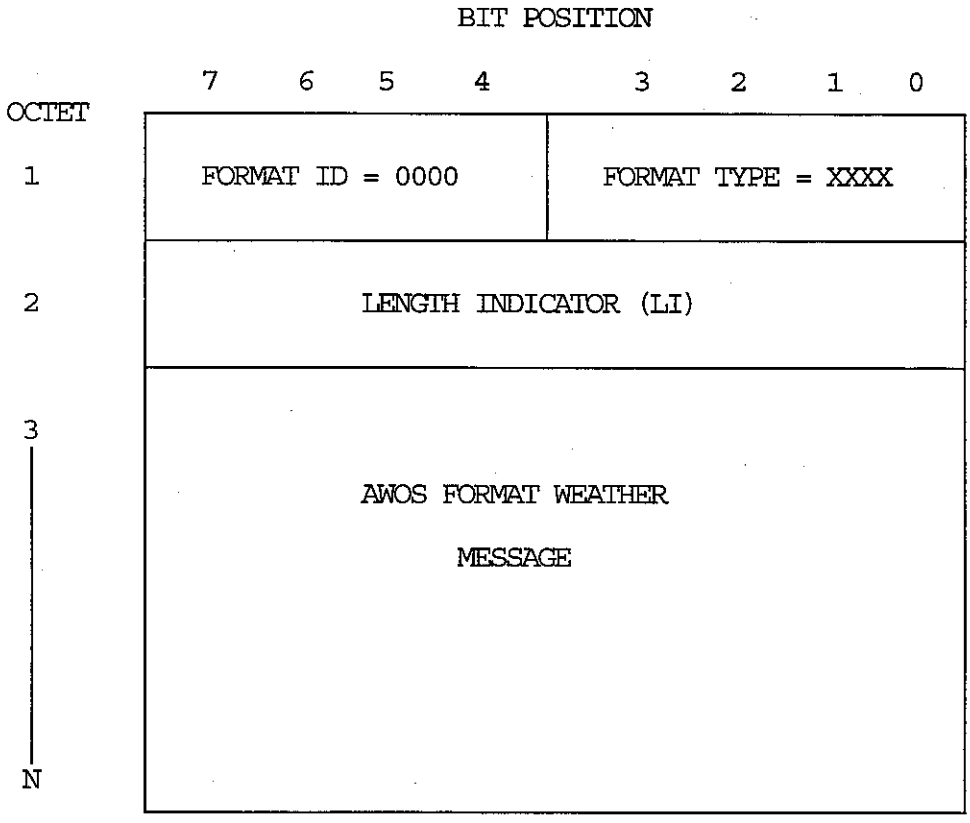
10.2.3 Encoding Convention. Individual octets comprising the AWOS Format Weather Message shall be encoded in binary or ASCII characters as specifically indicated in 10.3.

10.2.4 AWOS Message Type. There shall be a single AWOS Format Weather Message type that consists of a fixed length segment always and, when conditions warrant, a variable length automated remarks segment and a variable length operator augmentation segment.

10.2.5 Reporting Criteria. AWOS Format Weather Messages shall be generated once per minute.

10.2.6 Operator Input.

10.2.6.1 ASOS and AOS. An operator may enter manual observation data (e.g., observation of a tornado), edit all automatically monitored and processed sensor data (e.g., ambient temperature), incorporate comments to enhance a message (e.g., sky cover above 12,000 ft) via an Operator Interface Device (OID; for details, see the current issue of the ASOS Specification). This information shall be incorporated positionally within the fields allocated to the type of information added, e.g. sky cover in Sky and Ceiling (Field 5; field descriptions are detailed in 10.3).



N = LI + 2, where LI (Max) = 228
N = 230 (Max)

Figure 10-1. AWOS Format Weather Message ADU.

10.2.6.2 Federal and Non-federal AWOS. Federal and non-federal AWOS may be operated in either manual or automated mode. In automated mode the operator may directly enter manual override data into Fields 5, 6, and 7 (see 10.3.5, 10.3.6, and 10.3.7, and Table 10-12). In both modes the AWOS operator may enter remarks into Operator Remarks, Field 23 (see 10.3.21). In manual mode, however, any such operator remarks shall constitute a manual Metar or SAO message, as appropriate, and supersede the automated portions of the message.

10.2.7 Missing Data. Missing data shall be indicated in the AWOS Format Message.

10.2.7.1 Sensor Data Status Field. An indication in the Sensor Data Status Field (Field 19) of the AWOS Message shall provide a categorical explanation when sensor data (e.g. ambient temperature) are missing (e.g. no sensor, automatically invalidated by AWOS, manually invalidated by the operator). Details are provided in 10.3.17.

10.2.7.2 Data Field. In addition, that field in the fixed length segment of the AWOS Format Weather Message allocated for sensor data (e.g. ambient temperature), or derived parameter data (e.g. sea-level pressure uses both station pressure and 12-hour average temperature) that uses the sensor data as input, shall be encoded in one of two ways with respect to missing data.

(a) Case 1: If the site is not configured for that sensor, or the site is not configured to compute that derived parameter, all bits in the engineering field allocated to that sensor data or the derived parameter data, except the least significant bit, shall be set to one.

(b) Case 2: If the site is configured for that sensor, or the site is configured to compute that derived parameter, but data are missing because of a sensor or a system malfunction, all bits in the field allocated to that sensor data or the derived parameter data, shall be set to one.

The specific application of the requirements in this paragraph to each engineering data field are given under the individual field descriptions in the next section.

10.3 Content and Format. The AWOS Format Weather Message shall be made up of a fixed length segment and a variable length (remarks) segment. The fixed length segment shall contain site identification, date and time, alert information, and all automatically recorded data. It shall be 68 octets long. The remarks segment is allocated for automated remarks and operator supplements. The remarks segment shall be of variable length, but shall not exceed 160 octets. Automated remarks shall precede operator supplements in sequence within the variable length segment. Up to 80 characters of automated

remarks, including a delimiter (see 10.3.20), shall be permitted in an individual message. Operator supplements up to 80 characters in length shall be permitted. The maximum length of a complete AWOS Format Weather Message shall be 228 octets (230 octets including ADU overhead) as summarized in Figure 10-2.

Content	Field
Fixed length segment	68
Variable length segment	160
Automated remarks plus delimiter	80
Operator supplement	80
AWOS Format Weather Message Total	228
ADU Overhead	2
Total	230

Figure 10-2. AWOS Format Weather Message Structure.

Table 10-1 presents the contents of the AWOS Format Weather Message. The table consists of five columns of information:

(a) "Field" identifies octet group(s) containing similar or related information. No field less than 1 octet long shall be permitted.

(b) "Octet" identifies sequences of 8-bit groups.

(c) "Contents" identifies the characteristics of the information contained within an octet or field.

(d) "Type" describes the characteristic of the encoded bit stream.

(e) "Explanation" is used to clarify the field input.

Several tables are used to clarify the explanation of the AWOS Format Weather Message. A visual representation may be seen in Figure 10-3 which graphically depicts the AWOS Format Weather Message and keys these tables to the fields each clarifies.

10.3.1 Site ID (Table 10-1, Field 1). Each AWOS site shall have a four byte Site ID assigned by the FAA. The Site ID shall be four ASCII characters encoded in Octets 1-4 of the AWOS Format Weather Message. No ASCII space characters (32D) shall be included.

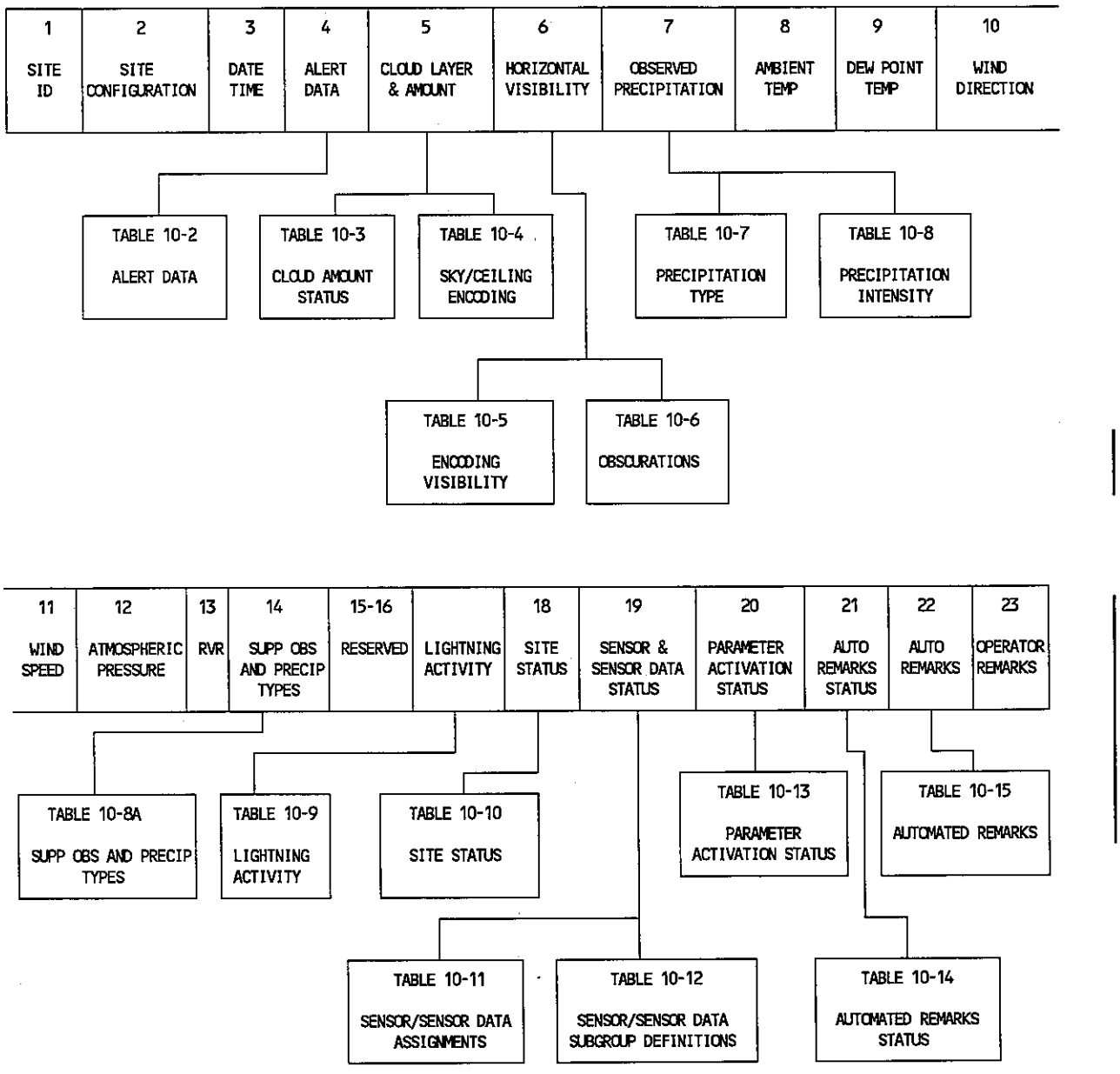
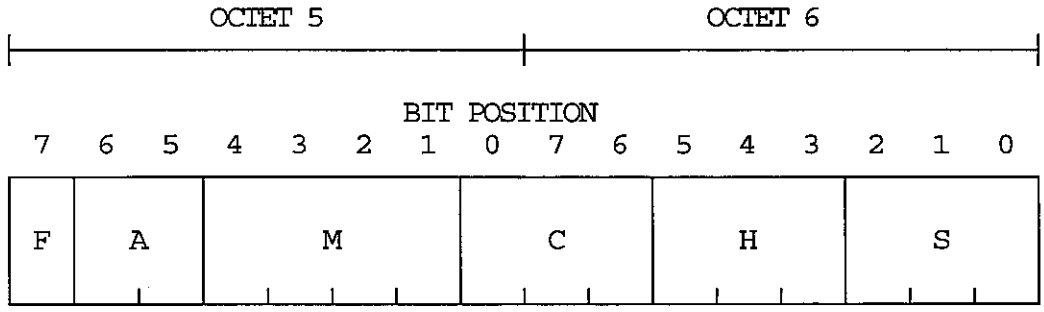


Figure 10-3. Visual Representation of the AWOS Format Weather Message.

10.3.2 Site Configuration Number (Table 10-1, Field 2). Every AWOS shall have a Site Configuration Number implemented by the contractor to the FAA's specification as given below. The Site Configuration Number shall identify a specific installed AWOS hardware, software, and system configuration. Note that, for ASOS and AOS only, fields C, H, and S are combined into a single C/H/S field as described below. The Site Configuration Number shall be two octets long and encoded in binary in Octets 5 and 6 as follows:



Where: F Octet 5, Bit 7 shall be a Federal or non-Federal Indicator. If the AWOS station is a federally purchased and maintained weather site, then a "1" shall be placed in this field.

A Octet 5, Bits 6-5 shall indicate the type of weather observing station. A shall be set to "01" for AWOS, to "10" for ASOS, and to "11" for AOS. The value "00" is currently undefined.

M Octet 5, Bits 4-1 is a miscellaneous field for special site-related features. Octet 5, Bit 1 shall indicate the engineering units of the Ambient Temperature, Field 8, and the Dew Point Temperature, Field 9, to be as follows: 0 = degrees Fahrenheit, 1 = degrees Celsius. Currently, Bits 4-2 of this field shall be set to "000". In the future, special features may include lightning sensor or altimeter-only station indicators.

C Octet 5, Bit 0 and Octet 6, Bits 7-6. (Federal/non-Federal AWOS Only) This field shall contain a company code for the manufacturer, to be specified for each manufacturer by the FAA.

H Octet 6, Bits 5-3. (Federal/non-Federal AWOS Only) This field shall be a hardware configuration field coded by the contractor and shall indicate a particular AWOS hardware configuration. The contractor shall

maintain a unique list of allowable codes for this field. When the AWOS hardware configuration is changed by the contractor, a new and unique value shall be placed in this field.

S Octet 6, Bits 2-0. (Federal/non-Federal AWOS Only) This field shall be a software configuration field coded by the contractor and shall indicate a particular AWOS software configuration. The contractor shall maintain the list of allowable codes for this field. When the AWOS software configuration is changed by the contractor, a new and unique value shall be placed in this field.

S Octet 5, Bit 0, and Octet 6, Bits 7-0. (ASOS and AOS only) These three fields (9 bits total) shall be combined into a single binary field denoting the installed ASOS software version number. The binary value 0 shall denote ASOS version number 2.40 or earlier. Subsequent versions shall be encoded as: (encoded_binary_value) = int(version_number x 100.) - 240. When read, the binary value may thus be transformed into a version number up to 7.51 as: (version_number) = float(240 + encoded_binary_value)/100.

10.3.3 Date and Time (Table 10-1, Field 3). Date and time shall be recorded as binary values in Octets 7-11 of the AWOS Format Weather Message. This field indicates when the corresponding AWOS Format Weather Message was generated. The last two digits of the year shall be stored in Octet 7. Month of the year (values 1-12) shall be stored in Octet 8. Day of the month (values 1-31) shall be stored in Octet 9. Hour of the day (values 0-23) in UTC shall be encoded in Octet 10. Minute of the hour (values 0-59) shall be encoded in Octet 11.

10.3.4 Alert Data (Table 10-1, Field 4). The Alert Data shall comprise four octets (12, 13, 14, and 15) of the AWOS Format Weather Message and be encoded in binary. The purpose of the Alert Data is to implement an optional means to alert users of the AWOS Format Weather Message to an operational value. Since this feature is optional, it may not be implemented on all AWOS stations.

Table 10-2 defines the Alert Data. There are five columns of information shown. Column 1 identifies the octet number in the AWOS Format Weather Message; Column 2 indicates the bit position within the associated octet where Bit 0 is the Least Significant Bit (LSB) and Bit 7 is the Most Significant Bit (MSB). Column 3 describes the information content represented by the bit. Columns 4 and 5 explain the bit setting conventions for each alert condition.

The Alert Data field shall contain all null (zero) octets to indicate that no critical atmospheric conditions were detected by the AWOS during the previous observation cycle. Each detected alert shall be recorded in the AWOS Format Weather Message for only one observation cycle (i.e. 1 minute). An alert must be detected anew the next minute in order to be recorded anew. Any bit that is turned on (i.e. set to one) shall indicate that the critical condition it

represents has been detected. The simultaneous detection of alert conditions for multiple weather types shall be identifiable in the Alert Field. Octet 14, Bit 7, if set, shall indicate that one or more local threshold value(s) were exceeded. Hail (Octet 13, Bits 0 and 1) shall consist of both large hail (Metar "GR") and small hail (Metar "GS"). Snow (Octet 15, Bits 0 and 1) shall include snow grains (Metar "SG"). Fog (Octet 15, Bits 6 and 7) shall include all forms of fog (Metar "FG", "FZFG", "MIFG", and "BCFG") as well as mist (Metar "BR").

10.3.5 Cloud Layer and Amount (Table 10-1, Field 5). Octets 16 through 21 shall contain information on cloud layer and amount for up to three individual layers. Cloud base heights shall be encoded in binary and recorded in hundreds of feet. The requirements in paragraph 10.2.7.2 shall be applied individually to the six Octets of this field (i.e. sensor-not-installed shall be indicated by the values FE,FE,FE,FE,FE,FEh).

Cloud amounts shall be recorded in a one-octet field according to the convention presented in Table 10-3 for up to three layers of clouds (Octets 17, 19, and 21). The table lists bit sequence in the first column and the associated sky condition in Column 2. A bit shall be "turned on" (set to 1) to indicate the occurrence of a given condition. An "indefinite" obscuration shall be indicated by turning on Bit 5. Bit 6 shall indicate that the sensor has not detected any clouds below its design level (e.g. 12,000 ft).

Tables 10-4a through 10-4d delineate the convention for encoding cloud layer and amount in the AWOS Format Weather Message based upon the algorithms provided in the FAA's AWOS Specification and ASOS Specification. Tables 10-4a through 10-4d present, by column heading: CASE NO.: case sequences; DESCRIPTION: case descriptions; AWOS CRITERIA: cloud algorithm criteria; the bit encoding scheme in Octets 16-21 (Cloud Layer and Amount); and the Sensor/Data Status Field (Octet 62) of the AWOS Format Weather Message for the corresponding case sequences. A description of the Sensor/Data Status Field is given in 10.3.17.

The federal/non-federal AWOS operator, as well as the ASOS/AOS operator, shall have the capability to enter human observation data (manual override) directly into this field. The manual data shall be denoted by the appropriate value placed in Field 19, Sensor and Sensor Data Status (see Tables 10-11 and 10-12).

(ASOS/AOS only) The occurrence of variable ceiling/sky condition is determined by algorithm (see the current issue of the ASOS Specification). When a variable ceiling/sky condition is detected, average base height shall be indicated as usual in Field 5; in addition, the variable ceiling/sky condition bit in Field 21 (see 10.3.19) shall be set, and the ceiling/sky condition automated remark shall be encoded in Field 22 (see 10.3.20).

10.3.6 Horizontal Visibility (Table 10-1, Fields 6 and 14). Horizontal visibility data shall be recorded in Field 6, Octets 22 through 25, and Field 14, Octets 46 and 47, of the AWOS Format Weather Message. Visibility distance (Octets 22 and 23) shall be stored in hundredths of statute miles with rounding as necessary. The requirements in paragraph 10.2.7.2 shall be applied to these two Octets as a unit (e.g. sensor-not-installed shall be denoted by FFFEh).

Table 10-5 provides the convention for encoding horizontal visibility. There are four columns of information. Column 1 indicates a visibility category (or rather sequence, since discrete values are used). Column 2 gives the range of observed visibilities that are included in a corresponding category. Column 3 and Column 4 provide the indicated visibility and the encoded values, respectively.

The first category indicates a detected visibility of zero miles; it shall be encoded in binary as 0. The last category represents visibilities greater than 87.5 miles; it shall be encoded as 9000.

The occurrence of variable visibility is determined by algorithm. When a variable visibility condition is detected, average visibility shall be indicated as usual in Field 6; in addition, the variable visibility bit in Field 21 (see 10.3.19) is set, and the range of variable visibility is encoded in Field 22 (see 10.3.20).

Octets 24, 25, 46, and 47 of the AWOS Format Weather Message shall provide information on the obscurations detected during the latest observation cycle. The information on obscurations shall be encoded in binary. The requirements in paragraph 10.2.7.2 shall be applied to these two Octets as a unit. In addition, Field 20, Parameter Activation Status, Octet 66, shall be utilized to indicate the monitoring status of the individual obscuration types (see 10.3.18).

Tables 10-6 and 10-8A delineate the obscurations data. Columns 1 and 2 list the octet and bit sequences, respectively, with Bit 0 the LSB and Bit 7 the MSB for each octet. Column 3 explains the representation of each bit.

All forms of fog shall be reported only when horizontal visibility is less than or equal to 5/8 statute mile. Mist, if present, shall be reported when visibility is greater than 5/8 statute mile. Volcanic ash, if present, shall always be reported.

The federal/non-federal AWOS operator, as well as the ASOS/AOS operator, shall have the capability to enter human observation data (manual override) directly into this field. The manual data shall be denoted by the appropriate value placed in Field 19, Sensor and Sensor Data Status (see Tables 10-11 and 10-12)

10.3.7 Observed Precipitation (Table 10-1, Fields 7 and 14). Observed precipitation shall be recorded in Octets 26 through 31 and 46 and 47 of the AWOS Format Weather Message.

Octets 26 and 27 shall contain accumulated precipitation. Accumulated precipitation shall be encoded in binary, and reported in hundredths of inches, i.e. 2.65 inches is encoded as 265.

(a) (ASOS/AOS only): New accumulations shall be initiated at the start of each hour. Trace precipitation (i.e. < 0.005 inch) shall be indicated by encoding a null value (binary zero) in precipitation accumulation and by indicating precipitation occurrence (see below). The requirements in paragraph 10.2.7.2 shall be applied to these two Octets, 26 and 27, as a unit.

(b) (Federal/non-federal AWOS only): Precipitation shall accumulate from 0 through 999D (03E7h), when it shall automatically roll over. The requirements in paragraph 10.2.7.2.a, but not 10.2.7.2.b, shall apply to these two Octets as a unit.

Octets 28 through 31 and 46 and 47 of the AWOS Format Weather Message shall provide information on precipitation occurrence and intensity as detected during the latest observation cycle. This information, depicted in Tables 10-7 and 10-8A, shall be encoded in binary. The requirements in paragraph 10.2.7.2 shall be applied to each individual 4-bit subfield as a unit within these four Octets. In addition, Field 20, Parameter Activation Status, Octet 67, shall be utilized to indicate the monitoring status of the individual precipitation types (see 10.3.18).

The AWOS operator shall have the capability to enter human observation data (manual override) directly into Octets 28 through 31 and 46 and 47 of this field. The manual data shall be denoted by the appropriate value placed in Field 19, Sensor and Sensor Data Status (see Tables 10-11 and 10-12).

Columns 1 and 2 of Tables 10-7 and 10-8A provide the octet and bit numbers, respectively. Column 3 contains the current precipitation condition. Column 4 provides additional information relevant to the description of each parameter.

All precipitation bits of the precipitation fields shall be set to zero (i.e. precipitation field is null) to indicate that no precipitation was detected (and thus recorded) during the latest observation cycle. The first seven precipitation types shall use four bits to indicate a precipitation condition, or a no precipitation condition. When precipitation is detected, a precipitation intensity may be encoded for these seven types. The remaining six types shall use only a single bit assigned.

Table 10-8 delineates the precipitation intensity levels defined for each precipitation type in Octets 28 through 31 for which different intensities are identified. Table 10-8 presents four columns of bit identification, a column containing the corresponding numeric value of the bit sequence, and a column containing the associated precipitation intensity level. A numeric value of 0 indicates that no precipitation (of the specified type) was detected during the past observation cycle. A numeric value of 1 indicates that precipitation was detected, but no intensity level was determined. Numeric values of 2 through 4 indicate that continuous precipitation was observed at light, moderate, and heavy intensity levels, respectively. Numeric values of 5 through 7 indicate that showers of precipitation were observed at light, moderate, and heavy intensity levels, respectively, while the numeric value of 8 indicates showers of preciptation in the vicinity. Numeric values of 9, 10, and 11 indicate that the observed precipitation was low and drifting, blowing, or blowing in the vicinity, respectively.

Octet 28, Bits 0 through 3 are used in combination to indicate that precipitation of a non-specified form was detected during the latest observation cycle. Some precipitation forms listed in Table 10-7, for example, hail and ice crystals, may not be required to be isolated by the "precipitation type" instrument described in the latest AWOS Specification. These precipitation types are identified in Table 10-7 by a "+" indicator and are included to provide the capability for system enhancement when technology permits.

10.3.8 Ambient Temperature (Table 10-1, Field 8). Octet 32 in the AWOS Format Weather Message shall contain ambient temperature. Temperature data shall be encoded in binary. The engineering units shall be whole degrees Fahrenheit (° F) or degrees Celsius (° C), as shall be indicated by the setting of Octet 5, Bit 1, Site Configuration Number. Note that Celsius is preferred. Therefore, the encoded value shall be equal to the average ambient temperature plus 100. Values shall be stored in whole degrees. The requirements in paragraph 10.2.7.2 shall be applied to this Octet as a unit.

10.3.9 Dew Point Temperature. (Table 10-1, Field 9). Octet 33 in the AWOS Format Weather Message shall contain dew point temperature. Dew point data shall be stored in binary. The engineering units shall be whole degrees Fahrenheit (° F) or degrees Celsius (° C), as shall be indicated by the

setting of Octet 5, Bit 1, Site Configuration Number. Note that Celsius is preferred. Similar to ambient temperature, the encoded value for dew point shall be equal to the average dew point temperature plus 100. Dew point temperature shall be stored in whole degrees. The requirements in paragraph 10.2.7.2 shall be applied to this Octet as a unit.

10.3.10 Wind Direction (Table 10-1, Field 10). Wind direction shall be stored in Octets 34 and 35 of the AWOS Format Weather Message. Octet 34 shall contain, in binary, the wind direction with respect to true north. The requirements in paragraph 10.2.7.2 shall be applied to Octet 34 as a unit. Octet 35 shall hold wind direction with respect to magnetic north. The requirements in paragraph 10.2.7.2 shall be applied to Octet 35 as a unit. Values shall be stored in tens of degrees, i.e. an indicated value of 1 represents 10 degrees.

A range of wind direction values of 0 through 36, inclusively, shall be used. A value of zero (0) in the wind direction field shall indicate calm conditions (note that a zero wind speed is recorded simultaneously also to indicate calm conditions). The detected occurrence of a variable wind condition shall be indicated by encoding the true and magnetic winds as usual in Field 10, setting the variable wind bit in Field 21 of the AWOS Format Weather Message (see 10.3.19), and encoding either the range of the variable wind with respect to true north detected (when the current two-minute average wind speed is greater than 6 knots), or the average wind speed (when the current two-minute average wind speed is less than or equal to 6 knots), in Field 22 (see 10.3.20).

10.3.11 Wind Speed and Gust (Table 10-1, Field 11). Field 11 of the AWOS Format Weather Message shall contain wind speed (Octet 36) and gust (Octet 37). Values shall be stored as binary numbers and in whole knots. The requirements in paragraph 10.2.7.2 shall be applied to Octet 36 as a unit. The requirements in paragraph 10.2.7.2 shall not apply to Octet 37. Calm conditions shall be indicated by setting the wind speed, gust, and direction to zero. When 2-minute average wind speeds are non-zero, but there are no gusts, wind gust shall be set to zero.

10.3.12 Atmospheric Pressure (Table 10-1, Field 12). Three distinct atmospheric pressure parameters shall be recorded in the AWOS Format Weather Message: altimeter setting, density altitude, and sea level pressure. All shall be recorded as binary values.

Altimeter setting shall be recorded in Octets 38 and 39 of the AWOS Format Weather Message (the first two octets of Field 12). Values shall be stored in hundredths of inches Hg, e.g. 29.92 observed is encoded as 2992. The requirements in paragraph 10.2.7.2 shall be applied to these two Octets as a unit.