Density altitude (DA) shall be reported in Octet 40 of the AWOS Format Weather Message, the third octet of Field 12. Values of density altitude shall be reported to the nearest 100 feet, when DA has been determined to exceed 1000 feet above station elevation. When DA has been determined to be less than or equal to 1000 ft above station elevation, a zero (null value) shall be recorded. The requirements in paragraph 10.2.7.2 shall be applied to this Octet as a unit.

Sea level pressure shall be recorded in Octets 41 and 42 of the AWOS Format Weather Message, the fourth and fifth octets of Field 12. Sea level pressure shall be recorded in tenths of millibars (mb), i.e. 1013.2 is stored as 10132 in the AWOS Message. The requirements in paragraph 10.2.7.2 shall be applied to these two Octets as a unit.

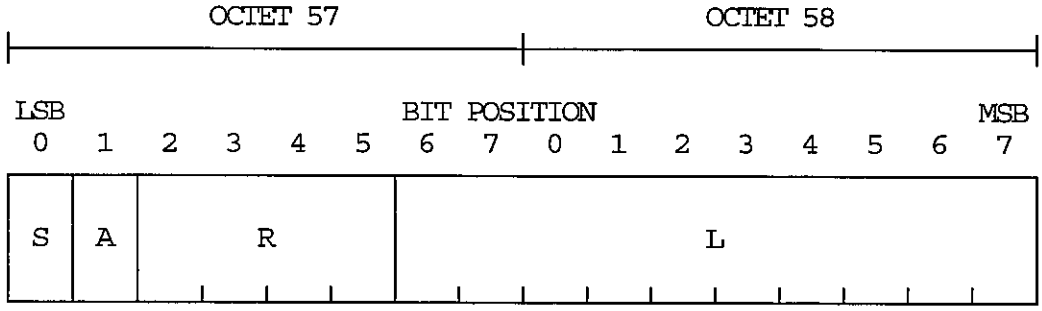
10.3.13 Runway Visual Range (Table 10-1, Field 13). The determination and reporting of Runway Visual Range (RVR) by AWOS will be a future capability. When instituted, RVR shall be recorded in Octets 43 through 45 of the AWOS Format Weather Message. Octets 43 and 44 shall be encoded in binary. Octet 43 shall give the Runway ID, in tens of degrees over the range of 1-36. A runway ID of 240 degrees is encoded as 24.

Octet 44 shall provide the RVR distance in hundreds of feet, e.g. an encoded value of 40 represents 4000 feet. Octet 45 shall be encoded in binary. Octet 45, Bits 4-7, shall take on the following values: the value 1 shall denote that the RVR distance in Octet 44 is the lowest reportable value; the value 2 shall denote that the RVR distance in Octet 44 is the highest reportable value; the value 0 shall denote that the RVR distance in Octet 44 is between the lowest and highest reportable values. Octet 45, Bits 0-3, shall denote the location of the RVR runway relative to other parallel runways as follows: 0 = none (no runway is parallel to the RVR runway), 1 = Left, 2 = Center, 3 = Right. For a given RVR runway, when the direction of recommended landing changes, the values in Octet 43 and Octet 45, Bits 0-3, shall change by 180 degrees. The requirements in paragraph 10.2.7.2 shall be applied individually to the 3 Octets of this field.

10.3.14 Reserved for Expansion (Table 10-1, Fields 14-16). The three fields 14 through 16 (i.e. Octets 46 through 56) shall be reserved for new AWOS parameters. While these Octets are reserved, the requirements in paragraph 10.2.7.2 shall not apply. Future allocation of these reserved octets may be to up to 3 additional RVR runways (see 10.3.13).

10.3.15 Lightning Activity (Table 10-1, Field 17). Field 17 shall comprise 2 octets encoded in binary in Octets 57 and 58, and shall contain the current binary lightning information derived from the current ADAS LAD message (see 30.3.2). When no new LAD message has been received from ADAS during the current minute, the most recent contents of this field shall be repeated.

Field contents are described in Table 10-9. This field shall be composed of 4 subfields as follows:



10.3.15.1 Special (S). Octet 57, Bit 0, is the Metar special message (SPECI) indicator. For Federal/Non-federal AWOS only, the value 1 in this subfield shall be an indication to the ADAS weather data processing function that the ADAS lightning data processing function has determined that the conditions for generating a Metar Format Weather Message based on lightning criteria have been met for the current minute (see the ADAS Specification, FAA-E-2804D). The value 0 shall indicate to the ADAS that the conditions are not met. ASOS and AOS shall ignore this subfield, provided that they maintain their own lightning history, and make their own determinations as to when a lightning-based SPECI shall be generated.

10.3.15.2 Availability (A). Octet 57, Bit 1, indicates the current availability of lightning information to AWOS. The value 1 in this subfield indicates that lightning information is not currently available. The value 0 in this subfield indicates that lightning information is currently available.

10.3.15.3 Lightning (L). Octet 57, Bits 6 and 7, and Octet 58, Bits 0 through 7, are the lightning indicator bits. These bits apply to the zones/sectors as indicated in Table 30-2. The value 1 in any bit of this subfield indicates lightning present in the associated zone/sector. The value 0 in any bit of this subfield indicates that lightning is not present in the associated zone/sector.

10.3.15.4 Reserved (R). Octet 57, Bits 2 through 5, are reserved for future use.

10.3.16 Site Status (Table 10-1, Field 18). Site Status, encoded in binary, shall be contained in Octet 59 of the AWOS Format Weather Message. The purpose of the Site Status field is to carry current operating information pertaining to the AWOS. Table 10-10 provides a description of this field. Columns 1 and 2 list the octet and bit sequences, respectively; Column 3 indicates the contents; and Column 4 is used to explain the contents.

(a) Bit 0 shall be set to 1 when an AWOS operator is on duty (logged on).

(b) Bit 1 shall be set to 1 to indicate that the AWOS is operating in "Test Mode".

(c) Bit 2 shall be set to 1 to indicate that messages at the AWOS are being generated in "Manual Mode".

(d) Bit 3 shall be set to 1 to indicate that part or all of the data in the AWOS Message are suspect, and thus, the message is not viable for operational processing and dissemination.

(e) Bits 4, 5, 6, and 7 are reserved.

10.3.17 Sensor and Sensor Data Status (Table 10-1, Field 19). The Sensor and Sensor Data Status field shall be incorporated in Octets 60 through 65 of the AWOS Format Weather Message. One octet shall contain information pertaining to two sensors, i.e. space has been allocated for up to 12 distinct sensors.

Table 10-11(a) delineates how information is stored in one octet (e.g., Octet 60). Bit sequence, informational content and explanation, respectively, are given in three columns shown. Table 10-11(b) depicts the assignments of sensors currently required.

Table 10-12 delineates the definition of the 4-bit subgroups contained in the Sensor and Sensor Data Status field. Columns 1 through 4 show the binary value, Column 5 the decimal equivalent, and Column 6 the informational content represented by each bit. Bit "A" is the LSB.

(a) A numeric value of 0 (decimal) in any 4-bit group, shall indicate that the sensor is installed at the site, is operating within specification limits, and sensor data are available.

(b) (Reserved)

(c) Any value of 2 or greater, except the value 15, shall indicate that data is unavailable. The numeric value of the 4-bit subgroup shall indicate the reason for missing sensor data.

(d) A numeric value of 2 shall indicate that no sensor has been installed at the site.

(e) A value of 3 shall indicate that the site is configured with the sensor, but that it is currently out of service.

(f) An indication for the numeric value of 4 is reserved.

(g) A numeric value of 5 shall indicate that concurrent readings of output obtained from two matched sensors are in conflict (e.g., two pressure sensors), and thus by definition, sensor data is missing.

(h) A numeric value of 6 shall indicate that sensor/data values were automatically invalidated because of a sensor range check.

(i) A numeric value of 7 shall indicate that sensor/data values were automatically invalidated because of an unacceptable rate of change.

(j) A numeric value of 8 shall indicate that sensor/data values were automatically invalidated because of an insufficient number of inputs were available.

(k) A numeric value of 9 shall indicate that the AWOS operator invalidated the value.

(l) A numeric value of 10 shall indicate that data is missing because of a communication link failure with the sensor.

(m) A numeric value of 11 shall indicate that the dew point sensor data is considered out of range by comparison with the temperature sensor data. This value is unused for all but the dew point sensor.

(n) Indications for the numeric values of 12, 13, and 14 are reserved.

(o) (Federal/non-federal AWOS only) For Octet 62, Sensor 2 (CHI), Octet 63, Sensor 1 (Precipitation Occurrence/Type), Octet 65, Sensor 1 (Freezing Rain), and Octet 64, Sensor 1 (Visibility) only, a numeric value of 15 shall indicate that the operator has entered manual observation data directly into the indicated data fields. (ASOS/AOS only) The numeric value of 15 is reserved.

10.3.18 Parameter Activation Status (Table 10-1, Field 20). Octets 66 and 67 of the AWOS Format Weather Message shall indicate parameter activation status; information specifically pertains to obstructions to visibility and precipitation types, respectively. Data shall be encoded in binary. Table 10-13 depicts the bit assignments for the parameter activation status field. Columns 1 and 2 of the Table 10-13 provide the octet and bit number sequences, respectively. Column 3 identifies the specific bit assignments. Each bit set within this 2-Octet sequence shall indicate that the associated parameter is active, i.e. being monitored (e.g. rain or snow), or determined by algorithm (e.g. haze, smoke).

10.3.19 Automated Remarks Status (Table 10-1, Field 21). Octet 68 is the last one contained in the fixed length segment. It shall contain, encoded in binary, the Automated Remarks Status that is delineated in Table 10-14.

(a) An occurrence of no automated remarks shall be indicated by setting Octet 68 to 0.

(b) When a variable visibility condition has been detected Bit 0 shall be set.

(c) When a variable wind direction has been detected, Bit 1 shall be set.

(d) (ASOS/AOS only) When a variable ceiling has been determined, Bit 2 shall be set.

(e) When an automated lightning remark is present Bit 3 shall be set (see Appendix III).

(f) (ASOS/AOS only) When a visibility at second location condition has been determined, Bit 4 shall be set.

(g) (ASOS/AOS only) When a ceiling height at second location condition has been determined, Bit 5 shall be set.

10.3.20 Automated Remarks (Table 10-1, Field 22). Byte 69 is the first of the variable length remarks segment of the AWOS Format Weather Message. A maximum of 80 ASCII characters of automated remarks (including a delimiter suffix) shall be permitted in a single AWOS Format Weather Message. All automated remarks shall be encoded in ASCII. When generated, automated remarks shall be encoded in Bytes 69 to N, where N shall be less than or equal to 148. When more than one automated remark is generated, the second and successive automated remarks shall be separated from the preceding automated remark by an ASCII space character. When generated, the automated remarks shall be delimited by an ASCII exclamation point "!" in Byte N. The first character of the automated remarks may contain an ASCII space character.

Octet 68 can define a total of eight unique conditions that prompt automated remarks; however, only six such conditions are currently defined. When two (or more) automated remarks occur their order of encoding shall be as follows:

(a) Automated lightning remark.

(b) Variable visibility remark.

(c) Variable wind direction remark.

(d) (ASOS/AOS only) Variable ceiling height remark.

(e) (ASOS/AOS only) Visibility at second location remark.

(f) (ASOS/AOS only) Ceiling height at second location remark.

Table 10-15 summarizes the automated remarks defined for the AWOS Format Weather Message.

10.3.20.1 Automated Lightning Remark. The automated remark pertaining to lightning shall be formatted and inserted in the AWOS Format Weather Message automated remarks field in accordance with the requirements stated in Appendix III. Examples of lightning remarks are:

LTG DSNT NW

LTG DATA MISG

where remark phrases are in accordance with Table 30-3.

10.3.20.2 Variable Visibility. The automated remark pertaining to variable visibility shall be:

VSBY aaa(a)Vbbb(b)

where aaa(a) and bbb(b) shall be 3- or 4-character, variable-length fields with leading "0" characters as necessary to ensure a 3 character minimum, and shall represent range limits provided in hundredths of statute miles. For example:

VSBY 075V250

indicates a variation in visibility between 0.75 and 2.5 miles.

(ASOS/AOS Only) A multiple sensor visibility remark shall be inserted in this field in the exact format by which it is prepared for insertion as a multiple sensor visibility REMARK in Metar Format Weather Messages generated by ASOS/AOS. See the current issue of the ASOS Specification for details of formatting.

10.3.20.3 Variable Wind. The automated remark for variable wind direction shall be encoded as follows when the current average wind speed exceeds 6 knots:

WND ccVdd

where cc and dd shall be 2-character, fixed-length fields with a leading "0" character as necessary, and shall indicate range limits provided in tens of degrees. For example:

WND 06V13

denotes a variation in the true direction between 60 and 130 degrees. Note that if a magnetic decoding of this remark is required, the parameter values must be modified by the difference between Octet 34, True Wind Direction, and Octet 35, Magnetic Wind Direction.

The automated remark for variable wind direction shall be encoded as follows when the current average wind speed is equal to or less than 6 knots and five-second wind samples have varied over a range of 60 degrees or more over the past two minutes:

VRBkkKT

where kk shall be a 2-character, fixed-length field with a leading "0" character, and "VRB" and "KT" shall be literals. For example:

VRB03KT

Figure 10-4 presents an example of two automated remarks encoded following the fixed length segment of an AWOS Format Weather Message.

Octets 1-68 FIXED LENGTH SEGMENT	Bytes 69-91 VSBY 175V300 WND 01V08!

Figure 10-4. Two Automated Remarks with "!" Delimiter

The encoding shall start in Byte 69. A space shall be used to separate contiguous automated remarks, and the "!" delimiter shall be encoded in the last byte (Byte 91 in this case).

10.3.20.4 Variable Ceiling. (ASOS/AOS Only) The automated remark for variable ceiling condition inserted into a single AWOS Format Weather Message may indicate one (for an airport configured with a single cloud sensor) or one of two (for an airport configured with multiple cloud sensors) cloud conditions. The format of each is shown in Table 10-15. Upper case letters and blanks within individual remarks are fixed. Lower case letters represent variable inputs, where:

eee,fff shall be 3-character, fixed-length fields with leading "0" character(s) as necessary, and shall respectively represent minimum and maximum ceiling heights, in hundreds of feet, above ground level (AGL).

gggggggg shall be a 1- to 8-character, variable-length field representing one of the eight cardinal directions: "N", "NE", "E", "SE", "S",

"SW", "W", "NW" and/or additional descriptors such as runway designators, etc.

For example:

CIG 008V020

indicates that a variable ceiling base height was detected between 800 and 2000 feet.

10.3.20.5 Visibility At Second Location. (ASOS/AOS Only) The automated remark pertaining to visibility at a second location, generated only when this value is less than that registered at the primary location, shall be encoded as:

VIS aaaaa gggggggg

where aaaaa shall be a variable length field of up to 5 characters representing the visibility in fractional format, with a single space character separating the integer and fractional parts, and gggggggg shall be a 1- to 8-character, variable-length field representing one of the eight cardinal directions: "N", "NE", "E", "SE", "S", "SW", "W", "NW" and/or additional descriptors such as runway designators, etc. For example:

VIS 1 3/4 RWY22

indicates a visibility of one and three quarters statute miles registered at the Runway 22 location.

10.3.20.6 Ceiling Height At Second Location. (ASOS/AOS Only) The automated remark pertaining to ceiling height at a second location, generated only when this value is less than that registered at the primary location, shall be encoded as:

CIG hhh gggggggg

where hhh shall be a fixed length field of 3 characters representing the measured ceiling height in hundreds of feet, and gggggggg shall be a 1- to 8-character, variable-length field representing one of the eight cardinal directions: "N", "NE", "E", "SE", "S", "SW", "W", "NW" and/or additional descriptors such as runway designators, etc. For example:

CIG 003 RWY22

indicates a ceiling height of three hundred feet registered at the Runway 22 location.

10.3.21 Operator Remarks (Table 10-1, Field 23). Operator remarks, if encoded, shall be positioned, if automated remarks are generated, immediately following the automated remarks delimiter, or, if automated remarks are not generated, immediately after the fixed length segment. A maximum of 80 ASCII characters of operator remarks shall be permitted in a single AWOS Format Weather Message. Operator remarks shall be freely formatted and encoded in ASCII.

Figure 10-5 shows an example of a single operator comment following two automated remarks and the fixed length segment of the AWOS Format Weather Message.

Octets 1-68 FIXED LENGTH SEGMENT	Bytes 69-90 LTG DSNT SE WND 01V08!	Bytes 91-99 OCNL SHRA

Figure 10-5. Single Operator Comment Following Two Automated Remarks.

The comment indicates occasional light rain showers have been occurring.

Table 10-1. AWOS Format Weather Message.

FIELD	OCTET	CONTENTS	TYPE	EXPLANATION
1	1	Site ID	ASCII	Four unique characters
	2	|	"	per AWOS Site (no spaces)
	3	|	"	|
	4	|	"	|
2	5	Site Configuration #	Binary	See 10.3.2
	6	|	"	|
3	7	Year	"	Range: 00-99, e.g. 88
	8	Month of year	"	Range: 1-12
	9	Day of month	"	Range: 1-31
	10	Hour of day	"	Range: 0-23 (UTC)
	11	Minute of hour	"	Range: 0-59
4	12	Alert Data	"	See Table 10-2
	13	|	"	"
	14	|	"	"
	15	|	"	"
5	16	1st Cloud Layer Base Ht	"	100s of feet
	17	1st Cloud Amount	"	See Table 10-3
	18	2nd Cloud Layer Base Ht	"	100s of feet
	19	2nd Cloud Amount	"	See Table 10-3
	20	3rd Cloud Layer Base Ht	"	100s of feet
	21	3rd Cloud Amount	"	See Table 10-3
6	22	Visibility	"	See Table 10-5
	23	|	"	100ths st. miles
	24	Obstructions to Vision	"	See Table 10-6
	25	|	"	"
7	26	Precip Accumulation	"	100ths of inches since
	27	|	"	start of the hour
	28	Precipitation	"	See Table 10-7
	29	Type and Intensity	"	"
	30	|	"	"
	31	|	"	"
8	32	Ambient Temperature	"	Whole deg. F or C + 100
9	33	Dew Point Temperature	"	Whole deg. F or C + 100
10	34	Wind Direction: True	"	Range:0-36, 10s of deg.
	35	:Magnetic	"	Range:0-36, 10s of deg.
11	36	Wind Speed: Average	"	Range:0-100, Whole kn
	37	: Gust	"	Range:0-100, Whole kn
12	38	Altimeter	"	100ths of inches Hg
	39	|	"	|
	40	Density Altitude	"	100s of feet, >1000ft
	41	Sea Level Pressure	"	10ths of mb
	42	|	"	|
13	43	RVR Runway ID	"	10's of degrees, 1-36
	44	RVR	"	100's of feet
	45	Bits 0-3: RVR Parallel Runway	"	0, 1, 2, or 3
	45	Bits 4-7: RVR High/Low Flag	"	0, 1, or 2

Table 10-1. AWOS Format Weather Message. (Continued)

FIELD	OCTET	CONTENTS	TYPE	EXPLANATION
14	46 47	Supplementary Obscurations and Precipitation Types	Binary	See Table 10-8A
15 | | | 16	48 | | | 56	Reserved for Expansion	-	Assumed 2 fields using up to 9 octets in total (Primarily reserved for up to 3 additional RVR runways)
17	57 58	Lightning Activity	Binary "	See Table 10-9 "
18	59	Site Status Data	"	See Table 10-10
19	60 61 62 63 64 65	Sensor/Data Status Data: 1 Sensor/Data Status Data: 2 Sensor/Data Status Data: 3 Sensor/Data Status Data: 4 Sensor/Data Status Data: 5 Sensor/Data Status Data: 6	" " " " " "	See Table 10-11 | | | | |
20	66 67	Parameter Activation Status	" "	See Table 10-13 "
21	68	Automated Remarks Data	"	See Table 10-14
		End of Fixed Field Data / Start of Remarks		
22	69 | | | | | | | N	Automated Remarks Lightning Variable Visibility Variable Wind Variable Ceiling (ASOS/AOS only) Visibility at Second Location (ASOS/AOS only) Ceiling Height at Second Location (ASOS/AOS only) Automated Remarks Delimiter	ASCII " " " " " " "	See Table 10-15 ! ! ! ! ! ! !
23	N+1 | | | M	Operator Remarks	ASCII " " "	At Operator Discretion | | |

Table 10-2. Definition of the Alert Data Field 4.

OCTET	BIT	CONTENT	ALERT VALUE NO	YES
12	0	Sky Condition, In	0	1
	1	Ceiling, Up	0	1
	2	Ceiling, Down	0	1
	3	Visibility, Increase	0	1
	4	Visibility, Decrease	0	1
	5	Wind Direction/Preferred Runway Change	0	1
	6	Wind Speed, Increase	0	1
	7	**	0	1
13	0	Hail, Begin	0	1
	1	Hail, End	0	1
	2	Ice Pellets, Begin	0	1
	3	Ice Pellets, End	0	1
	4	Freezing Rain, Begin	0	1
	5	Freezing Rain, End	0	1
	6	Freezing Drizzle, Begin	0	1
	7	Freezing Drizzle, End	0	1
14	0	Thunderstorm, Begin	0	1
	1	Thunderstorm, End	0	1
	2	Thunderstorm, Increase	0	1
	3	Tornado Observed	0	1
	4	Funnel Cloud Observed	0	1
	5	Water Spout Observed	0	1
	6	**	0	1
	7	Local Threshold Exceeded	0	1
15	0	Snow, Begin	0	1
	1	Snow, End	0	1
	2	Rain, Begin	0	1
	3	Rain, End	0	1
	4	Non-specific Precip, Begin	0	1
	5	Non-specific Precip, End	0	1
	6	Fog, Begin	0	1
	7	Fog, End	0	1

** Available for Future Use

Table 10-3. Definition of Cloud Amount Status Octets Field 5*

BIT	SKY CONDITION
0	Scattered
1	Broken
2	Overcast
3	Obscured
4	**
5	Indefinite Ceiling Designator (VV)
6	No Clouds Detected Below Design Level
7	Few

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* Octets 17, 19, and 21 of the AWOS Format Weather Message

** Available for Future Use

Table 10-4a. AWOS Format Weather Message Sky/Ceiling Encoding Convention

CASE	DESCRIPTION	AWOS CRITERIA	LAYER	HEIGHT OCTET NO.	HEIGHT 100'S FT	AMOUNT OCTET NO.	CLOUD LAYER AMOUNT 7 6 5 4 3 2 1 0	STATUS OCTET NO.	SENSOR/DATA STATUS 7 6 5 4 3 2 1 0
1.	MISSING DATA								
1.a	Sky/Ceiling Missing	Ceiling Height Indicator	1	16	255	17	1 1 1 1 1 1 1 1	62	0 0 1 1 x x x x
		(CHI) missing or	2	18	255	19	1 1 1 1 1 1 1 1		
		<30 minutes data	3	20	255	21	1 1 1 1 1 1 1 1		
1.b	Visibility Missing and								
1.b.1	No clouds detected	RC < 0.06 & DPD > 5F	1	16	120	17	0 1 0 0 0 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
1.b.2	1 or more layers	RL > 0.06 & DPD ≥ 5F	1	16	20	17	0 0 0 0 0 0 0 1	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
1.b.3	1 or more layers	RL ≥ 0.5 & DPD ≤ 4F	1	16	20	17	0 0 0 1 0 0 0 1	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
1.b.4	1 or more layers	RL < 0.5 & DPD < 5F	1	16	255	17	1 1 1 1 1 1 1 1	62	0 1 0 0 x x x x
			2	18	255	19	1 1 1 1 1 1 1 1		
			3	20	255	21	1 1 1 1 1 1 1 1		
1.c	Precipitation Missing	see Case No. "4.a"							
1.d	Dew Point Depression (DPD) Missing and								
1.d.1	No clouds detected	Visibility (V) missing,	1	16	255	17	1 1 1 1 1 1 1 1	62	0 1 0 0 x x x x
		and RC < 0.06	2	18	255	19	1 1 1 1 1 1 1 1		
			3	20	255	21	1 1 1 1 1 1 1 1		

Table 10-4b. AWOS Format Weather Message Sky/Ceiling Encoding Convention

CASE	DESCRIPTION	AWOS CRITERIA	LAYER	HEIGHT OCTET NO.	HEIGHT 100'S FT	AMOUNT OCTET NO.	CLOUD LAYER AMOUNT 7 6 5 4 3 2 1 0	STATUS OCTET NO.	SENSOR/DATA STATUS 7 6 5 4 3 2 1 0
1.d.2	1 or more layers	Visibility (V) missing, and RL < 0.5	1	16	255	17	1 1 1 1 1 1 1 1	62	0 1 0 0 x x x x
			2	18	255	19	1 1 1 1 1 1 1 1		
			3	20	255	21	1 1 1 1 1 1 1 1		
1.d.3	1 or more layers	Visibility (V) missing, and RL ≥ 0.5	1	16	20	17	0 0 0 0 0 0 1 0	62	0 0 0 0 x x x x
			2	18	125	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
2.	CLEAR SKIES No clouds detected (within sensor design range)	RC < 0.06 (or no hits) DPD > 5.0 F, V ≥ 2.	1	16	120	17	0 1 0 0 0 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
3.	FULL OBSCURATION								
3.a	No clouds detected	RC < 0.06 & V < 0.25	1	16	0	17	0 0 1 0 1 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
3.b	No clouds detected	RC < 0.06 & 0.25 ≤ V < 0.5	1	16	2	17	0 0 1 0 1 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
3.c	No clouds detected	RC < 0.06 & 0.5 ≤ V < 1.0	1	16	5	17	0 0 1 0 1 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		

Table 10-4c. AWOS Format Weather Message Sky/Ceiling Encoding Convention

CASE	DESCRIPTION	AWOS CRITERIA	LAYER	HEIGHT OCTET NO.	HEIGHT 100'S FT	AMOUNT OCTET NO.	CLOUD LAYER AMOUNT 7 6 5 4 3 2 1 0	STATUS OCTET NO.	SENSOR/DATA STATUS 7 6 5 4 3 2 1 0
3.d	No clouds detected	RC < 0.06 & 1.0 ≤ V < 2.0 precip reported	1	16	7	17	0 0 1 0 1 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
4.	(deleted)								
5.	SKY/CEILING								
5.a	Few	RL < 0.06	1	16	5	17	1 0 0 0 0 0 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
5.b	Scattered	0.06 ≤ RL < 0.5	1	16	10	17	0 0 0 0 0 0 0 1	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
5.c	Broken	0.50 ≤ RL < 0.88	1	16	20	17	0 0 0 0 0 0 1 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		
5.d	Overcast	0.88 ≤ RL	1	16	30	17	0 0 0 0 0 1 0 0	62	0 0 0 0 x x x x
			2	18	0	19	0 0 0 0 0 0 0 0		
			3	20	0	21	0 0 0 0 0 0 0 0		

Table 10-4d. AWOS Format Weather Message Sky/Ceiling Encoding Convention

CASE	DESCRIPTION	AWOS CRITERIA	LAYER	HEIGHT OCTET NO.	HEIGHT 100'S FT	AMOUNT OCTET NO.	CLOUD LAYER AMOUNT 7 6 5 4 3 2 1 0	STATUS OCTET NO.	SENSOR/DATA STATUS 7 6 5 4 3 2 1 0
6.	MULTIPLE CLOUD LAYERS								
6.a	3 or fewer	Combos of "5." above. Report the layers in order of ascending coverage (i.e. "FEW", "SCT", 'BKN", "OVC") rather than layer height. Report only one "OVC".							
			1	16	25	17	1 0 0 0 0 0 0 0	62	0 0 0 0 x x x x
			2	18	110	19	0 0 0 0 0 0 0 1		
			3	20	70	21	0 0 0 0 0 1 0 0		
6.b	More than 3 layers	Select 3 with priority: Lowest "FEW", Lowest "BKN", Lowest "OVC", Lowest "SCT, 2nd Lowest "SCT", 2nd Lowest "BKN", Highest "BKN", Highest "SCT". Report the layers as in 6.a.							
			1	16	50	17	0 0 0 0 0 0 0 1	62	0 0 0 0 x x x x
			2	18	10	19	0 0 0 0 0 0 1 0		
			3	20	80	21	0 0 0 0 0 0 1 0		

Table 10-5. Convention for Encoding Visibility, Field 6*

CATEGORY	RANGE, R statute miles	INDICATED VISIBILITY stat miles	ENCODED VALUE +
1	0.000 = R ≤ 0.03125	0.0	0
2	0.3125 < R ≤ 0.09375	0.0625	6
3	0.09375 < R ≤ 0.15625	0.125	13
4	0.15625 < R ≤ 0.21875	0.1875	19
OLD 1 5	R < 0.200	< 0.25	24
" 2 6	0.21875 < R ≤ 0.28125	0.25	25
7	0.28125 < R ≤ 0.34375	0.3125	31
8	0.34375 < R ≤ 0.4375	0.375	38
" 3 9	0.4375 < R ≤ 0.5625	0.50	50
10	0.5625 < R ≤ 0.6875	0.625	63
" 4 11	0.6875 < R ≤ 0.8125	0.75	75
12	0.8125 < R ≤ 0.9375	0.875	88
" 5 13	0.9375 < R ≤ 1.0625	1.00	100
14	1.0625 < R ≤ 1.1575	1.125	113
" 6 15	1.1575 < R ≤ 1.3125	1.25	125
16	1.3125 < R ≤ 1.4375	1.375	138
" 7 17	1.4375 < R ≤ 1.5625	1.50	150
18	1.5625 < R ≤ 1.6875	1.625	163
" 8 19	1.6875 < R ≤ 1.8125	1.75	175
20	1.8125 < R ≤ 1.9375	1.875	188
" 9 21	1.9375 < R ≤ 2.125	2.0	200
22	2.125 < R ≤ 2.375	2.25	225
" 10 23	2.375 < R ≤ 2.625	2.5	250
24	2.625 < R ≤ 2.875	2.75	275
" 11 25	2.875 < R ≤ 3.25	3.0	300
" 12 26	3.25 < R ≤ 3.75	3.5	350
" 13 27	3.75 < R ≤ 4.5	4.0	400
" 14a 28	4.5 < R ≤ 5.5	5.0	500
" 15 29	5.5 < R ≤ 6.5	6.0	600
" 16 30	6.5 < R ≤ 7.5	7.0	700
" 17 31	7.5 < R ≤ 8.5	8.0	800
" 18 32	8.5 < R ≤ 9.5	9.0	900
" 19 33	9.5 < R ≤ 10.5	10.0	1000
34	10.5 < R ≤ 11.5	11.0	1100
35	11.5 < R ≤ 12.5	12.0	1200
36	12.5 < R ≤ 13.5	13.0	1300
37	13.5 < R ≤ 14.5	14.0	1400
38	14.5 < R ≤ 17.5	15.0	1500
39	17.5 < R ≤ 22.5	20.0	2000
40	22.5 < R ≤ 27.5	25.0	2500
41	27.5 < R ≤ 32.5	30.0	3000
42	32.5 < R ≤ 37.5	35.0	3500
43	37.5 < R ≤ 42.5	40.0	4000
44	42.5 < R ≤ 47.5	45.0	4500
45	47.5 < R ≤ 52.5	50.0	5000
46	52.5 < R ≤ 57.5	55.0	5500
47	57.5 < R ≤ 62.5	60.0	6000
48	62.5 < R ≤ 67.5	65.0	6500
49	67.5 < R ≤ 72.5	70.0	7000
50	72.5 < R ≤ 77.5	75.0	7500
51	77.5 < R ≤ 82.5	80.0	8000
52	82.5 < R ≤ 87.5	85.0	8500
53	87.5 < R	90.0	9000

* Octets 22 and 23 of the AWOS Format Weather Message + 100ths of miles

Table 10-6. Definition of Obscurations Field 6*

OCTET	BIT	OBSCURATION
24	0	Obstruction (non-specific)
	1	Fog
	2	Ground/Shallow Fog
	3	Partial Fog
	4	Haze
	5	Smoke
	6	Drifting Dust
	7	Drifting Sand
25	0	Blowing Sand
	1	Blowing Dust
	2	Blowing Spray
	3	Mist
	4	Volcanic Ash
	5	Sand/Dust Whirls
	6	Sand/Dust Whirls Vicinity
	7	Patchy Fog

* Octets 24 and 25 of the AWOS Format Weather Message

Table 10-7. Definition of Precipitation Type Field 7*

OCTET	BIT	PRECIPITATION TYPE	EXPLANATION
28	0	Precip (Non-specific)	See Table 10-8
	1		
	2		
	3		
	4	Rain	"
	5		
	6		
	7		
29	0	Drizzle	"
	1		
	2		
	3		
	4	Freezing Rain	"
	5		
	6		
	7		
30	0	Freezing Drizzle	"
	1		
	2		
	3		
	4	Ice Pellets	"
	5		
	6		
	7		
31	0	Snow	"
	1		
	2		
	3		
	4	Snow Grains	
	5	Small Hail/Snow Pellets	
	6	Hail	Moderate Intensity
	7	Ice Crystals	Light Intensity

* Octets 28 through 31 of the AWOS Format Weather Message

Table 10-8. Encoding of Precipitation Field 7

BIT ID*				NUMERIC	
D	C	B	A+	VALUE	CONTENTS
0	0	0	0	0	No Precipitation
0	0	0	1	1	Precipitation Occurrence - No Intensity Information Provided
0	0	1	0	2	Precipitation - Light
0	0	1	1	3	Precipitation - Moderate
0	1	0	0	4	Precipitation - Heavy
0	1	0	1	5	Showers - Light
0	1	1	0	6	Showers - Moderate
0	1	1	1	7	Showers - Heavy
1	0	0	0	8	Showers in Vicinity
1	0	0	1	9	Low Drifting
1	0	1	0	10	Blowing
1	0	1	1	11	Blowing in Vicinity
1	1	0	0	12	**
1	1	0	1	13	**
1	1	1	0	14	Sensor Not Installed ++
1	1	1	1	15	Missing Data ++

---

* Bit position in the AWOS Precipitation Data Group

\+ Bit A is the Least Significant Bit (LSB) of each 4-Bit Precipitation Type Group Contained in the Current Precipitation Data

** Available for Future Use, Except Octet 31, Bits 4 - 7

++ Except Octet 31, Bits 4 - 7

Table 10-8A. Supplementary Obscurations and Precipitation Types Field 14*

OCTET	BIT	OBSCURATION/PRECIPITATION
46	0	Light Snow Grains
	1	Heavy Snow Grains
	2	Sandstorm
	3	Heavy Sandstorm
	4	Sandstorm Vicinity
	5	Duststorm
	6	Heavy Duststorm
	7	Duststorm Vicinity
47	0	Blowing Sand Vicinity
	1	Blowing Dust Vicinity
	2	Fog Vicinity
	3	Freezing Fog
	4	Squall
	5	**
	6	**
	7	**

---

* Octets 24 and 25 of the AWOS Format Weather Message

** Available For Future Use

Table 10-9. Description of the AWOS Lightning Activity Field 17

OCTET	BIT	FIELD	DEFINITION
57	0 (LSB)	Special	1 = Metar Generation Condition, 0 = NOT
	1	Availability	1 = Ltg Data Not Available, 0 = Available *
	2	Reserved	Reserved for future use
	3	Reserved	Reserved for future use
	4	Reserved	Reserved for future use
	5	Reserved	Reserved for future use
	6	0 < x ≤ 5	1 = Ltg at airport, 0 = NOT
	7	5 < x ≤ 10	1 = Ltg in vicinity, 0 = NOT

		RANGE FROM AWOS		DIRECTION FROM AWOS	
OCTET	BIT	N. MILES	OCTANT	MIDPOINT	SECTOR
58	0	10 < x ≤ 30	N	360	337.5 to 22.5++
	1	"	NE	45	22.5 to 67.5++
	2	"	E	90	67.5 to 112.5++
	3	"	SE	135	112.5 to 157.5++
	4	"	S	180	157.5 to 202.5++
	5	"	SW	225	202.5 to 247.5++
	6	"	W	270	247.5 to 292.5++
	7 (MSB)	"	NW	315	292.5 to 337.5++

++ For all Bits of Octet 58, 1 = Lightning in the indicated sector
0 = No lightning

* NOTE: When Bit 1, Octet 57, is set to the value 1, all other 15 bits of this Field are undefined.

Table 10-10. Definition of the Site Status Field 18

OCTET	BIT	CONTENT	BIT VALUE EXPLANATION 0	1
59	0	Duty Status	No Operator	Operator
	1	AWOS Operating Mode	Normal Operations	Test
	2	AWOS Message Mode	Automated	Manual*
	3	AWOS Data Status	Operational Data	Suspect Data
	4		**	
	5		**	
	6		**	
	7		**	

* ASOS, AOS, and non-federal AAI AWOS do not have a Manual Mode

** Available for Future Use

Table 10-11. Definition of the Sensor and Sensor Data Status Field 19*

(a) Partitioning of an Individual Octet

BIT	CONTENT	EXPLANATION
0 (LSB)	Sensor 1	See Table 10-12
1		
2		
3		
4	Sensor 2	
5		
6		
7 (MSB)		

(b) Sensor / Data Assignments

Octet 60 Sensor 1: Wind Direction
Sensor 2: Wind Speed

Octet 61 Sensor 1: Ambient Temperature
Sensor 2: Dew Point Temperature

Octet 62 Sensor 1: Pressure
Sensor 2: Ceiling Height Indicator (CHI)

Octet 63 Sensor 1: Precipitation Occurrence/Type
Sensor 2: Precipitation Accumulation

Octet 64 Sensor 1: Visibility
Sensor 2: Lightning

Octet 65 Sensor 1: Freezing Rain
Sensor 2: RVR

---

* Octets 60 through 65 of the AWOS Format Weather Message

Table 10-12. Definition of the 4-Bit Subgroups Contained in the Sensor and Sensor Data Status Field 19

BIT ID*				NUMERIC	
D	C	B	A+	VALUE	CONTENTS
0	0	0	0	0	Sensor(s) Operating / Data Available Data Source onsite
0	0	0	1	1	**
					Data Missing:
0	0	1	0	2	Sensor not installed xx
0	0	1	1	3	Sensor out of service ++
0	1	0	0	4	**
0	1	0	1	5	Sensors output in conflict
0	1	1	0	6	Invalidated: Auto range check
0	1	1	1	7	: Auto rate of change
1	0	0	0	8	: Auto insufficient count
1	0	0	1	9	: AWOS operator
1	0	1	0	10	Data Source offsite: Link failure
1	0	1	1	11	Dew point sensor invalidated
1	1	0	0	12	**
1	1	0	1	13	**
1	1	1	0	14	**
1	1	1	1	15	Operator manual data entry

* Bit position in the Sensor / Data Status Data

\+ Bit A = 0 or 4
B = 1 or 5
C = 2 or 6
D = 3 or 7

xx Missing data resulting from sensor not installed is also signified by turning on all bits except the least significant in the corresponding data field

++ Missing data resulting from sensor or system malfunction is also signified by turning on all bits in the corresponding data field

** Available for Future Use

Table 10-13. Definition of the Obscurations and Precipitation Type Parameter Activation Status Field 20

OCTET	BIT	CONTENTS
	Obscurations	
66	0	Mist
	1	Fog
	2	Ground Fog
	3	Ice Fog
	4	Haze
	5	Smoke
	6	Dust, Volcanic Ash
	7	Blowing Snow, Sand, Dust, Spray
	Precipitation Type	
67	0	Rain
	1	Snow Grains
	2	Freezing Rain
	3	Small hail and/or ice pellets
	4	Ice Pellets
	5	Snow
	6	Ice Crystals
	7	Hail

Table 10-14. Automated Remarks Status Field 21

OCTET	BIT	CONTENT
68	0	Variable visibility
	1	Variable wind direction
	2	Variable ceiling (ASOS/AOS only)
	3	Automated lightning remark
	4	Visibility at second location
	5	Ceiling height at second location
	6	**
	7	**

** Available for Future Use

Table 10-15. Automated Remarks Summary for the AWOS Format Weather Message Field 22.

CONDITION		REMARK FORMAT*
Automated Lightning Remark		(see Table 30-3)
Variable Visibility		VSBY aaa(a)Vbbb(b)
Variable Wind Direction (true+)	(avg wind > 6 KT)	WND ccVdd
	(avg wind <= 6 KT)	VRB03KT
Variable Ceiling Condition** (ASOS/AOS only)		
Single Cloud Sensor Configuration		CIG eeeVfff
Multiple Cloud Sensor Configuration		CIG eee ggggggg
		CIG eeeVfff
		CHINO ggggggg
Visibility at Second Location (ASOS/AOS Only)		VIS ccccc ggggggg
Ceiling Height at Second Location (ASOS/AOS Only)		CIG hhh ggggggg

---

+ See 10.3.20.3

* Lower case letters represent variable inputs. Upper case letters and blank spaces within specific remarks are fixed. Details are provided in the text.

** Only one Ceiling Condition automated remark shall be inserted into a single AWOS Format Weather Message. Ceiling Condition remarks are given in a descending order of priority.

APPENDIX II

20. AUTOMATED SURFACE AVIATION OBSERVATION (SAO) FORMAT WEATHER MESSAGE

20.1 Purpose. Surface Aviation Observation (SAO) Format Weather Messages are prepared by National Weather Service (NWS) Automated Surface Observing Systems (ASOS), Department of Defense (DoD) Automated Observing Systems (AOS), and FAA's AWOS Data Acquisition System (ADAS) for dissemination to and utilization by the National Airspace System (NAS), NWS, and their end users until a cutoff date to be determined. SAO message generation and dissemination shall be discontinued by all parties as of that cutoff date. This version of this ICD makes no further reference to the SAO Format Message. Until the cutoff date to be announced, Appendix II of the previous version of this ICD shall document the requirements for the ADAS-generated SAO Format Weather Message.

APPENDIX III

30. LIGHTNING ACTIVITY DATA MESSAGE

30.1 Purpose. The Lightning Activity Data (LAD) message shall be used to transmit current lightning flash information from ADAS to AWOS each minute. ADAS computes LAD from Lightning Detection Data (LDD) acquired from the commercial National Lightning Detection Network (NLDN).

30.2 General Conventions and Criteria.

30.2.1 Source Data and Systems. ADAS shall provide the LAD message to all AWOS, AOS, and ASOS.

30.2.2 Application Data Unit. The ADU containing an LAD message shall be of variable length, consisting of a fixed 2-octet ADU Header, a fixed 2-octet binary lightning information field, and a variable length binary-encoded automated lightning remark field (see Figure 30-1). Octet 2 of the ADU, the Length Indicator (LI) field, contains the value of the length of the LAD message in octets, exclusive of the 2-octet ADU Header, encoded in binary. As shown in Figure 30-1, the length of the LAD message shall vary from 6 octets to N octets, where N - 6 is the length of the Automated Lightning Remark field when present. The total ADU length shall be always 2 octets greater than the length of the LAD message.

30.2.3 Encoding Convention. The LAD message shall be of variable length and encoded in binary.

30.2.4 LAD Message Type. There shall be a single LAD message type which provides current lightning availability status, an indicator for the generation of a Metar Format Weather Message lightning activity Selected Special Weather Report (SPECI) for use by ASOS/AOS and ADAS, and an encoded compressed automated lightning remark for expansion by AWOS into text remarks for dissemination in the AWOS Format Weather Message (see 10.3.20.1) and into voiced remarks for dissemination in the AWOS Voice Message over the Very High Frequency (VHF) Omnidirectional Ranging (VOR) radio voice channel.

30.2.5 Reporting Criteria. ADAS shall transmit LAD messages to AWOS in accordance with the following requirements:

(a) ADAS shall transmit only that LAD detected for locations within a 30 nautical mile radius of an AWOS to that AWOS.

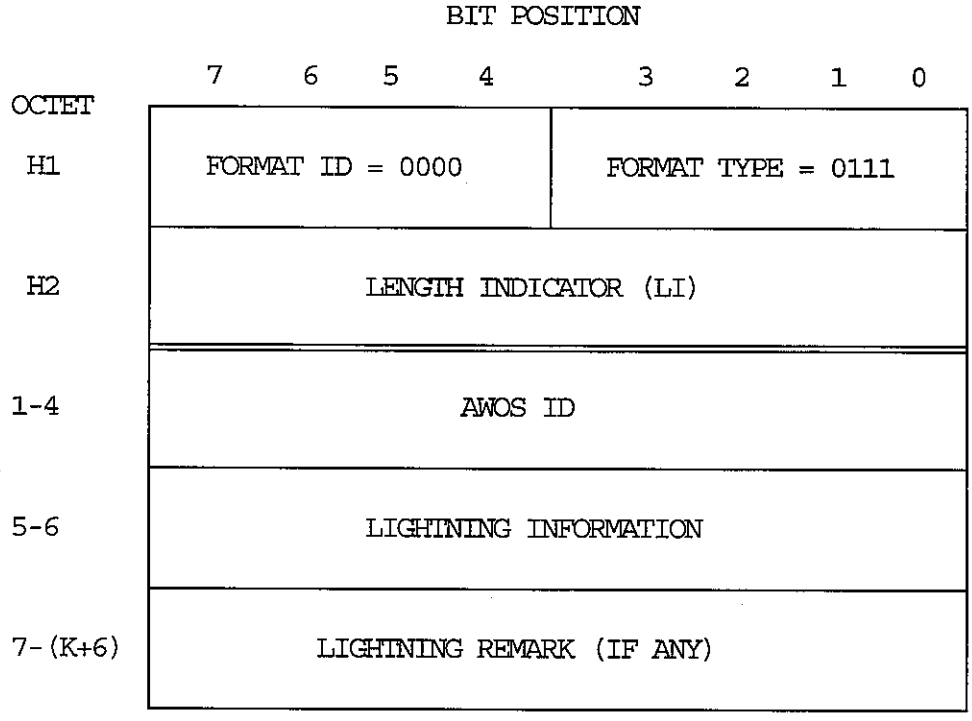
(b) ADAS shall transmit LAD to all AWOS, at maximum, once per minute.

(c) ADAS shall transmit LAD to all AWOS, at minimum, once per minute.

30.2.6 Operator Input. There shall be no operator (manual) input to the LAD message.

30.3 Format and Content. LAD message contents are shown in Table 30-1 and described in the following subparagraphs.

30.3.1 AWOS Site ID (Table 30-1, Field 1). Field 1 of the LAD message shall comprise 4 octets encoded in ASCII in Octets 1 through 4, and shall contain the AWOS Site ID.



LI = 6 + K, where K => 0 (length of LIGHTNING REMARK)
N = LI + 2 = Total ADU length

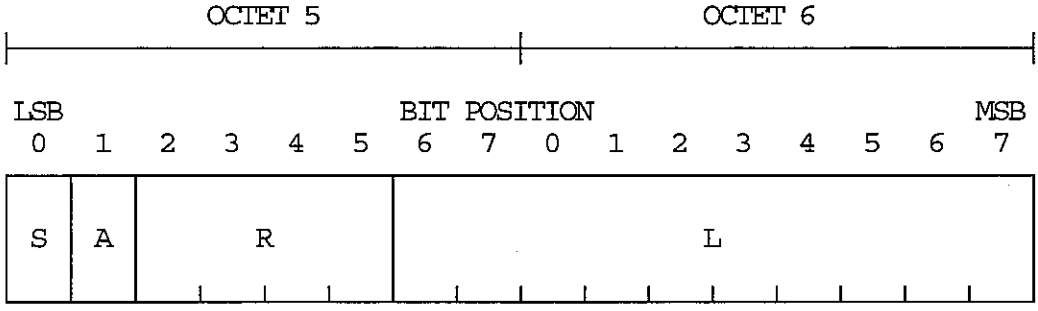
Figure 30-1. LAD Message ADU.

Table 30-1. General Format of the LAD Message.

FIELD	OCTET	TYPE	CONTENTS
1	1	ASCII	AWOS Site ID
	2	"	"
	3	"	"
	4	"	"
2	5	BINARY	Lightning Information
	6	"	"
WHEN PRESENT:			
3	7	"	Lightning Remark Octet 1
	---	---	---
	N	"	Lightning Remark Octet K

N = K + 6

30.3.2 Lightning Information (Table 30-1, Field 2). Field 2 of the LAD message shall comprise 2 octets encoded in binary in Octets 5 and 6, and shall contain current (i.e. as of the minute the LAD message is received by AWOS) lightning information. Field contents are described in Table 30-2. This field shall be composed of 4 subfields as follows:



30.3.2.1 Special (S). Octet 5, Bit 0, shall be the Metar Selected Special Weather Message (SPECI) indicator. Federal/Non-federal AWOS shall not test this subfield. The value 1 in this subfield shall be an indication to ASOS/AOS and ADAS that ADAS has determined that at least one condition for generating a Metar Format Weather Message based on lightning criteria has been met for the current minute. The value 0 indicates no conditions have been met. The lightning special generation criteria are specified in the current issue of the ADAS Specification.

30.3.2.2 Availability (A). Octet 5, Bit 1, shall indicate the current availability of lightning information to AWOS. The value 1 in this subfield shall indicate that lightning information is not currently available. The value 0 in this subfield shall indicate that lightning information is currently available. When ADAS sets the value of this subfield to 1, ADAS shall also set all other bits of Octets 5 and 6 to 1.

30.3.2.3 Lightning (L). Octet 5, Bits 6 and 7, and Octet 6, Bits 0 through 7, shall be the lightning indicator bits. These bits shall apply to the zones/sectors as indicated in Table 30-2. The value 1 in any bit of this subfield shall indicate lightning present in the associated zone/sector. The value 0 in any bit of this subfield shall indicate that lightning is not present in the associated zone/sector.

30.3.2.4 Reserved (R). Octet 5, Bits 2 through 5 are reserved for future use.

Table 30-2. Description of the Lightning Information Field 2

OCTET	BIT	FIELD	DEFINITION
5	0(LSB)	Special	1 = Metar Special msg condition, 0 = NOT
	1	Available	1 = Lightning Data Not Available, 0 = Available
	2	Reserved	Reserved for future use
	3	Reserved	Reserved for future use
	4	Reserved	Reserved for future use
	5	Reserved	Reserved for future use
	6	0 ≤ x ≤ 5	1 = Ltg at airport, 0 = NOT
	7	5 < x ≤ 10	1 = Ltg in vicinity, 0 = NOT

OCTET	BIT	RANGE FROM AWOS N. MILES	OCTANT	DIRECTION FROM AWOS MIDPOINT	SECTOR
6	0	10 < x ≤ 30	N	360	337.5 to 22.5++
	1	"	NE	45	22.5 to 67.5++
	2	"	E	90	67.5 to 112.5++
	3	"	SE	135	112.5 to 157.5++
	4	"	S	180	157.5 to 202.5++
	5	"	SW	225	202.5 to 247.5++
	6	"	W	270	247.5 to 292.5++
	7(MSB)	"	NW	315	292.5 to 337.5++

++ For all Bits of Octet 6, 1 = Lightning in the indicated sector
0 = No lightning

30.3.3 Automated Lightning Remark (Table 30-1, Field 3). Field 3 of the LAD message, only when present, shall comprise a variable number of octets encoded in binary in Octets 7 through 6+K, where K is the field length in octets, and shall contain the compressed current lightning remark. Each octet present shall contain one of the currently defined binary integer remark codes delineated in Table 30-3, column 1. Values greater than 15 are reserved for possible future use. Table 30-3, column 2, exhibits ASCII one or two character mnemonics associated with each code value; these mnemonics are included for the sole purpose of enhancing example remarks in LAD related documentation. Table 30-3, column 3, contains the literal ASCII text phrases which the AWOS shall insert into the text version of the Automated Lightning Remark. Table 30-3, column 4, contains the voice phrases which the AWOS shall insert into the voiced version of the Automated Lightning Remark.

As an example, using the code mnemonics, the compressed remark:

LDNE&SW&NW (7 bytes with integer values 1,4,7,14,11,14, and 13)

shall be expanded by AWOS into the text version of the remark as:

LTG_DSNT_NE_AND_SW_AND_NW (25 bytes)

AWOS shall sequentially translate and expand the series of remark code values in the LAD message remark field into the text (see 10.3.20.1) and voiced versions of the AWOS Automated Lightning Remark, in accordance with the vocabulary given in Table 30-3, as follows.

30.3.3.1 Text remark. In preparing the text remark, AWOS shall insert an ASCII space character (32D) into the text remark between each whole phrase and the prior phrase, if there is a prior phrase. Internal ASCII space characters within a phrase are indicated by the symbol "_" in column 3 of Table 30-3.

30.3.3.2 Voiced remark. In preparing the voiced remark, AWOS shall insert a voiced inter-word break into the voiced remark before each whole phrase and the prior phrase, if there is a prior phrase. Internal voiced inter-word breaks within a phrase are indicated by the symbol "p" in column 4 of Table 30-3.

Table 30-3. Automated Lightning Remark Encoding/Decoding Vocabulary.

Note: ASCII lower case "p" symbolizes a voiced inter-word break.
ASCII underscore "_" symbolizes an ASCII text space.

Column 1 CODE VALUE	2 MNEMONIC	3 TEXT PHRASE	4 VOICED PHRASE
0		(reserved)	
1	L	LTG	LIGHTNING
2		(reserved)	
3		(reserved)	
4	D	DSNT	DISTANT
5	Q	ALQDS	ALLpQUADRANTS
6	N	N	NORTH
7	NE	NE	NORTHEAST
8	E	E	EAST
9	SE	SE	SOUTHEAST
10	S	S	SOUTH
11	SW	SW	SOUTHWEST
12	W	W	WEST
13	NW	NW	NORTHWEST
14	&	AND	AND
15	-	-	THROUGH
16 - 255		(reserved)	

30.4 AWOS lightning processing. AWOS shall perform the following processing related to lightning.

(a) When a new LAD message is received from ADAS, AWOS shall always, prior to any other processing of the message, test Octet 5, Bit 1, Availability, of the new message (see 30.3.2.2 and Table 30-2). The value of this bit shall determine for AWOS the current availability status of LAD lightning information.

(b) AWOS shall develop the capability to maintain the known availability status of LAD lightning information.

(c) AWOS shall develop the capability to determine that the availability status of LAD lightning information is unknown to AWOS.

(d) AWOS shall develop the capability to determine that the external connection to ADAS has failed.

30.4.1 Lightning not available.

(a) When AWOS determines that the availability status of LAD lightning information is unknown to AWOS for two or more consecutive ADAS polling cycles, AWOS shall automatically set its internal lightning availability status to indicate non-availability.

(b) When a new LAD message is received from ADAS, if the value of Octet 5, Bit 1, Availability, in the new message is 1, AWOS shall automatically set its internal lightning availability status to indicate non-availability.

(c) AWOS shall detect the case that the connection to ADAS became and has remained failed for a period of 2 consecutive minutes. AWOS shall at that time automatically set its internal lightning availability status to indicate non-availability, and shall retain that value until a new LAD message is received for processing.

(d) While the AWOS internal lightning availability status indicates non-availability, AWOS shall automatically each minute,

1) Set Octet 64, Bits 4-7, in the pending AWOS Format Weather Message to the numeric value 3 (see 10.3.17 and Tables 10-11 and 10-12).

2) Set all bits of Octets 57 and 58 in the pending AWOS Format Weather Message to the value 1 (see 10.3.15 and Table 10-9).

3) Set Bit 3 of Octet 68 in the pending AWOS Format Weather Message to the value 1 (see 10.3.19 and Table 10-14).

4) Place into the text Automated Lightning Remark field in the pending AWOS Format Weather Message (see 10.3.20.1) the text remark "LTG DATA MISG"

5) (ASOS/AOS only) ASOS/AOS shall insert the text remark "LTG DATA MISG" in the Automated REMARK field of the current pending Metar Format Weather Message.

(e) While the AWOS internal lightning availability status indicates non-availability, AWOS shall automatically each minute in the pending AWOS Voice Message,

1) Place into the voiced Automated Lightning Remark field the voiced remark "LIGHTNINGpDATApMISSING"

30.4.2 Lightning available.

(a) When the AWOS receives a new LAD message with Octet 5, Bit 1, Availability, containing the value 0, AWOS shall automatically set its internal lightning availability status to indicate availability.

(b) While the AWOS internal lightning availability status indicates availability, AWOS shall automatically each minute in the current pending AWOS Format Weather Message and AWOS Voice Message:

1) Set Octet 64, Bits 4-7, of the AWOS Format Weather Message to the numeric value 0 (see 10.3.17 and Tables 10-11 and 10-12).

2) Transfer the entire, unedited contents of the LAD message Field 2, Octets 5 and 6, to the AWOS Format Weather Message Octets 57 and 58 respectively (see 10.3.15 and Table 10-9).

3) Test for the presence in the LAD message of Field 3, Automated Lightning Remark, Octets 7 to LI (see 3.3.3 and Table 30-3).

a) If Field 3 is of 0 length (i.e. LI = 6), AWOS shall not construct any Automated Lightning Remark for voice and text.

b) If Field 3 is not of 0 length, AWOS shall expand the compressed remark in Field 3 into both the text and voiced versions of the Automated Lightning Remark in accordance with the requirements set forth in 30.3.3 et infra and Table 30-3.

c) AWOS shall insert the text version of the expanded remark in the Automated Remark field of the current pending AWOS Format

Weather Message (see 10.3.20.1), and shall set Bit 3 of Octet 68 to the value 1 (see 10.3.19 and Table 10-14).

d) AWOS shall insert the voiced version of the expanded remark in the automated remark field of the current pending AWOS Voice Message.

e) (ASOS/AOS only) ASOS/AOS shall insert the text version of the expanded remark in the Automated REMARK field of the current pending Metar Format Weather Message.

(c) While the AWOS internal lightning availability status indicates availability, and, within the same LAD message, Octet 5, Subfield L, Bit 6 contains the value 1, indicating lightning activity within 5 miles,

1) AWOS shall automatically place into the voiced Present Weather field with the standard relative precedence the voiced remark "THUNDERSTORM".

2) (ASOS/AOS only) ASOS/AOS shall automatically insert the text phrase "TS" into the Weather Group field of the current pending Metar Format Weather Message.

(d) While the AWOS internal lightning availability status indicates availability, and, within the same LAD message, Octet 5, Subfield L, Bit 6 contains the value 0 and Bit 7 contains the value 1, indicating lightning activity within 10 miles but not within 5 miles,

1) AWOS shall automatically place into the voiced Present Weather field with the standard relative precedence the voiced remark "THUNDERSTORM IN VICINITY".

2) (ASOS/AOS only) ASOS/AOS shall automatically insert the text phrase "VCTS" into the Weather Group field of the current pending Metar Format Weather Message.

(e) (ASOS/AOS only) While the ASOS/AOS internal lightning availability status indicates availability, and, within the same LAD message, Octet 5, Subfield S, Bit 0 contains the value 1, indicating lightning alert criteria have been met, ASOS/AOS shall prepare and generate a Metar Format Aviation Selected Special Weather Message (SPECI) to the ADAS.

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APPENDIX IV

40. NON-WEATHER MESSAGES

40.1 Purpose. Non-weather messages shall be used when implemented on the link between ADAS and AWOS to provide date/time information, basic communication test sequences, and error handling procedures for the applications.

40.1.1 Applicability. It shall be mandatory for the ADAS to implement the message types specified within this appendix. It shall be optional for any AWOS interfacing the ADAS to implement any of these message types. The reception by any AWOS of an unrecognized (i.e. unimplemented by AWOS) message of any of the types specified herein shall not cause any positive response within the AWOS (i.e. the unrecognized message shall be discarded).

40.2 General Conventions and Criteria.

40.2.1 Source Data and Systems. AWOS shall interact with ADAS in utilizing non-weather message formats under conditions specified in 40.2.5.

40.2.2 Application Data Unit. Non-weather messages may have data request and/or data transfer ADUs. Data request ADUs comprise a two-octet header only. The specific values given to Format ID and Format Type for various data request ADUs are listed in Table 3-1.

Specific values for Format ID and Format Type given to data transfer ADUs are listed in Table 3-1 and shown in the schematic figures presented in 40.3. The characteristics of data transfer ADUs depend on message type (see 40.3).

40.2.3 Non-Weather Message Types. There shall be three types of non-weather messages.

40.2.3.1 Test Message. The Test Message Request ADU is provided to the AWOS or ADAS station technician to confirm the ID and software configuration of the other station. It is to be used under technician control primarily during initial installation, AWOS link reconfiguration, or diagnostic sessions. It may be used during the operating mission only at low priority.

40.2.3.2 Date/Time Message. ADAS is interfaced to the Coded Time Source (CTS). The Date/Time Message Request ADU permits a technician at an AWOS to query for the standard time from ADAS. In addition, the ADAS may transmit unsolicited Date/Time Messages to the AWOS. In this case, AWOS that have implemented the Date/Time Message shall utilize the ADAS time/date data within the message to synchronize the AWOS internal clock.

ADAS may use the Date/Time Message Request to obtain the current time at an AWOS. The current date and time (resolution to the second) is provided in the Date/Time Message.

40.2.3.3 Error Message. The Error Message ADU is available to permit ADAS (or AWOS) to signal a detected error in ADU format or message information provided by its link counterpart. Because HDLC link layer facilities provide reliable transmission, such errors can result only from software errors in AWOS or ADAS; error ADUs should never arise during normal operation.

40.2.4 Encoding Convention.

40.2.4.1 Test Message. Test Messages shall be fixed length and encoded in ASCII only.

40.2.4.2 Date/Time Message. The Date/Time Message shall be fixed length and encoded in binary (e.g., date/time), and ASCII (Site ID).

40.2.4.3 Error Message. Error Messages shall be variable length and may contain either binary code, ASCII characters or both.

40.2.5 Reporting Scenarios.

40.2.5.1 Test Message. ADAS shall have the ability to request station identification, system identification, and site and software configuration information from AWOS. AWOS shall be capable of requesting ADAS site identification and software configuration information from ADAS. Requests shall be provided by means of a Test Message Request ADU. In response, AWOS and ADAS transmit distinct Test Message ADUs[1].

40.2.5.2 Date/Time Message. An authorized technician at an AWOS initiates the date/time request through the OID. When polled the AWOS transmits the date/time request to ADAS. In response, ADAS generates and transmits the Date/Time Message ADU to AWOS. An authorized technician at ADAS initiates the date/time request. The ADAS transmits the date/time request to AWOS together with the weather data poll. In response, AWOS generates and transmits the Date/Time Message ADU to the ADAS immediately following the weather data ADU(s).

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[1] ADAS (or AWOS) may process all Test Message Requests and Test Message receptions by recording the type of ADU, AWOS (or ADAS) ID, date and time, and indication of received or failed response. Test message contents may be displayed on the ADAS system console, AWOS operator terminal (or ASOS OID) with minimal formatting required.

40.2.5.3 Error Message. AWOS (or ADAS) transmits an ADU to ADAS (or AWOS). For example, AWOS transmits (in response to an ADAS poll for current weather data) a data transfer ADU containing an AWOS Format Weather Message. The receiving station (ADAS in this case) interprets the ADU type and performs any basic validation procedures required (e.g. check of message date and time). The receiving station (ADAS here) terminates message processing at the first application layer error detected (e.g. an uninterpretable ADU header; or date/time out of tolerance), determines the relative position of the octet in error, and constructs an Error Message ADU for transmission back to the sending station (AWOS here).

40.2.6 Operator Input.

40.2.6.1 Test Message. An authorized technician at AWOS or ADAS may start the Test Message sequence. However, there shall be no manual input to the Test Message request or transfer ADUs.

40.2.6.2 Date/Time Message. An authorized technician at AWOS or ADAS may start the Date/Time Message sequence. However, there shall be no manual input to the Date/Time Message request or transfer ADUs.

40.2.6.3 Error Message. There shall be no manual intervention or input to the Error Message ADU.

40.2.7 Missing Data. All necessary information requested or provided (e.g., site identification and configuration) associated with non-weather messages shall be pre-specified and resident in each of the host computers (i.e. no system information shall be dynamically generated). However, in the case that any requested information is not available:

(a) For missing data to be encoded in ASCII, an "M" shall be placed in each octet.

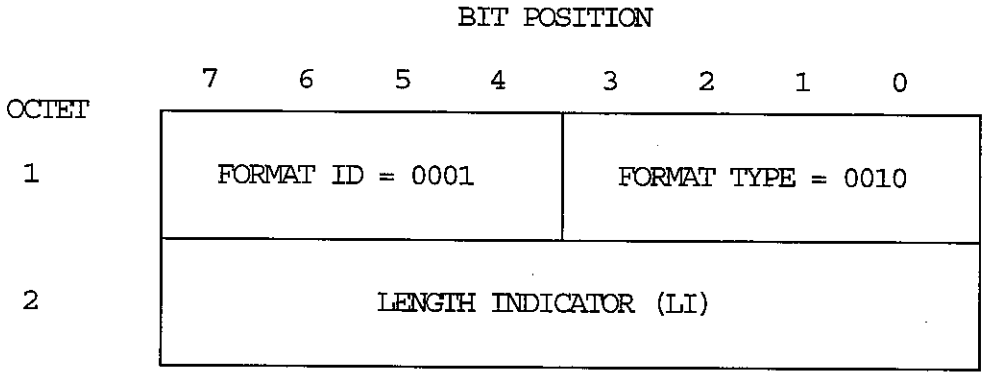
(b) For missing binary data, all of the bits in the affected octets shall be set to one.

40.3 Content and Format.

40.3.1 Test Messages. Figures 40-1 through 40-3 show, respectively, schematics of the Test Message request ADU (a two-octet Header), the AWOS Test Message ADU, and the ADAS Test Message ADU.

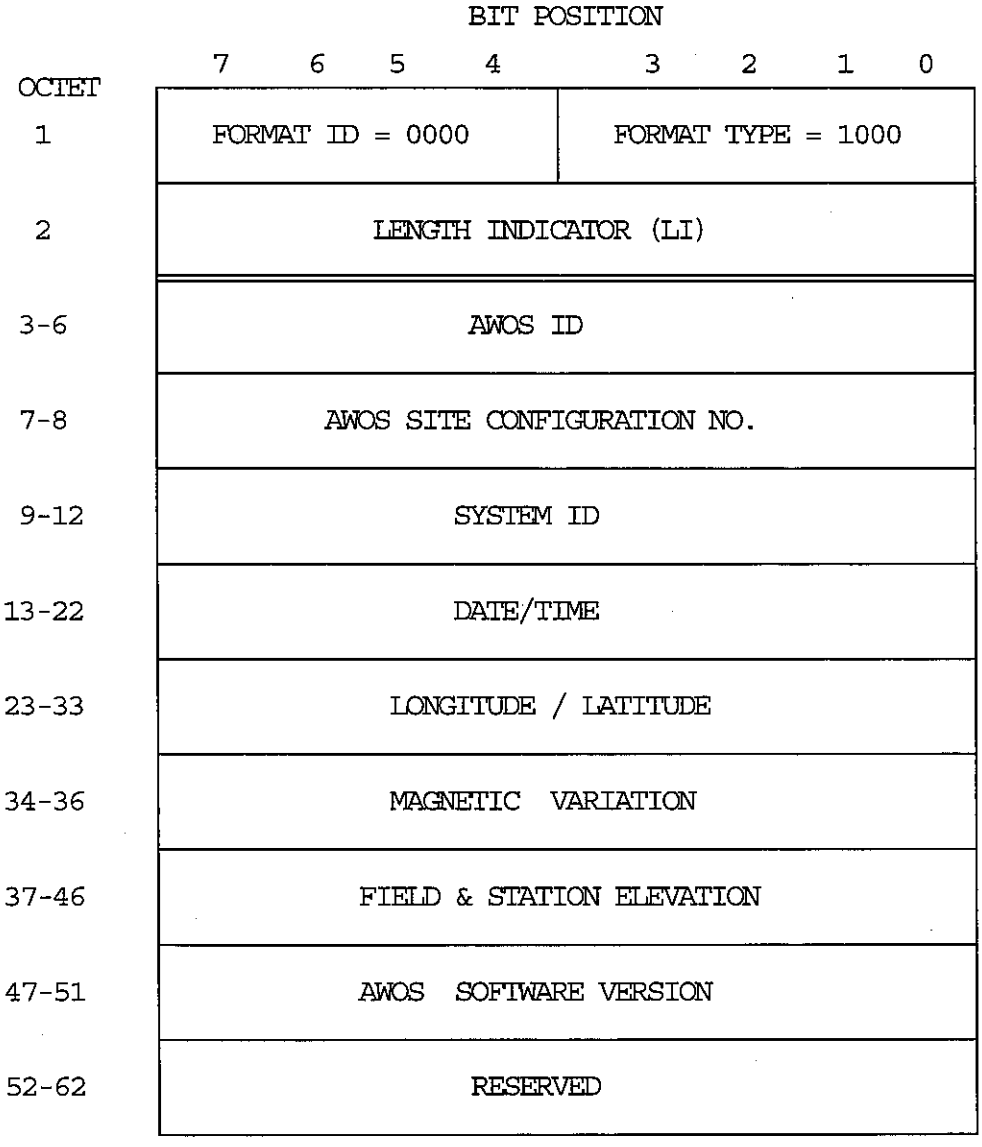
40.3.1.1 AWOS Test Message. The AWOS Test Message is fixed length. The structure and contents of the AWOS Test Message are provided in Table 40-1.

40.3.1.1.1 Site ID (Table 40-1, Field 1). Each AWOS site shall have a four ASCII character Site ID assigned by the FAA.



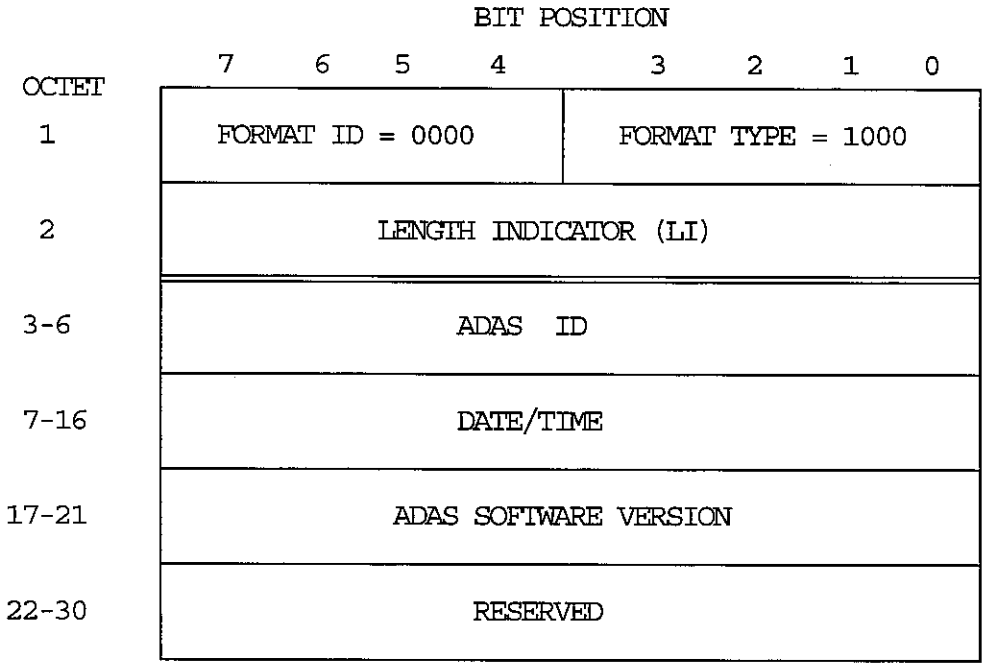
N = LI + 2, where LI = 0
N = 2

Figure 40-1. Test Message Request ADU.



N = LI + 2, where LI = 62
N = 64

Figure 40-2. AWOS Test Message ADU.



N = LI + 2, where LI = 30
N = 32

Figure 40-3. ADAS Test Message ADU.

40.3.1.1.2 Site Configuration Number (Table 40-1, Field 2). Each AWOS site shall have a Site Configuration Number assigned to it by the FAA (see 10.3.2). The Site Configuration Number identifies a specific hardware and software configuration installed at the airport. In the AWOS Test Message, the Site Configuration Number shall be two octets long.

40.3.1.1.3 System Identifier (Table 40-1, Field 3). System Identifier shall comprise four ASCII characters. Systems identified shall be "AWOS", "AO1A", "AO1_", "AO2A", and "AO2_", where the underscore character "_" symbolizes the use of the ASCII space character (32D)..

40.3.1.1.4 Date and Time (Table 40-1, Field 4). Date and time shall be recorded as ASCII characters in the AWOS Test Message. Each element of the date/time field shall comprise two ASCII characters. Leading zeros shall be encoded where necessary.

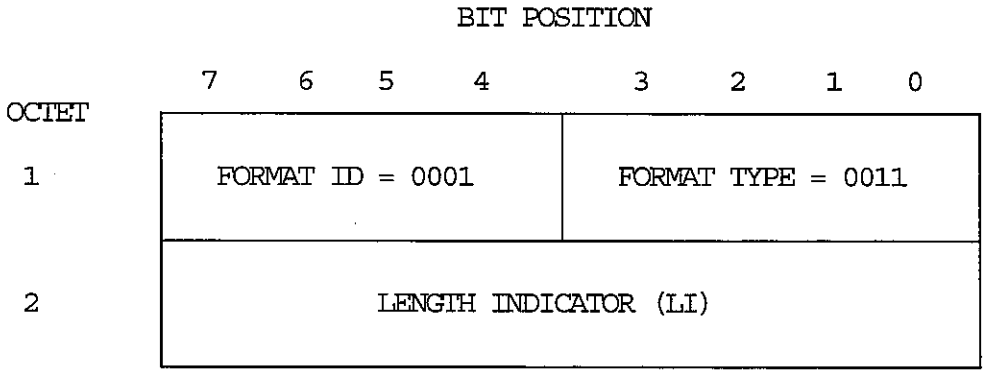
40.3.1.1.5 Site Location (Table 40-1, Field 5). Latitude shall be given in whole degrees (2 ASCII characters) and minutes (2 ASCII characters). A single descriptor octet is provided to indicate that the site is located in the northern ("N") hemisphere. Longitude shall be encoded next. It is given in a similar format to latitude except that the meridional position, in degrees, shall be allocated three characters instead of two. A single descriptor octet is provided to indicate that the site is located in the western ("W") hemisphere. Leading zeros shall be used where necessary.

40.3.1.1.6 Magnetic Variation (Table 40-1, Field 6). Magnetic variation shall be the last parameter encoded in the Site Location Field. Magnetic variation shall be given in 2 characters, with a leading zero character when needed, in whole degrees. A descriptor character, symbolized by "Y" in Table 40-1, shall be used to indicate whether magnetic north is west ("W") or east ("E") of true north at this site.

40.3.1.1.7 Elevation (Table 40-1, Field 7). Both field and station elevation shall be provided in this field. Elevation shall be given in feet, mean sea level. Each elevation shall be given in 5 characters, with leading "0" characters as needed.

40.3.1.1.8 AWOS Software Version (Table 40-1, Field 8). The next field of information in the AWOS Test Message shall provide the AWOS software version number. The version number is given in the form "XX.xx" (5 characters). Leading zeros shall be used where necessary.

40.3.1.1.9 Reserved (Table 40-1, Fields 9 to N). Thirteen octets shall be reserved at the end of the AWOS Test Message. Reserved octets shall be encoded as spaces (ASCII 32D) until actual parameters are specified.



N = LI + 2, where LI = 0
N = 2

Figure 40-4. Date/Time Message Request ADU.