

CHANGE**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**JO 7900.5E
CHG 1

Air Traffic Organization Policy

Effective
Date:
07/1/2021**SUBJ:** Surface Weather Observing

1. **Purpose.** This change amends practices and procedures in Surface Weather Observing.
2. **Who this change affects.** This order applies to all FAA and FAA-contract personnel, Limited Aviation Weather Reporting Stations (LAWRS) personnel, Non-Federal Observation (NF-OBS) Program personnel, as well as United States Coast Guard (USCG) personnel, as a component of the Department of Homeland Security and engaged in taking and reporting aviation surface observations.
3. **Disposition of Transmittal Paragraph.** Retain this transmittal sheet until the directive is replaced by a new directive.

PAGE CHANGE CONTROL CHART

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4. Administrative Information.

5. Where I can find this order. This order is available on the FAA Web site at [Air Traffic Publications](#) and on the My FAA employee website at [Orders and Notices](#).

6. Explanation of Changes. This change adds new criteria for weather observers including LAWRS to issue a SPECI weather observation to report the beginning, ending, or change in intensity of snow. In 2019, an SRM panel determined that this change to SPECI reporting criteria did not change the existing acceptable level of risk for the system.

This change also adds new criteria to issue a SPECI weather observation when the visibility increases/decreases at or below 1/2 statute mile or 1/4 statute mile. Adding the lower visibility SPECI criteria will assist in automatically generating a SNOW SPECI at controlled/uncontrolled airports.

ASOS/AWOS-C must also have these new SPECI thresholds added to the system local SPECI criteria until ASOS/AWOS-C software is upgraded.

Paragraph 3.10 is revised to clarify that the NWS MF1M-10C is only completed at manual stations. Table 3-1, Chapter 11, 12 and 13 have also been edited to clarify that weather observers do not augment/edit the additive data groups that the automated weather observation system automatically generates.

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

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Vice President
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3.9 Rounding Off Numbers. Except where otherwise designated in this order, when computations require that a number be rounded, if the fractional part of a positive number to be dropped is equal to or greater than one-half, the preceding digit must be increased by one. If the fractional part of a negative number to be dropped is greater than one-half, the preceding digit must be decreased by one. In all other cases, the preceding digit must remain unchanged. For example, 1.5 becomes 2, 1.3 becomes 1, -1.5 becomes -1, and -2.6 becomes -3.

3.10 Record Keeping and Forms

a. Manual Observations. All manual observations at manual stations, whether complete or partial, must be recorded on the electronic version of form MF1M-10C (does not include automated/augmented stations). The form is available from the NWS at <https://www.weather.gov/surface/forms>. After completing the form, it must be archived at the facility for 90 days. Manual Stations must send the electronic form to the National Center for Environmental Information (NCEI) at SURFACE.QC@NOAA.GOV by the second working day of each month. Corrected copies of all forms must be retained locally for 90 days. Retention of copies beyond 90 days must be as directed by the FAA.

b. Automated Weather Observations. Automated weather observations and operator terminal entries are archived on site. No further action is required by FAA, FAA-contract, or NF-OBS facilities. In the event of a complete failure of automated equipment, observers are expected to follow manual observation reporting requirements. The MF1M-10C is not required.

3.11 Criteria for SPECI Observations. The observer must take, record, and disseminate a SPECI observation when any of the following is observed to occur:

a. Wind Shift. Wind direction changes by 45 degrees or more in less than 15 minutes, and the wind speed is 10 knots or more throughout the wind shift.

b. Visibility. Visibility as reported in the body of the report decreases to less than, or if below, increases to equal or exceed:

(1) 3 miles.

(2) 2 miles.

(3) 1 mile.

(4) 1/2 mile.

(5) 1/4 mile.

(6) The lowest standard instrument approach procedure minimum as published in the U.S. Terminal Procedures. If not listed above.

c. Runway Visual Range (NA LAWRS). The highest value from the designated RVR runway decreases to less than, or if below, increases to equal or exceed 2,400 feet during the preceding 10 minutes.

d. Tornado, Funnel Cloud, or Waterspout.

- (1) Is observed.
- (2) Disappears from sight or ends.

e. Thunderstorm.

- (1) Begins (a SPECI report is not required to report the beginning of a new thunderstorm if one is currently reported).
- (2) Ends.

f. Precipitation.

- (1) Hail (including small hail) begins or ends.
- (2) Freezing precipitation begins, ends, or changes intensity.
- (3) Ice pellets begin, end, or change intensity.
- (4) Snow begins, ends, or changes intensity.

g. Squall. Wind speed suddenly increases by at least 16 knots and is sustained at 22 knots or more for at least one minute.

h. Ceiling. The height of the base of clouds covering five eighths or more (for example, broken and overcast) of the sky forms or dissipates below, decreases to less than or, if below, increases to equal or exceed:

- (1) 3,000 feet.
- (2) 1,500 feet.
- (3) 1,000 feet.
- (4) 500 feet.

(5) The lowest standard instrument approach procedure minimum as published in the U.S. Terminal Procedures. If none published, use 200 feet.

i. Sky Condition. A layer of clouds or obscuring phenomenon aloft is present below 1,000 feet and no layer aloft was reported below 1,000 feet in the preceding METAR or SPECI observation.

j. Volcanic Eruption. When eruption is first noted.

k. Aircraft Mishap. Upon notification of an aircraft mishap, unless there has been an intervening observation.

I. Miscellaneous. Any other meteorological situation that, in the opinion of the observer, is critical. The local Air Traffic Control facility may also develop site-specific criteria for issuing a SPECI (e.g. additional ceiling criteria, Layers below criteria, Visibility criteria, RVR). Site-specific SPECI criteria can be added to automated weather system by the ASOS/AWOS-C system manager or implemented by the weather observer.

3.12 Content of METAR/SPECI Observations. Table 3-1 contains the content of METAR observations. The first column of the table lists the elements of the observation both for the body of the report and the remarks section. The second column lists a reference to the section in 13 that discusses coding of the particular element. The third column presents a brief description of the element. The fourth column indicates whether the element is reported in METAR observations, and the fifth column indicates whether the element is reported in SPECI observations.

Body of METAR – Consists of 11 Elements

Element	Paragraph	Brief Description	METAR	SPECI
Type of Report (METAR/SPECI)	13.6	METAR is the routine (scheduled) report. SPECI is the non-routine (unscheduled) weather report.	X	X
Station Identifier (CCCC)	13.7	ICAO station identifier. Consists of four alphabetic characters, for example, KABC.	X	X
Date/Time (YYGGggZ)	13.8	Day of the month, followed by the actual time of the report or when the criteria for a SPECI is met or noted. Group ends with Z to indicate UTC. For example,	X	X
Report Modifier (AUTO)	13.9	AUTO indicates a fully automated report. If not automated report, this field is blank.	X	X
Report Modifier COR	13.9	COR indicates the report is a correction of a previously issued METAR or SPECI	X	X

Body of METAR - Consists of 11 Elements

Element	Paragraph	Brief Description	METAR	SPECI
<p>Wind (dddff(f)Gf_mf_mf_m KT) (d_nd_nd_nVd_xd_xd_x)</p>	13.10	<p>True wind direction in tens of degrees using three digits. Speed reported in whole knots (two or three digits). Gusts (G) appended to the speed, if observed. Group ends with KT, for example, 23018G26KT. If wind direction varies by 60° or more and speed is >6 knots, a variable wind group may also be reported, for example, 180V250. Direction may be reported VRB (variable) if speed is <6 knots or less. For example, VRB05KT. Calm winds are coded 00000KT.</p>	X	X
<p>Visibility (VVVVVSM)</p>	13.11	<p>Prevailing visibility in statute miles. A space divides whole miles and fractions. Ends with SM: 1 1/2SM. AUTO: M pref. means "less than": M1/4SM.</p>	X	X
<p>Runway Visual Range (RD_RDR/V_RV_RV_RV_RF T Or RD_RDR/V_NV_NV_NV_NVV x V_xV_xV_xFT)</p> <p>Automated Only Do Not Back Up</p>	13.12	<p>The 10-minute RVR value: Reported in hundreds of feet if visibility is < one statute mile or RVR is < 6000 feet. Group ends with FT to indicate feet, for example, R06L/2000FT. Prefixed with either M or P indicates the value is lower or higher than the RVR reportable values, for example, R06L/P6000FT. If variable during the evaluation period, the variability is reported, for example, R06L/2000V4000FT.</p>	A/B	A/B
<p>Present Weather (w'w')</p>	13.13	<p>Weather phenomena (other than obscurations) occurring at the station are reported in the body of the report. Weather obscurations are generally reported if visibility < 7 miles (see 14-14 for exceptions). Volcanic ash may be reported with any visibility. Reported in order of decreasing predominance.</p> <p>Maximum of three groups reported (pcpn included in one group; separate groups for other phenomena).</p>	X	X

Body of METAR - Consists of 11 Elements

Element	Paragraph	Brief Description	METAR	SPECI
Sky Condition (NsNshshshs or VVshshs or CLR or SKC)	13.14	Automated stations report no more than three layers up to 12,000 feet; if no layers are detected, CLR is reported. At manual stations, up to six layers may be reported; if no layers observed, SKC is reported. Each layer contains the amount (FEW, SCT, BKN, OVC) immediately followed by the height using three digits, for example, FEW015, BKN030. A layer containing CB or TCU is indicated by appending the contraction to the layer height, for example, FEW015TCU. All layers are considered opaque. Vertical Visibility (VV) is reported in hundreds of feet for a total obscuration (indefinite ceiling), for example, VV002. Surface-based obscuration (manual only) reported using amount (FEW, SCT, BKN) followed by "000," for example, SCT000; remark reported as "FG SCT000".	X	X
Temperature/Dew Point (T'T'/T'dT'd)	13.15	Temperature and dew point are reported to the nearest whole degree Celsius using two digits, for example, 17/13. Sub-zero values are prefixed with an M, for example, 03/M02.	X	X
Altimeter (APHPHPHPH)	13.16	Altimeter is prefixed with an A indicating altimeter in inches of mercury. Reported using four digits; tens, units, tenths, and hundredths of inches of mercury, for example, A2990.	X	X

Remarks Section of Observation

Element	Paragraph	Brief Description	METAR	SPECI
Volcanic Eruptions	13.19	Volcanic eruptions must be reported whenever first noted. Pre-eruption activity must not be reported. (Use PIREPs to report pre-eruption activity.) Encode volcanic eruptions as described in Chapter 14.	X	X
Tornadic Activity (Manual and Augmented Auto) (Tornadic activity_B/E(hh)mm LOC/DIR_(MOV))	13.20	Whenever tornadoes, funnel clouds, or waterspouts begin, are in progress, end, or disappear from sight, the event should be described directly after the "RMK" element. This remark must give, insofar as known, the phenomena, time, location and direction from the station, and direction of movement. The time the tornadic activity began must be reported and prefixed with a "B," the time the tornadic activity ended or disappeared from sight must be reported and prefixed with an "E," for example, TORNADO B13 DSNT NE.	X	X
Type of Automated Station (AO1, AO2) Automated Remark Only Do Not Back Up	13.21	This remark identifies the type of automated station. It must be included in all reports from automated stations. AO1 identifies an automated station without a precipitation discriminator; AO2 identifies an automated station with a precipitation discriminator.	X	X
Peak Wind (PK WND dddff(f)/(hh)mm) Automated Remark Only Do Not Back Up	13.22	When the peak wind exceeds 25 knots, the remark is included in the next METAR report. ddd is the direction of the peak wind, ff(f) is the peak wind speed since the last METAR report, and (hh)mm is the time of occurrence (with only the minutes reported if the hour can be inferred from the report time), for example, PK WND 28045/15.	X	

Element	Paragraph	Brief Description	METAR	SPECI
Wind Shift (WSHFT_(hh)mm)	13.23	At stations with automated systems with SPECI capability and manual stations, when a wind shift occurs, WSHFT followed by a space and the time the wind shift began must be reported (with only the minutes reported if the hour can be inferred from the report time). The contraction FROPA may be entered following the time if it is reasonably certain that the wind shift was the result of frontal passage, for example, WSHFT 30 FROPA.	X	X
Tower or Surface Visibility (TWR VIS) (SFC VIS)	13.24	If tower visibility or surface visibility is carried in the remarks, use the appropriate set of values and precede the visibility with the appropriate identifier, TWR VIS or SFC VIS, for example, TWR VIS 1.	A/B	A/B
Variable Prevailing Visibility (VIS minVmax)	13.25	Whenever the prevailing visibility is less than 3 statute miles and is variable, this remark must be entered where min is the lowest visibility evaluated and max is the highest visibility evaluated, for example, VIS 1/2V2.	X	X
Sector Visibility (VIS_dd_vv)	13.26	Sector visibility must be reported when it differs from the prevailing visibility by one or more reportable values and, either the prevailing or sector visibility is less than 3 miles or considered to be operationally significant. In the remark, dd defines the sector to 8 points of the compass and vv is the sector visibility in SM, for example, VIS N 2.	X	X
Visibility at Second Location (VIS vv location) Automated Remark Only Do Not Back Up	13.27	When an automated station uses meteorological discontinuity sensors, remarks must be added to identify site-specific visibilities, which differ from conditions reported in the body of the report. vv is the visibility value measured at the secondary location. This remark must only be generated when the condition is lower than that contained in the body of the report.	X ¹	X ¹

Element	Paragraph	Brief Description	METAR	SPECI
Lightning (Frequency_LTG(type) - [LOC])	13.28	When lightning is manually observed, the frequency and location must be reported, along with the type of lightning, if known. For example, OCNL LTG OHD, FRQ LTGCG VC NE. When lightning is detected by an automated sensor (e.g. ALDARS) within 5NM of the ARP, it is reported as "TS" in the body of the report with no remark; within 5-10NM of the ARP, it is reported as "VCTS" in the body of the report with no remark. Beyond 10NM from the ARP lightning is reported in remarks as "LTG DSNT" followed by direction from the ARP, for example, OCNL LTG DSNT NE.	X	X
Beginning/Ending Time of Precipitation (WX)B(mm)E(mm) (NA LAWRS	13.29	At stations with automated systems with SPECI capability and Manual Stations, when precipitation begins or ends, the next METAR report must include the type of phenomena, the beginning and/or ending time (prefixed with a B and/or E). If the beginning or ending of the precipitation type (hail, freezing precipitation, or ice pellets), initiated the SPECI report, then that SPECI report must include the type of phenomena, the beginning and/or ending time, and should be reported in the next METAR report.	X	X
Beginning/Ending Time of Thunderstorms (TS)B(mm)E(mm)	13.30	When thunderstorms begin or end, the SPECI report must include the type of phenomena, the beginning and/or ending time (prefixed with a B and/or E), and should also be reported in the next METAR report, for example, TSB05E45	X	X
Thunderstorm Location (TS_LOC_(MOV_DIR)	13.31	Thunderstorm location and movement, if known, must be encoded. For example, TS SE MOV NE.	X	X

Element	Paragraph	Brief Description	METAR	SPECI
Hailstone Size (GR_{INCHES})	13.32	At augmented automated stations and at manual stations, the size of the largest hailstone is coded in 1/4 inch increments, identified with the contraction GR. When small hail less than 1/4 inch in size is occurring, the hailstone size is reported in remarks as "GR LESS THAN 1/4".	X	X
Virga (VIRGA_{Direction})	13.33	When precipitation is observed to be falling from clouds, but is not reaching the ground because of evaporation, report VIRGA; the direction from the station is optional, for example, VIRGA or VIRGA SW.	X	X
Variable Ceiling Height (CIG minVmax)	13.34	Whenever the ceiling is below 3,000 feet and is variable, enter min as the lowest ceiling height evaluated and max as the highest ceiling height evaluated, for example, CIG 005V010.	X	X
Obscurations (w'w'_{(NsNsNs) hshshs})	13.35	When the sky condition contains an obscuration either, at the surface or aloft, other than clouds, the type of phenomena in the layer, plus the sky cover at the layer and the height must be reported in remarks, for example, FG SCT000 or FU BKN015.	X	X
Variable Sky Condition (NsNsNs(hshshs)_V_Ns NsNs)	13.36	This remark must identify the layer that is varying and indicate the range of variability. If there are several layers of the same coverage, the variable layer must be identified by including the layer height.	X	X
Significant Cloud Types	13.37	When observed, the following clouds are reported in remarks: 1.) Cumulonimbus (CB) or Cumulonimbus Mammatus (CBMAM), distance, direction from the station, direction of movement, for example, CB W MOV E, CB DSNT W. 2.) Towering Cumulus (TCU), distance, and direction from the station, for example, TCU W. 3.) Altocumulus Castellanus (ACC), direction from station, for example, ACC NW. 4.) Standing Lenticular (stratocumulus SCSL; altocumulus ACSL, or cirrocumulus CCSL) or rotor	A	A

Element	Paragraph	Brief Description	METAR	SPECI
		clouds, direction from the station, for example, ACSL SW-W, APRNT ROTOR CLD NE, CCSL S. Cumulonimbus of any kind and towering cumulus are also identified in the body of the report.		
Ceiling Height at Second Location (CIG_{height}_{LOC}) Automated Remark Only Do Not Back Up	13.38	When an automated station uses meteorological discontinuity sensors, remarks must be added to identify site-specific sky conditions, which differ from conditions reported in the body of the report. This remark must only be generated when the ceiling is lower than that contained in the body of the report. For example, CIG_002_RY11.	X ¹	X ¹
Pressure Rising or Falling Rapidly (PRESRR) (PRESFR) Automated Remark Only Do Not Back Up	13.39	When the pressure is rising or falling rapidly at the time of the observation, the remark Pressure Rising Rapidly (PRESRR) or Pressure Falling Rapidly (PRESFR) is included.	X	X
Sea-Level Pressure (SLPppp) (SLPNO) Automated Remark Only Do Not Back Up	13.40	At stations with automated systems with SPECI capability and manual stations, this remark begins with SLP and is coded using the tens, units, and tenths of sea-level pressure in hectopascals, for example, SLP982. If sea-level pressure would normally be reported, but is not available, the remark is coded SLPNO.	X	
Aircraft Mishap (ACFT_MSHP)	13.41	If a report was taken to document weather conditions when notified of an aircraft mishap, the remark ACFT MSHP is included in the report, but is not transmitted. This is indicated by putting the remark in parenthesis in the record.	X	X

Element	Paragraph	Brief Description	METAR	SPECI
Snow Increasing Rapidly (SNINCR_(ii)/(ii)) At Designated sites in Appendix F)	13.42	Report SNINCR if snow depth increases by 0.5 inch to the nearest whole inch or more in the past hour, followed by amounts. The remark SNINCR is followed by the depth of increase in the last hour, a solidus, and the total depth of snow on the ground at the time of the report. For example, a snow depth increase of 2 inches in the past hour with a total depth on the ground of 10 inches would be coded "SNINCR 2/10".	X	
Other Significant Information (Plain Language)	13.43	Other significant information important to operations, such as information on fog dispersal operations, runway conditions, or "Last" report from a manual location, etc.	X	X

Group 2`-Additive and Automated Maintenance Data

Element	Paragraph	Brief Description	METAR	SPECI
Hourly Precipitation Amount (Prrrr) Automated Remark Only Do Not Back Up	13.46	At automated stations this remark is included in METAR reports for the water equivalent of all precipitation that has occurred since the last METAR coded in hundredths of an inch, for example, P0009 indicates 9/100 ^{ths} of an inch of precipitation in the past hour.	X	
1-, 3- and 6-Hourly Ice Accretion Amount, I1nnn, I3nnn, I6nnn Automated Remark Only Do Not Back Up	13.47	At automated stations with a freezing rain sensor, this remark is included in METAR/SPECI reports for the ice accretion amount that has occurred in hundredths of an inch during the last 1-hour (I1nnn), 3-hour (I3nnn), and 6-hour (I6nnn) period. No manual backup is required.	X	X
3- and 6-Hourly Precipitation Amount, 6RRRR/ Automated Remark Only Do Not Back Up	13.48	At stations equipped with automated systems with SPECI capability and Manual stations, this remark is included in 3- and 6-hourly observation; encoded in inches, using tenths, and hundredths, of the amt. 2.17 inches of precipitation would be encoded 60217. When an indeterminable amount of precipitation has occurred, the 6RRRR group is coded 6////.	X	
24-Hour Precipitation, 7R24R24R24R24 Automated Remark Only Do Not Back Up	13.49	Included in 1200 UTC observation if more than a trace of precipitation has fallen in past 24 hours, coded using the tens, units, tenths, and hundredths of inches, for example, 1.25 inches would be coded 70125.	X	
Depth of Snow on the Ground, 4/sss (At Designated Sites in Appendix F)	13.50	At stations listed in Appendix F, the total snow depth on ground group is coded in the 0000, 0600, 1200, and 1800 UTC observations whenever there is more than a trace of snow on the ground For example, a snow depth of 21 inches would be coded as "4/021".	X	
Water Equivalent of Snow on Ground (933RRR) (At Designated sites in Appendix F)	13.51	At manual stations, this group reported in 1800UTC report if average snow depth is 2 inches or more. 933 is the code indicator for water equivalent of snow on ground. RRR represents the water equivalent of snow on the ground reported in tens, units and tenths of inches using 3 digits, for example, water equivalent of 3.6 inches would be 933036.	X	

Remarks Section of Observation

Element	Paragraph	Brief Description	METAR	SPECI
Hourly Temperature and Dew Point T _s T'T'T's _n T'dT'dT'd Automated Remark Only Do Not Back Up	13.52	At automated stations except AWOS-A, this element is used to report temperature and dew point to the tenth of a degree Celsius. T identifies the group, the s _n the sign of the temperature - coded as 1 if the value is below 0 degrees Celsius and 0 if the value is 0 degrees Celsius or higher. TaTaTa is the temperature in tens, units, and tenths of degrees and T'aT'aT'a is the dew point in tens, units and tenths of degrees, for example, a temperature of 2.6 and dew point of -1.5 would be coded in the body as 03/M01 and in remarks as T00261015.	X	
6-Hour Maximum Temperature, 1s _n T _x T _x T _x Automated Remark Only Do Not Back Up	13.53	The maximum temperature in past 6-hours in tenths of degrees Celsius using 3 digits, where the 1 identifies the maximum temperature group, the s _n the sign of the temperature - coded as 1 if the value is below 0 degrees Celsius and 0 if the value is 0 degrees Celsius or higher. The T _x T _x T _x must be the maximum temperature during the last 6 hours, for example, a temperature of 1.0 degrees Celsius is coded as 10010, a maximum temperature of -2.1 degrees Celsius is coded 11021.	X	
6 Hour Minimum Temperature, 2s _n T _n T _n T _n (NA Automated Remark Only Do Not Back Up	13.54	The minimum temperature in past 6-hours in tenths of degrees Celsius using 3 digits where the 2 identifies the minimum temperature group, the s _n the sign of the temperature - coded as 1 if the value is below 0 degrees Celsius and 0 if the value is 0 degrees Celsius or higher. The T _n T _n T _n must be the minimum temperature during the last 6 hours, for example, a temperature of -2.1 degrees Celsius is coded as 21021, a minimum temperature of 1.2 degrees Celsius is coded 20012.	X	

Remarks Section of Observation

Element	Paragraph	Brief Description	METAR	SPECI
24-Hour Maximum and Minimum Temperature, 4 _{sn} T _x T _x T _x S _n T _n T _n Automated Remark Only Do Not Back Up	13.55	Reported at midnight (LST); the maximum and minimum temperatures for the day coded in tenths of degrees Celsius using 3 digits where the 4 identifies the maximum/minimum temperature group, the sn the sign of the temperature - coded as 1 if the value is below 0 degrees Celsius and 0 if the value is 0 degrees Celsius or higher. For example, a 24-hour maximum temperature of 10.0 degrees Celsius and a 24-hour minimum temperature of -1.5 degrees Celsius is coded 401001015.	X	
Pressure Tendency, 5 _{app} Automated Remark Only Do Not Back Up	13.56	At equipped automated stations, include in 3- and 6-hourly observations where the 5 identifies the pressure tendency group, the a represents the character of pressure change over the past 3 hours, and ppp is the change in pressure in the past 3 hours. the ppp is coded based on the absolute value of the change of either the station pressure or the altimeter in the past 3 hours coded in tenths of hectopascals and using the tens, units, and tenths digits, for example, a steady increase of 3.2 hectopascals in the past 3 hours would be coded 52032.	X	
Sensor Status Indicators Automated Remark Only Do Not Back Up	13.57	At equipped automated stations: When automated stations are equipped with a precipitation identifier and that sensor is not working, the remark PWINO is included. When the tipping bucket rain gauge is not operating at an automated station equipped with the device, PNO is included in remarks. When automated stations are equipped with a Freezing Rain Sensor and it is not working, the remark FZRANO is included. When automated stations are equipped with a lightning detection system and that sensor is not working, the remark TSNO is included. At an automated station, when the secondary visibility sensor is not working, VISNO_(LOC) is included, and when the cloud height indicator is not working CHINO_(LOC) is included.	X	

Remarks Section of Observation

Element	Paragraph	Brief Description	METAR	SPECI
Maintenance Indicator Automated Remark Only Do Not Back Up	13.58	A maintenance indicator sign, \$, is included when an ASOS/AWOS-C detects that maintenance is needed on the system.	X	X

X – Indicates elements included at all stations

A – Indicates elements that are at service level A

B – Indicates elements that are at service level B

¹At stations equipped with meteorological discontinuity sensors.

Chapter 11. Temperature and Dew Point

11.1. Introduction. This chapter describes procedures for observing and reporting temperature and dew point in a METAR or SPECI observation. The temperature data obtained using the procedures and practices in this chapter are normally in terms of the Celsius scale. However, temperature may be given in both degrees Fahrenheit and Celsius since some instruments may be marked in only one scale. Dew point must be calculated with respect to water at all temperatures.

11.2. Definitions

a. Temperature. The degree of hotness or coldness of the ambient air as measured by any approved instrument.

b. Dew Point. The temperature to which a given parcel of air must be cooled at constant pressure and constant water-vapor content in order for saturation to occur, as measured by any approved instrument. If the dew point is higher than the temperature, the observer must discontinue use of the sensor until it has been serviced and calibrated.

c. Psychrometer. A psychrometer is an instrument used to measure the water vapor content of the air.

11.3. Temperature and Dew Point Observing and Reporting Practices. The method of obtaining temperature and dew point varies according to the system in use at the station. The observer must use the automated weather system for temperature and dewpoint, where available.

a. Whenever the primary system is inoperative or determined to be in error, the observer must obtain the temperature and dewpoint from the station's backup system (e.g. SAWS, SWS, handheld electronic psychrometer).

b. If the observer has access to multiple backup systems for Temperature/Dew Point, readings for SAWS or SWS must be used if available.

c. As a second priority, the observer may use an FAA approved handheld electronic psychrometer or a sling psychrometer to obtain the readings.

d. Handheld psychrometers must be compared to automated weather system once per week to ensure their accuracy.

e. If no backup system is available, the temperature and/or dew point is omitted.

11.4. Obtaining Readings from a Sling Psychrometer

a. Sling Psychrometer Ventilation. The observer shall ventilate the psychrometer for about 10 seconds. The minimum speed of air passing over the psychrometer bulbs should be 15 feet per second. This is approximately one revolution per second of the geared (2 to 1 ratio)

whirling psychrometer crank, two revolutions per second of the sling psychrometer, and three and one-half revolutions per second of the crank of the psychrometer fan or motor (direct-drive) whirling psychrometer. The observer shall ventilate the sling psychrometer as follows:

- (1) Select a shady spot with no obstructions within a radius of the whirling sling.
- (2) Face into the wind.
- (3) Hold the handle at arm's length while whirling the psychrometer.

b. After proper ventilation has been achieved, the observer shall quickly read both thermometers, wet-bulb first. The observer shall repeat this procedure until two successive wet-bulb readings are the same, indicating that the wet-bulb temperature has reached its equilibrium point. If the wet-bulb temperature rises between successive readings, the observer shall re-moisten the wick and re-ventilate. Accurate readings are especially important at low temperatures, where a given wet-bulb depression has a greater effect on the accuracy of psychrometer computations.

11.5. Maximum and Minimum Temperature. Automated systems report in remarks the maximum and minimum temperatures that occurred in the previous 6 hours to the nearest tenth of a degree Celsius for the 0000, 0600, 1200, and 1800 UTC observations. Automated systems determine and report the calendar day (LST) maximum and minimum temperatures to the nearest tenth of a degree Celsius. If the midnight LST observation is also a 6-hour synoptic observation, the system determines and reports both the 6-hour temperatures and the past 24-hour maximum and minimum temperatures. The format for reporting these temperatures is given in Paragraph 13.53, 6-Hourly Maximum Temperature (1snTxTxTx) through Paragraph 13.55, 24-Hour Maximum and Minimum Temperature (4snTxTxTxsnTnTnTn). If the Maximum/Minimum Temperature data is missing or non-representative, it is not backed up by the observer.

11.6. Maximum/Minimum Extremes. Maximum/minimum temperature values from the primary automated weather system. This measurement is not backed up when the primary automated weather system does not report the maximum/minimum temperature.

Chapter 12. Pressure

12.1. Introduction. This chapter presents procedures and practices to be followed for the reporting of pressure. Atmospheric pressure is the force exerted by the atmosphere at a given point.

12.2. Definitions

a. Altimeter Setting (ALTSG). Altimeter setting defines the pressure value to which an aircraft altimeter scale is set so that the altimeter indicates the altitude above mean sea level of an aircraft on the ground at the location for which the value was determined. Altimeter setting must be reported in the body of all reports (METAR and SPECI). Other pressure data (including sea level pressure) are reported in the remarks section only.

b. Atmospheric Pressure. Atmospheric pressure is the pressure exerted by the atmosphere at a given point. The various pressure parameters must be determined from the barometric pressure after appropriate corrections are applied. The method used must depend on the type of sensor and the available computational aids. These aids may be systems that result in a direct readout of the desired parameter.

c. Barometric Pressure. The atmospheric pressure measured by a barometer is barometric pressure. In this chapter, the term "barometric pressure" refers to the actual pressure sensor value. The sensor value may be an altimeter setting, station pressure, or simply a direct pressure value without applied corrections depending on the type of sensor.

d. Field Elevation, Ha. Field elevation, Ha, is the elevation of the highest point on any of the runways of the airport.

e. Pressure Altitude, PA. Pressure altitude is the altitude in feet, in the standard atmosphere, at which a given pressure will be observed. It is the indicated altitude of a pressure altimeter at an altitude setting of 29.92 inches (1013.2 hPa) of mercury and is therefore the indicated altitude above or below the 29.92 inches constant-pressure surface.

f. Pressure Change. Pressure change is the net difference between the barometric pressure at the beginning and end of a specified interval of time, usually the 3-hour period preceding an observation. If the pressure is rising or falling at a rate of at least 0.06 inch per hour and the pressure change totals 0.02 inch or more at the time of the observation, a pressure change remark is reported. (see Table 3-2)

g. Pressure Falling Rapidly. Pressure falling rapidly occurs when station pressure falls at the rate of at least .06 inch (2.03 hPa) or more per hour which totals 0.02 inch (0.68 hPa) or more at time of observation.

h. Pressure Rising Rapidly. Pressure rising rapidly occurs when station pressure rises at the rate of at least 0.06 inch (2.03 hPa) or more per hour, which totals 0.02 inch (0.68 hPa) or more at time of observation.

i. Pressure Tendency. Pressure tendency is the pressure characteristic and amount of pressure change during a specified period of time, usually the 3-hour period preceding an observation. The pressure tendency includes two parts: the characteristic (an indication of how the pressure has been changing over the past three hours) and the amount of the pressure change in the past three hours. The characteristic must be based on the observed changes in pressure over the past three hours. The amount of pressure change is the absolute value of the change in station pressure or altimeter setting in the past three hours converted to tenths of hectopascals.

j. Sea Level Pressure. Sea level pressure is a pressure value obtained by the theoretical reduction of barometric pressure to sea level. Where the earth's surface is above sea level, it is assumed that the atmosphere extends to sea level below the station and that the properties of the hypothetical atmosphere are related to conditions observed at the station. When the automated sea level pressure is missing at stations that would normally report sea level pressure, the remark SLPNO is added in the remarks section. (Automated only)

k. Standard Atmosphere. Standard atmosphere is a hypothetical vertical distribution of the atmospheric temperature, pressure, and density, which by international agreement is considered representative of the atmosphere for pressure-altimeter calibrations and other purposes.

l. Station Elevation, Hp. Station elevation, Hp, is the officially designated height above sea level to which station pressure pertains. There may be occasions when the station elevation differs from the field elevation.

m. Station Pressure. Station pressure is the atmospheric pressure at the assigned station elevation (Hp).

n. Density Altitude, DA. Density altitude, DA, is the pressure altitude corrected for virtual temperature deviations from the standard atmosphere.

o. Barometric Elevation, Hz. Barometer elevation (Hz) is the height of the pressure instrument(s) above mean sea level surveyed accurately to within one foot.

12.3. Observing, Determining, and Reporting Procedures

General. Observing procedures must include the reading of FAA approved pressure instruments, FAA JO 7210.3 Paragraph 2-10-3, Altimeter Requirements together with the correction of pressure values (if necessary), FAA JO 7210.3, Paragraph 2-10-4.

Table 12-1: Units of Measure of Pressure Parameters

Parameter	Units of Measure
Altimeter Setting	Inches of Mercury
Sea Level Pressure	Hectopascals
Station Pressure	Inches of Mercury

12.4. Determining Altimeter Setting. The observer must determine the altimeter setting for all observations. Altimeter setting values should be obtained or derived from one of the following types of instruments:

- a. A Precision Aneroid Altimeter Setting Indicator (ASI)
- b. A commissioned DASI
- c. Automated Systems With SPECI Capability
- d. Automated Systems Without SPECI Capability
- e. Standalone Weather Sensor System (SAWS)
- f. Surface Weather System (SWS)
- g. Any other altimeter equipment approved by FAA Technical Operations.

12.5. Pressure Related Remarks. Each significant change in barometric pressure and its characteristics are recorded in the remarks section and transmitted. These Remarks are automated and not backed up by weather observers.

a. Pressure Falling Rapidly. (Automated Only) Whenever the pressure is falling at the rate of 0.06 inch (2.03 hPa) or more per hour with a total fall of at least 0.02 inch (0.68 hPa) at the time of an observation, the system will report PRESFR in the remarks section.

b. Pressure Rising Rapidly. (Automated Only) Whenever the pressure is rising at the rate of 0.06 inch (2.03 hPa) or more per hour with a total of at least 0.02 inch (0.68 hPa) at the time of observation, the system reports PRESRR in the remarks section.

c. Pressure Tendency. (Automated Only) The barometric pressure tendency comprises two elements.

d. Frequency of Pressure Tendency Remark. (Automated Only) Pressure tendencies should be determined at the time of each 3- and 6-hour observation.

e. Determining Pressure Change. (Automated Only) The net change in station pressure for the preceding 3 hours to the nearest 0.005 inch.

13.39. Pressure Rising or Falling Rapidly (PRESRR or PRESFR) (Automated Only). At automated stations and manual stations, when the pressure is rising or falling rapidly at the time of the observation (METAR AND/OR SPECI) the remark PRESRR or PRESFR is included in the report.

13.40. Sea-Level Pressure (SLPppp) (Automated Only). Sea-level pressure is reported in the above format. The remark begins with SLP and is coded using the tens, units, and tenths of the sea-level pressure in hectopascals. For example, a sea-level pressure of 998.2 hectopascals would be coded as "SLP982". For a METAR, if sea-level pressure is not available at stations where it would normally be reported, it is coded as "SLPNO".

13.41. Aircraft Mishap (ACFT_MSHP). If a report is taken to document weather conditions when notified of an aircraft mishap, the remark ACFT_MSHP must be included in the report, but not transmitted. The act of non-transmission must be indicated by enclosing the remark in parentheses in the record, that is, "(ACFT MSHP)".

13.42. Snow Increasing Rapidly (SNINCR_(inches-hour/inches on ground)) (Sites listed in Appendix F). At Service Level A and B and manual stations, the snow increasing rapidly remark is coded, in the next METAR, whenever the snow depth increases by 0.5 inch (1 inch to the nearest whole inch) or more in the past hour and the reportable value (in whole inches) of the total depth of snow on the ground increases by one inch or more. The remark is coded in the above format, where SNINCR is the remark indicator, "inches-hour" is the depth increase in the past hour, and "inches on ground" is the total depth of snow on the ground at the time of the report. The depth increase in the past hour and the total depth on the ground are separated from each other by a solidus (/).

EXAMPLE: Snow depth increase of 2 inches in the last hour with a total depth on the ground of 10 inches: SNINCR 2/10

13.43. Other Significant Information. Agencies may have other information significant to their operations, such as information on fog dispersal operations, runway conditions, and other information important to aircraft operations.

13.44. Additive and Automated Maintenance Data. Additive data groups are reported at automated and manual stations. Maintenance data groups are only reported from automated stations. Additive data groups reported by automated weather systems (Automated Only) are not backed up by weather observers.

13.45. Precipitation Additive Data. The amount of liquid precipitation is evaluated as the depth of precipitation that accumulates in an exposed vessel during the time period being evaluated. The amount of freezing or frozen precipitation must be the water equivalent of the solid precipitation accumulated during the appropriate time period. Precipitation measurements are in inches, tenths of inches, or hundredths of inches depending on the precipitation being measured (see Table 13-8: Units of Measure for Precipitation). The depth of freezing and/or frozen precipitation is the actual vertical depth of the precipitation accumulated on a horizontal surface during the appropriate time period. If snow falls, melts, and refreezes, the depth of ice formed is included in the measurement.

13.50. Snow Depth on Ground (4/sss) (Sites listed in Appendix F). At stations listed in Appendix F, the total snow depth on ground group is coded in the 0000, 0600, 1200, and 1800 UTC observations whenever there is more than a trace of snow on the ground. The remark is coded in the format 4/sss, where 4/ is the group indicator and sss is the snow depth in whole inches using three digits.

EXAMPLE: Snow depth of 21 inches: 4/021

13.51. Water Equivalent of Snow on Ground (933RRR) (Sites Listed in Appendix F). The water equivalent of snow on ground group is reported each day in the 1800 UTC report if the average snow depth is 2 inches or more. The remark is coded in the format 933RRR, where 933 is the group indicator and RRR is the water equivalent of snow; that is, snow, snow pellets, snow grains, ice pellets, ice crystals, hail, on the ground. The water equivalent is reported in tens, units, and tenths of inches, using three digits. Do not code the group if it consists entirely of hail. Estimations, ratios (for example, 10 to 1), or temperature/snow water equivalent tables are not to be used to determine water equivalency of snow for this group.

EXAMPLES: 3.6 inches water equivalent of snow: 933036
12.5 water equivalent of snow: 933125

13.52. Hourly Temperature and Dew Point (TsnT'T'T'snT'dT'dT'd) (Automated Only). At automated stations except AWOS-A, the hourly temperature and dew point group is coded in the above format, where T is the group indicator, sn is the sign of the temperature, T'T'T' is the temperature, and T'dT'dT'd is the dew point. The sign of the temperature and dew point is coded as 1 if the value is below 0°C and 0 if the value is 0°C or higher. The temperature and dew point is reported in tens, units, and tenths of degrees Celsius. There are no spaces between the entries. If dew point is missing, the temperature is reported; if the temperature is missing, the temperature/dew point group is not reported.

EXAMPLES: Temperature of 2.6°C and dew point of -1.5°C reported in the body of the report: 03/M01....Temperature of 2.6°C and dew point of -1.5°C reported in the temperature/dew point group; T00261015

13.53. 6-Hourly Maximum Temperature (1snTxTxTx) (Automated Only). The 6-hourly maximum temperature group is coded in the above format, where 1 is the group indicator, sn is the sign of the temperature, and TxTxTx is the maximum temperature in tenths of degrees Celsius using three digits. The sign of the maximum temperature is coded as 1 if the maximum temperature is below 0°C and 0 if the maximum temperature is 0°C or higher.

EXAMPLES: A maximum temperature of -0.1°C: 11001

A maximum temperature of 14.2°C: 10142

C.5 Procedures for LAWRS Using Automated Systems with SPECI Capability

a. Augmenting observations using automated systems with SPECI capability. An outline of the requirements for augmentation is provided in Table C-1 through Table C-3 of this Appendix. More detail is given in Chapter 4 and Chapter 5. LAWRS observers must augment the following weather phenomena at sites equipped with automated systems with SPECI capability:

- (1) Thunderstorm (at non-ALDARS sites)
- (2) Tornado activity (including tornado, waterspout, and funnel cloud)
- (3) Hail
- (4) Snow
- (5) Virga
- (6) Volcanic ash
- (7) Operationally significant remarks as deemed appropriate by the observer

b. Backup of automated systems with SPECI capability. If portions of, or the complete automated systems with SPECI capability observation is unavailable due to sensor/system malfunction, communications failure, erroneous data and/or non-representative data (see Paragraph 2.6, Backup Requirements and Chapter 6, Backup/Editing Requirements at Automated Weather Stations), LAWRS must backup, at a minimum, the following weather elements at sites with an automated system with SPECI capability: (Table C-1 through Table C-3 provides an outline of backup requirements for LAWRS.)

- (1) Wind
- (2) Visibility to 10 miles
- (3) Present weather and obscurations (thunderstorms, at ALDARS sites), see Table 6-2
- (4) Sky condition to 12K feet
- (5) Temperature/dew point
- (6) Altimeter setting

NOTE: Documentation requirements, equipment requirements, and examples of augmented and backup observations are given in Chapters 4, 5 and 6.

**LAWRS Requirements for Remarks Section of Observation
(Automated, Manual, and Plain Language)**

Element	LAWRS w/ ASOS or AWOS-C	LAWRS w/ Non-Federal AWOS	LAWRS Manual
No SPECI Reports Taken (NOSPECI)			X
Other Significant Information (Plain Language)			X

¹ Automated stations automatically archive the weather before and after the event Legend:
X = Required.

LAWRS Requirements for SPECI

SPECI Criteria	LAWRS w/ ASOS or AWOS-C	LAWRS w/ Non-Fed AWOS ¹	LAWRS Manual
Wind Shift - Wind direction changes by 45 degrees or more in less than 15 minutes and the wind speed is 10 knots or more throughout the wind shift.	X	X	X
Visibility - Surface visibility as reported in the body of the report decreases to less than, or if below, increases to equal or exceed: 3 miles, 2 miles, 1 mile, and 1/2 mile or the lowest standard instrument approach procedure minimum as published in the National Ocean Survey (NOS) U.S. Terminal Procedures.	X	X	X
Runway Visual Range - Automated Report Only	N/A	N/A	N/A
Tornado, Funnel Cloud, Or Waterspout - Is observed or disappears from sight.	X	X	X
Thunderstorm - Begins (a SPECI report is not required to report the beginning of a new thunderstorm if one is currently reported) or ends.	X	X	X
Precipitation - Hail begins or ends; freezing precipitation begins, ends, or changes intensity; Snow begins, ends, or changes intensity; ice pellets begin, end, or change intensity at manual stations.	X	X	X
Squall - Wind suddenly increases at least 16 knots and is sustained at 22 knots or more for at least one minute.	X	X	X
Ceiling - When the height of the base of clouds covering five oktas or more (for example, broken and overcast) of the sky forms or dissipates below, decreases to less than or, if below, increases to equal or exceed: 3,000 ft., 1,500 ft., 1,000 ft., 500 ft., and 200 ft. or the lowest standard instrument approach procedure minimum as published in the National Ocean Survey (NOS) U.S. Terminal Procedures.	X	X	X
Sky Condition - A layer of clouds or obscuring phenomena aloft is present below 1,000 feet and no layer aloft was reported below 1,000 feet in the preceding METAR or SPECI observation.	X	X	X
Volcanic Eruption - When eruption is first noted.	X	X	X