APPENDIX I

Description of ASOS V2.80 Software Algorithms

(As of August 23, 2004)

TABLE: New Capabilities In V2.80. (As of 2/24/04)

Change	Title
1. (S00703)	SOFTWARE SUPPORT FOR ADDITIONAL ASOSs
Group 1	Discussion: Allows ASOS to conform to standard METAR encoding practices. An ASOS site that is not required to have a present weather sensor configured shall have "AO1" encoded in the remarks section of the METAR report. ASOS shall retain the use of "AO2" whenever a present weather sensor is required to be configured at the site.
2. (S00704)	IMPROVE PRESENT WEATHER QUALITY CONTROL LOGIC
Group 1	Discussion: Reduces false reports of snow after a warm start. ASOS shall not allow the reporting of snow until it evaluates the most recently reported valid ambient temperature during the past 30 minutes from the 12-hour archive.
3. (S00705)	TRANSMIT SPECIALS AT ANY TIME
	Discussion: Implemented in software version 2.79. Allows both automated and manually generated SPECI reports to be generated and transmitted during the edit time of a pending hourly METAR report. Tornadic SPECI reports can still be generated and transmitted during the hourly edit time, i.e., as they were in the past.
4. (S00706)	ADD PRECIPITATION ACCUMULATION REMARK IN ALL 5-MINUTE OBSERVATIONS WHEN PRECIPITATION IS OCCURRING
Group 1	Discussion: Whenever precipitation is occurring, or has occurred, since the last transmitted hourly METAR report, the hourly precipitation remark (Prrrr) shall be encoded in the 5-minute observations. This will allow forecasters to monitor the rate of precipitation accumulation for their forecast and warning products.
5. (S00707)	MODIFY DAILY SUMMARY PRODUCT WEATHER CODES
Group 1	Discussion: Provides consistent reporting procedures for encoding weather occurrences with the FMH-1, Part B. When encoding weather codes in the Daily Summary Product, it is not permissible to enter both the values of "1" and "2." If the primary cause for the visibility being reduced to 1/4 mile or less is fog, then the code figure "1" is replaced by code figure "2." Allows for the automated entry of the following weather codes: 1 (mist/fog); 2 (fog reducing visibility to 1/4 mile or less); 3 (thunder); 4 (ice pellets); 5 (hail); 6 (glaze); 8 (haze); 9 (blowing snow); and X (tornado).
6. (S00719)	PRECIPITATION BEGIN/END REMARKS
Group 1	Discussion: Provides a change to the existing 15-minute rule which is used to reduce long strings of precipitation begin/end remarks. When a precipitation begin/end remark is now transmitted as part of the METAR/SPECI report, the content of that transmitted remark is not to be altered after transmission of the report. Only additional begin and/or end times may be added to the remark.

TABLE: New Capabilities In v2.80. (As of 2/24/04)

Change	Title
7. (S00786)	ELIMINATE POSSIBLE CLR AUTO ENTRY BEFORE AUGMENTED ENTRY IN SKY FIELD
Group 2	Discussion: If ASOS reported automated layers below 12,000 feet, and the observer augmented a layer above 12,000 feet (e.g., FEW100 OVC160), it was possible for the automated layers to change to a clear condition and have a report of "CLR OVC160" included in the METAR/SPECI reports. This software change will remove the automated CLR report and only "OVC160" will be reported.
8. (S00788)	REMOVE ADDITIVE DATA FROM SPECIALS TRANSMITTED DURING HOURLY EDIT TIME
Group 1	Discussion: Data groups encoded hourly, as well as 3- and 6-hourly additive data, are not to be encoded in SPECI reports transmitted during the hourly METAR edit time. This change will ensure that only the hourly precipitation accumulation remark (Prrrr) will be encoded in the SPECI report.
9. (S00789)	GENERATE SPECIAL FOR BEGIN/END/CHANGE OF INTENSITY OF ICE PELLETS
Group 1	Discussion: If ice pellets (PL) were augmented, ASOS would not recognize this present weather element as a criterion for a SPECI report. (PL is not automatically reported by ASOS.)
10. (S00790)	CHANGE ORDER OF ENCODED REMARKS FOR BEGINNING AND ENDING TIMES OF THUNDERSTORMS
Group 1	Discussion: Brings the order of encoding remarks in accordance with the FMH-1. The begin and end times for thunderstorms will be encoded after those for precipitation.
11. (S00791)	DISPLAYING AND VOICING ALL VALUES OF DENSITY ALTITUDE
Group 2	Discussion: ASOS would only broadcast and display values of density altitude when they were 1,000 feet or greater. This change will broadcast and display all computed values.
12. (S00815)	SEPARATE REPORT PROCESSING CONTROL FOR EACH SENSOR
Group 2	Discussion: In the past, when multiple sensors for a specific parameter were configured, e.g., two ceilometers to report sky condition, and if the report processing were turned-off for one of those sensors, then all the sensors for that parameter were turned-off. This change allows for separate report processing control for each configured sensor.
13. (S00830)	REPORT MULTIPLE "FEW" LAYERS IN SKY FIELD
Group 2	Discussion: ASOS only allowed one cloud layer to be reported as FEW. This change will permit multiple layers to be reported as FEW from both the automated and manual observing process.
14. (S00836)	QC ERROR MESSAGE FOR DEW POINT WITH MISSING AMBIENT TEMPERATURE
Group 2	Discussion: ASOS allowed the observer to enter a dew point temperature without an entry for the ambient temperature. This violates the FMH-1 and an error message will now be displayed to the observer if he/she should attempt to enter a dew point without an ambient temperature.

TABLE: New Capabilities In v2.80. (As of 2/24/04)

Change	Title
15. (S00837)	REVISE VDU DISPLAY FORMAT FOR TEMP/DEWPOINT
Group 2	Discussion: The VDU displayed ambient and dew point temperatures in whole degrees Celsius only. This change will display both ambient and dew point temperatures to the nearest tenth of a degree Celsius and to the nearest whole degree Fahrenheit.
16. (S00847)	COMPUTE MINUTES OF SUN AT LATITUDES GREATER THAN 60 DEGREES
Group 3	Discussion: ASOS computed the minutes of sunshine for all sites, regardless of latitude, using the algorithm in Naval Observatory Circular 171. This was incorrect for sites with a latitude of greater than 60 degrees. A software check has been implemented so ASOS will not compute minutes of sunshine for sites at a latitude greater than 60 degrees.
17. (S00874)	DISPLAY LAST TRANSMITTED METAR/SPECI REPORT
	Discussion: This change was implemented in software version 2.79. It allows for both the last transmitted METAR or SPECI report to be displayed, along with the METAR or SPECI report that is pending transmission. In other words, the last transmitted report is always displayed on the one-minute screen.
18. (S00914)	MANUAL ENTRY OF ‘000" IN THE SKY CONDITION FIELD
Group 2	Discussion: Will allow the manual entry of “000" for a layer height in the SKY condition field.
19. (S01110)	VALIDATION OF PRECIP ACCUMULATION
Group 1	Discussion: This change is sometimes referred to as “The False Tip Algorithm.” It is an effort to remove the false reporting of precipitation from dew, fog, or anything else that might fall into the rain gauge (i.e., Heated Tipping Bucket (HTB) or the All Weather Precipitation Accumulation Gauge (AWPAG)) when precipitation is not occurring. See Appendix I for more details..
20. (S00972)	REMOVE SAO LOGIC FROM ACU SOFTWARE
Group 3	Discussion: Prior to the METAR era, ASOS encoded Surface Aviation Observations (SAO) in the Airways code. Since the logic to encode SAOs is no longer necessary, it has been removed.
21. (S00983)	CURSOR CONTROL DURING CORRECTION EDIT
Group 2	Discussion: Allows the observer to use the TAB function to move from element to element to help speed up the editing process while generating a corrected METAR/SPECI report. TAB will move the cursor from left to right, and SHIFT TAB will move the cursor from right to left.
22. (S01005)	NEGATIVE PRESSURE REDUCTION CONSTANTS
Group 2	Discussion: At sites that have an elevation which is significantly below Mean Sea-Level (MSL), negative pressure reduction constants are required to compute pressure parameters. ASOS can now support these locations.

TABLE: New Capabilities In v2.80. (As of 2/24/04)

Change	Title
23. (S01016)	MODIFICATION TO WIND DATA QUALITY ALGORITHM
Group 1	Discussion: This modification applies only to the Belfort wind sensor. The Ice Fee Wind Sensor uses the old DQ algorithm (Change of 1 degree within 5 minutes, regradless of temperature). The modification introduces ambient temperature dependency into the wind data quality algorithm for wind speeds of 6 knots or greater. If the temperature is 36F or less, then a directions change of 1 degree or less is required within 5 minutes before a Data Quality Error (DQE) condition will be set. If temperature is greater than 36F, then a direction change of 2 degrees or less is required within 11 minutes before a DQE condition is set. If the temperature is missing, use the algorithm for temperatures of 36F or less.
24. (S01018)	CONNECT WSP AND REPORT 10s WINDS
	Discussion: This interface capability is used to support the FAA's Weather Sensor Processor (WSP) program. It has been part of several developmental and site-specific software loads prior to v2.80. The interface uses a dedicated, single user data port to transmit two-minute average wind speed (updated every 10 seconds), magnetic wind direction, and wind gust information. This interface should be completely transparent to the other operators of ASOS.
25. (S01152)	RESTRICT 'COR' IN DSM/MSM TO POST-PRIMARY TRANSMISSIONS
	Discussion: If the observer should edit or augment the Daily Summary Product or the Monthly Summary Product before the primary transmission time of the respective message, ASOS will insert a COR (i.e., correction) into the message. Since the changes occurred before the primary transmission time, the changes are not considered corrections. Therefore, inserting a COR into the message is incorrect. This software change fixes this logic error.
26. (S01055)	ADAPTIVE BASELINE FREQUENCY FOR FREEZING RAIN SENSOR
Group 3	Discussion: The freezing rain sensor is designed to have a resting baseline frequency of 40,000 hertz. When the frequency decreases to 39,967 hertz (i.e., a decrease of 33 hertz), it is possible for ASOS to report the occurrence of freezing rain. Unfortunately, many sensors have a resting frequency lower than 40,000 hertz, and in the past it was possible for ASOS to erroneously report freezing rain. This change will allow ASOS to determine a dynamic resting baseline frequency for the installed freezing rain sensor at the site. Then when a decrease of 33 hertz is detected, it will be possible for freezing rain will to be reported.
27. (S01078)	INCLUDE TEMP/DP REMARK IN ALL OBS
Group 3	Discussion: The ambient / dew point temperature remark ($TS_nTTTS_nT_dT_dT_d$) is currently encoded in the hourly METAR report remarks section. This change will encode this remark in all METAR and SPECI reports.
28. (S01105)	CHANGE DAILY SUMMARY PRODUCT SKY COVER LABELS
Group 2	Discussion: When the United States transitioned to METAR, the SKY COVER amounts reported for the periods of Midnight to Midnight and Sunrise to Sunset were changed from tenths to oktas. The labels on the Daily Summary Product were changed to OKTAS on these fields.
29. (S01106)	IMPROVE CHANGE OF TIME SYSLOG ENTRY

Group 2	Discussion: Adds the old date and the new date and time in the SYSLOG message when the ASOS system time is manually changed. The new SYSLOG message will include the old date, old time, the new date, and new time. This makes the message complete and usable.

TABLE: New Capabilities In v2.80. (As of 2/24/04)

Change	Title
30. (S01113)	ADD "LST" LABEL TO DATE FIELD ON THE PHYSICAL AND OID SCREENS
Group 2	Discussion: Include the "LST" indication to the DATE field on the PHYSICAL data screen and after the date in the upper-left-hand corner on all of the OID screens. Without an indication on the screens, it is often confused whether the date is LST or UTC.
31. (S01125)	ELIMINATE UNNECESSARY OID FUNCTION CALLS
Group 2	Discussion: NEED TEXT - TBD
32. (S01126)	ADD ICE ACCRETION REMARK TO METAR/SPECI REPORTS
	Discussion: The amount of ice accreting on a flat surface (planar icing) as estimated by the data from the freezing rain sensor, will be included in the remarks section of the METAR / SPECI reports. The remark will have the format of "Ihnnn," where "h" is the hourly time period, i.e., 1, 3 or 6 hours. The value "nnn" is the ice thickness accumulated to the nearest 0.01 inch. See Appendix II for additional details.
33. (S01133)	PROVIDE TECHNICIAN AUTHORIZATION TO SET DSM/MSM TRANSMIT TIMES
Group 2	Discussion: This privilege was once reserved for the SYStem Manager (SYS) password level, but now it has also been provided to the electronics TEChnician (TEC).
34. (S01164)	ADD ICE ACCRETION TO AMR FOR DIRECT COMMAND MODE (DCM ACCESS)
	Discussion: This change was first implemented in a software version that was given a limited distribution (v2.62I). The ASOS Meteorological Report (AMR) was developed as a message to transmit non-standard meteorological data observed by ASOS. The ice accretion remarks are generated at 15-minute intervals during the hour when icing is detected. Remarks are also provided for hourly amounts, and both intermediate and mandatory synoptic observing times. See Appendix II for additional details.
35. (AA618)	GENERATE GTA RADIO TONE AT TECH LEVEL
	Discussion: NEED TEXT - TBD

TABLE: Operational Trouble Report (OTR) Fixes In v2.80 (As of 2/24/04)

OTR Number	Title
1001 Group 1	IF PRESENT WEATHER FIELD IS IN MANUAL MODE WHEN FREEZING RAIN ENDS AND FIELD IS RESET, ASOS WILL CARRY FZRA WHEN NONE EXISTS
1002 Group 2	EDIT LOG CONTAINS DATE TIME WITHOUT ANY LOG ENTRY
1004 Group 2	PEAK WIND REMARK NOT ENCODED DURING TRANSMISSION OF OBSERVATION
1012 Group 2	ASOS EDIT LOG DOES NOT RECORD ABORTED ENTRIES CORRECTLY
1014 Group 1	ASOS ROUNDS PRECIP ROUNDING FROM NORMAL INCORRECTLY
	Discussion: This OTR refers to the Monthly Precipitation Departure from Normal on the Monthly Summary Product.
1016 Group 1	ASOS DOES NOT CORRECTLY UPDATE THE PRESENT WEATHER FIELD AND MAKES INCORRECT ENTRIES IN EDIT LOG
1022 Group 1	ASOS AUTOMATICALLY DELETES PL FROM PRESENT WEATHER
1047	INCORRECT FUNCTION PRESENT WEATHER
	Discussion: If the observer removes the automated entry of UP (unknown precipitation) from the PRESENT WX field by using the <space bar> to enter blank spaces, the PRESENT WX field is not changed from automated to manual mode. This has been fixed and the field is now placed in manual mode.
1057	INCORRECT ENDING DATES AND TIMES REPORTED ON THE MONTHLY SUMMARY PRODUCT FOR THE SHORT DURATION PRECIPITATION AMOUNTS

APPENDIX - II

PRECIPITATION VALIDATION ALGORITHM

Upon system cold boot or following a power outage, initialize a three-member array (current minute, past minute, amount 2 minutes ago) to indicate no precipitation amount (0.00 inches).

Following a warm start, do NOT reinitialize the three-member array.

Once each minute, perform the following steps:

1. Obtain the current precipitation accumulation data from the sensor. If **no** precipitation accumulation was reported by the sensor, enter a valid entry of "0.00" in the 12-hour archive.

2. If the current present weather report field on the one-minute OID screen contains an indication of edited or automated precipitation (PL, GS, GR, RA, SN, DZ, or UP), or any of these precipitation types have occurred within the past 59 minutes, or the site is designated as an "AO1" site:

   A. Mark the current precipitation accumulation data as valid.

   B. Enter the current precipitation accumulation value in the 12-hour archive.

   C. Check the contents of the three-member array. Validate all precipitation amounts in the array. Enter these precipitation amounts in the 12-hour archive. Once validated, sum the contents of the test array as the value to use in updating all derived precipitation parameters.

   D. Once validated, reset all values of the three-member array to zero. (Don't use positive precipitation values more than once when updating derived precipitation parameters.)

   E. Proceed to step 4.

3. If no precipitation (as defined above) is currently reported in the present weather field and precipitation has not been reported within the past 59 minutes and a positive indication of precipitation accumulation was reported by the sensor 2 minutes ago:

   A. Mark the precipitation accumulation value from 2 minutes ago as invalid by entering the value in the 12-hour archive with brackets surrounding it.

   B. Do not use the precipitation value from 2 minutes ago to update any derived precipitation parameters in step 4.

4. Use current valid precipitation amount to update the following parameters:

   A. Hourly precipitation remark (“Pxxxx” group)

   B. Hourly incremental precipitation amount

   C. 15-Minute and Hourly SHEF amounts

   D. Maximum Short Duration Precipitation amounts

   E. Three-Hourly and Six-Hourly Precipitation Amounts (“6xxxx”)

   F. Twenty-four Hour Precipitation Amount (“7xxxx”)

   G. Calendar Day Total Precipitation amount (Daily Summary)

   H. Monthly Total Precipitation amount (Monthly Summary)

APPENDIX - III

ICE ACCRETION REMARK

Table of Contents

1.0 Introduction:

In 1995 the ASOS Program Office sponsored an effort to develop an algorithm to generate quantitative ice accretion amounts using output from the ASOS freezing rain sensor. Over a three year period (1995 - 1998) Al Ramsay of Raytheon Information Technology and Scientific Services worked with the NWS Eastern Region (WSFOs at Cleveland, Binghamton, and Taunton), the Mount Washington Observatory, and Dr. Charles Ryerson of the Cold Regions Research and Engineering Laboratory to develop such an algorithm. Based on a recommendation from the Ice Storm and Flood of January 1998 Service Assessment report, the NWS identified a requirement for the real-time reporting of ice accretion amounts. This was deemed to be critical in supporting the NWS mission of protecting life and property through the winter weather forecast and warning program.

During two winter seasons (1999 - 2000, 2000 - 2001) Al Ramsay continued to evaluate the effectiveness of the algorithm. Although there were no coincident manual icing measurements available to directly verify the quantitative amounts generated by ASOS, there were no indications that the ASOS estimates were anything but reasonable. Estimates from adjacent or near-by airports provided comparable and consistent values of ice accretion. The primary value in ice-thickness estimates from ASOS will lie in the real-time availability of standard, objective, and quantified information which was otherwise unavailable to forecasters and other users.

During the winter season of 2001-2002, the NWS performed a service evaluation of the effectiveness of these quantitative ice accretion amounts. The amounts were only available through the Direct Command Mode (DCM) form of remote access to ASOS. The service evaluation results were positive, and steps were then taken to encode this information in the METAR and SPECI reports generated by ASOS.

The ice accretion amounts are automatically generated by the ASOS ACU software. They are encoded in an ice accretion remark which is then transmitted long-line in METAR and SPECI reports. The remark is also available via the DCM method of remote access to ASOS. These remarks can be downloaded from the site and then used operationally. There is no requirement for observers to manually backup this remark if the freezing rain sensor should malfunction.

Sensor Operation & Ice Accretion Algorithm:

The ASOS freezing rain sensor is the Rosemount Model 872C3 sensor. (Since the sensor is now being used to detect more than freezing rain, some documents refer to the sensor as the ASOS icing sensor.) The sensor detects ice accumulation by monitoring the resonant frequency (nominally 40,000 hertz) of a vibrating metal probe. The resonant frequency decreases with increasing ice accretion. Data are acquired from the sensor once each minute and are recorded in the ASOS 12-hour data archive file.

The response of the ASOS icing sensor to ice accretion is measured by summing all frequency drops (from a nominal value of 40,000 hertz) over the course of an icing event. The summation of the frequency drops is referred to as the "Net Frequency Change" (NFC). The ice thickness of glaze ice on a horizontal surface is estimated by the equation below.

$$\text{Ice Thickness (inches)} = 0.000152 * (\text{NFC})$$

The resting baseline frequency of the sensor is nominally 40,000 hertz. However, with the implementation of software version 2.80 (v2.80), ASOS now calculates the resting baseline frequency of each sensor by using the Adaptive Baseline Frequency (ABF) algorithm. So when a 33 hertz drop in frequency, i.e., from the baseline, is detected, this will indicate a ice accretion of 0.005 inches on the probe and an ice accretion remark will be encoded. The sensor will deice when the frequency drops 527 hertz (0.08 inches of ice) from its resting frequency.

There is a very slight possibility for a freezing rain sensor not to detect a freezing rain event. During this type of event the frequency does not drop, but rather increases. This case is called "clamping." (Clamping is caused by ice bridging between the sensor probe and the supporting structure.) This is an extremely rare event and over three winters (1999-2000, 2000-2001, and 2001-2002) there have only been two documented cases of clamping where the freezing rain events were missed (Albany, NY on 2/2/99 and Little Rock, AR on 12/25/00).

Since the ice accretion remark is based on the NFC (i.e., frequency drops), it will be encoded when sufficient frequency drops occur. Remarks can be encoded as a result of frost; ice deposited by fog (FG), freezing fog (FZFG), or mist (BR); freezing drizzle (FZDZ) where the drop size is too small to be detected by the Light Emitting Diode Weather Identifier (LEDWI), and freezing rain (FZRA). Whenever snow (SN) occurs it causes extreme drops in the sensor's frequency resulting in false ice accretion amounts. It is for this reason that the algorithm ignores the frequency drops from the sensor when ever

SN is encoded in the PRESENT WX field on the ASOS 1-Minute Screen, e.g., FZRASN or SN FZFG. The entry of SN in the field could be either automated from ASOS or entered by the observer.

Planar vs Radial Ice Accretion Amounts:

The ice accretion amounts inferred by ASOS are "planar" amounts. That is they apply to horizontal surfaces like roadways and sidewalks. By contrast, the term "radial" refers to ice thicknesses which would accumulate on branches and power lines. By knowing the planar amounts inferred by ASOS, it is possible to estimate the ice accreting on trees and wires. In theory, the relationship between radial and planar ice accretion is that radial accretion is 32 percent of planar accretion. A semi-empirical relationship, determined by calculating uniform radial values from field measurements of planar ice thickness is that uniform radial thickness would be about 37 to 40 percent of the ASOS planar ice thickness estimates, depending on assumptions of ice density.

In Theory: Estimated Radial Icing Amount = ASOS Planar Estimates x **0.32**

Strengths & Limitations of ASOS Planar Ice Accretion Amounts:

Using the ASOS planar ice accretion estimates requires knowledge of ASOS operations and some considerations of the local environment where the ASOS sensors are sited.

Strengths:

1. The primary strength of the ice accretion remark is in providing real-time ice-thickness estimates in a standard, objective, and quantified manner. In the past this information was relatively unavailable to forecasters and other users.

2. By using the ASOS planar ice accretion estimates it is possible to estimate the amount of ice accreting on trees and power lines, i.e., radial amounts.

Limitations:

1. Any ice accreting while SN is detected/occurring is ignored due to limitations of the ASOS icing sensor. In cases where the LEDWI misinterprets light drizzle as snow, ice accretion estimates will not be provided.

2. The ASOS icing algorithm can underestimate the amount of ice accretion during periods of heavy rain because the larger raindrops have time to run off the ASOS probe before freezing, and therefore do not contribute to the ASOS estimate of ice thickness. (The field data sets which were used to develop the ASOS ice-accretion algorithm contain primarily the more-common stratiform precipitation regimes, in which large drop sizes are seldom experienced.)

3. Icing detected by the sensor must, of course, freeze upon contact with the sensor. Rain falling onto a cold surface that freezes within minutes of contact, i.e., not the true definition of freezing rain, will be either underestimated or not included in the icing remark.

4. It is possible that the micrometeorology of the local environment could allow ice accretion at the ASOS, but not on surfaces near the observer. It must be noted that all estimates are valid "*at the ASOS*."

5. Users must be careful not to over-interpret the ASOS estimates. Local surface ice accretion estimates are heavily dependent on highly variable non-meteorological factors such as topography, object temperature history and thermal mass, and long-wave radiation sources. ASOS icing estimates can NOT be extrapolated directly to other locations.

6. The icing sensor may take a long time to recover from a deicing cycle when the precipitation is very light and the temperature is near freezing. In this case the icing estimates will be underestimated.

7. Due to sensor and deicing algorithm limitations, the ASOS icing estimates tend to be low. But they have not been so low as to generate concern. Over the past five years, ASOS estimates of planar ice thickness have been considered "reasonable" in comparison to reports from observers and news media.

Encoded Remark:

The encoded remark explanation includes the reporting periods, message format, remark encoding conventions, and encoding examples. A remark is encoded if icing has been detected during the reporting period. If the freezing rain sensor is malfunctioning, or is not available, no manual backup/augmentation for the ice accretion remark is required.

Reporting Periods:

The reporting periods for data retrieved via the DCM are from HH_0+01 through HH_1+00, i.e., from the top of the hour to the top of the next hour.

The periods for remarks encoded in the METAR / SPECI reports are based on the observation hour, i.e., from the time of the last hourly METAR report to the time of the current hourly METAR report, e.g., HH_0+57 through HH_1+56 if the hourly METAR report time is HH+56.

DCM Downloaded Data:

Reports are generated at 15-minute intervals (i.e., HH_0+15, HH_0+30, HH_0+45, and HH_1+00) for any hour in which icing is detected. Icing amounts are cumulative during the hour, with the total ice accretion for the hour reported at the top of the hour (HH_1+00). For example, if icing is detected at HH_0:17, a remark will be encoded at HH_0:30. If no additional ice accretes, the amount reported at HH_0:30 will be reported at HH_0:45, and again at the top of the hour HH_1:00. If ice accretion continually occurred after HH_0:17, a remark would be encoded at HH_0:30, then the increasing cumulative amount for the hour would be reported at HH_0:45, and the total for the hour reported at HH_1:00.

At the intermediate synoptic times (0300Z, 0900Z, 1500Z, and 2100Z), if icing had been detected during the previous 3-hour period, the total ice accretion amount during the 3-hour period would be reported.

At the mandatory synoptic times (0600Z, 1200Z, 1800Z, and 0000Z), if icing had been detected during the previous 6-hour period, the total ice accretion amount during the 6-hour period would be reported.

METAR / SPECI Encoded Remarks:

Hourly ice accretion amounts will be encoded in the remarks section of both the SPECI and METAR reports when icing is detected. If the last transmitted hourly METAR report has a valid time of HH_0+56, and a SPECI is transmitted with a valid time of HH_1+23, the icing remark will contain all the detected icing that occurred from HH_0+57 through HH_1+23. The next hourly METAR report (HH_1+56) will contain an icing remark with all the detected icing from HH_0+57 through HH_1+56.

At the intermediate synoptic times (0300Z, 0900Z, 1500Z, and 2100Z), if icing had been detected during the previous 3-hour period, the total ice accretion amount during the 3-hour period would be reported in the hourly METAR reports. (Example intermediate hourly METAR report times are 0256Z, 0856Z, 1456Z, and 2056Z.)

At the mandatory synoptic times (0600Z, 1200Z, 1800Z, and 0000Z), if icing had been detected during the previous 6-hour period, the total ice accretion amount during the 6-hour period would be reported in the hourly METAR reports. (Example mandatory hourly METAR report times are 0556Z, 1156Z, 1756Z, and 2356Z.)

Message Format:

When downloaded via the DCM, the remark will be encoded in the ASOS Meteorological Report (AMR). (See example below.) The AMR includes the Site Identifier of the ASOS site (KST0), the valid time (UTC) of the data (1900Z), and then the icing remark(s). The date and time encoded prior to the "AMR" message type indicator, are the Local Standard Time (LST) date and time when the message was stored in the ASOS data base.

01/07/2000 14:00:12 AMR KST0 1900Z I1007

Where:

01/07/2000 14:00:12 - Date & Time (LST) when AMR was stored in ASOS data base.

AMR - ASOS Meteorological Report Message Type Indicator

KST0 - Site Identifier for the ASOS site.

1900Z - Valid Time (UTC) for the ice accretion remark. Ice accretion from 1800Z through 1859Z is reported.

I1007 - Ice Accretion Remark

Example: ASOS Ice Accretion remark encoded in the AMR.

When the remark is encoded in the remarks section of the METAR / SPECI reports it will follow the encoding conventions described below.

Remark Encoding Conventions:

All ice accretion amounts will be reported to the nearest one-hundredth of an inch (0.01 in.). The amounts are with respect to glaze ice accretion on a horizontal surface, i.e., planar ice.

If augmentation/backup should occur for freezing precipitation, and the freezing rain sensor is either not installed or malfunctioning, then the remark will not be encoded automatically from ASOS. There is no manual backup required for this remark.

A) Hourly Ice Accretion Amount:

Ice accretion for the current hour encoded in hundredths of an inch (0.01 in.) has the following format:

I1nnn

Where: "I" - is the icing indicator for the group
"1" - is the reported time period (one hour)
"nnn" - is the thickness accumulated to the nearest one-hundredth of an inch (0.01 in.). A trace amount is encoded as "000."

B) Three (3-) Hourly Ice Accretion Amount:

The accretion of ice over the past three hour time period in one-hundredths of an inch (0.01 in.) would have the format:

I3nnn

Where: "I" - is the icing indicator for the group
"3" - is the reported time period (three hours)
"nnn" - is the thickness accumulated to the nearest one-hundredth of an inch (0.01 in.). A trace amount is encoded as "000."

The remark may be encoded at the intermediate synoptic times (0300, 0900, 1500, or 2100 UTC). When conditions warrant, the "I3nnn" remark will be encoded immediately following the hourly ice accretion amount (I1nnn).

C) Six (6-) Hourly Ice Accretion Amount:

The accretion of ice over the past six hour time period in one-hundredths of an inch (0.01 in.) will have the format:

I6nnn

Where: "I" - is the icing indicator for the group
"6" - is the reported time period (six hours)
"nnn" - is the thickness accumulated to the nearest one-hundredth of an inch (0.01 in.). A trace amount is encoded as "000."

The remark may be encoded at the mandatory synoptic times (0600, 1200, 1800, or 0000 UTC). When conditions warrant, the "I6nnn" remark will be encoded immediately following the hourly ice accretion amount (I1nnn).

D) Missing Icing Data:

If the freezing rain sensor is inoperative for more than 25 percent of the reporting period, the icing remark shall be considered missing. Missing groups shall be encoded as I1///, I3///, or I6///, as appropriate. If no icing is detected then the groups will not be encoded.

Encoding Examples:

1. AMR KST0 2100Z I1001 I3001

The 2100 UTC (intermediate synoptic) AMR is reporting that ice accretion in the last hour is 0.01 inch and the accretion over the last three hours is the same amount.

If a METAR report had been generated with a time of 2056Z and these same remarks, then it would be reporting that 0.01 inch of accretion had occurred from 1957Z through 2056Z. The accretion over the last three hours (1757Z through 2056Z) was the same amount. In other words, all the ice accretion occurred during the past hour.

2. AMR KST0 0030Z I1002

The 0030 UTC report is indicating that icing is occurring at the site and that 0.02 inch of ice has accreted during the period from 0000 UTC through 0029 UTC.

If a SPECI report has a time of 0030 UTC, and if the hourly METAR report has a valid time of 2356 UTC, then the SPECI will be reporting that 0.02 inch of ice has accreted between the

times of 2357 and 0030 UTC.

3. AMR KST0 0000Z I1003 I6008

The 0000Z AMR (mandatory synoptic time) report is indicating that icing has occurred during the past hour and accretion has been 0.03 inch. The total accretion from 1800Z through 2359Z (last six hours) is 0.08 inch.

A 2356Z METAR report with these same ice accretion remarks would be reporting that 0.03 inch of ice accreted during the past hour (2257Z throgh 2356Z), and that the total accretion from 1757Z through 2356Z was 0.08 of an inch.

4. AMR KST0 0600Z I1000 I6018

The 0600Z AMR (mandatory synoptic time) report shows that only a trace (less than 0.005 inch) of ice accretion has been detected during the past hour and that the accretion over the last six hours is 0.18 inch. If these same remarks were encoded in the 0556Z METAR report, then the interpretation would be the same.

5. Light freezing rain (-FZRA) is reported in the 0356 UTC METAR and no AMR is available for a valid time of 0400Z.

There are three possible explanations for this scenario. The first is that the freezing rain sensor at the site has malfunctioned and the observer is providing backup. The second is that the freezing rain sensor has not experienced sufficient drops in its frequency to report any icing and the observer is providing backup. The third is that the observer is providing augmentation at a site that does not have a freezing rain sensor installed.

6. AMR KST0 0600Z I1003 I6///

In this case, the freezing rain sensor was operative more than 75% of the reporting period during the current hour. However, the sensor was inoperative more than 90 minutes during the previous 6 hours.

7. AMR KST0 0600Z I1/// I6003

In this case, the freezing rain sensor was operative more than 75% of the reporting period for the previous 6 hours. However, the sensor was inoperative more than 15 minutes during the previous hours.

8. AMR KST0 0700Z I1002

During the past hour (0600 - 0659Z) the sky was a low overcast,

temperatures hovered around 30°F, winds were light, visibility was 1/4SM to 3/4SM, and periods of freezing fog (FZFG) and mist (BR) were reported. The ASOS algorithms infer the existence of both FZFG and BR, i.e., they are not actually detected by any sensor(s). In reality, it is likely that the ice accreting is really from freezing drizzle (FZDZ), as well as BR and FZFG. FZDZ being the most significant contributor to the accretion amount.

9. AMR KST0 1100Z I1001

From 1000 - 1059Z the sky was clear. The temperatures dropped to 28°F, visibility was 10SM, winds were calm, and no precipitation nor obscurations were reported in the PRESENT WX field. The ice accretion amount of 0.01 is frost.

10. AMR KST0 0000Z I6008

The 0000Z AMR (mandatory synoptic time) report is indicating that icing occurred during the previous 6 hours, but no accretion was detected during the previous hour. The total accretion from 1800Z through 2359Z (last six hours) is 0.08 inch.

Accessing The Icing Remark:

The ice accretion remark is available in the remarks section of the METAR and SPECI reports, and via the DCM method of remote access to ASOS in the AMR.

The DCM method of remote access is obtained by entering the pound sign(#) before the remote access code at the ACCESS CODE prompt, e.g., ACCESS CODE: #REMOTE. The AMR can be downloaded from ASOS by using the following command string:

AMR $mm_i dd_i$ $hh_i mm_i$ $mm_f dd_f$ $hh_f mm_f$.

Where: $mm_i dd_i$ $hh_i mm_i$ - month, day, hour, minutes to start the download

$mm_f dd_f$ $hh_f mm_f$ - month, day, hour, minutes to end the download

Examples: **AMR 1230 1220Z 0101 2200Z** will download the AMRs from December 30th at 1220 UTC through January 1st at 2200 UTC.

If **AMR 1230 1220 0101 2200** is entered, note that "Z" is not appended to the times, then ASOS assumes that Local Standard Time (LST) dates and times are being entered. AMRs for the period of December 30th at 1220 LST through January 1st at 2200 LST will be downloaded.

Using the **AMR** command without the begin/end dates and times will download all of the stored AMR reports stored in the ASOS memory. The AMRs are stored for a period of at least three days.

Sample DCM Download of the AMR (Icing Remark)

```
CMD>AMR
LISTING AMR FROM: 01/07/2000 12:30 THRU 01/07/2000 19:01
01/07/2000 12:30:12 AMR KST0 1730Z I1001
01/07/2000 12:45:12 AMR KST0 1745Z I1002
01/07/2000 13:00:12 AMR KST0 1800Z I1002 I6002
01/07/2000 13:15:12 AMR KST0 1815Z I1002
01/07/2000 13:30:12 AMR KST0 1830Z I1006
01/07/2000 13:45:12 AMR KST0 1845Z I1006
01/07/2000 14:00:12 AMR KST0 1900Z I1007
01/07/2000 14:45:12 AMR KST0 1945Z I1002
01/07/2000 15:00:12 AMR KST0 2000Z I1002
01/07/2000 15:30:12 AMR KST0 2030Z I1001
01/07/2000 15:45:12 AMR KST0 2045Z I1002
01/07/2000 16:00:12 AMR KST0 2100Z I1003 I3012
01/07/2000 16:15:12 AMR KST0 2115Z I1000
01/07/2000 16:30:12 AMR KST0 2130Z I1001
01/07/2000 16:45:12 AMR KST0 2145Z I1006
01/07/2000 17:00:12 AMR KST0 2200Z I1010
01/07/2000 17:15:12 AMR KST0 2215Z I1005
01/07/2000 17:30:12 AMR KST0 2230Z I1009
01/07/2000 17:45:12 AMR KST0 2245Z I1014
01/07/2000 18:00:12 AMR KST0 2300Z I1018
01/07/2000 18:15:12 AMR KST0 2315Z I1005
01/07/2000 18:30:12 AMR KST0 2330Z I1012
01/07/2000 18:45:12 AMR KST0 2345Z I1020
01/07/2000 19:00:12 AMR KST0 0000Z I1020 I6061
AMR LISTING COMPLETE, 24 AMR(S) LISTED.
```

***** TO BE CHECKED DURING 2.80 SAT *****

Operational Trouble Report:

A non-critical Operational Trouble Report (OTR) has been written against software version 2.62I. The problem will occur under the following conditions: 1) the LEDWI has the report processing turned off; 2) the freezing rain sensor is operational; and 3) the observer is signed off. All three conditions must exist at the same time for the problem to occur. Under these conditions, if the software operated correctly, then the icing amounts would be reported as missing, i.e., I1///, I3///, or I6///. With the observer signed-off and without an operating LEDWI, the precipitation at the site is unknown (PWINO is encoded in REMARKS of the METAR/SPECI reports). Reductions in the freezing rain sensor's frequency could be the result of snow. Since snow provides erroneous indications of ice accretion, the ice accretion amounts are not provided. It is better to provide no data, than to provide bad or misleading data. Currently with the software operating with the known OTR, the first 30 minutes of the hour having met the three conditions above will report no ice accretion amount, i.e., a non-event. After 30 minutes, the missing ice accretion amounts will appear. If PWINO and/or FZRANO are encoded in the METAR/SPECI remarks, then the user of the ice accretion remark should expect to see missing ice accretion amounts. So the error in the software is reporting a non-event instead of missing data for the first 30 minutes when the three conditions occur. In cases when icing is detected and accretion amounts are computed, the software has been working properly.

Appendix IV

V2.80 IMPLEMENTATION GROUP LISTS

GROUP 1: V2.80 XX OAT Sites

GROUP 2: Remaining NWS and FAA Sites

Subgroup 2A
Subgroup 2B
Subgroup 2C

GROUP 1: V2.80 XX OAT SITES

SID	LOCATION	ST	AGN	S/L	STN_LAT	LCD	AWPAG_GRP	AWPAG_INST
ABE	Allentown	PA	NWS	C	40-39-03N	Y	1	
ABR	Aberdeen	SD	NWS	D	45-26-36N	Y	1	04/01/2003
AMA	Amarillo	TX	NWS	B	35-13-12N	Y	1	04/24/2003
AVP	Wilkes-Barre/Scranton	PA	NWS	C	41-20-20N	Y	1	04/03/2003
BOI	Boise	ID	NWS	C	43-34-00N	Y	1	04/03/2003
BOS	Boston	MA	NWS	A	42-21-38N	Y	1	
ERI	Erie	PA	NWS	C	42-04-48N	Y	1	03/12/2003
FCA	Kalispell	MT	NWS	D	48-18-15N	Y	1	
GRB	Ashwaubenon	WI	NWS	C	44-28-46N	Y	1	04/23/2003
LAN	Lansing	MI	NWS	B	42-46-49N	Y	1	04/14/2003
MCN	Macon	GA	NWS	C	32-41-16N	Y	1	02/27/2003
MKG	Muskegon	MI	NWS	B	43-10-16N	Y	1	
MOB	Mobile	AL	NWS	B	30-41-18N	Y	1	
PWM	Portland	ME	NWS	C	43-38-32N	Y	1	04/15/2003
SPI	Springfield	IL	NWS	C	39-50-43N	Y	1	03/03/2003
TRI	Bristol/Johnson/Kingsport	TN	NWS	A	36-28-47N	Y	1	04/02/2003

Group 2:Remaining NWS and FAA Sites

TBD

APPENDIX V

ASOS Implementation Data Base Reports

For

For V2.80

- ASOS Sensor Configuration Report
- ASOS Port Configuration Report
- ASOS Sensor Firmware Version Report
- ASOS Implementation Status Report

ASOS SENSOR CONFIGURATION REPORT

DATE: 11-06-02

SID	LOCATION	ST	S/W VER	ACU S/W DATE	ACU/ UPS	DCP/ UPS	DCP 1-SENSORS STAT	CPUS	SIO	UPS	A/D	PORTS 1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-4	4-1	4-2	4-3	4-4	5-1	5-2	DCP 2-SENSORS STAT	CPUS	SIO	UPS	A/D	PORTS 1-2	1-3	1-4	DCP 3-SENSORS STAT	CPUS	SIO	UPS	A/D	PORTS 1-2	1-3	1-4	P1	P2	P3	LOCAL SENSORS 1	2	3	4	5	6	7	8	9	10	11	12	13	ACU/DCP COMM
1V4	St. Johnsbury	VT	2.6A	09/28/01			D	1	1	0	1																	D	1	1	0	1				D	1	1	0	1				X	X		WS	TD	TB											PH I RADIO
2WX	Buffalo	SD	2.6				D	0	0	0	0																	D	0	0	0	0				D	0	0	0	0				X	X		TD	WS	TB											PH I RADIO
40J	Perry - Foley Airport	FL	2.6				E	1	2	0	1				TB	WS	TD											D	0	0	0	0				D	0	0	0	0				X	X															PH I RADIO
6R6	Terrell County Airport	TX	2.6				D	0	0	0	0																	D	0	0	0	0				D	0	0	0	0				X	X					TB	WS	TD								PH I RADIO
79J	Andalusia Municipal Airport	AL	2.6		SOLA	SOLA	E	2	3	1	2	C1	FR	PW	TB	WS	TD	V1		TS								D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
87Q	Point Piedras Blancas	CA	2.6				D	0	0	0	0																	D	0	0	0	0				D	0	0	0	0				X	X		TB	WS	TD											PH I RADIO
8D3	Sisseton Municipal Airport	SD	2.6				E	1	2	0	1				TB	WS	TD											D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
9V9	Chamberlain Municipal Airport	SD	2.6				D	0	0	0	0																	D	0	0	0	0				D	0	0	0	0				X	X		TD	WS	TB											PH I RADIO
AAF	Apalachicola Municipal Airport	FL	2.6			SOLA	E	1	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
AAO	Colonel James Jabara Airport	KS	2.6				E	1	2	0	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
AAT	Alturas Municipal Airport	CA	2.6				E	1	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH I RADIO
ABE	Lehigh Valley Int'l. Airport	PA	2.62	12/19/01	SOLA	SOLA	E	2	4	1	2			PW		WS	TD	V1		C1	C3	TB						D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ABI	Abilene Regional Airport	TX	2.6		SOLA	CPI	E	2	4	1	2		FR	PW		WS	TD	V1		C3	C1	TB						D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
ABQ	Albuquerque Int'l. Sunport Airport	NM	2.6		SOLA	SOLA	E	2	4	1	2			PW		WS	TD	V1	V3	C1	C3	TB						D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ABR	Aberdeen Regional Airport	SD	2.6		SOLA	SOLA	E	2	4	1	2		FR	PW	TB	WS	TD	V1		C1	C3							D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ABY	Southwest Georgia Regional Airport	GA	2.6		SOLA	CPI	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
ACK	Nantucket Memorial Airport	MA	2.6		SOLA		E	2	2	0	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
ACT	Waco Regional Airport	TX	2.6		SOLA	CPI	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ACV	Arcata Airport	CA	2.6		DELT	SOLA	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ACY	Atlantic City Int'l. Airport	NJ	2.6		SOLA		E	2	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ADG	Lenawee County Airport	MI	2.6				E	1	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
ADQ	Kodiak Airport	AK	2.6		SOLA	SOLA	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AEX	Alexandria Int'l. Airport	LA	2.6		SOLA	CPI	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AFAC1	Bullseye Aux Airfield	CO	2.6		SOLA		D	1	1	0	1																	D	1	1	0	1				D	1	1	0	1				X	X	X	C1	FR	PW	TB	WS	TD	V1	TS					PH I RADIO
AFN	Jaffrey - Silver Ranch Airport	NH	2.6		SOLA	CPI	E	1	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH I RADIO
AFW	Fort Worth Alliance Airport	TX	2.6		SOLA	CPI	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AGC	Allegheny County Airport	PA	2.6		DELT	SOLA	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AGS	Augusta Regional at Bush Field	GA	2.6		SOLA	CPI	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AHN	Athens/Ben Epps Airport	GA	2.6		SOLA	CPI	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AIA	Alliance Municipal Airport	NE	2.6				E	1	2	0	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH I RADIO
AKH	Gastonia Municipal Airport	NC	2.6				E	1	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
AKN	King Salmon Airport	AK	2.6		SOLA	SOLA	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AKO	Colorado Plains Regional Airport	CO	2.6		SOLA	CPI	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AKQ	Wakefield Municipal Airport	VA	2.6		SOLA	SOLA	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AKR	Akron Fulton Int'l. Airport	OH	2.6		SOLA		E	1	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH II RADIO
ALB	Albany Int'l. Airport	NY	2.63	03/28/02	SOLA	SOLA	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ALI	Alice Int'l. Airport	TX	2.6		SOLA	SOLA	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	1	1	0	1				D	1	1	0	1				X	X	X														PH II RADIO
ALO	Waterloo Municipal Airport	IA	2.6		DELT	CPI	E	2	2	1	1	C1	FR	PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
ALS	San Luis Valley Regional Airport/Bergman Field	CO	2.6		SOLA	SOLA	E	2	3	1	1	C1		PW	TB	WS	TD	V1	TS									D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
ALW	Walla Walla Regional Airport	WA	2.6		SOLA	CPI	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH I RADIO
AMA	Amarillo Int'l. Airport	TX	2.6		SOLA	SOLA	E	2	4	1	2		FR	PW		WS	TD	V1		C1	TB							D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AMG	Bacon County Airport	GA	2.6		SOLA	SOLA	E	2	2	1	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X	X														PH II RADIO
AMW	Ames Municipal Airport	IA	2.6				E	1	2	0	1	C1		PW	TB	WS	TD	V1										D	0	0	0	0				D	0	0	0	0				X	X															PH I RADIO

ASOS Count: 975

SID: Site Location Identifier
ST: State
S/W VER: Software Version Used In Acquisition Control Unit (ACU)
ACU S/W DATE: Date Software Installed
ACU/UPS: Acquisition Control Unit Uninterruptible Power Supply (UPS)
DCP/UPS: Data Collection Package(DCP)Uninterruptible Power Supply (UPS)
DCP: Data Collection Package
STAT: Status D-Disabled, E-Enabled
CPUS: Number Of Central Processing Boards
SIO: Number Of Serial InPut/OutPut Boards
UPS: Number Of Uninterruptible Power Supplies
ACU/DCP COMM: Communications Method Between ACU & DCP
A/D: Number Of Analog To Digital Converters

Sensors:
C1: Primary Ceilometer
C2: Meteorological Discontinuity Ceilometer
C3: Backup Ceilometer
DT: Vaisala DTS1 Dewpoint Temperature
FP: All Weather Precipitation Accumulation Gauge
FR: Freezing Rain
P1: Pressure 1
P2: Pressure 2
P3: Pressure 3

PW: Present Weather
TB: Tipping Bucket Rain Gauge
TD: 1088 or H083 Ambient/Dew Point Temperature
TS: Lighting Detection
V1: Primary Visibility
V2: Meteorological Discontinuity Visibility
V3: Backup Visibility
WI: Ice Free Wind (Vaisala 425)
WS: Belfort Wind

ASOS PORT CONFIGURATION REPORT

DATE:11-06-02

SID	PORT NUM	FUNCTION	STATUS	BAUD RATE	PARITY	BITS	STOP BITS	HANDSHAKE	CONNECTION	MODEM SLOT	DIAL TYPE
XNA	2-1	ACU-DCP A	Enabled	2400	NONE	8	1	RTS/CTS	Radio		
XNA	2-2	Pressure 1	Enabled	2400	NONE	8	1	None	Hard-Wire		
XNA	2-3	OID-4 User 1	Enabled	2400	NONE	8	1	None	Phone	4	Tone
XNA	2-4	VOICE	Enabled	9600	NONE	8	1	None	Hard-Wire		
XNA	3-1	ACU-DCP B	Enabled	2400	NONE	8	1	RTS/CTS	Radio		
XNA	3-2	Pressure 2	Enabled	2400	NONE	8	1	None	Hard-Wire		
XNA	3-3	OID-5 User 2	Enabled	38400	NONE	8	1	None	Phone	5	Tone
XNA	3-4	OID-1 Local	Enabled	9600	NONE	8	1	None	Hard-Wire		
XNA	4-1	UPS	Enabled	9600	NONE	8	1	None	Hard-Wire		
XNA	4-2	Pressure 3	Enabled	2400	NONE	8	1	None	Hard-Wire		
XNA	4-3	GTA Radio	Enabled	1200	NONE	8	1	None	Hard-Wire		
XNA	4-4	OID-2 Secondary	Enabled	9600	NONE	8	1	None	Hard-Wire		
XNA	5-1	ADAS	Enabled	2400	NONE	8	1	Synchronous	Hard-Wire		
YIP	1-3	RVR	Disabled	2400	EVEN	7	1	None	Hard-Wire		
YIP	2-1	ACU-DCP A	Enabled	2400	NONE	8	1	RTS/CTS	Radio		
YIP	2-2	Pressure 1	Enabled	2400	NONE	8	1	None	Hard-Wire		
YIP	2-3	OID-4 User 1	Enabled	2400	NONE	8	1	None	Phone	4	Tone
YIP	2-4	VOICE	Enabled	9600	NONE	8	1	None	Hard-Wire		
YIP	3-1	ACU-DCP B	Enabled	2400	NONE	8	1	RTS/CTS	Radio		
YIP	3-2	Pressure 2	Enabled	2400	NONE	8	1	None	Hard-Wire		
YIP	3-3	OID-5 User 2	Enabled	38400	NONE	8	1	None	Phone	5	Tone
YIP	3-4	OID-2 Secondary	Enabled	9600	NONE	8	1	None	Hard-Wire		
YIP	4-1	UPS	Enabled	9600	NONE	8	1	None	Hard-Wire		
YIP	4-2	Pressure 3	Enabled	2400	NONE	8	1	None	Hard-Wire		
YIP	4-3	CVD-1	Enabled	1200	NONE	8	1	None	Leased	6	Tone
YIP	4-4	OID-1 Local	Enabled	2400	NONE	8	1	None	Leased	2	Tone
YIP	5-1	Printer	Enabled	9600	NONE	8	1	XON/XOFF	Leased	1	Tone
YIP	5-3	ADAS	Enabled	2400	NONE	8	1	Synchronous	Hard-Wire		

ASOS Count: 976

ASOS SENSOR FIRMWARE VERSION REPORT

DATE: 11-06-02

SID	CEIL	VIS	TA TD	PWX	WND	PRESS	FZRA	SNOW	HAIL	SUN	L PRECIP	TSTM
12N	0000.00	0000.00	2.46	0000.00	4.0	N/A	0000.00	SD		SS	N/A	0000.00
1V4	0000.00	0000.00	A92/F91	0000.00	4.0		0000.00	SD		SS		0000.00
2WX	0000.00	0000.00	B91/F91	0000.00	4.0	N/A	0000.00	SD		SS	N/A	0000.00
40J	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
6R6	0000.00	0000.00	A92/F91	0000.00	4.00	N/A	0000.00	SD		SS	N/A	0000.00
79J	0002.46	0039.00	A92/F91	0003.64	0004.00	0000.00	0002.00	SD		SS	0000.00	0001.06
87Q	0000.00	0000.00	B91AF91	0000.00	4.0	N/A	0000.00	SD		SS	N/A	0000.00
8D3	0000.00	0000.00	A92/F91	0000.00	4.0	N/A	0000.00	SD		SS	N/A	0000.00
9V9	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
AAF	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
AAO	0002.46	0040.00	A92/F91	0003.64	0004.00	0000.00	0002.00	SD		SS	0000.00	0000.00
AAT	2.46"	039"	A92/F91	3.64"	4.0"	N/A"	"	"	"	"	N/A"	"
ABE	2.46"	040"	A92/F91	3.64	4.0	N/A	0000.00	SD		SS	N/A	0000.00
ABI	2.46	039	B91/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
ABQ	2.46.00	0040.00	B91/F91	0003.64	004.00	0000.00	0000.00	SD		SS	0000.00	0000.00
ABR	2.46	039	B91/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
ABY	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
ACK	2.46"	040	A92/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
ACT	2.46	039	A92/F91	3.64	40	N/A	0000.00	SD		SS	N/A	0000.00
ACV	2.46	039	B91/F91	3.64	4.0	N/A	0000.00	SD		SS	N/A	0000.00
ACY	2.46	040	A92/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
ADG	2.46	040	A92/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
ADQ	2.46	039	A92/F91	3.64	4.00	N/A	2	SD		SS	N/A	0000.00
AEX	K.46	040"	A9K/F91	3.64	4.0	N/A	3	SD		SS	N/A	0000.00
AFAC1	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
AFN	2.46	040	A92/F91	3.64	4.00	N/A	2	SD		SS	N/A	0000.00
AFW	2.46	040	B91AF91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
AGC	2.46	040	A92/F91	3.64	4.0	N/A	0000.00	SD		SS	N/A	0000.00
AGS	2.46	040	A92/F91	3.64	4.0	N/A	2	SD		SS	N/A	0000.00
AHN	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	0000.00	SD		SS	0000.00	0000.00
DAB	2.46	040	A92/F91	3.64	4.00	0000.00	0000.00	SD		SS	0000.00	0000.00

ASOS Count: 887

UPS: Number Of Uninterruptible Power Supplies
ACU/DCP COMM: Communications Method Between ACU & DCP
A/D: Number Of Analog To Digital Converters

Page 1 of 1

Date: 11/27/02

ASOS Implementation Status Report

AOMC Update 136

SID	City	ST	NWS Region	Agency	Svr Lvl	Processor	Processor Installation	Previous ACU S/W	Previous Installed	ACU S/W	S/W Installed	Ta Sensor	Td Sensor	DTS1	IFW Installation	AWPAG Installation	ALDARS Turn-On
12N	Andover	NJ	E	NWS	C	Synergy	10/01/02	2.6		2.6A-3	10/01/02	H083	H083				
1V4	St. Johnsbury	VT	E	NWS	C	Synergy	09/28/01	2.6		2.6A-3	05/10/02	1088	1088				
2WX	Buffalo	SD	C	NWS	C	Xycom		2.6A-3	09/27/02	2.6	10/02/02	HO83	HO83				
6R6	Dryden	TX	S	NWS	C	Synergy	10/03/02	2.6		2.6A-3	10/03/02	1088	1088				
AAF	Apalachicola	FL	S	NWS	D	Xycom				2.6		1088	1088				
AAT	Alturas	CA	W	NWS	D	Xycom				2.6		1088	1088				
ABE	Allentown	PA	E	NWS	C	Xycom		2.62I	12/19/01	2.6	06/03/02	1088	1088				
ALB	Albany	NY	E	NWS	A	Xycom		2.6		2.63	03/28/02	1088	1088				
ARR	Chicago - Aurora	IL	C	FAA	C	Xycom				2.6		1088	1088				3/19/01 A
ASD	Slidell	LA	S	FAA	D	Synergy	01/29/02	2.6		2.6A-3	05/16/02	1088	1088				5/11/00 A
ATT	Austin (Camp Mabry)	TX	S	NWS	C	Synergy	08/12/02	2.6A-5	08/13/02	2.7A-3	11/20/02	1088	DTS1				
AUS	Austin (Bergstrom)	TX	S	FAA	C	Xycom		2.6		2.63	04/01/02	1088	1088				5/10/00 A
AVL	Asheville	NC	E	NWS	C	Xycom		2.6		2.62I	12/19/01	1088	1088				8/01/01 A
BDL	Windsor Locks	CT	E	NWS	A	Xycom				2.63	08/27/02	1088	1088				
BFF	Scottsbluff Heilig	NE	C	NWS	D	Xycom				2.6		1088	1088				
BGM	Binghamton	NY	E	NWS	C	Xycom		2.6		2.62I	12/12/01	HO83	HO83				10/01/02 A
BHM	Birmingham	AL	S	FAA	B	Xycom		2.6		2.63	04/16/02	1088	1088				
BIS	Bismark	ND	C	NWS	C	Synergy	01/22/02	2.6		2.6A-5	08/09/02	H083	DTS1				10/01/02 A
BLU	Blue Canyon	CA	W	NWS	D	Synergy	10/04/02	2.7A-1	10/04/02	2.7A-3	11/19/02	1088	1088		10/30/02		
BNA	Nashville	TN	S	NWS	A	Synergy	03/27/02	2.6		2.6A-3	03/27/02	1088	1088				
BOI	Boise	ID	W	NWS	C	Synergy	01/23/02	2.6		2.6A-5	08/12/02	1088	DTS1				
BRW	Barrow	AK	A	NWS	D	Xycom				2.6		1088	1088				
BTV	Burlington	VT	E	NWS	B	Synergy	09/03/02	2.7A-1	09/03/02	2.7A-3	11/19/02	1088	1088		09/13/02		
BUF	Buffalo	NY	E	NWS	A	Xycom		2.6		2.63	09/06/02	H083	H083				
BVE	Boothville	LA	S	NWS	C	Synergy	09/24/01	2.6V	09/24/01	2.6A-5	08/28/02	1088	1088				
CAK	Akron	OH	E	NWS	A	Xycom		2.6		2.62I	12/13/01	1088	1088				
CAO	Clayton	NM	S	NWS	D	Xycom				2.6		1088	1088				
CAR	Caribou	ME	E	NWS	D	Synergy	09/12/02	2.6		2.7A-1	09/12/02	1088	1088		09/26/02		
CDJ	Chillicothe	MO	C	NWS	C	Synergy	06/27/02	2.6		2.6A-3	06/27/02	1088	DTS1				
CHA	Chattanooga	TN	S	NWS	B	Xycom		2.6		2.62I	12/19/01	1088	1088				
CID	Cedar Rapids	IA	C	FAA	C	Xycom		2.6		2.63	03/21/02	HO83	HO83				03/08/01 A
CLE	Cleveland	OH	E	NWS	A	Synergy	05/15/02	2.6A-3	05/15/01	2.7A-3	11/13/02	1088	1088				
CMX	Hancock	MI	C	FAA	D	Synergy	11/26/02	2.6		2.7A-3	11/26/02	1088	1088				10/14/99 A
CNK	Concordia	KS	C	NWS	D	Synergy	09/12/02	2.7A-2	10/15/02	2.7A-3	11/07/02	1088	DTS1				
CSM	Clinton	OK	S	FAA	C	Xycom		2.6A-5	08/14/02	2.6	05/28/02	1088	1088				3/09/00 A
CUT	Custer	SD	C	NWS	D	Xycom				2.6		1088	1088				
CYS	Cheyenne	WY	C	NWS	C	Synergy	01/22/02	2.6A-3	04/12/02	2.6	08/21/02	1088	1088				11/01/02 A
CZZ	Campo	CA	W	NWS	C	Synergy	02/20/02	2.6		2.6A-3	05/24/02	1088	DTS1				
DFW	Dallas / Ft Worth	TX	S	NWS	A	Synergy	09/05/02	2.6		2.6A-3	09/05/02	H083	H083				
DMH	Baltimore	MD	E	NWS	C	Synergy	12/20/01	2.6		2.6A-3	07/02/02	1088	DTS1				
DSM	DesMoines	IA	C	NWS	A	Xycom		2.6		2.63	09/11/02	1088	1088				
ELP	El Paso	TX	S	NWS	B	Xycom		2.6		2.63	04/04/02	1088	1088				
ERI	Erie	PA	E	NWS	C	Xycom		2.6		2.62I	12/12/01	1088	1088				10/01/01 A
EYE	Indianapolis	IN	C	FAA	D	Synergy	01/22/02	2.6		2.6A-5	08/09/02	1088	1088				

APPENDIX VI

ASOS Operational Implementation Check List

For

Software Version # 2.80 (V2.80)

ASOS Planned Product Improvement
OI Check List - Part A

Planned Product Improvement: Software Version # 2.80 (V2.80)

Office completing this check list:_____ Date:_____

Item #	Item Description	OPR	Validation Date
2.1	**Pre- System Test (ST) Activities**		
A.	Submit RC for ST & obtain APMC approval to proceed	OS7/ OS12	
B.	Prepare ST plan & draft outline for ST report	OPS24	
C.	Identify ST locations & dates	OPS24	
D.	Initiate procurement/delivery of PPI test units to ST sites	OS7	
E.	Deliver logistic supplies & test equipment to ST sites	OPS12	
F.	Install PPI test units at ST sites	OPS12	
2.2	**ST Activities**		
A.	**Verify start date for ST**	**OPS22**	
B.	Complete ST data collection & analysis	OPS24	
C.	**Verify completion date for ST**	**OPS22**	
D.	Provide ST report to ASWG	OPS24	
2.3	**Pre-Operational Acceptance Test (OAT) Activities**		
A.	Submit RC to ASWG for OAT	OS7	
B.	OAT management decision by ASWG/APMC	OS7/ OS12/O PS2	
C.	Prepare OAT plan	OPS24	
D.	Determine OAT locations and schedule	OPS24	
E.	Initiate procurement/delivery of OAT units	OS7	
F.	Coordinate OAT logistics support	OPS12	
G.	Coordinate OAT maintenance support	OPS12	
I.1.	OAT Documentation: Deliver MOD NOTE # 80 to OAT sites	OPS12	
I.2.	OAT Documentation: Deliver OAT procedures to OAT sites	OPS24	
I.3.	OAT Documentation: Deliver draft Release Notes to OAT sites	OPS22	
2.4	**OAT Activities**		
A.	**Verify start date for OAT**	**OPS22**	

B.	Complete OAT data collection and analysis	OPS24	
C.	Verify efficacy of draft OI plan	OPS24	
D.	**Verify Completion date for OAT**	**OPS22**	
E.	Provide OAT Report to ACCB	OPS24	
3.1	**Pre- Operational Implementation (OI) Planning Activities**		
A.	Prepare OI plan	OPS22	
B.	Prepare RC for OI	OPS23	
C.	Full Scale Production Decision	OS7	
D.	OI Deployment Desision (DRR)	OS7	
E.	Identify OI locations	OPS22	
F.	Develop OI deployment/installation sequence strategy	OPS22	
3.2	**Pre-OI Logistic Support Activities**		
A.	Initiate procurement/delivery of OI production units to NLSC	OS7	
B.	Execute and support logistic supply support strategy for OI production units	OPS12	
C.	Coordinate installation & maintenance of OI production units	OPS12	
3.3	**Pre-OI Configuration Management Activities**		
B.	Perform Functional Configuration Audit	OPS13	
C.	Perform Physical Configuration Audit	OPS13	NA
3.4	**Pre-OI Operational Support Activities**		
A.1.	Provide MOD NOTE # 80 to WFOs	OPS12	
A.2..	Provide Release Notes to WFOs	OPS22	
A.3.	Provide updates of appropriate NDS chapters to WFOs	OS7	
A.4.	Provide updates of ASOS Users' Guide and other appropriate user information materials to WFOs, FAA, DOD	OPS22	NA
A.5	Post V2.80 Implementation Plan to web page	OPS22	
B.1.	Provide maintenance training materials guidance to NWSTC	OPS12	
B.2.	Provide observer training materials	FAA ATP-310	NA
B.3.	Conduct local operator/maintenance training	WFOs	
C.	Provide pre-implementation user notification	OS7 \WFOs	
D.	**Verify completion of all pre-OI activities**	OPS22	
4.1	**Implementation Management Activities**		
A.	Implementation Management Decision	OS7	
4.2	**Acquisition Activities**		
A .	**Verify start date for Operational Implementation (OI)**	**OPS22**	

B.	Monitor & validate delivery of all production units to NLSC	OPS23	
C.	Stock production units and spare kits at NLSC	OPS14	
4.4 OI Monitoring & Coordination Activities			
B.1.	Begin routine maintenance monitoring	AOMC	
C.1.	Begin monitoring and reporting implementation status for all sites	AOMC	
C.2.	Begin monitoring implementation status reports and initiate coordination	OPS22	
D.	Issue post-implementation notification to affected users	OPS22	

ASOS Planned Product Improvement

Operational Implementation (OI) Check List - Part B

Planned Product Improvement: Software Version # 2.80 (V2.80)

Location (SID, Name, State):_____

Office completing this check list:_____ Date:_____

Item #	Item Description	OPR	Validation Date
4.2	**Acquisition Activities**		
D.	Requisition PPI production units and kits from NLSC as needed	WFO	
4.3	**OI Installation Activities**		
A.	Download files for NCDC archive	WFO	
B.	Ensure contractor performed site preparation activities are completed	OST11	NA
C.	Perform installation & checkout in accordance with MOD NOTE # 80	WFO	
4.4	**OI Monitoring & Coordination Activities**		
A.	Installation Notification	WFO	
B.2.	Begin 30-day monitoring & coordination	WFO	
B.3.	Begin 30-day monitoring & coordination	RFP	
B.4.	Begin 30-day monitoring & coordination	AOMC	
5.0	**Post OI Activities**		
A.	Operational Quality Control: Monitor ongoing meteorological performance	WFO	
B.1.	Ensure system changes are documented through EMRS	WFO	
B.2.	Ensure new EMRS data are documented in the CMIS	OPS13	
B.3.	Ensure CMIS documentation changes are entered into MIRS	OPS22	
C.	Dispose of old equipment in accordance with MOD NOTE # 80	WFO	NA
D.	Conduct data climate continuity study (Begin 1-2 year study)	OS7	
E.	Prepare and deliver report on results of data continuity study	OS7	

Appendix VII

Sample of EMRS Form A-26

ENGINEERING MANAGEMENT REPORTING SYSTEM
MAINTENANCE RECORD

Document Number
G 49978

General Information	1. Open Date	Time	2. Initials	3. Response Priority (check one)	4. Close Date	Time
	12/ 20 / 01	0730	DKR	O Immediate O Low O Routine X Not Applicable	12 / 20 /01	1430

5. Description

INSTALL NEW DEWPOINT SENSOR IAW MOD NOTE 75

Equipment Information	6. Station ID	7. Equipment Code	8. Serial Number	9. TM	10. AT	11. How Mal.
	DMH	ATDP	T0807	M	M	999

12. EQUIPMENT OPERATIONAL STATUS TIMES	a. Fully Operational	b. Logistics Delay	Partly Operational	c. All Other	d. Logistics Delay	Not Operational	e. All Other
							1:00

13. *Parts Failure Information*

Block #	a. ASN	b. NSN	c. TM	d. AT	e. How Mal.	f. Qty.	g. Maint. Hrs.
1							
2							
3							
4							
5							

14. *Work Load Information*

Type	Staff Hrs.
a. Routine	
b. Non-routine	
c. Travel	3:00
d. Misc.	4:00
e. Overtime	

Miscellaneous Information	15. Maintenance Comments	16. Initials
	INSTALLED NEW DEWPOINT SENSOR	DKR

17. SPECIAL PURPOSE REPORTING	a. Mod. No.	b. Mod./Act./Deact.Dat	c.	d.	e.
	75	12/20/01			

18. CONFIGURATION MGMT. REPORTING (use as directed)	ASN	Vendor Part Number (New Part)	Serial Number (Old Part)	Serial Number (New Part)