

ASOS MODIFICATION NOTE 7 (for Electronics Technicians)

Engineering Division
W/OSO321:BGM

SUBJECT : Automated Surface Observing System (ASOS) Software Version 2.0

PURPOSE : To add maintenance capability and operational enhancements for the ASOS.

EQUIPMENT AFFECTED: ASOS

PARTS REQUIRED : Microcircuit P/N 62828-45002-1
Microcircuit P/N 62828-45003-1
Microcircuit P/N 62828-45004-1
Microcircuit P/N 62828-45005-1

MOD PROCUREMENT : The above parts will be provided by the contractor, AAI Systems Management, Inc., as an ASOS Field Modification Kit (FMK). ECP No. E93SMO5FO77
ECN No. 21465.

SPECIAL TOOLS : IC insertion tool
REQUIRED Small flat-tipped screwdriver
Conductive foam
Electrostatic discharge (ESD) straps

TIME REQUIRED : 1 hour

EFFECT ON OTHER : None.
INSTRUCTIONS

CERTIFICATION : This modification was successfully tested for
STATEMENT operational integrity in the Engineering Design Branch laboratory.

GENERAL

This modification note provides procedures to upgrade the ASOS software by removing and replacing erasable programmable read only memory (EPROM). This note provides procedures for "Before Installing Firmware" and "After Installing Firmware." Information on changes and fixes implemented in version 2.0 is attached to this note.

PROCEDURE

Reference installation instructions for "Field Modification Kit (FMK) - #31 and #15A (EHB-11, Section 3.6, Modification Note 1) ASOS Software Upgrade" provided by AAI Systems

Management, Inc. Both modifications must be completed prior to or concurrent with this modification note.

CAUTION

Be careful to protect the electronics on the ACU memory and CPU boards during this procedure. Do not reconfigure any jumpers on the ACU memory or the ACU CPU boards unless instructed by the procedure.

BEFORE INSTALLING FIRMWARE

1. Call the AOMC at 1-800-242-8194. Inform the person who answers the phone at which office you will be installing new firmware. Confirm that AOMC will provide access to the site-specific data base. Coordinate with the AOMC, then upload current configuration status before installing the new firmware.
2. For commissioned sites, get approval of the responsible MIC/OIC before starting installation. For non-commissioned sites, the el tech must coordinate with the site MIC/OIC before starting installation. You may install on any day of the month if permission is granted and the restrictions in steps 3 and 4 are complied with.
3. **Commissioned Sites Only:** Do **not** start installation during bad weather, precipitation, instrument flight rule (IFR) conditions, or if any of those conditions is expected within 3 hours. These meteorological conditions will be defined by the responsible MIC/OIC.
4. Do not start firmware installation at a time that will conflict with scheduled synoptic observations at 00, 03, 06, 09, 12, 15, 18, and 21Z. Although about 45 minutes should be sufficient, allow 1 hour to complete installation and restart ASOS.
5. Immediately before beginning work at NWS staffed sites, the MIC/OIC/Observer will inform the tower and any other critical users that ASOS will be shut off for firmware upgrade (unstaffed sites, the el tech will inform tower). He/She will alert towers using Controller Video Displays (CVD) and Operator Interface Devices (OID) to log off and shut down display power to avoid confusion. At commissioned sites only, download the following data to laptop using the direct command mode: 5-minute data (12 hrs.), and SYSLOG information (24 hrs.), SHEF messages (24 hrs.), and any 2-hour archive files.
6. Do not begin the installation process, i.e., halt ASOS, until immediately after an hourly observation has been transmitted. At NWS-staffed sites, normal backup observing procedures will be implemented.
7. Disable all hardware and dial communication ports to AFOS (REVUE-SITE-CONFIG-COMMS). The system voice function will automatically broadcast "not available" message when the ACU power is turned off.
8. Make the appropriate SYSLOG entries (MAINT-ACT-FMK) #15B.

AFTER INSTALLING FIRMWARE

See ASOS Modification Note 1, Appendix A, for a description of the time required to reboot ASOS and sensor response time after a new firmware load.

9. When ASOS is restarted at unstaffed sites, call to inform towers using CVDs and OIDs to turn on their displays. (At staffed sites, the MIC/OIC observer will call the tower).
10. If, on-site NWS staff provides backup while the installation is underway, no special observation is needed when ASOS is restarted. Proceed to step 11.

If there is no backup on site and a record observation was missed during the installation, a special observation must be taken when ASOS is restarted. The el tech should take the following steps at the ASOS keyboard after installation:

- a. Press [SIGN].
- b. Type his/her initials and press [RETURN].
- c. Type the observer level password and press [RETURN].
- d. Press [GENOB].
- e. Press [SPECL].
- f. Press [EXIT].
- g. Press [SIGN].
- h. Type his/her initials again and press [RETURN].
- i. Press [RETURN] *twice*. This signs the "observer" off ASOS.
- j. Leave ASOS running.

Note: The "observer" must sign off before the 5-minute edit time is up.

11. Inform office staff that ASOS is again operational and that, because at most, 15 minutes remain until the next hourly observation, augmentation of the ceiling might be required. It might also be necessary to augment several elements or even enter manually an entire observation. The chart below indicates how long it takes after start up for ASOS to report each observation element automatically.

Times Needed for Elements to be Reported Automatically

	<u>Minimum</u>	<u>Maximum</u>
Pressure	60 seconds	10 minutes
Precipitation Amount	60 seconds	*
Wind direction	2 minutes	7 minutes
Wind speed	2 minutes	7 minutes
Precipitation Type	2 minutes	*
Temperature	5 minutes	10 minutes
Dew Point	5 minutes	10 minutes
Visibility	10 minutes	15 minutes
Obstruction to Visibility	10 minutes	
*		
Ceiling	30 minutes	35 minutes

* Maximum time not applicable since phenomena may not be present. ("Minimum" time applies if phenomena is present).

12. Verify that ASOS transmitted an hourly observation. Call the AOMC at 1-800-242-8194 and tell the operator:
 - a. Your location,
 - b. That installation of the new firmware has been completed, and
 - c. That ASOS is operational.

13. Enter in the syslog that maintenance has been completed.
14. At an expansion site with ATCT, the el tech will contact ATCT and supply information on the following:
 - a. ASOS maintenance completed,
 - b. ASOS restored to service, and
 - c. Tower CVDs and OIDs need to be turned on, and TRACON asked to turn on their displays.

REPORTING MODIFICATION

Target date for completion of this modification is 30 days after receipt of parts. Report completed modification on WS Form H-28, Engineering Progress Report, according to instructions in EHB-4, part 2, using reporting code ASOS.

J. Michael St. Clair
Chief, Engineering Division

Attachments

W/OSO321:BGMcCormick:sol:6/22/93:sol:6/25/93:rhz:7/13/93:7/14/93
Revision by AJW:8/12/93:disk EHB 10,11,12 "ASOSMOD7.H11":8/19/93:AJW
8/25/93:sol:now in disk **HB 11-A** still called "ASOSMOD7.H11" WP5,1 speller

CAUTION: THE FOLLOWING PROCEDURE HAS CHANGED. READ BEFORE PROCEEDING !!!

SID ____

FMK# 15B
ASOS FIELD MOD KIT (FMK)

CONTRACT 50-SANW-1-00050

UPON COMPLETION OF MOD. COMPLETE LOWER SECTION OF THIS SHEET AND RETURN
ALONG WITH THE OLD PROMS TO:

AAI SYSTEMS MANAGEMENT INC.
11011 GILROY ROAD
P.O. BOX 238
HUNT VALLEY, MARYLAND 21030-0238

Date Prepared: 01/14/93 Task Order/ECP: E93SM05F077 ECN No. 21465

Part Numbers Affected:

62828-47008-10	CIRCUIT CARD ASSY.
62828-45002-1	MICROCIRCUIT, EPROM
62828-45003-1	MICROCIRCUIT, EPROM
62828-45004-1	MICROCIRCUIT, EPROM
62828-45005-1	MICROCIRCUIT, EPROM

Documentation Included: Detailed Installation Instructions (see attachment)

Description of Change:

The EPROMs located on the memory board in the ACU change to Revision 2.0

Parts Included:

Microcircuit	P/N	62828-45002-1	1	EA	SR-2.0
Microcircuit	P/N	62828-45003-1	1	EA	SR-2.0
Microcircuit	P/N	62828-45004-1	1	EA	SR-2.0
Microcircuit	P/N	62828-45005-1	1	EA	SR-2.0

QA Concurrence With FMK:

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Date Modification Complete:

Part Removed: Serial # _____

Part installed: Serial # _____

Person Completing Modification: _____

Were FMK Instructions clear/concise? Y/N (circle)

Was FMK complete? (parts, drawings, etc.) Y/N (circle)

If NO, please comment (use back of form, if needed):

ASSEMBLY DRAWING

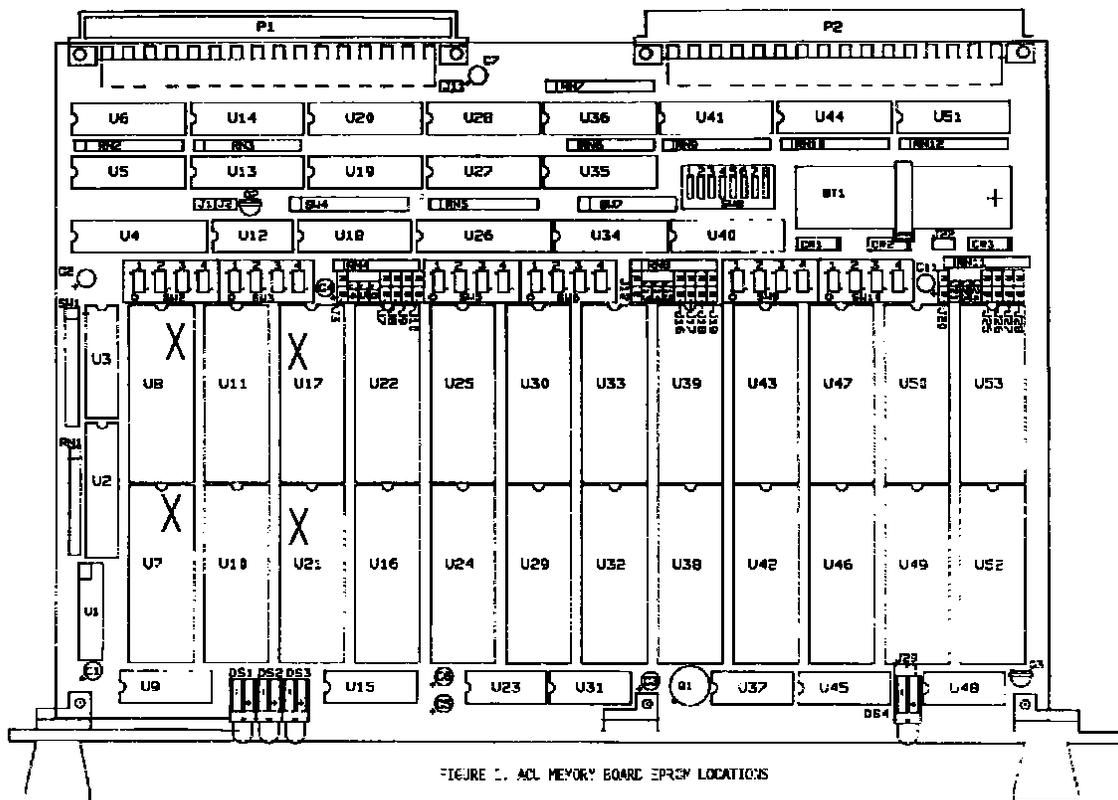


FIGURE 1. ACL MEMORY BOARD EPROM LOCATIONS

EPROM DESIGNATOR	PART NUMBER	FUNCTION
J8	62863-45102-1	3YTE 0
U17	62862-45305-1	3YTE 1
U7	62826-45C04-1	BYT 2
U21	52825-45306-1	BYTE 3

INSTRUCTIONS

FIELD MODIFICATION KIT - ASOS SOFTWARE VERSION UPGRADE

1.0 UPGRADING ASOS SOFTWARE

1.1 GENERAL

All ASOS application software is contained on four erasable programmable read only memory (EPROM) integrated circuits (IC) on ACU memory board 1A2A3. Figure 1 illustrates the ACU memory board and identifies the four EPROMs (U8, U17, U7, and U21). The EPROMs are 32-pin dual in-line package (DIP) CMOS devices, each providing 512K x 8 bits of storage. Upgrading ASOS software requires only replacing the four EPROMs on the ACU memory board with higher revision level ICs.

The four EPROMs on the ACU memory board contain both the ACU application program and the DCP application program. The ACU CPU runs the ACU application program directly from the ACU memory board. The DCP application program must first be downloaded from the ACU memory board to RAM storage in the DCP before it can be run by the DCP CPU.

Sites without a local OID (i.e., no RS232 connected for the primary OID) should attach a terminal to the LOCAL OID port of the ACU (J22) before proceeding.

1.2 SOFTWARE UPGRADE PROCEDURE

Table 1 provides the procedure to upgrade ASOS software by removing and replacing the four EPROMs on the ACU memory board. After new EPROMs are installed, this procedure cold starts both the ACU and associated DCPs.

If the ACU PROMs in the system are 1.70 or higher, the ACU is no longer cold started by removing battery jumper J22 (Figure 1) to clear all RAM on the board. The next step requires receiving a download of site-specific data from the AOMC. The DCPs are cold started by performing a hard reset of each DCP from the processor status page on the OID. After completion of the upgrade procedure, the EPROMs removed from the ACU memory board should be packaged in appropriate electrostatic discharge (ESD) protective material for return. NOTE: There may be an approximate 20-minute wait required to access the AOMC.

Table 1 (continued)

Table 1. Replacing ACU Firmware

S))
Step Procedure
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REMOVAL

Tools and Materials Required: IC insertion tool
Small flat-tipped screwdriver
Conductive foam

- 1. If printer is on-line, take it off-line by pressing **ON-LINE** switch on printer front panel. **ON-LINE** indicator extinguishes.

CAUTION

Damage to equipment may result if power is not removed prior to removal or installation. Ensure that **OUTPUT POWER** switch is set to 0 (off) and facility power is removed.

To avoid damage to circuit boards and integrated circuits, use proper ESD handling procedures, including the use of a grounding strap when performing the following steps.

- 2. Set **OUTPUT POWER** switch on UPS status panel to 0 (off) position. **OUTPUT** indicator on status panel extinguishes.
- 3. Remove facility power from ACU cabinet.
- 4. Using small flat-tipped screwdriver, loosen captive screws located at top and bottom of ACU memory board 1A2A3.
- 5. Press extractor handles at top and bottom of ACU memory board 1A2A3 in opposite directions to release board and remove board from rack.
- 6. On underside of board using small flat-tipped screwdriver, remove three screws and flat washers securing front panel to board. Remove board from front panel.
- 7. **IF THE ACU PROMS IN THE SYSTEM ARE 1.70 OR HIGHER PROCEED TO STEP 8, OTHERWISE CONTINUE WITH STEP 7.**

Remove battery jumper J22 from ACU memory card. Jumper will be reinstalled during installation procedure.

CAUTION

Throughout this procedure, discharge screwdriver before and during use by touching tool to grounded chassis surface. Failure to comply may result in damage to integrated circuits.

CAUTION

Lift integrated circuit as evenly as possible. Failure to comply may result in damage to integrated circuits.

Table 1 (continued)

8. From front of board, slide small flat-tipped screwdriver between integrated circuit **U7** and its IC socket. Carefully pry up on **U7** to lift it from socket as evenly as possible. Remove U7 from socket and place in conductive foam or on some other static-free surface.
9. Repeat Step 8 for the following integrated circuits: U21, U8, and U17.

INSTALLATION

Tools Required: IC insertion tool
Small flat-tipped screwdriver

Step Procedure

1. Verify that printer is off-line.

CAUTION

Damage to equipment may result if power is not removed prior to removal or Installation. Ensure that OUTPUT POWER switch is set to 0 (off) and facility power is removed.

To avoid damage to circuit boards and Integrated circuits, use proper ESD handling procedures, including the use of a grounding strap when performing the following steps.

2. Verify that OUTPUT POWER switch on UPS status panel is set to 0 (off) position and **OUTPUT** indicator on status panel is extinguished.
3. Verify that facility power is removed from ACU cabinet.

CAUTION

Throughout this procedure, discharge IC insertion tool before and during use by touching tool to grounded chassis surface. Failure to comply may result in damage to integrated circuits.

4. Using IC insertion tool, remove new EPROM integrated circuits from protective packaging and insert into ACU memory board sockets in accordance with the following chart. Ensure that EPROMs are installed with pin 1 (as identified by notch in top of IC) oriented toward board connector P1 as shown on Figure 1.

IC socket	IC part number
U8	62828-45002-1
U17	62828-45003-1
U7	62828-45004-1
U21	62828-45005-1

5. Using a small flat-tipped screwdriver, install three flat washers and screws securing front panel to board.
6. Holding ACU memory board by handles, position board with component side to the right and carefully slide board into card rack on its guides. Align board with rear connector and press into place.
7. Using small flat-tipped screwdriver, tighten captive screws located at top and bottom of board.

Table 1 (continued)

8. Apply facility power to ACU cabinet.
9. Set OUTPUT POWER switch to 1 (on) position.
10. Place printer on-line by pressing ON-LINE switch on printer front panel. **ON-LINE** indicator illuminates.
11. With power applied to ACU and OID and after a brief warmup delay, OID displays 1-minute display. If display is not being updated, press HELP key twice to refresh screen. The NEED SID AND AOMC PHONE message appears at top of screen.

If this does not occur, return to REMOVAL procedure, step 1. Follow the steps until the ACU memory board is removed. Ensure the ACU PROMs are installed correctly. Follow INSTALLATION procedures to replace the ACU memory board. If the system is still not functioning correctly, contact Al Wissman at (301) 713-0260.
12. At OID, sign on to system as a technician.
13. Display external communications page on OID (sequentially press REVUE-SITE-CONFIG-EXT-RN keys from 1-minute display). Enter phone number of AOMC (1-800-253-4717) into AOMC PHONE NUMBER field and press EXIT function key.
14. Display site physical page on OID (sequentially press REVUE-SITE-PHYS function keys from 1-minute display). Enter three or four character SID code in STATION IDENTIFIER field and press EXIT function key. The system then calls the AOMC and receives a download of site-specific data.
15. Display AOMC version page on OID (sequentially press REVUE-SITE-VERSN-AOMC function keys from 1-minute display). This will allow you to observe that all the files are being downloaded from the AOMC. All status fields should read "COMPLETE" in approximately 5 minutes. Press EXIT.

NOTE: The following steps cold start the DCPs.

16. Display maintenance page on OID (press MAINT function key from 1-minute display).
17. Using PREV/NEXT keys, position cursor over PROC field and press SEL key. The OID displays the processor status page.
18. Using PREV/NEXT keys, position cursor over DCP #1 - HARD field and press RESET key. Respond "YES" and "ENTER" to the "ARE YOU SURE?" message. The corresponding status field displays INITIALIZING while the unit is initializing. The progress of the download can be monitored by the PERCENT COMPLETE message that appears at the top of the screen.

When the percent complete reaches 100, the DCP status field changes to RUNNING.

19. If the system contains more than one DCP, repeat step 19 for DCPs #2 and #3 as required.

Table 1 (continued)

1. After the FMK has been completed, clear any maintenance flags that occur as a result of the restart.
2. After the FMK has been completed, display the maintenance action page on OID (sequentially press MAINT-ACT function keys from 1-minute display). Press FMK, enter the requested information. This will place a message in the SYSLOG indicating the type of maintenance performed. (Additional information on the maintenance action function may be found in the Software User's Manual.) Step 3 should be performed twice, once for each FMK.
3. Display the SW version page on the OID (sequentially press REVUE-SITE-VERSN-SW function keys from 1-minute display). The following fields should display version 2.0: MEMORY ACU APPLICATION EPROM, MEMORY DCP APPLICATION EPROM, and MEMORY DCP APPLICATION RAM. (These fields may take 5-10 minutes before they all read 2.0.)

At this point, the FMK is complete. Please fill out the bottom of the first page of each FMK and return them ALONG WITH THE OLD PROMS to AAI Systems Management, Inc.

ASOS Software Version 2.0

The following represents a coordinated effort to define the changes and fixes included in software version 2.0. The software has been formally tested at SMI and is undergoing beta site testing by the Systems Program Office (SPO). An operational NWS field test is planned for July. This list has been coordinated with SPO.

Modifications

- 450 Photometer data quality checking logic was changed for sites near the poles. Specifically, there will be no data quality checks north of 67°N, there will be no nighttime photometer check between 55°N and 67°N (inclusive) from February through October, and there will be no daytime check between 55°N and 67°N (inclusive) from November through January.
- 453 There will be no photometer data quality checks south of 67°S.
- 452 The field for magnetic variation on the SITE PHYSICAL page will be increased to hold up to three digits to accommodate polar sites.
- 468 Tower visibility will no longer automatically reset after the hourly SAO transmission. This fix was requested by the FAA.
- 469 When logged on as an Air Traffic Control observer, there will no longer be an automatic logoff. This fix was also requested by the FAA.
- 470 Add an alarm to indicate the actual transmission of an SAO. This fix was requested by the FAA. Note: The alarm is exactly the same as the alarm triggering the edit window.
- 471 The system identifiers **A02** and **A02A** will now be **AO2** and **AO2A**. Since this software version will be installed on a site-by-site basis, it is important for any SAO decoders to be able to decode both.
- 472 The current specials logic looks only at the trend of any change in ceiling or visibility requiring the issuance of a special, i.e., falling or rising. When both occur during the edit time it is called a reversal of trend, and the special is deleted. However, this logic potentially may cause the cancellation of a valid special. If conditions were to fall through *two* special thresholds during the edit window, then rise back through one, a special may be cancelled that should have been issued. The new logic now looks at the last transmitted observation for verification of a reversal.

Table 1 (continued)

OTRs fixed by V2.0 (government generated trouble reports)

- 165 If a wind was manually edited into the SAO during the day and this wind became the fastest two minute wind for the day, the daily summary page would indicate an incorrect time of the occurrence. It will now indicate the correct time.
- 174 During a heavy fog event with visibilities below 1/4 mile, false data quality check failures were generated. Tolerance levels have been adjusted to prevent this occurrence.
- 186 The dew point temperature was occasionally reported having a higher value than the ambient temperature. In V1.90, if the dew point temperature is more than 2 degrees higher than the ambient temperature, it will be reported missing. If it is *within 2* degrees over the ambient temperature, it will be reported as *equal* to the ambient temperature.
- 189 There was an inaccurate TREND page title error message - it would report "Radio comms are failing" even if the system was hardwired. The new message will use the term "Radio/line driver."
- 196 There was an erroneous UPS message that referenced UPS batteries at class I stations that have no UPS. Now, there is no message.
- 197 SIO errors could not be cleared (changed from degraded condition causing '\$' in SAO) from the ACU maintenance screen at the lowest (fourth) level. Now this will be possible.
- 198 A cold restart caused an incorrect SYSLOG message date/time stamp - set the current year to '0' rather than the current year. Any SYSLOG messages that were generated from the time of the cold restart to the time ASOS called AOMC for time sync were unavailable for later download by direct command mode. The date/time stamp will now be correct after a cold restart.
- 201 There were no range limit checks on temperature, allowing the transmission of a temperature of 196 degrees. There will now be range limit checks - maximum reportable value of 130 degrees, minimum of -80 degrees, and maximum change of 6 degrees since the last non-missing 1-minute reading.
- 202 Tower visibility will now be included when entered in the 5-minute archive used for aircraft accidents.
- 209 When the wind sensor was frozen in place there were excessive examples of the wind sensor cycling between inoperative and operative in 1-minute intervals. Excessive messages are now limited.
- 212 There was an incorrect format in the remarks section - the TNO remark had no space after it when there was a report of the onset of precipitation (TNORBxx should be TNO RBxx).
- 213 Local sensors would "hang up" in test mode. If the wind sensor was configured as a local sensor, the technician would go into test mode to test the sensor and it would not go back to regular mode, forcing a warm start. It now returns to regular mode.
- 215 The ASOS algorithm for photometer data quality checks for 24 hours of night and day. This check needs to be added to the Addenda to Government Furnished Algorithms. Reference STRs 452 and 453.

- 217 The rainfall totals differed between the PCPN (hourly) numbers and the 6-hour total and 24-hour totals. This was caused by the lack of the tipping bucket correction factor in the 6-hour and 24-hour totals, related to a change in the processing for these totals from the ACU to the DCP. This correction will now be made.
- 221 On the daily summary page, the wind speed associated with the fastest 2-minute wind was frequently incorrect. It will now report correctly.
- 222 The daily and monthly summary pages reported precipitation totals that did not agree with the hourly PCPN when totaled for the period. This problem was fixed by the same change as 217.

STRs fixed by V2.0 (contractor generated trouble reports)

- 461 When the tipping bucket was configured as a local sensor, tips were not being recorded. Now they will be.
- 417 A warm start would cause all sensors status to be set ON, regardless of their status before the warm start. Now, a sensor that had been configured OFF will stay OFF after a warm start.
- 448 The monthly normals are being updated to floating point values from integers. They will be the new 30-year normals and will be provided by NCDC. Implementation issues at AOMC are being worked out.
- 487 There was at least one site unable to assign a modem to SIO slot 8. When a port with a modem assigned was changed to hardwire, the modem assigned before the change to hardwire was permanently unavailable. All sites will now be able to configure the modem to slot 8.
- 488 The Site ID field as fed to ADAS has to be four characters long. We were sending just three characters at sites with three character site IDs. We will now pad these with a space to make four characters for ADAS. This will not affect the appearance of the observation in AFOS.
- 489 When the wind speed is manually edited and becomes the peak wind for the day, the daily summary did not report the correct value. Now it will.
- 490 When wind values are manually edited to generate a wind special, the system correctly noticed the need for a special, would highlight the wind field, then 1 minute later the highlight would disappear. Five minutes later the system would initiate a special again and begin the 5-minute edit window. Now it works properly, highlighting the wind field during the 5-minute edit window, then transmitting the special.