AUTOMATED SURFACE OBSERVING SYSTEM
(ASOS)

RELEASE NOTE

SOFTWARE VERSION - 2.6A

Processor Upgrade / Rehost
and
Dew Point Temperature Replacement Sensor

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U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service / Office of Operational Systems
Engineering and Acquisition Branch

Observing Systems Branch
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1.0 Introduction

1.1 <u>Background</u>

Two significant changes will be implemented with the installation of software version 2.6A. The first is the rehost of software version 2.60 on a faster processor with more memory, and the second is the capability to install a new dew point temperature replacement sensor which has improved reliability.

1.1.1 Rehost of Software Version 2.60

ASOS Acquisition Control Unit (ACU) application software version 2.60 was installed beginning in 1998. After deployment, it was determined that under certain conditions, the ACU processor performance induced processing anomalies. These anomalies were initially detected by incorrect time of day displayed on the Operator Interface Devices (OID) and Video Display Units (VDU). In December 1999, the National Weather Service (NWS) initiated a study to determine the extent to which the processor performance had negative impact on system performance. It was determined that under heavy loads, the ACU processor was not able to provide adequate processing throughput.

In March 2000, the ASOS Product Improvement Program established a contract to replace the current ACU processor, and to rehost the version 2.60 ACU software to this new processor. The replacement processor consists of a PowerPC Central Processing Unit (CPU). This processor executes at a 300 MHZ clock rate. The CPU has been integrated with an Ethernet interface capability, VERSA Module Eurocard (VME) interface capability, 9 megabytes of field programmable FLASH Read-Only Memory (FLASH ROM), 8 Megabytes of Dynamic Random Access Memory (DRAM), and 8 Megabytes of battery backed-up Non-Volatile Static Random Access Memory (NVRAM). The resulting Single Board Computer (SBC) is a commercial off-the-shelf product. The basic board design incorporates all capabilities onto the main SBC board except the NVRAM which is used to store archive and configuration data. The NVRAM is located on a daughter board which is integral to the SBC board. The jumper which is used to retain memory is located on the NVRAM daughter board, as opposed to on the memory board.

The ACU application software version 2.6A is functionally identical to the software version 2.60 release, with the exception that software installation and/or update no longer requires programming and installation of Electrically Erasable Programmable Read Only Memory (EEPROM). The replacement SBC uses an Ethernet interface to perform this function. Also, two critical operational problems were fixed. The first was the generation of erroneous 1-minute thunderstorms. The second was the AWOS Data Acquisition System (ADAS) to ASOS interface communications failure when ASOS held the Request to Send (RTS) control signal high for too long a time. One additional item added to software version 2.6A is an interface to interrogate data from a new dew point temperature replacement sensor.

1.1.2 New Dew Point Temperature Replacement Sensor

Currently ASOS uses a hygrothermometer (H083 or 1088) sensor for measuring both ambient and dew point temperatures. This sensor uses a platinum wire Resistive Temperature Device (RTD) to measure ambient temperature and a chilled mirror to determine dew point temperature. The mirror is cooled by a thermoelectric or Peltier cooler until dew or frost begins to condense on the mirror surface. The body of the mirror contains a platinum wire RTD and the mirror's temperature is measured and reported as the dew point temperature. The ambient temperature sensor for both hygrothermometers meets ASOS performance requirements. The dew point temperature sensor performance is below expectations.

In order to improve the performance of the dew point temperature sensor, the NWS looked for a more reliable technology. The new sensor measures relative humidity via capacitance and then the dew point temperature is calculated and processed through the ASOS algorithms. The ASOS data processing algorithms have not changed; only the dew point temperature sensor has been replaced. The new ASOS dew point temperature replacement sensor is the Vaisala DTS1. At this time the NWS is deploying a new processor board using ACU application software version 2.6A. The DTS1 interface to ASOS only exists as part of the new processor board.

1.2 Purpose

This ASOS Release Note gives a summary of the changes found in ACU application software version 2.6A, since 2.60.

2.0 General Information

With the installation of the new processor board the only changes are: 1) software installation instructions; 2) cold start procedures; 3) warm start procedures; 4) the two software fixes as described in section 1.1.1; and 5) support for the interface to the new dew point temperature replacement sensor.

2.1 Software Installation and Cold / Warm Start Procedures

The information in this section primarily affects the ASOS electronics technician.

1.   Software Installation - Procedures can be found in Engineering Handbook 11, Modification Note 73.

2.   Cold Start Procedures - A cold start of the system is now performed through the maintenance (MAINT) function available to the electronics technician password level. See the APPENDIX or Engineering Handbook 11, Modification Note 73, for step-by-step instructions.

3.   Warm Start Procedures - A warm start of the system may be performed by momentarily toggling the switch located on the front of the processor board to the right. After approximately 30 seconds, the system will begin a warm system reset. As in earlier software versions, the capability to perform a warm start through the MAINT function remains.

2.2 New Dew Point Temperature Sensor Interface

The new dew point temperature replacement sensor is the Vaisala DTS1. This new interface includes: 1) OID functions to configure the DTS1 sensor and define it as the data source to be used in ASOS products and messages (e.g., METAR/SPECI reports); 2) System Maintenance Log (SYSLOG) messages for the DTS1; 3) Maintenance functions to test and trouble shoot the sensor via the OID; and 4) Twelve-hour archive of data from the dew point sensor not defined as the data source for ASOS products and messages.

After the DTS1 is installed, the site will have the capability of defining either the DTS1 or the H083/1088 as the source of the dew point temperature reported by ASOS. The data from the "defined" dew point temperature source will be stored as part of the 12-hour archive of sensor data. Data from the "undefined" dew point source will be stored in a TEST file available via the 12-hour archive OID function. (See Section 3.3.)

2.3 Verifying Installation of Software Version 2.6A

At the OID's 1-Minute Screen, use the commands REVUE-SITE-VERSN-SW to verify the installation of the 2.6A ACU application software. (See Figure 1 below.) Or through the Direct Command Mode (DCM) form of remote access, type the 'HELP' command at the 'CMD>' prompt and verify the '12TEST' command is provided in the list of the possible commands. (See Figure 2 on the next page.)

```
09:07:38 12/17/01 1407Z                          ASOS ACU REHOST CONTRACTOR
-----------------------------------------------------
| UNIT    BOARD    NAME              DEVICE  VERSION   DATE
|
| ACU     CPU A    PSOS OS           EPROM   2.5       04/19/01
|
|         MEMORY   ACU APPLICATION   EPROM   2.6A      07/08/02
|         MEMORY   DCP APPLICATION   EPROM   2.6A      07/08/02
|
| DCP-1   CPU A    BOOT              EPROM   1.90      11/03/97
|
|         MEMORY   DCP APPLICATION   RAM     2.6A      07/08/02
|
|
|
|                                                    SOFTWARE VERSIONS
| |                                                 |-----------------|
| |                                                 | PRINT           |
| |                                                 |-----------------|
| |                                                 |                 |
| |                                                 |-----------------|
| |                                                 | EXIT   BACK     |
```

Figure 1: SOFTWARE VERSIONS Screen (REVUE-SITE-VERSN-SW).

```
CMD> HELP

************** HELP **************
OBS     - Outputs observation data.
5MIN    - Outputs five minute observation data.
ARC5MIN - Outputs archived five minute observation data.
SHEF    - Outputs SHEF observation data.
12HR1   - Outputs twelve hour page one data.
12HR2   - Outputs twelve hour page two data.
12HRP   - Outputs twelve hour 15 minute precipitation data.
12HRC1  - Outputs twelve hour ceilometer #1 data.
12HRC2  - Outputs twelve hour ceilometer #2 data.
12HRC3  - Outputs twelve hour ceilometer #3 data.
12HR    - Outputs all twelve hour data.
DAILY   - Outputs daily data.
MONTH   - Outputs monthly data.
SYSLOG  - Outputs system log data.
TREND   - Outputs trend data.
LEDWI   - Outputs LEDWI C command data.
THUNDER - Outputs thunderstorm sensor data.
CLOUD   - Outputs cloud layer cover factor data.
COMLOG  - Outputs communications log data.
ADAS    - Outputs ADAS Summary data.
DSM     - Outputs Daily Summary Message data.
MSM     - Outputs Monthly Summary Message data.
ALDARS  - Outputs ALDARS lightning data.
EDITLOG - Outputs edit log data.
XMODEM  - Toggles from/to Xmodem mode.
12TEST  - Outputs 12HRTEST observation data.
BYE     - Exits direct command mode.
```

Figure 2: v2.6A Direct Command Mode (DCM) HELP Menu File

3.0 Specific Changes In Software Version 2.6A

This section will identify changes that are available to operators of the OID and to those accessing ASOS remotely via the DCM. Operators at the OID include the UNSigned user (UNS) and the following password levels: 1) OBServer (OBS); 2) Air Traffic Controller (ATC); 3) Electronics TEChnician (TEC); and 4) SYStem Manager (SYS). The functions to be used to complete a task are provided in each section. All function command strings provided assume the operator begins from the 1-Minute Screen on the OID. If you are not sure you are looking at the 1-Minute Screen, press the EXIT function from the current screen and that will return you to the 1-Minute Screen. If the EXIT function does not exist, but the SIGN function does, then you are looking at the 1-Minute Screen. (See Figure 3.) The DCM requires only a remote access code and not a password.

```
09:05:53 12/17/01 1405Z                          ASOS ACU REHOST CONTRACTOR
       ┌──────────────────────────────────────────────────┐
       │  SKY        = MM                                   │
       │                                                    │
       │  VISIBILITY = M                TEMP/DEWPT  = 25.6 /16.7  C  78 /62  F│
       │  RVR        = RVRNO            WIND DIR/SPD = 000/00│
       │  PRESENT WX =                  ALTIMETER    = 30.07 │
       │                                                    │
       │  REMARKS    = RMK AO2 TSNO RVRNO                   │
       │                                                    │
       │                                                    │
       │ TESTM KAAI 171358Z AUTO 00000KT 26/17 A3008 RMK AO2 SLP183 T02560167 TSNO │
       │ RVRNO FIBI                                         │
       │                                                    │
       │                                                    │
       │                                                    │
       │                                   ┌─────┬─────┬────┐│
       │                                   │PRINT│     │    ││
       │                                   ├─────┼─────┼────┤│
       │                                   │REVUE│     │    ││
       │                                   ├─────┼─────┼────┤│
       │                                   │SIGN │     │AUX ││
       └───────────────────────────────────┴─────┴─────┴────┘
```

Figure 3: OID 1-Minute Screen

3.1 Configuring the DTS1 (TEC and SYS)

After the DTS1 sensor has been installed, only the electronics technician or system manager can configure the sensor on the REVUE-SITE-CONFG-SENSR page. (See Figure 4.) Using the CHANG function, move the cursor to the correct Serial Input/Output (SIO) port and enter the two-letter code of **'DT'** for the DTS1 sensor. Use the EXIT or BACK function for ASOS to accept the change to the sensor configuration page.

```
09:06:42 12/17/01 1406Z                          ASOS ACU REHOST CONTRACTOR
       ┌──────────────────────────────────────────────────┐
       │       SIO #1    SIO #2       SIO #3    SIO #4       SIO #5 │
       │  PORTS 2  3  4   1  2  3  4   1  3  4   1  2  3  4   1  2  │
       │                                                    │
       │ DCP #1C1 PW DT   TB WS TD V1                        │
       │                                                    │
       │ DCP #2                                             │
       │                                                    │
       │ DCP #3                                             │
       │                                                    │
       │                                                    │
       │ LOCAL SENSORS                                      │
       │                                                    │
       │  **  ** **                                         │
       │                                       CONFIGURATION│
       │ PRESSURE SENSORS                     ┌──────┬──────┐│
       │                                      │PRINT │      ││
       │ P1  P2  P3                           ├──────┼──────┤│
       │                                      │ALGOR │CHANG ││
       │                                      ├──────┼──────┤│
       │                                      │EXIT  │BACK  ││
       └──────────────────────────────────────┴──────┴──────┘
```

Figure 4: SENSOR CONFIGURATION Screen (REVUE-SITE-CONFG-SENSR).

3.2 Defining the Source of the Dew Point Temperature (TEC and SYS)

    After the DTS1 sensor has been installed and configured, only the electronics technician or system manager can define it as the source of the dew point temperature to be used in all ASOS messages and products. Using the REVUE-SITE-CONFG-DEFIN page, the source of the dew point temperature can be sequenced through three choices, i.e., 1088, H083, and DTS1. If the ASOS site is using the 1088 sensor, then the dew point temperature sequence options will only include the 1088 and DTS1. Likewise, if the site has an H083, then only the H083 and DTS1 options will be available. (See Figure 5.) After pressing the CHANG function, move the cursor to the DEWPOINT field and use the SEQN function to sequence between H083 and DTS1. In the screen below, the DTS1 will be the source of the dew point temperature used in the ASOS messages and products, and the dew point temperature from the H083 will be stored on the TEST page of the 12-hour archive. (See Section 3.3.)

    After the sources of the ambient (TEMP - H083) and DEWPOINT (DTS1) temperatures have been defined, the report processing for each sensor can be controlled through the sensor STATUS page. (See Figure 6.)   There is no report processing control for the dew point temperature sensor data stored in the TEST page of the12-hour archive, i.e., in this case the H083. These values are stored in brackets, e.g., [40], on the TEST page. The brackets signify the data are **NOT** used in any ASOS messages or products.

```
 09:07:01 12/17/01 1407Z                      ASOS ACU REHOST CONTRACTOR
                            ----------
|                          DEFINE CONFIGURATION                          |
|                                                                        |
|   SENSORS                              HARDWARE                        |
| CEILOMETER        PHASE I            ACU MEMORY       1 MEGABYTE        |
| VISIBILITY        BELFORT ASOS       DCP MEMORY       1 MEGABYTE        |
| TEMP              H083               RS_232 MODEM     UDS               |
| DEWPOINT          DTS1               SYNCH MODEM      UDS               |
| PRESENT WX        LEDWI              ACU/DCP COMM     PHASE I RADIO      |
| WIND              BELFORT ASOS       RT CLOCK         VIDEO CARD        |
| PRESSURE          SETRA MODEL 470    ACU POWER SUP    ASTEC             |
| FREEZING RAIN     PHASE II           DCP POWER SUP    R.O. ASSOC.       |
| SNOW DEPTH        PHASE II           ACU UPS          CPI               |
| HAIL              PHASE II           DCP UPS          CPI               |
| SUNSHINE          PHASE II           GTA RADIO        MOTOROLA VT-200   |
| LIQUID PRECIP     BELFORT ASOS                        DEFINE CONFIG     |
|  THUNDERSTORM      LLP TSS 924                   -----------------      |
|                                                 | PRINT         |      |
|                                                 -----------------      |
|                                                       | CHANG   |      |
|                                                 -----------------      |
|                                                 | EXIT  BACK    |      |
```
Figure 5: DEFINE CONFIGURATION Screen (REVUE-SITE-CONFG-DEFIN)

```
09:14:49 12/17/01 1414Z                          ASOS ACU REHOST CONTRACTOR
┌───────────────────────────────────────────────────────────────────────┐
│   SENSOR           DCP#   SELFTEST  DATA QUALITY  AUTO/MAN  RPT PROC     │
│                                                                         │
│ PRESSURE #1          L       P           P          AUTO      ON        │
│ PRESSURE #2          L       P           P          AUTO      ON        │
│ PRESSURE #3          L       P           P          AUTO      ON        │
│ DEWPOINT             1       P           P          AUTO      ON        │
│ H083                 1       P           P          AUTO      ON        │
│ WIND SPEED/DIR       1       P           P          AUTO      ON        │
│ PRES WEA #1          1       P           P          AUTO      ON        │
│ TIPPING BUCKET       1      N/A          P          AUTO      ON        │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                            STATUS       │
│                                                   ┌─────┬─────┬─────┐    │
│                                                   │PRINT│PAGE │ PREV│    │
│                                                   ├─────┴─────┼─────┤    │
│                                                   │     PROC  │     │    │
│                                                   ├─────┬─────┼─────┤    │
│                                                   │EXIT │BACK │ NEXT│    │
          Figure 6: SENSOR STATUS Screen (REVUE-SENSR-STAT)
```

3.3 Twelve-Hour Archive Data (UNS, OBS, TEC, SYS)

Only the air traffic controller password level does not have access the 12-hour archive data. By using the REVUE-SENSR-(12-HR)-PAGE functions from the 1-Minute Screen, the ambient and dew point temperatures from the sensors will be displayed. (See Figure 7.) A new function (TEST) has been added to the menu for viewing any dew point temperatures from the sensor **NOT** defined to provide dew point data for the ASOS products and messages, i.e., in this case the H083. (See Figure 8.)

```
09:17:02 12/17/01 1417Z                          ASOS ACU REHOST CONTRACTOR
┌───────────────────────────────────────────────────────────────────────┐
│ UTC   WX    TS    PRECIP SUN   SNOW    ZR    PRESS1  PRESS2  PRESS3  TEMP DEWPT│
│ 1405  NP          0.00                       29.773  29.778  29.772   78   62 │
│ 1406  NP          0.00                       29.775  29.780  29.773   78   62 │
│ 1407  NP          0.00                       29.776  29.781  29.775   78   62 │
│ 1408  NP          0.00                       29.777  29.782  29.775   78   62 │
│ 1409  NP          0.00                       29.776  29.781  29.774   78   62 │
│ 1410  NP          0.00                       29.774  29.779  29.772   78   62 │
│ 1411  NP          0.00                       29.772  29.777  29.770   78   62 │
│ 1412  NP          0.00                       29.771  29.776  29.769   78   62 │
│ 1413  NP          0.00                       29.771  29.775  29.769   77   62 │
│ 1414  NP          0.00                       29.770  29.775  29.768   77   62 │
│ 1415  NP          0.00                       29.769  29.774  29.767   77   62 │
│ 1416  NP          0.00                       29.769  29.774  29.768   77   62 │
│                                                          12HR ARCHIVE        │
│                                                   ┌─────┬─────┬─────┐        │
│                                                   │PRINT│PAGE │ PREV│        │
│                                                   ├─────┼─────┼─────┤        │
│                                                   │     │TIME │ TEST│        │
│                                                   ├─────┼─────┼─────┤        │
│                                                   │EXIT │BACK │ NEXT│        │
      Figure 7: 12HR ARCHIVE Screen (REVUE-SENSR-(12-HR)-PAGE)
```

```
09:17:15 12/17/01 1417Z                              ASOS ACU REHOST CONTRACTOR
                            ----------
    UTC  DEWPT
    1405 [ 62]
    1406 [ 62]
    1407 [ 61]
    1408 [ 62]
    1409 [ 62]
    1410 [ 62]
    1411 [ 62]
    1412 [ 61]
    1413 [ 62]
    1414 [ 62]
    1415 [ 62]
    1416 [ 61]

                                                  12HR TEST SENSOR
                                                                PREV


                                                  EXIT  BACK  NEXT
```

Figure 8: 12HR ARCHIVE TEST SENSOR Screen (REVUE-SENSR-(12-HR)-TEST)

3.4 System Maintenance Log (SYSLOG) Messages (UNS, OBS, TEC, SYS)

Only the air traffic controller password level can not view messages in the SYSLOG. Press REVUE-SYSLG to enter the system maintenance log. ASOS automatically monitors the ambient and dew point temperature sensors being used to provide data in the messages and products, as well as the TEST dew point sensor. The TEST dew point sensor is not monitored as closely as the other sensors, and if a maintenance action is required for this sensor a maintenance indicator sign ($) is **NOT** appended to the METAR/SPECI reports. If a data quality error for the TEST dew point sensor should occur, a message will be placed in the SYSLOG. However, if the condition should correct itself, a message is **NOT** provided.

In order for ASOS to report on the maintenance status of these sensors, additional SYSLOG messages were developed. (See below.)

0416 DEWPOINT SENSOR DTS1 CONFIGURED
0417 DEWPOINT SENSOR DTS1 DECONFIGURED

1164 TEMPERATURE/DEWPOINT SENSOR OFFICIAL DEWPOINT DATA QUALITY
     ERROR
1168 TEST DEWPOINT DATA QUALITY ERROR
1197 1088 PRIMARY DEWPOINT SENSOR

1657 H083 PRIMARY DEWPOINT SENSOR
1660 DTS1 SENSOR RESPONSE TIMEOUT
1661 DTS1 SENSOR TRANSMITTER ERROR
1662 DTS1 SENSOR POWER SUPPLY ERROR
1663 DTS1 SENSOR ENCLOSURE HEATER ERROR

1664 DTS1 SENSOR ENCLOSURE TEMPERATURE ERROR
1665 DTS1 SENSOR DEWPOINT DATA QUALITY ERROR
1697 DCP #1 DTS1 SENSOR POWER COMMANDED ON REMAINED OFF
1698 DTS1 PRIMARY DEWPOINT SENSOR

3.4.1 TEST DEWPOINT DATA QUALITY ERROR

During the ASOS Operational Acceptance Test for software version 2.6A there were several questions concerning the following SYSLOG error message: TEST DEWPOINT DATA QUALITY ERROR. (Figure 9 on the next page is a listing of the SYSLOG for March 11, 2002 from Campo, California (CZZ).) When the DTS1 is installed at a site it may be defined as the source of the operational dew point temperature. If the DTS1 and the H083 or 1088 are configured at the site, and if the DTS1 is defined as the source of the operational dew point temperature, then the H083 or 1088 will be considered the TEST dew point temperature data source. The data from the H083 or 1088 will be stored in the 12-hour TEST file (REVUE-SENSR-(12-HR)-TEST) and the dew point temperature data from the DTS1 will be stored in the 12-hour archive file (REVUE-SENSR-(12-HR)-PAGE). (See Figures 10 and 11.)

The H083 and 1088 both perform a heat cycle at least once every 24 hours. During the cycle the dew point temperatures increase dramatically for a very short period of time, i.e., about 5 to10 minutes. Software version 2.6A does not recognize the heat cycle as a normal operating function of the sensor when it is the source of the TEST dew point temperature.   Therefore when it occurs, the rapid increase in dew point temperature violates the data quality algorithm for the amount the dew point temperature is allowed to change from minute to minute. In this case ASOS will enter a data quality error message in the SYSLOG. To verify that the heat cycle is triggering the data quality algorithm error message, use the time (Local Standard Time (LST)) the message is entered in the SYSLOG and convert it to Universal Time Coordinated (UTC). Then review the REVUE-SENSR-(12-HR)-TEST data for the UTC time of the SYSLOG message. (See Figures 9 through 11 for an example.)

In Figure 9 the time of the SYSLOG error message (TEST DEWPOINT DATA QUALITY ERROR) is 0200 LST. At this site the conversion from LST to UTC is +8 hours. So the UTC time is 10:00 UTC.

```
13:20:25 03/11/02 2120Z                                              CAMPO
┌───────────────────── ────────── ───────────────────────────────────┐
│                                                                      │
│  03/10/02 23:59   *SY 9999 AOMC CALLS TODAY: 0, AOMC SUCCESSFUL CALLS TODAY:│
│   0                                                                  │
│                                                                      │
│  03/11/02 02:00   *ST 1168 TEST DEWPOINT DATA QUALITY ERROR          │
│                                                                      │
│                                                                      │
│  03/11/02 03:01   *SY 9999 CLOCK WITHIN RANGE PADIFFT=-4, VDIFT=36187,│
│  PSOST=6049077, ACUT=6048356, AOMCT=56181067                         │
│                                                                      │
│  03/11/02 06:00   *ST 9999 MODEM FAILS FOR PAST 24 HOURS: #1=1.      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                    MAINTENANCE LOG   │
│                                            ┌───────────┬───────┐     │
│                                            │     DATE  PREV│     │
│                                            ├─────┬─────┼───────┤     │
│                                            │     FILTR│     │       │
│                                            ├─────┴─────┴───────┤     │
│                                            EXIT │BACK │NEXT│         │
```

Figure 9: CZZ REVUE-SYSLG Screen

The data from the REVUE-SENSR-(12-HR)-TEST file reveals the heat cycle of the 1088 as the cause of the SYSLOG message. (See Figure 10.) Note that the dew point temperature at 0959 UTC is likely the true start of the heat cycle.

```
13:22:16 03/11/02 2122Z                                              CAMPO
┌───────────────────── ────────── ───────────────────────────────────┐
│     UTC   DEWPT                                                      │
│    0956 [ 21]                                                        │
│    0957 [ 21]                                                        │
│    0958 [ 21]                                                        │
│    0959 [ 24]                                                        │
│    1000 [ 58]                                                        │
│    1001 [ 76]                                                        │
│    1002 [ 90]                                                        │
│    1003 [ 99]                                                        │
│    1004 [ 98]                                                        │
│    1005 [ 43]                                                        │
│    1006 [ 18]                                                        │
│    1007 [ 18]                                                        │
│                                                                      │
│                                                  12HR TEST SENSOR    │
│                                            ┌───────────┬───────┐     │
│                                            │           PREV│     │
│                                            ├─────┬─────┼───────┤     │
│                                            │           │     │       │
│                                            ├─────┼─────┴───────┤     │
│                                            │EXIT BACK   NEXT │        │
```

Figure 10: CZZ REVUE-SENSR-(12-HR)-TEST Screen

During the time of the heat cycle in the TEST data (0959 UTC - 1005 UTC), the DTS1 was measuring the operational dew point temperature values. (See the REVUE-SENSR-(12-HR)-PAGE data in Figure 11.)

```
13:22:01 03/11/02 2122Z                                              CAMPO
          -----------------------------
 UTC  WX   TS   PRECIP SUN  SNOW   ZR     PRESS1  PRESS2  PRESS3  TEMP DEWPT
0956            0.00                       27.355  27.352            33    22
0957            0.00                       27.354  27.351            35    22
0958            0.00                       27.353  27.350            34    22
0959            0.00                       27.353  27.350            35    21
1000            0.00                       27.353  27.350            34    21
1001            0.00                       27.353  27.350            35    21
1002            0.00                       27.353  27.350            36    20
1003            0.00                       27.354  27.351            35    20
1004            0.00                       27.354  27.351            34    21
1005            0.00                       27.354  27.351            33    21
1006            0.00                       27.355  27.352            32    21
1007            0.00                       27.355  27.352            33    20

                                                       12HR ARCHIVE

                                                           PAGE PREV

                                                           TIME TEST

                                                    EXIT  BACK NEXT
```

Figure 11: CZZ REVUE-SENSR-(12-HR)-PAGE Screen

In this case at CZZ, the TEST DEWPOINT DATA QUALITY ERROR entry in the SYSLOG is providing an indication that the heat cycle occurred for the 1088 sensor. If the TEST dew point data are being used for any type of study, each TEST DEWPOINT DATA QUALITY ERROR entry in the SYSLOG will need to be investigated to verify the sensor is operating correctly and service is not required.

3.5   Maintenance Page for DTS1 (TEC and SYS)

A maintenance screen has been provided to preform maintenance actions on the DTS1. This screen is accessed through the MAINT function from the 1-Minute Screen. From the Maintenance Screen (Figure 12), use the SEL function to select the appropriate Data Collection Package (DCP) (Figure 13) and then select **DTS1** (Figure 14).

```
  ┌----------------------------------------┐
  |                     ----------          |
  |                                         |
  |  ACU   P          DCP #1   P       ACU/DCP COMMS  P      TREND      PROC
  |                                                                 ADAS SUMMARY
  |
  |
  |
  |
  |
  |
  |                                                        MAINTENANCE
  |                                                   ┌──────┬──────┬──────┐
  |                                                   |      | CLEAR | PREV |
  |                                                   ├──────┼──────┼──────┤
  |                                                   | SEL  | ACT  |      |
  |                                                   ├──────┼──────┼──────┤
  |                                                   | EXIT |      | NEXT |
  |                                                   └──────┴──────┴──────┘
```
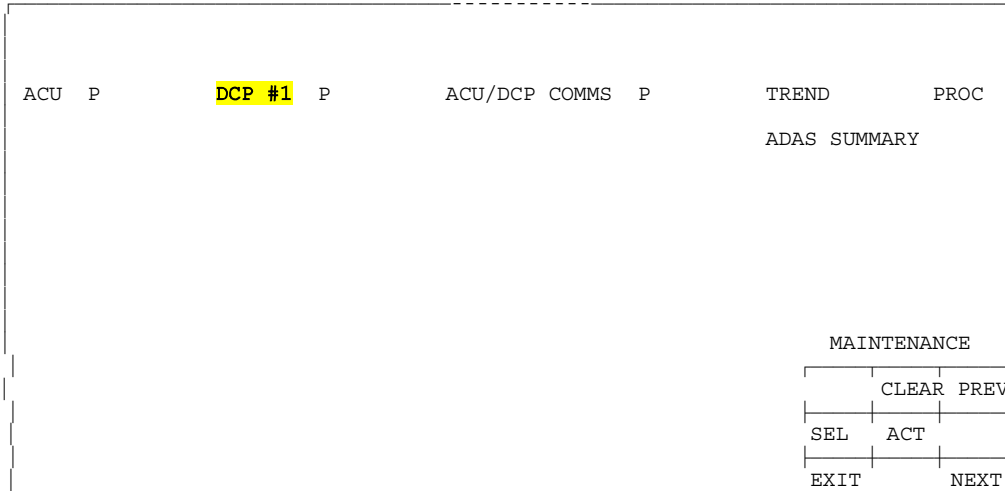
Figure 12: MAINTENANCE Screen (MAINT)

```
  ┌----------------------------------------┐
  |    SENSOR GROUP:                 HARDWARE:
  |  DTS1                P
  |  WIND SPEED/DIR      P         VME            P
  |  TIPPING BUCKET      P
  |                                DCP POWER      P
  |
  |
  |
  |
  |
  |
  |                                                        REMOTE DCP#1
  |                                                   ┌──────┬──────┬──────┐
  |                                                   |      | CLEAR | PREV |
  |                                                   ├──────┼──────┼──────┤
  |                                                   | SEL  |      |      |
  |                                                   ├──────┼──────┼──────┤
  |                                                   | EXIT | BACK | NEXT |
  |                                                   └──────┴──────┴──────┘
```
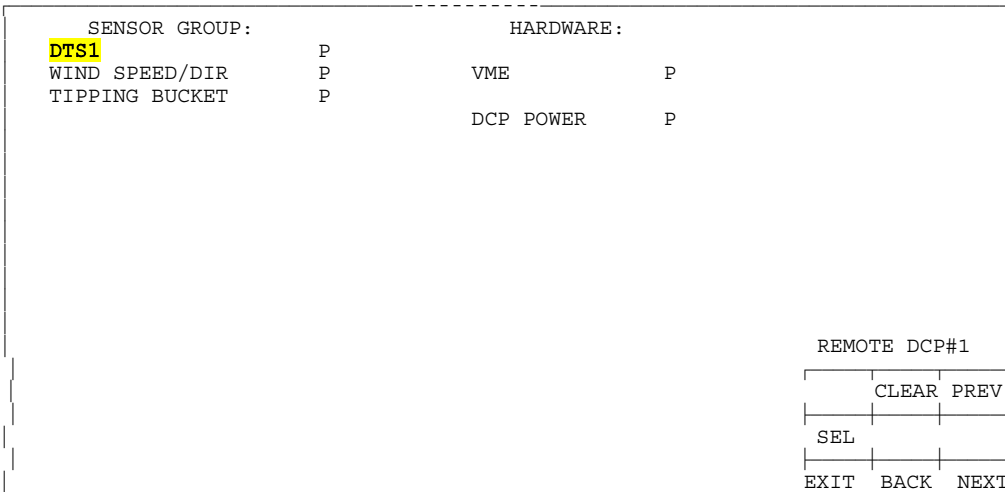
Figure 13: REMOTE DCP#1 Screen (MAINT-DCP#1)

12

```
09:12:52 12/17/01 1412Z                              ASOS ACU REHOST CONTRACTOR
        ---------
|----------------------------------------------------------------------------|
|                                                                            |
| SENSOR STATUS            P              DEW QUALITY            P            |
| DEWPOINT XMTR STATUS     P              REPORT PROCESS         Y            |
| POWER SUPPLY STATUS      P              SENSOR RESPONSE        P            |
| 24-VOLT SUPPLY VOLTAGE   24.0                                              |
| ENCLOSURE HEATER STATUS  P              POWER STATUS           P            |
| ENCLOSURE TEMP STATUS    P              POWER CONTROL          ON           |
| ENCLOSURE TEMP           +70.0                                            |
| THERMOSTAT               OFF                                              |
|                                                                            |
|                                                         DTS1               |
|                                                  |----------------|        |
|                                                  |     CLEAR      |        |
|                                                  |----------------|        |
|                                                  | TEST     POWER |        |
|                                                  |----------------|        |
|                                                  | EXIT  BACK     |        |
|----------------------------------------------------------------------------|
```

Figure 14: DTS1 SENSOR MAINTENANCE Screen (MAINT-DCP#1-DTS1)

3.6   Direct Command Mode

As shown in Figure 2, the TEST data displayed in Figure 8 may also be downloaded via the Direct Command Mode (DCM). ASOS will store 12 hours of the dew point temperature data **NOT** being used in the messages and products. The command to download the data has the following syntax: **12TEST hhmm$_i$ hhmm$_f$**   (See Figure 15.)

Where: **hhmm$_i$** - begin time and **hhmm$_f$** - end time

NOTE: Placing a "Z" after the time will retrieve data based on UTC. If a "Z" is not entered, ASOS assumes LST.

CMD>12TEST 0728Z 0733

LISTING 12HR TEST PAGE FROM: 12/17/2001 07:28 THRU 12/17/2001 07:33

```
 UTC  DEWPT
0728 [ 39]
0729 [ 39]
0730 [ 39]
0731 [ 39]
0732 [ 39]
0733 [ 39]
```
12HR TEST LISTING COMPLETE, 6 ENTRY(S) LISTED.

CMD>

Figure 15: TEST Dew Point Temperature Data Downloaded via DCM

4.0 Summary

Implementation of the new processor board in the ACU is expected to improve ASOS performance under heavy processing loads. The expanded processing and memory capabilities provides opportunities for ASOS to become more robust as new sensors and software enhancements are developed and implemented.

With the installation of the Vaisala DTS1, the NWS expects the reporting of dew point temperatures to be more reliable. The current hygrothermometer (H083 or 1088) will continue to be used to measure and report ambient temperature values. With both the 1088/DTS1 or H083/DTS1 installed, the option exists to define either the DTS1 or 1088/H083 as the source of the dew point temperature to be used in the messages and products generated by ASOS.

The ASOS processing algorithms for data quality checks, obscurations, relative humidity, and any other meteorological algorithms have not changed. The interface for the ATC password level has not changed. Only one new function, i.e., TEST, has been added to the OBS password level interface. This new function does not alter any procedures required to perform surface observing duties, i.e., editing and augmenting of data, or the controlling of the report processing functions.

ACRONYMS

```
ACU    -   Acquisition Control Unit
ADAS   -   AWOS Data Acquisition System
ATC    -   OID Air Traffic Controller Password Level
ASOS   -   Automated Surface Observing System
CPU    -   Central Processing Unit
DCM    -   Direct Command Mode
DCP    -   Data Collection Package
DRAM   -   Dynamic Random Access Memory
EEPROM -   Electronically Erasable Programmable Read Only Memory
LST    -   Local Standard Time
NVRAM  -   Non-Volatile Static Random Access Memory
NWS    -   National Weather Service
OBS    -   OID Observer Password Level
OID    -   Operator Interface Device
ROM    -   Read-Only Memory
RTD    -   Resistive Temperature Device
RTS    -   Request to Send
SBC    -   Single Board Computer
SIO    -   Serial Input/Output
SYS    -   OID System Manager Password Level
SYSLOG -   System Maintenance Log
TEC    -   OID Electronics Technician Password Level
UNS    -   OID Unsigned User Level
UTC    -   Universal Time Coordinated
VDU    -   Video Display Unit
VME    -   VERSA Module Eurocard
```

APPENDIX

COLD   START   PROCEDURE

ASOS Cold Start Procedure

The cold start procedure has been streamlined and now can be performed via the Operator Interface Device (OID). This feature is available to the TEChnician (TEC) password user level. See step-by-step instructions below. Examples of OID screens are provided in the figures on the following pages.

1. From the 1-Minute Screen use the SIGN function to sign on the system using the TEC password for the site.

2. From the 1-Minute Screen use the MAINT function. (Figure A1)

3. Using the PREV / NEXT fuctions, highlight the PROC function and press SEL.   (Figure A2)

4. Under the ACU heading two options (COLD and WARM) exist. Using the PREV / NEXT functions, highlight COLD and press RESET. (Figure A3)

5. ASOS will ask: "ARE YOU SURE (Y/N)? N"

6. Change the N to Y and press <RETURN>

7. ASOS will respond with: ENTER YOUR INITIALS

8. Enter your initials and press <RETURN>. (Figure A4)

9. After about 40 seconds, the 1-Minute Screen will be displayed and "NEED SID AND AOMC PHONE" will be displayed in the upper-right-hand corner.

10. Using the SIGN function and the SYSTEM DEFAULT technician password as originally provided with ASOS, sign on ASOS. (Figure A5)

11. From the 1-Minute Screen, use the REVUE-SITE-PHYS-CHANG function and enter the STATION IDENTIFIER (i.e., SID) on the PHYSICAL page. Press EXIT to save the change and return to the 1-Minute Screen. (Figure A6)

12. From the 1-Minute Screen, use the REVUE-SITE-CONFG-EXTRN-CHANG function and enter the AOMC PRIMARY PHONE NO. Press EXIT to save the change and return to the 1-Minute Screen. (Figure A7)

13. The process of downloading the site files from the AOMC will begin. (Figure A8)

```
                                    ----------
    SKY        = CLR

    VISIBILITY = 9SM                    TEMP/DEWPT   = 26.7 /21.1  C  80 /70  F
    RVR        = RVRNO                  WIND DIR/SPD = 000/00
    PRESENT WX =                        ALTIMETER    = 30.00

    REMARKS    = RMK AO2


  METAR KST0 021156Z AUTO 00000KT 7SM CLR 24/21 A3000 RMK AO2 SLP158 T02440211
  10244 20183 50010 $ RTX FIBI




                                          |     |   CMD |
                                          |REVUE|  MAINT|
                                          |SIGN |   AUX |
```

Figure A1: <u>Step 2</u> - Select the maintenance function (MAINT) from
           the 1-Minute Screen.

```
                                ------      ------
    ACU   P         DCP #1  C       ACU/DCP COMMS  *       TREND       PROC

                    DCP #2  C                             ADAS SUMMARY




                                                    MAINTENANCE
                                          |     |CLEAR|PREV|
                                          | SEL | ACT |    |
                                          |EXIT |     |NEXT|
```

Figure A2: <u>Step 3</u> - After highlighting the PROC function, press SEL.

```
 _____----------_____
|                                                                                 |
|            ACU       RUNNING                                                    |
|            COLD                                                                 |
|            WARM                                                                 |
|                                                                                 |
|            DCP #1    RUNNING                                                    |
|             HARD                                                                |
|             SOFT                                                                |
|                                                                                 |
|            DCP #2    RUNNING                                                    |
|             HARD                                                                |
|             SOFT                                                                |
|                                                                                 |
|                                                        PROCESSOR STATS          |
|                                                      _____   |
|                                                      |       |    | PREV |      |
|         START PRINT          END PRINT               |_____|____|_____|___  |
|                                                      |RESET|CHANG|     |      |  |
|                                                      |_____|_____|_____|____|  |
|                                                      |EXIT |BACK |NEXT|         |
|                                                                                 |
```
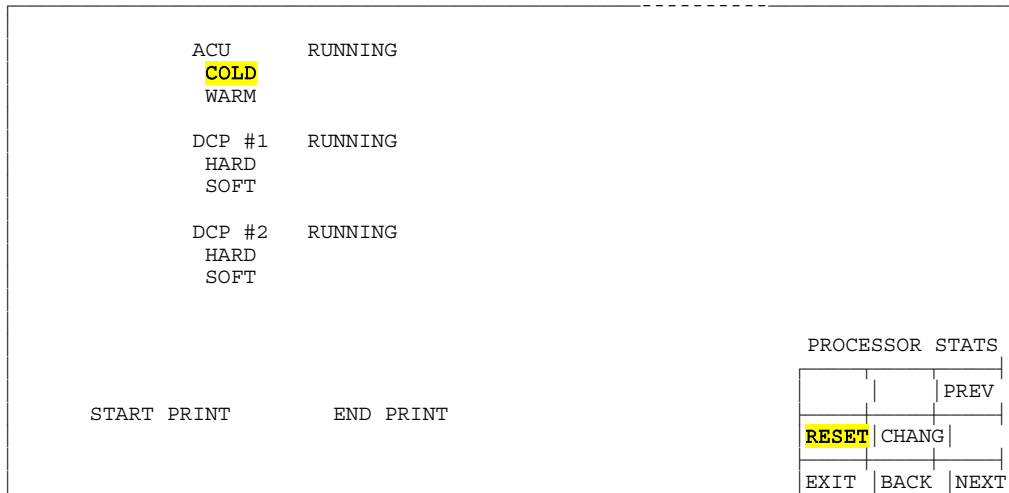
Figure A3:   <u>Step 4</u> - On the Processor Status screen, ensure the
             COLD start function is highlighted under the ACU
             heading, then use the RESET function.

```
 _____----------_____
|                                                                                 |
|            ACU       RUNNING              ARE YOU SURE (Y/N)? Y                  |
|            COLD                           ENTER YOUR INITIALS XXX                |
|            WARM                                                                 |
|                                                                                 |
|            DCP #1    RUNNING                                                    |
|             HARD                                                                |
|             SOFT                                                                |
|                                                                                 |
|            DCP #2    RUNNING                                                    |
|             HARD                                                                |
|             SOFT                                                                |
|                                                                                 |
|                                                        PROCESSOR STATS          |
|                                                      _____   |
|                                                      |       |    | PREV |      |
|         START PRINT          END PRINT               |_____|____|_____|___  |
|                                                      |RESET|CHANG|     |      |  |
|                                                      |_____|_____|_____|____|  |
|                                                      |EXIT |BACK |NEXT|         |
|                                                                                 |
```

Figure A4:   <u>Steps 5 - 8</u> - Change "N" to "Y" and press <Return>
             and then enter your initials and press <Return>.

```
    ┌─────────────────────────────────────────────────────────────────┐
    │  SKY       = MM                                                   │
    │                                                                   │
    │  VISIBILITY = M              TEMP/DEWPT  = M    /-17.8 C  M  /00 F │
    │                              WIND DIR/SPD = M  /M                 │
    │  PRESENT WX =                ALTIMETER   = M                      │
    │                                                                   │
    │  REMARKS    = RMK AO2                                             │
    │                                                                   │
    │                                                                   │
    │                                                                   │
    │                                                                   │
    │ *  WARNING:  USER HAS ACCESSED A U.S. GOVERNMENT COMPUTER *       │
    │ *            SYSTEM.  UNAUTHORIZED USE CAN BE PUNISHED BY *       │
    │ *            FINES OR IMPRISONMENT                      *         │
    │                                              ┌────┬───┬───┐       │
    │        ENTER YOUR INITIALS        XXX        │    │   │   │       │
    │                                              ├────┼───┼───┤       │
    │        ENTER YOUR PASSWORD        ******      REVUE│   │   │      │
    │        (OR PRESS RETURN TO SIGN OFF)         ├────┴───┴───┤       │
    │                                              │SIGN │   AUX │       │
    └─────────────────────────────────────────────────────────────────┘
```
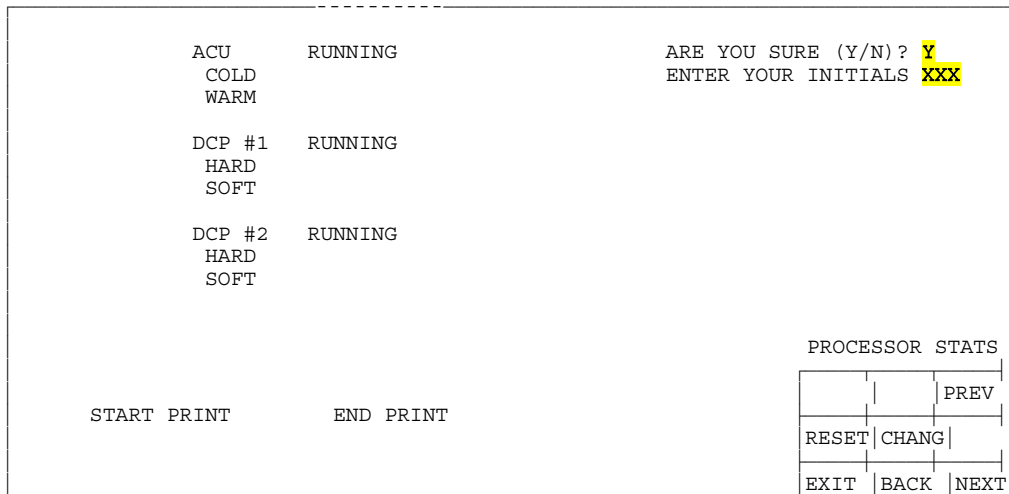
Figure A5: Step 10 - Use the SYSTEM DEFAULT Technician password
            to sign on ASOS.

```
    ┌─────────────────────────────────────────────────────────────────┐
    │ STATION                                                           │
    │   NAME:              NEED SID AND AOMC PHONE                       │
    │   IDENTIFIER:        XXX            DATE:            08/02/01      │
    │   COMMISSIONED:      NON            TIME:            12:50:46 UTC  │
    │   ATTENDED:          YES            UTC TO LST OFFSET:   -5        │
    │   OPEN 24 HOURS:     YES            METAR SWITCH DATE:   07/01/96 UTC │
    │   OPENING TIME:                     METAR SWITCH TIME:   07:45:00 UTC │
    │   CLOSING TIME:                     DSM GENERATED:       YES       │
    │   ELEVATION:         277   FEET     PRIMARY DSM XMIT TIME:    UTC  │
    │                                     INTERMED DSM XMIT TIMES:  UTC  │
    │ FIELD ELEVATION:     277   FEET                              UTC   │
    │ PRESSURE SENSOR ELEVATION: 277  FEET                         UTC   │
    │                                     MSM GENERATED:      YES        │
    │ OBS HOURLY REPORT TIME:   55        MSM XMIT TIME:           UTC   │
    │ OBS EDIT TIME:             2:30                      PHYSICAL      │
    │ OBS HOURLY TRANSMIT TIME: 57:30                                   │
    │ SHEF HOURLY TRANSMIT TIME: 22              ┌──────┬───┬─────┐     │
    │ LATITUDE:            38:57N                │      │   │PREV │     │
    │ LONGITUDE:           77:27W                ├──────┼───┼─────┤     │
    │ MAG DECLINATION:     9W                    │SEQN  │   │ABORT│     │
    │                                            ├──────┼───┼─────┤     │
    │                                            │EXIT  │BACK│NEXT│     │
    └─────────────────────────────────────────────────────────────────┘
```

Figure A6: Step 11 - Enter the Station Identifier (SID) for the
            site.

```
07:53:07 08/02/01 1253Z ** SYSTEM MODIFICATIONS **      NEED SID AND AOMC PHONE
┌─────────────────────────────────────────────────────────────────────────┐
│  STATION ID (XXX):      AAI          WMO IDENTIFIER:       KAAI           │
│  FORECAST OFFICE (CCC): ITB          PRODUCT ID (NNN):     MTT            │
│  METAR/SPECI ADDRESS:   RDC          15-MIN SHEF ID (NNN): RRX            │
│  DSM/MSM ADDRESS:       000 / 000    1-HOUR SHEF ID (NNN): RRY            │
│  15-MIN SHEF ADDRESS:                DSM/MSM PRODUCT ID:   DSM / MSM      │
│  1-HOUR SHEF ADDRESS:                ADAS:                                │
│  STATION IDS/PHONE NUMBERS           ASOS ADDRESS:         100            │
│     STATION 1:                       ADAS TIMEOUT (SEC): 360              │
│                       1XXXXXXXXXX  TCCC:                                  │
│     STATION 2:                       TCCC ADDRESS:         100            │
│                       1XXXXXXXXXX  AOMC:                                  │
│     STATION 3:                       PRIMARY PHONE NO:   XXXXXXXXXX       │
│                       1XXXXXXXXXX    SECONDARY PHONE NO:                  │
│  MESSAGE FORMAT TYPE:   I            AOMC 1200 BAUD:       NO             │
│  PARITY SELECTION:      NONE                                EXTERNAL      │
│  REPLY REQUEST:         NO                        ┌──────┬──────┬──────┐  │
│  BUSY ATTEMPT TIME:     1                         │      │      │ PREV │  │
│  SEND REPLY TIME(SECS): 120                       ├──────┼──────┼──────┤  │
│  RECV REPLY TIME(MINS): 2                         │ SEQN │      │ ABORT│  │
│  BACKUP FOR ADAS:       NO                        ├──────┼──────┼──────┤  │
│                                                   │ EXIT │ BACK │ NEXT │  │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure A7:   Step 12 - Enter the AOMC phone numbers on the
             EXTERNAL Communications Page.

```
07:53:58 08/02/01 1253Z                              NEED SID AND AOMC PHONE
┌─────────────────────────────────────────────────────────────────────────┐
│   DATA FILE              STATUS       LAST UPLOAD     LAST DOWNLOAD        │
│                                                                           │
│  SITE   NORMAL        DOWNLOAD REQ                                         │
│         PHYSICAL       DOWNLOAD REQ                                        │
│         PRESSURE       DOWNLOAD REQ                                        │
│         CRITERION      DOWNLOAD REQ                                        │
│  CONFIG DEFINES        DOWNLOAD REQ                                        │
│         RS-232 COMM    DOWNLOAD REQ                                        │
│         SENSORS        DOWNLOAD REQ                                        │
│         HARDWARE       DOWNLOAD REQ                                        │
│         EXTERNAL COMM  DOWNLOAD REQ                                        │
│  CMD    VOICE/PASSW    DOWNLOAD REQ                                        │
│  VOICE  AIRPORT NAME   DOWNLOAD REQ                                        │
│  VERSN  SENSOR         DOWNLOAD REQ                                        │
│                                                      AOMC COMMS STATUS     │
│                                           ┌──────┬──────┬──────┐           │
│                                           │      │ UP-LD│ PREV │           │
│                                           ├──────┼──────┼──────┤           │
│                                           │ CNCL │ DN-LD│      │           │
│                                           ├──────┼──────┼──────┤           │
│                                           │ EXIT │ BACK │ NEXT │           │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure A8: Step 13 - AOMC Download Process Begin