



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric
Administration
NATIONAL WEATHER SERVICE
1325 East-West Highway
Silver Spring, Maryland 20910-3283

MEMORANDUM FOR: Distribution

FROM: W/OPS24 – Jerald J. Dinges

SUBJECT: Systems Test (ST) Plan for the National Weather Service Automated Surface Observing System (ASOS) Ice Free Wind (IFW) Sensor Version (V) 4.54 Firmware (FW) Upgrade

The IFW sensor V4.54 FW upgrade corrects a “latent defect.” The fix ensures: A “failed” flag (“F”) indicator is sent to ASOS from the IFW sensor when there is a heater failure on the sensor; the proper “WA/WD” commands are issued; and, the proper System Log error message is generated. The new sensor firmware will use an existing NWS Modification Note for the IFW sensor firmware installation.

This change was approved for operational testing on October 9, 2008, by the ASOS Test Review Board (ATRB) after presentation of the development test results by the ASOS Product Improvement project manager (W/OST11). The final development test report is available on the OPS24 Web page:

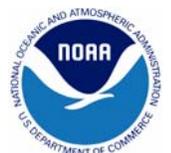
<http://www.nws.noaa.gov/ops2/ops24/documents/IFW%20FW%20Final%20Report%20V3.pdf>

The operational test phase is the responsibility of the NWS Office of Operational Systems and consists of both an ST and an Operational Test & Evaluation (OT&E). The ATRB approved the ST plan at the November 14, 2008 meeting. The subject ST plan is available on the OPS24 web page:

http://www.nws.noaa.gov/ops2/ops24/documents/asos_ifw_docs.htm

The ST plan describes the functional tests that will be performed to verify changes in IFW sensor V4.54 FW upgrade in a simulated operational environment.

The ST Test Review Group (TRG) “Kick-off” meeting will be scheduled immediately following the formal review and approval of the ST plan by the ATRB at their scheduled February 19, 2009 meeting. The ST will be conducted on an ASOS test system (ST0) at the Sterling Field Support Center, Sterling, VA and is estimated to last 2 weeks.



This change is deemed “low” operational risk due to the limited nature of the fix and the ease of its installation. Therefore, if successful, the ST Director will present the test results with the conclusions and a recommendation to the ATRB for approval of the change for limited national deployment at operational ASOS sites for a short evaluation to confirm ASOS is not negatively affected. This limited deployment checkout will be in lieu of a formal OT&E. The results of this limited deployment will be presented to the ATRB as input into the decision to deploy the IFW sensor firmware at all operational ASOS sites.

Please direct any comments or questions to the ST Test Director, Harry Tran, W/OPS24 at 301-713-0326 ext 105, (harry.tran@noaa.gov) or Jerald Dinges W/OPS24 at 301-713-0326 ext 160, (jerald.dinges@noaa.gov).

Attachment

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SYSTEM TEST PLAN
For the
Automated Surface Observing System
(ASOS)
Ice Free Wind (IFW) Sensor Version (V) 4.54
Firmware Upgrade

February 2009



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service/Office of Operational Systems
Field Systems Operations Center/Test and Evaluation Branch

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Executive Summary

This document describes the methods employed by the National Weather Service (NWS) in the System Test of the Automated Surface Observing System (ASOS), herein referred to as the ST. The objectives, methods, management, resource requirements, and schedule of the ST are presented.

The purpose of the ST is to evaluate the Version (V) 4.54 Firmware (FW) upgrade in a simulated operational environment. This version of FW will set the overall status flag in the WA Command to “F” (failed) and report 999 for Wind Direction and 999.9 for Wind Speed when a failed analog switch on the thermistor is encountered. The new FW will also set the Thermistor Temperature status to “F” in the WT Command, and ASOS will generate an ASOS System Log (SYSLOG) error message “1775”, which denotes a thermistor failure.

The conduct of the ST will be overseen by a Test Review Group (TRG) comprised of NWS National Headquarters (WSH), NWS Central Regional Headquarters, Federal Aviation Administration (FAA), and U.S. Air Force (USAF) and U.S. Navy personnel. The TRG will monitor the status of the ST and adjudicate and prioritize problems documented during the test as to its potential affect on service operations and to the urgency of implementing a fix. The TRG may suspend the ST at any time, should the performance of the IFW sensor FW be found unacceptable. If the ST is suspended, the TRG will authorize the resumption of tests when appropriate corrective actions have been taken. The TRG may recommend additional regression tests prior to the resumption of the ST to validate the fix. The TRG will meet weekly during the conduct of the ST. The TRG may also meet irregularly or on an emergency basis as needed. The TRG meetings will be conducted by teleconference calls and will be coordinated by the ST Director.

The ST for the IFW sensor V4.54 FW upgrade is scheduled to begin on Monday, February 23, 2009 and to conclude on Friday, March 6, 2009 at the Sterling Field Support Center (SFSC), Sterling, VA. An ST TRG “kick-off” meeting will be held to confirm all test prerequisites have been satisfied to begin the ST.

The TRG will review the test results, including the status of all reported Test Trouble Report upon the completion of the ST, and will recommend to the ASOS Test Review Board (ATRB) whether the IFW sensor FW is ready for limited deployment at operational ASOS locations. These sites will be monitored for a short period of time to ensure the change does not negatively affect either the IFW sensor or the ASOS. An ST report will be prepared to document the results of testing. After this checkout at the sample of operational ASOSs, the results will be presented to the ATRB as input into the decision to deploy the IFW sensor firmware at all operational ASOSs.

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Acronyms

| | |
|--------------|---|
| ACE | ASOS Controller Equipment |
| ACU | Acquisition Control Unit |
| ADAS | AWOS/ASOS Data Acquisition System |
| ALDARS | Automated Lighting Detection and Reporting System |
| ASOS | Automated Surface Observing System |
| ATRB | ASOS Test Review Board |
| AWIPS | Advanced Weather Interactive Processing System |
| AWOS | Automated Weather Observing System (FAA) |
| DCP | Data Collection Platform |
| ET | Electronics Technician |
| EPROM | Erasable Programmable Read-Only Memory |
| FAA | Federal Aviation Administration |
| FAATC | FAA Technical Center |
| FSOC | Field Systems Operations Center |
| FW | Firmware |
| IDS | Integrate Data System |
| IFW | Ice Free Wind |
| METAR | Meteorological Aviation Routine Weather Report |
| NAS | National Airspace System (FAA) |
| NWS | National Weather Service |
| NWSTC | NWS Training Center |
| OCWWS | Office of Climate, Water, and Weather Services |
| OID | Operator Interface Device |
| OOS | Office of Operational Systems |
| OS&T | Office of Science and Technology |
| OT&E | Operational Test and Evaluation |
| SCA | Single Cabinet ASOS |
| SFSC | Sterling Field Support Center |
| SHEF | Standard Hydrometeorological Exchange Format |
| SIT | System Integration Test |
| SPAWARSYSCEN | Space and Naval Warfare System Center |
| SPECI | Aviation Selected Special Weather Reports |
| ST0 | Sterling, VA ASOS System 2 |
| ST1 | Sterling , VA ASOS System 3 |
| SYSLOG | System Log |
| TRG | Test Review Group |
| V | Version |
| USAF | United State Air Force |
| WSH | National Weather Service Headquarters |
| WSP | Weather Systems Processor |

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1. Introduction

In recent months, an issue related to the Ice Free Wind (IFW) sensor began appearing at a few ASOS sites around the country. The problem is that the analog switch on the thermistor that monitors the temperature of the transducer heaters can fail. When this happens, the reported temperature is not within the bounds of the sensor specification therefore, impeding the heater from activating. This can allow ice to build up on the transducer arms during freezing precipitation events. Upon further investigation, it was discovered when the heater controller fails, the sensor does not send an “F” (failed) Flag to ASOS; does not generate the set of proper diagnostics on the Operator Interface Device (OID) Maintenance Page; and, does not generate the proper System Log (SYSLOG) error messages.

The National Weather Service (NWS) Office of Science and Technology (OS&T) successfully completed development tests for this fix, IFW V4.54 FW, and presented the test results “Ice-Free Wind Firmware V4.54 Final Report” to the ASOS Test Review Board (ATRB) on Thursday, October 9, 2008. The ATRB subsequently approved V4.54 FW for the operational test phase. The final development test report is available on the OPS24 web page at:

<http://www.nws.noaa.gov/ops2/ops24/documents/IFW%20FW%20Final%20Report%20V3.pdf>

The National Weather Headquarters (WSH) Office of Operational Systems (OOS), Field Systems Operations Center (FSOC), Test and Evaluation Branch (OPS24) is responsible for the operational test phase. OPS24 will conduct a System Test (ST) to evaluate the IFW sensor V4.54 FW upgrade in a simulated operational ASOS configuration.

This version of FW corrects a “latent defect.” It sets the overall status flag in the WA Command to “F” (failed) and reports “999” for wind direction and “999.9” for wind speed when a failed analog switch on the thermistor is encountered. The new FW will also set the Thermistor Temperature status to “F” in the WT Command, and ASOS will generate a SYSLOG error message “1775”, which denotes a thermistor failure. The NWS engineering modification note used for V 4.54 firmware installation will be identical to the standard one used for installing the IFW sensor firmware (i.e., ASOS Modification Note 85).

1.1 Test Plan Organization

This ST Plan is comprised of three sections:

- Section 1 contains introductory materials;
- Section 2 describes the method of accomplishment; and
- Section 3 provides test recommendations and report.

Four appendices are provided with the ST Plan:

- Appendix A lists the ST schedule;
- Appendix B provides ASOS Modification Note 85 which contains installation instructions for the test FW;
- Appendix C specifies the regression tests that will be performed during the ST; and

- Appendix D includes ASOS TTR form for use by ST site personnel in reporting problems identified during the ST.

1.2 Prerequisites

The following conditions must be satisfied before entering the ST:

- a. The conduct of IFW sensor V4.54 FW Upgrade ST is approved by the ATRB;
- b. The ST Plan for IFW sensor V4.54 FW Upgrade is signed after proper review and signature coordination (OPS24);
- c. The test FW and updated ASOS Modification Note 85 installation instructions for the test FW into the IFW sensor are available (OPS12);
- d. Certify the ASOS test system ST0 is functioning properly using the following software versions:
 - 1) Acquisition Control Unit (ACU) V2.79E and Data Collection Platform (DCP) V1.9 Erasable Programmable Read-Only Memory (EPROM)
 - 2) ACU V2.79S and DCP V2.0 EPROM, and
 - 3) Previous IFW sensor FW (V4.50)
 - 4) CT12K ceilometer (Note: V2.79S/V2.0 EPROMS support both CT12K and CL31 ceilometers).
- e. A known failed IFW sensor and a properly working IFW sensor are available (OST11); and
- f. Conduct an ST TRG “Kick-off” meeting to validate the above stated prerequisites are met.

1.3 Test Assumptions and Limitations

The following assumptions and limitations define the scope of this ST:

- 1) System Integration Test (SIT) is not required based on development tests results presented at the ATRB. Previous “latent defect” ASOS testing was performed during the development test phase using the test V4.54 FW that was installed in a known failed IFW sensor. The failed sensor was deemed to have a failure of the analog switch on the thermistor. In addition, the ASOS testing was performed with an IFW sensor that is properly working. Correct output was verified on the ASOS OID maintenance page and that the correct SYSLOG message was generated with the failed sensor and conversely, the expected results were verified with the working sensor. However, the ASOS Product Improvement Manager (OST11) will support the ST to ensure the required IFW sensor configurations are installed and operating with ASOS test system, ST0, at the start of the ST
- 2) No changes were made either to the ASOS ACU FW or the DCP EPROM as a result of

the IFW sensor firmware upgrade. However, both the existing operational baseline ASOS software and the planned replacement to the ASOS operational software will be tested in conjunction with this ST to ensure compatibility of the fix with both ASOS software versions. Specifically, the following ASOS ACU firmware and DCP EPROM will be used in evaluating the IFW V4.54 FW:

- ACU V2.79E and DCP V1.9 EPROM
- ACU V2.79U and DCP V2.0 EPROM

- 3) The procedural documentation (ASOS Modification Note 85) used to install the V4.54 FW remains unchanged except for inclusion of the new version of FW;
- 4) Due to the limited nature of this change associated with IFW V 4.54, the NWS Training Center (NWSTC), Kansas City, MO, U.S. Navy Space and Naval Warfare System Center (SPAWARSYSCEN), Charleston, SC, and Federal Aviation Administration (FAA) National Airspace System support center, Oklahoma City, OK, will not participate in this ST;
- 5) Due to the limited nature of the change associated with IFW V4.54, no FAA system interface tests [i.e., Weather Systems Processor (WSP), AWOS/ASOS Data Acquisition System (ADAS)/ Automated Lightning Detection and Reporting System (ALDARS), and ASOS Communication Equipment (ACE) /Integrate Data System (IDS)] will be required;
- 6) Due to the limited nature of this change associated with IFW V 4.54, only the CT12K will be used as the operational ASOS ceilometer; and,
- 7) ST0 is the only test system available at SFSC for ST during the month of November for regression tests. ST1 is a baseline system (no changes allowed) to accomplish the CT12K and CL31 ceilometers meteorology comparison evaluation.

1.4 Test Objectives and Evaluation Criteria

The specific test objectives and criteria are:

- a. Verify the draft NWS ASOS Modification Note 85 for installing the IFW sensor V4.54 FW upgrade.

Evaluation Criterion: The NWS ASOS Modification Note 85 for instructions to install IFW sensor V4.54 FW are complete and accurate.

- b. Verify the ASOS is not negatively affected (i.e., Particularly to ensure wind data in 12-hour archive and METAR/SPECIs are correctly reported and SYS LOG messages generated, if any, are abnormal).

Evaluation Criterion: Wind data are correctly reported in 12-hour archive page, Operator Interface Device (OID) screen, one-minute and 5-second pages, and in METAR/SPECIs transmissions. Check all error messages generated by ASOS in the SYSLOG.

- c. Verify the IFW sensor is not negatively affected (i.e. particularly ensure wind data in 12-hour archive and METAR/SPECIs correctly reported and check any generated SYSLOG messages).

Evaluation Criterion: The IFW sensor passes all the diagnostic and stability tests with the new FW and all diagnostic parameters fall within the specifications for the IFW sensor.

- d. Verify the sensor output correctly sends failed messages to ASOS when a failed analog switch on the thermistor is encountered, and ASOS generates the proper diagnostics flag and SYSLOG error messages.

Evaluation Criterion: The overall status flag in the WA Command is set to “F” (failed) and reports 999 for Wind Direction, and 999.9 for Wind Speed. The Thermistor Temperature status is set to “F” in the WT Command, and the SYSLOG listed a 1775 message which indicates a Thermistor Failure.

1.5 Test Review Group (TRG) Responsibilities

A Test Review Group (TRG) will oversee the conduct of the ST. The TRG is comprised of subject-matter experts selected from WSH, NWS Central Regional Headquarters, the FAA, and USAF and U.S. Navy. The role of the TRG is to evaluate each observed deficiency as documented by a TTR during the ST and assign a priority for fixing. The TRG will also ensure no deficiencies are introduced by the change made to the IFW sensor firmware.

During the ST, the TRG Chair will convene the TRG weekly to:

- a) Review, clarify, and evaluate deficiencies documented in the TTRs;
- b) Prioritize, validate deficiencies, and recommend corrective actions to the ASOS Project Manager; and
- c) Coordinate the resolution of other test-related issues.

If a critical problem occurs between weekly meetings and requires a vote of the members whether to suspend the ST, the ST Director shall convene an emergency TRG meeting.

The TRG will be composed of the personnel identified in Table 1. The “voting” members will forward a recommendation to the ATRB Chair whether the ST for FW upgrade is successful.

Table 1 – ASOS Test Review Group

| Name | Function | Voting Member | Phone |
|-----------------------|-------------------------------|---------------|--------------------|
| Jerald Dinges (OPS24) | Test Review Group Chair | | 301-713-0326 x160 |
| Harry Tran (OPS24) | System Test Director | Y | 301-713-0326 x105 |
| Khien Nguyen (OPS24) | Test Support | | 301-713-0326 x 177 |
| Richard Parry (OPS22) | Observing Systems | | 301-713-2093 x 109 |
| Greg Dalyai(OPS12) | Maintenance Branch | Y | 301-713-1833 x 147 |
| Dan Lester (CR4) | Central Regional Headquarters | Y | 816-540-5147 x 381 |
| Kevin Conaty (OCIO12) | AOMC | Y | 301-713-0864 x 170 |
| Robert Retzlaff | NWSTC | Y | 816-880-9368 |
| Laura Cook (OCWWS) | ASOS Requirements | Y | 301-713-1792 x 126 |
| John Monte (OPS11) | Project Manager | Y | 301-713-1975 x 160 |
| Ron Heatherdale | U.S. Navy SPAWARSYSCEN | Y | 843-218-4818 |
| William M. Lawrence | USAF HQ | Y | 402-294-0866 |
| Bing Huang (ATO-T) | FAA ATO-T | Y | 202-385-8579 |

The following describes the major roles and responsibilities of the TRG personnel:

TRG Chair – The TRG Chair convenes the meetings of the TRG and works with the ST Director and the members of the TRG to ensure that tests are conducted efficiently. The Chair works to resolve any issues that may arise during the conduct of the ST.

System Test Director – The Test Director is the primary point of contact for the ST. The test Director manages the development and coordination of the ST Plan, oversees the conduct of the tests, and manages the development and coordination of the ST Report to document the test results and recommendations. As a voting member, the ST Director solicits inputs from the ASOS test team for any issues which require a decision among the voting members.

ASOS Product Improvement Manager – The ASOS Product Improvement Manager is responsible for providing technical support and information as required when ASOS questions arise, and schedules investigation and solution of ASOS discrepancies.

ASOS Test Team – The ASOS Test Team is comprised of subject experts from WSH. The ASOS Test Team installs the test V4.54 FW and conducts the ST.

1.6 Test Result Analysis

On Thursday of each test week, all TTRs will be collected and the TRG will meet to classify the

problems. The TRG is a group of subject-matter experts and is chaired by the Chief, Test and Evaluation Branch (OPS24) or his designee. The TTRs will be assigned numerical scores to indicate the severity of the defect.

The TestTrack database will include, among other relevant problem information, the **Impact** and the **Priority** of each TTR.

The **Impact** field deals with how each problem affects the overall operations. The problem can be assigned (sorted in ascending severity):

- 1) Impact 1 – A repeatable problem, with no workaround, that prevents or may compromise the full delivery of products or services.

ACTION: The TRG will recommend the immediate suspension of ST, and the software will be turned over to the developer to resolve the problem. The ST may be resumed at the recommendation of the TRG after an appropriate fix or workaround has been developed. The Test Team may develop new Test Case Procedures and/or repeat selected Test Case Procedures to fully evaluate the proposed solutions.

- 2) Impact 2 – A repeatable problem, with an acceptable workaround, that prevents or may compromise the full delivery of products or services.

ACTION: The TRG may recommend the ST continue with an approved workaround in place until an appropriate fix is developed. If a fix becomes available during the ST, the TRG may recommend the immediate implementation of the fix. The test Team may develop new Test Case Procedures and/or repeat selected Test Case Procedures to fully evaluate the fix.

- 3) Impact 3 – A repeatable problem that does not prevent or compromise the full delivery of products and services.

ACTION: The ST may continue at the discretion of the TRG. An approved workaround may be authorized until the problem is fixed, but this is not mandatory. Routine deficiencies are documented and prioritized by the proper authority for future fixes.

- 4) Impact 4 – Infrequent or poorly documented behavior of the System-Under-Test that may prevent or compromise the delivery of products or services.

ACTION: The TRG may recommend that the ST continue. The Test Team may develop new Test Case Procedures and/or repeat selected Test Case Procedures in an attempt to reproduce the problem. Any further observations are documented and submitted to the TRG for review.

The **Priority** addresses how the problem is to be resolved and will be assigned as follows:

- Priority 1 – Immediate emergency action is required.

ACTION: All appropriate resources are directed to resolve the problem as soon as possible.

- Priority 2 – Include in the next interim release.

ACTION: The available resources are directed to resolve the problem.

- Priority 3 – Include in the future interim release.

ACTION: Resources are directed to resolve the problem as allowed.

- Priority 4 – Consider for the next major release.

ACTION: The item is deferred to future system improvements.

- Priority 5 – The priority has not yet been assigned.

ACTION: None.

No recommendation will be made to proceed to the deployment if any **Impact 1** and **Priority 1** deficiency remains open.

2. Method of Accomplishment

The following sections provide the test schedule, descriptions of the test facility, the test system configurations, the required test resources, and the methodology for how the ST will be conducted.

2.1 Schedule

The ST for the IFW sensor V4.54 FW upgrade is scheduled to begin on Monday, February 23, 2009 and to conclude on Friday, March 6, 2009. The ST will start with a “kick-off” TRG meeting to discuss test strategies and schedules. The ST will be performed as specified in the ST Schedule (see Appendix A). The ST will conclude with a “wrap-up” meeting to finalize recommendations to the ATRB Chair.

Test team members will use test system ST0 as required. On Thursdays during the ST, a meeting will be convened by the Test Director to review the problems documented on TTR forms during the week and to assess the status of the ST. If the TRG deems deficiencies to be critical Impact 1/Urgent Priority 1, these TTRs will be forwarded to the ATRB Chair for review and approval. If the ATRB Chair agrees the deficiencies are “Urgent”, the Chair will task the ASOS Project Office (OST11) to correct them. Depending on the time required for deficiency correction, revisions to the test schedule will be required. At the end of the ST, the TRG will present the ST results to the ATRB Chair and recommend whether the ST is successful.

2.2 Test Facility

The Sterling Field Support Center (SFSC), Sterling, VA, will participate in the ST. The SFSC ASOS test system, ST0, will be used to verify the fix, validate the Modification Note, and to ensure the IFW sensor is working properly with the new FW.

2.3 Test Methodology

The following sections provide a description of how the ST will be conducted. It will be the responsibility of the Test Director to ensure the test is performed as outlined. Any deviation from the test methodology will be documented and provided to the ST testers prior to conduct of the affected tests.

2.3.1 Pre-ST Activities

Prior to ST conduct, OPS24 will develop the ST Plan and test procedures. The Test Director will conduct an ST TRG “kick-off” meeting for the ASOS TRG to ensure all prerequisites are in place (see Section 1.2), and to discuss details (see Appendix C) of what will be tested, how any discrepancies will be documented, and the test schedule. After the ST TRG “kick-off” meeting, the Test Director will commence the ST.

2.3.2 SFSC

The SFSC, an NWS facility for testing surface and upper air observation systems, is located in Sterling, Virginia. The SFSC has two test ASOSs, 1) ST0 and 2) ST1. However, during the ST, only ST0 (see Figure 1) will be used to validate the IFW sensor V4.54 FW upgrade; it is configured as an operational system.

- 1) The FW will be installed into the failed IFW sensor (with failed analog switch on the thermistor) at the DCP. ST0 will be operated with ACU V2.79U and DCP V2.0 EPROMs. The following tests will be performed:
 - a. Complete a 24-hour stability test;
 - b. Regression tests (see Attachment C) will be limited to the sensor input and ASOS output of wind data, Maintenance /Diagnostic status reports, and SYSLOG error messages; and
 - c. METAR/SPECIs transmissions will be verified on AWIPS.
- 2) The FW will be installed into the IFW sensor that is working properly on DCP 1 and the above Steps a, b, and c are repeated.
- 3) Repeat the above Steps (1) and (2) using ASOS ACU V2.79E and DCP V1.90 EPROMs.

(NOTE: To avoid system configuration conflicts, the Vaisala ceilometer (CT12K) will be used as the operational ASOS ceilometer throughout the ST.)

ASOS Peripherals, Interfaces & Sensors

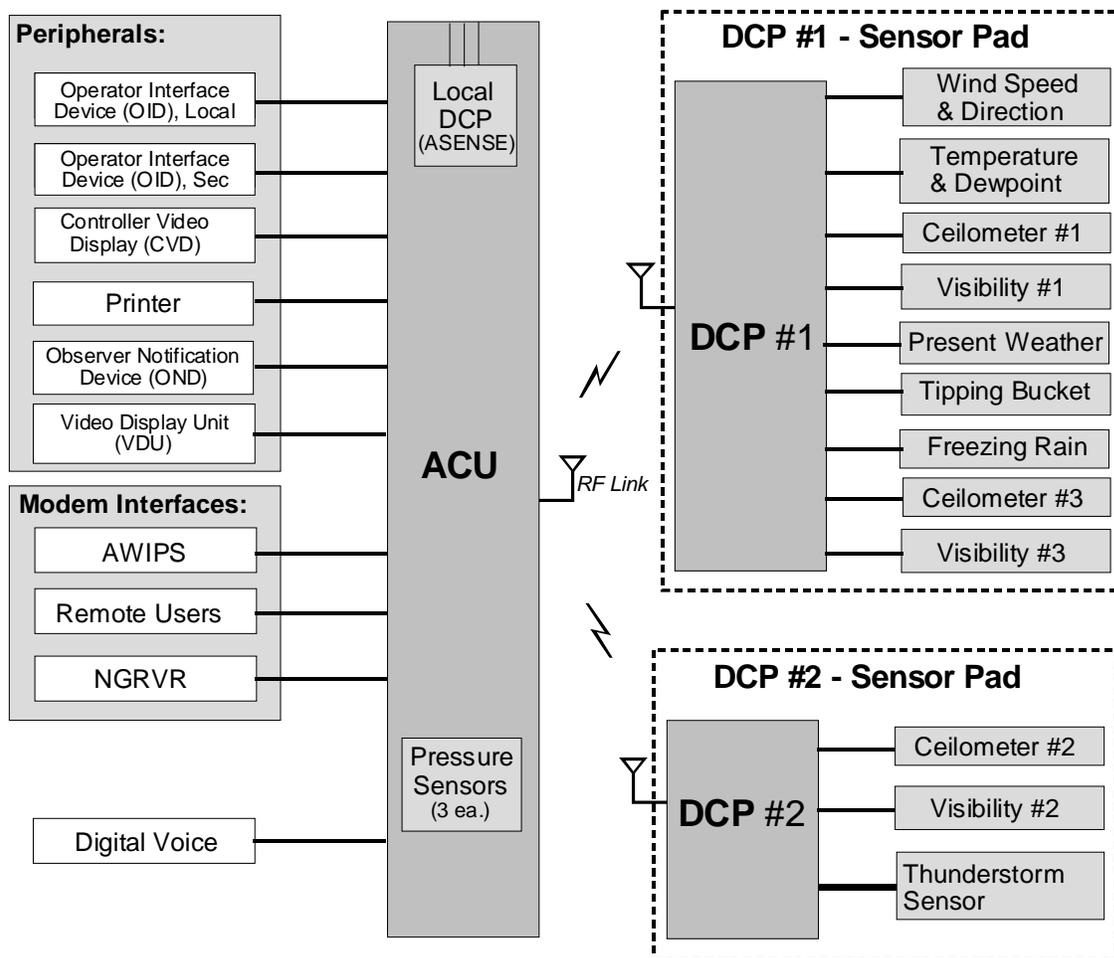


Figure 1 –ASOS ST0 Configuration

2.3.4 Personnel and Responsibilities

The following describes the major roles and responsibilities of the test personnel.

Test Director - Ensures all tests defined for the ST are completed and the results properly documented in the ST report. Responsible for collecting and presenting all test trouble reports to the TRG for classification. Following completion of the ST, the Test Director will call a “wrap-up” meeting for the TRG, detail to the ATRB Chair what was tested, report the ST conclusions, and recommend whether to proceed with the national deployment. The Director also ensures all test trouble reports documented and classified during the ST are forwarded to the proper WSH organization or board for resolution.

Test Coordinator - Responsible for the daily conduct of the ST to ensure testers assigned are present, test procedures are conducted, a log of all completed test procedures is kept (see Appendix C), test trouble report forms are provided to the testers on duty, and all completed forms are provided to the

Test Director each day; informs the Test Director of any problems encountered not resolved and briefs the director on the status of the test; writes the ST report to document the test results and recommendations.

Test Team Member - Responsible for performing individual test procedures as assigned; documents the results of each test and completes trouble report forms when problems/discrepancies are observed. Provides the test coordinator with comprehensive technical information on how the tests were conducted and any problems encountered. For interface testing, the tester is responsible for the setup of the various FAA and NWS communication interfaces. Test Team Member also ensures that all observations are provided to the assigned WSH personnel for analysis.

Electronics Technician (ET) - Responsible for maintaining the ASOSs under test, installing software and other hardware as appropriate, and commenting on NWS ASOS Modification Notes used during the installation of software/hardware. Configures the ASOS test system(s) for individual tests, reports any problems observed to the test coordinator, and takes maintenance action when hardware failures occur.

Data Analyst - On request by the Test Director, responsible for reviewing all METAR/SPECI observations and Standard Hydrometeorological Exchange Format (SHEF) products for correctness.

The ST test team will consist of the following personnel:

Table 2 – Test Personnel

| Name | Function | Phone |
|-------------------------|---------------------------------------|--------------------|
| Harry Tran (OPS24) | Test Director, Primary | 301-713-0326 x105 |
| Khien Nguyen (OPS24) | Test Director, Alternate | 301-713-0326 x177 |
| Peggy Hoch (OPS23) | Software Manager | 301-713-0191 x 165 |
| Joseph Devost (OPS12) | Maintenance Branch | 301-713-1833 x 156 |
| Greg Sikora (OPS12) | Maintenance Branch | 301-713-1833 x 187 |
| Jennifer Dover (OPS22) | Test Support | 703-661-1259 |
| Juan Montenegro (OPS22) | Test Support | 703-661-1206 |
| Dave Eckberg (SAIC) | Test Support (Electronics Technician) | 703-661-1288 |
| Paul Oosterhout (SAIC) | Test Support | 703-661-1224 |
| Brian Rice (SAIC) | Test Support | 703-661-1259 |

2.3.4 Support Documentation

Updated support documentation and test procedures will be used in the ST. Reference to these documents will be made as required throughout the test. The list of documentation (with the office of responsibility in parenthesis) and procedures includes, but is not limited to, the following documents:

- a. ST Plan for IFW sensor V4.54 FW upgrade (OPS24);
- b. System Test Procedures and associated data sets (located at ASOS Test System ST0) (OPS24);
- c. Updated ASOS Modification Note 85 for installing instructions of IFW sensor V4.54 FW; and (OPS12)

https://www.ops1.nws.noaa.gov/Secure/asos/Mod_Notes/ModNote85_S.pdf

- d. ASOS Modification Note 77A for instructions to install the IFW sensor at the DCP:

https://www.ops1.nws.noaa.gov/Secure/asos/Mod_Notes/ASOSmod77A_S.pdf

2.3.5 Problem Reporting

Testers will use the TestTrackPro software to enter the TTR's into database as soon as possible so that the information is available to the test team and the software developer in a timely manner. User accounts and passwords will be available for the test members to access the TestTrackPro by using either the work station located near ST0 and ST1 or the website (<http://webdev1.weather.gov/ttweb/login.htm>).

3. Test Recommendations and Report

At the conclusion of the ST, the TRG will convene an ST wrap-up meeting to review the findings of the ST and to recommend whether to proceed with a limited deployment of the firmware to a sample of operational ASOS locations for a short evaluation period to determine if the change has any unforeseen negative affect on ASOS not captured during the ST. After this limited deployment phase, the ATRB will be briefed on the results as input into the decision to nationally deploy the IFW sensor firmware fix to all operational ASOSs. The decisions of the TRG are based on simple majority among the voting members. The voting members of the TRG are listed in Table 1.

A formal ST Report will be generated by OPS24 to document the TRG recommendation, the test status, and all problems found during the ST.

Appendix A – IFW V4.54 FW ST Test Schedule

| Dates | Duration Day | Action |
|---------------------------------------|-----------------|--|
| Feb 19 | 1 | ST TRG “kick-off” meeting |
| ACU V2.79U and DCP V2.0 EPROMs | | |
| Feb 23 | 2 | <ul style="list-style-type: none"> - Install the known failed IFW sensor at DCP - Install V4.54 FW into the failed sensor, verify the results. - Complete a 24-hour stability test. - Perform Regression tests, verify ASOS and METAR/SPECIs |
| Feb 25 | 2 | <ul style="list-style-type: none"> - Install the properly working IFW sensor at DCP - Install V4.54 FW into the properly working sensor, verify the results. - Complete a 24-hour stability test. - Perform Regression tests, verify ASOS and METAR/SPECIs |
| ACU V2.79E and DCP V1.9 EPROMs | | |
| Feb 26 | 2 | <ul style="list-style-type: none"> - Install the known failed IFW sensor at DCP - Install V4.54 FW into the failed sensor, verify the results. - Complete a 24-hour stability test. - Perform Regression tests, verify ASOS and METAR/SPECIs |
| Mar 2 | 2 | <ul style="list-style-type: none"> - Install the properly working IFW sensor at DCP - Install V4.54 FW into the properly working sensor, verify the results. - Complete a 24-hour stability test. - Perform Regression tests, verify ASOS and METAR/SPECIs |
| ACU V2.79S and DCP V2.0 EPROMs | | |
| Mar 4 | 2 | <ul style="list-style-type: none"> - Verify IFW sensor is working properly - Complete a 24-hour stability test. - Perform Regression tests, verify ASOS and METAR/SPECIs |
| Mar 6 | 1 | - Wrap-up Meeting |
| Mar 9 – Mar 27 | 14 | - Prepare ST Report |

Appendix B – ASOS Modification Note 85

ASOS MODIFICATION NOTE 85

Maintenance, Logistics, and Acquisition Division
W/OPS12: AL

SUBJECT: **ASOS Ice Free Wind (IFW) Sensor Firmware Update**

PURPOSE: This procedure provides instructions to install an updated version of firmware in the Vaisala Model 425 NWS Ice Free Wind Sensor.

SITES AFFECTED: This modification applies to all ASOS sites with IFW wind sensors, including National Weather Service (NWS), Federal Aviation Administration (FAA), and Department of Defense (DoD) sites.

AUTHORIZATION: The authority for this note is Request for Change S01144.

VERIFICATION STATEMENT: This procedure was tested and verified at the Sterling Research and Development Center (SRDC).

ESTIMATED COMPLETION DATE: During the next scheduled preventive maintenance visit.

TIME REQUIRED: Approximately .5 hour.

ACCOMPLISHED BY: NWS and/or contract electronics technicians

EQUIPMENT AFFECTED: ASOS Vaisala Ice Free Wind Sensor

SPARES AFFECTED: Field spares must have updated version of firmware installed before being shipped to the field.

PARTS/MATERIALS REQUIRED: NWS Diagnostic Program Version 1.24, revision date June 13, 2006, Firmware File e_450.hex file

SOURCE OF PARTS/MATERIALS: The NWS Diagnostic Program Version 1.24 and sensor firmware (e_450.hex) files are both available from the ASOS Technicians Home Page.
<https://www.ops1.nws.noaa.gov/Secure/asos.htm>

DISPOSITION OF REMOVED PARTS/MATERIALS: N/A

TOOLS AND TEST EQUIPMENT REQUIRED: Technician Laptop Computer with NWS Diagnostic Program version 1.24 and Firmware file (e_450.hex)
S100-TE379 DB9F-DB9F RS-232 cable

DOCUMENTS AFFECTED: Maintenance Note 57, Chapter 4A ASOS STM Rev A
Modification Note 77, IFW Installation Instructions
ASOS STM Revision A, Change 2, Paragraph 4A.5.3.1, “Fault Isolation Overview.”

PROCEDURE: Attachment A provides instructions for installing an updated version of firmware to the Vaisala Model 425 NWS Ice Free Wind Sensor.

Attachment B provides a completed Engineering Management Reporting (EMRS) report sample.

TECHNICAL ASSISTANCE: For questions or problems pertaining to this note, contact WSH W/OPS12 at 301-713-1833 x120 x156 x157

REPORTING INSTRUCTIONS: Report the completed modification using the EMRS according to the instructions in [EHB-4, Maintenance Documentation](#), Part 4, and Appendix D. Include the following information on the EMRS report:

Maintenance Description (block 5): **ASOS Mod Note 85, ASOS Ice Free Wind (IFW) Sensor Firmware Update**

Equipment Code (block 7): **AIFWS**

Serial Number (block 8): **(Appropriate Serial Number)**

Maintenance Comments (block 15): **ASOS Mod Note 85 – Updated Ice Free Wind (IFW) Sensor Firmware I.A.W ASOS Modification Note 85.**

Mod No. (block 17a): **85**

A sample EMRS report is provided as attachment **B**.

Mark S. Paese
Director, Maintenance, Logistics, and Acquisition Division

Attachment A – ASOS IFW Sensor Firmware Updating Procedures
Attachment B – Sample EMRS Report

Attachment A – ASOS IFW Sensor Firmware Updating Procedures

NOTE: Each time this procedure is performed, the WFO spare Ice Free Wind (IFW) sensor must be on-site. In the event of an IFW sensor failure, the spare sensor will ensure continuous reporting of the Automated Surface Observing System (ASOS) IFW sensor.

1. Visit the ASOS Technicians Home Page and download a copy of the latest version of IFW sensor firmware, Version 4.50. (<https://www.ops1.nws.noaa.gov/Secure/asos.htm>).
2. Create a folder in *My Documents* and name it **IFW-V4.50**.
3. Copy the **e_450.hex** file to this folder (see [Figure 2](#)).

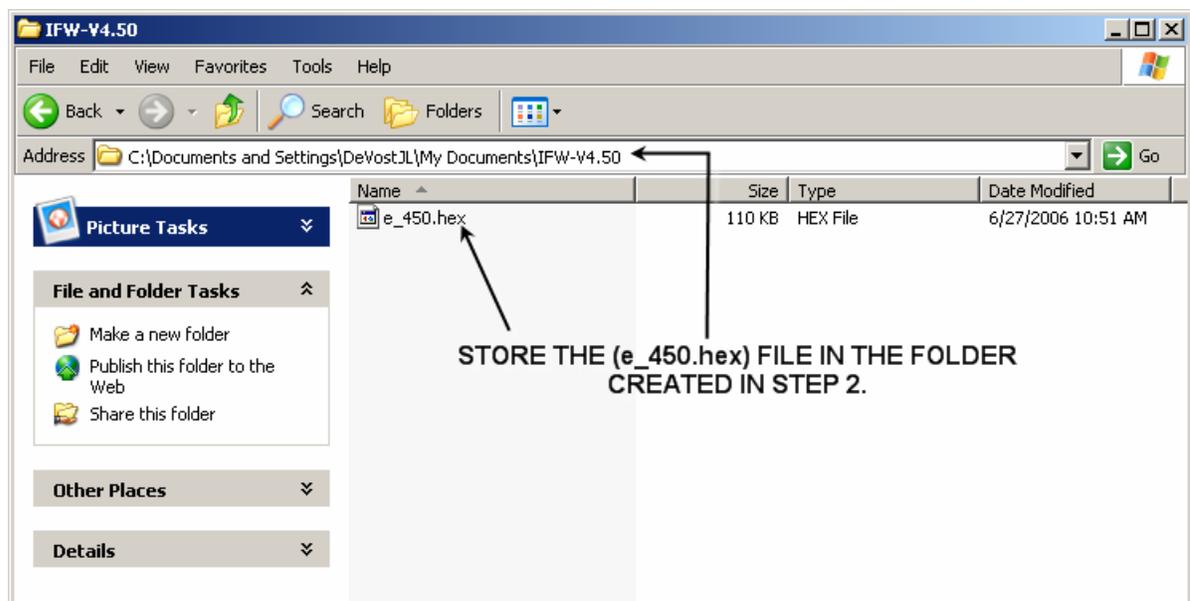


Figure 2 Store the (e_450.hex) file in the IFW-V4.50 Folder

4. Open the IFW sensor electronics enclosure door.
5. Connect the **RS-232** cable (S100-TE379) between the port labeled **TEST** (on the IFW power supply) and the laptop computer's **COM 1** port.
6. At the Desktop, select **Start, Programs, NWS_Diagnostic**.

7. Verify that the proper COM port on the laptop computer is selected. In most cases, the port used will be COM 1 (see [Figure 3](#)).

NOTE: The *NWS Diagnostic Program* automatically defaults to the computer's COM 1 port. To use a different COM port, click the **Comm Port** tab (see [Figure 3](#)) and choose the desired COM port from the menu. The default baud rate for the IFW sensor is 2400.

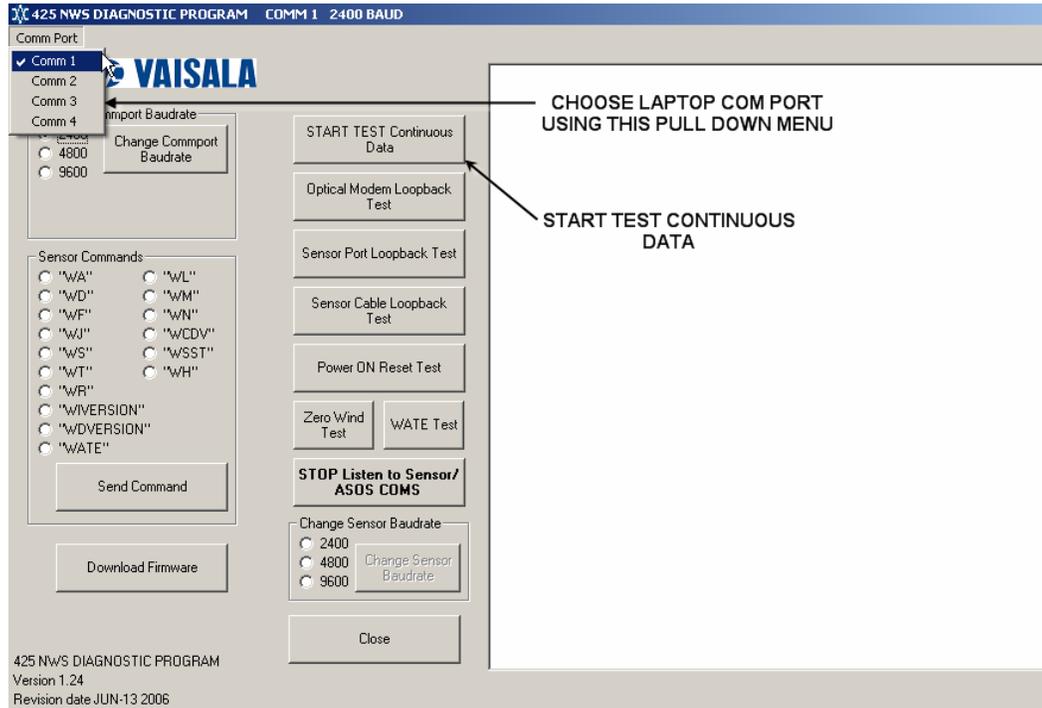


Figure 3 Sensor COM Port Selection and Port Speed Settings

8. Select the **START TEST Continuous Data** button to observe current wind speed/direction data (see [Figure 3](#)).

9. Verify the sensor is responding with current wind speed/direction data (see Figure 4). Is the sensor responding?

Yes Select the **STOP TEST Continuous Data** button to stop continuous data responses (see Figure 4). Proceed to step 10.

No Refer to **ASOS STM Revision A, Change 2, Paragraph 4A.5.3.1, "Fault Isolation Overview."**

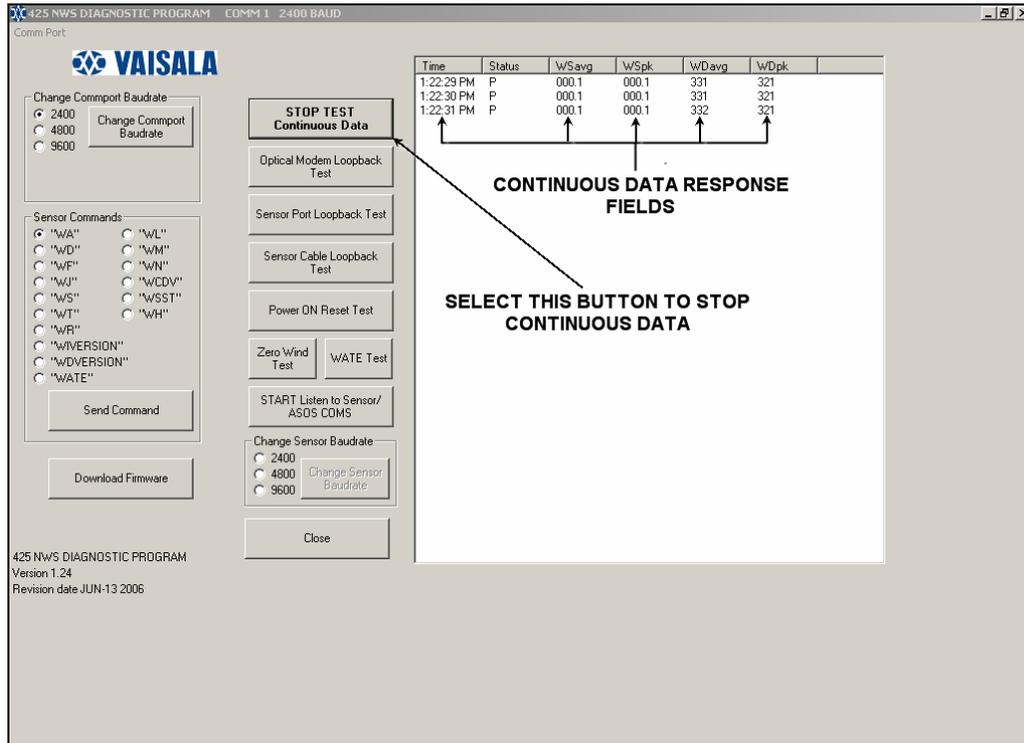


Figure 4 Start Test Continuous Data Sensor Response

NOTE: The *NWS Diagnostic Program* automatically adjusts the host computer's COM port baud rate to match changes made to the sensor COM port baud rate. The example in step 9 illustrates a *Change Sensor Baudrate* command, which will change the sensor baud rate from 2400 to 9600 (see Figure 5). Changing the Baud rate from 2400 to 9600 cuts the firmware installation time in half.

- Change the sensor baud rate from 2400 to 9600. Under *Change Sensor Baudrate*, select the **9600** radio button, and then select the **Change Sensor Baudrate** button. Wait for the message “COM rate changing to 9600 please wait” to close. The sensor should respond with a sensor **Ready** message and **Status=P** message indicating a successful sensor com port Baud rate change (see [Figure 5](#)).

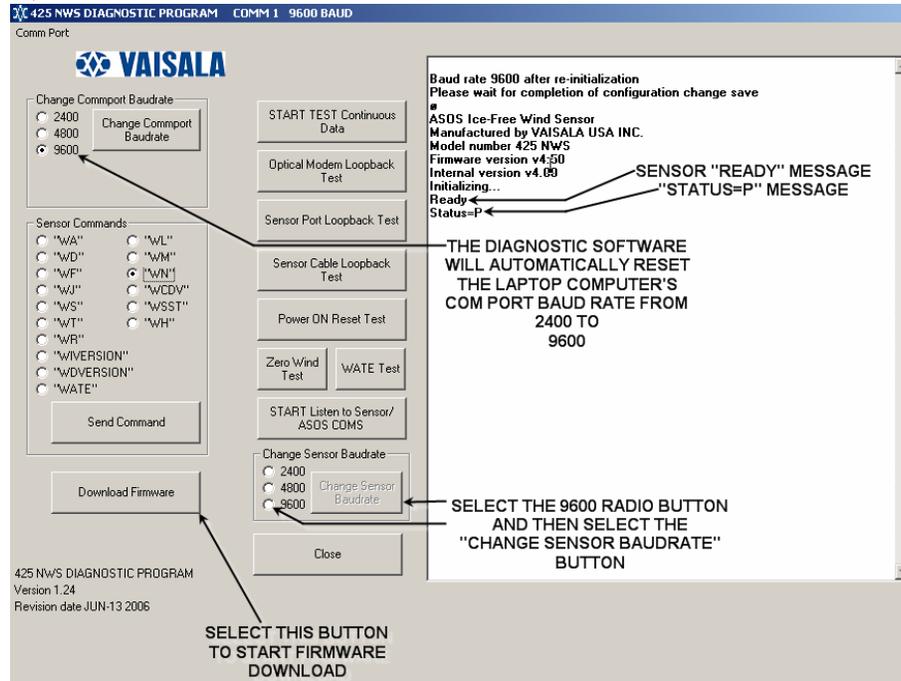


Figure 5 Changing Sensor Baud Rate

- Select the **Download Firmware** button to start the firmware download session. (See [Figure 5](#).)
- Continue with firmware download by selecting the **Begin Download** button. (See [Figure 6](#).)

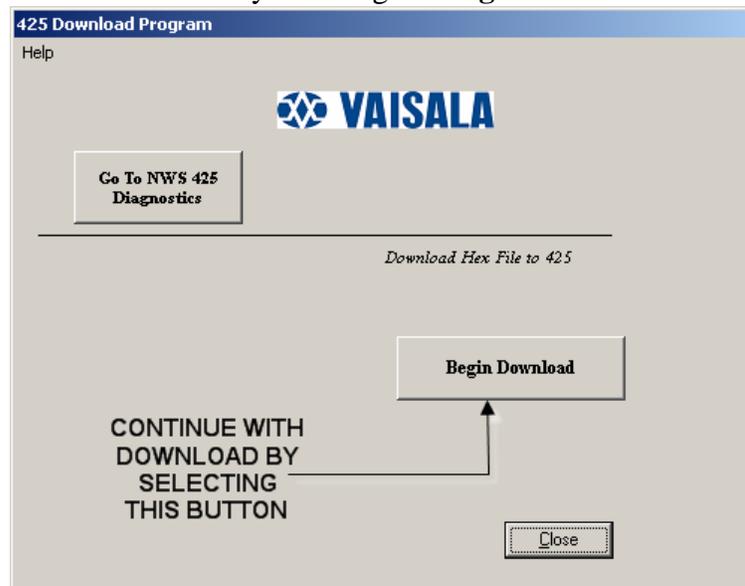


Figure 6 Continue With Download Procedure

- Select the **e_450.hex** file stored in the IFW-V4.50 folder created in step 2 and then select **Open**.

(See Figure 7.)

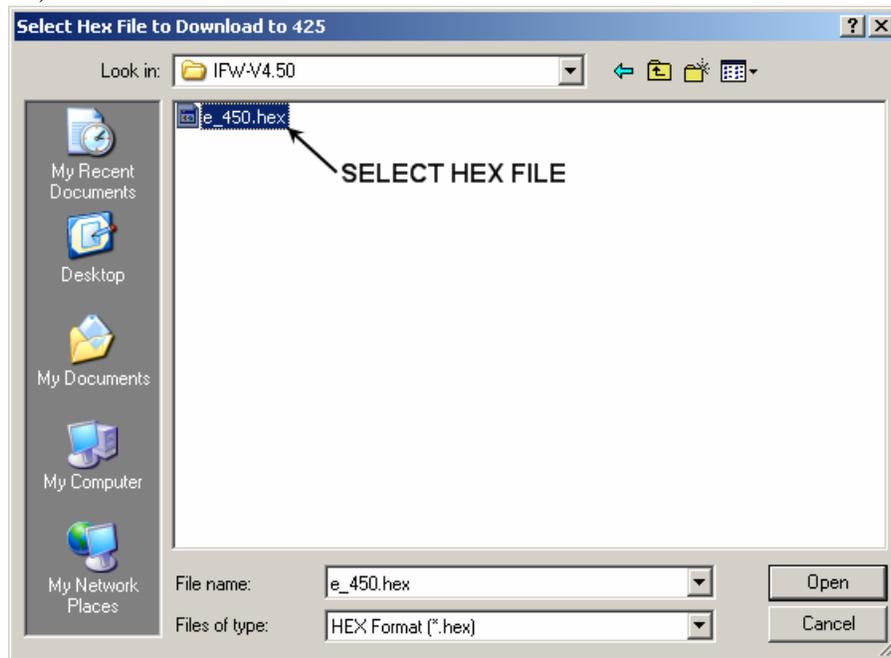


Figure 7 Select the Proper Hex File

14. In the **ENTER PASSWORD** dialog box, type the password, **NWSSONIC**, and then press **Enter**. (See Figure 8.) The *425 NWS Download Firmware* dialog box displays, which indicates file download status and progress. (See Figure 9.)

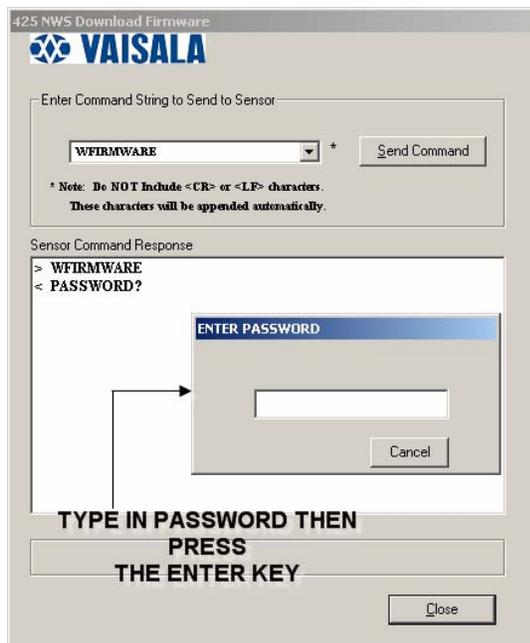


Figure 8 Enter Password

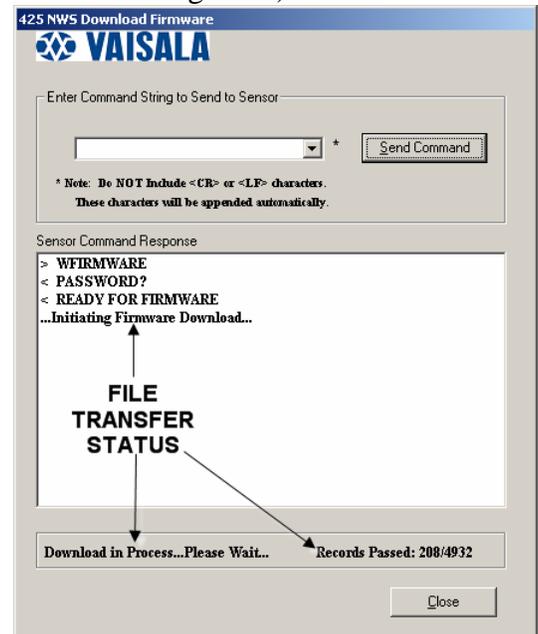


Figure 9 Monitor Progress

15. The *Firmware Download* dialog box displays *Sensor Communications at 2400b*. Close this dialog box by selecting **OK**. (See Figure 10.)



Figure 10 Sensor Com Port Baud Rate

NOTE: The sensor re-initializes after the download is complete. This resets the sensor COM port back to the default baud rate of 2400. In order to communicate with the sensor, the laptop computer com port must be set back to 2400. This set back is done in step 19.

16. Verify the file was successfully downloaded to the sensor by observing the **Firmware Download Successful** message displayed in the *425 NWS Download Firmware* dialog box. (See [Figure 11](#).)

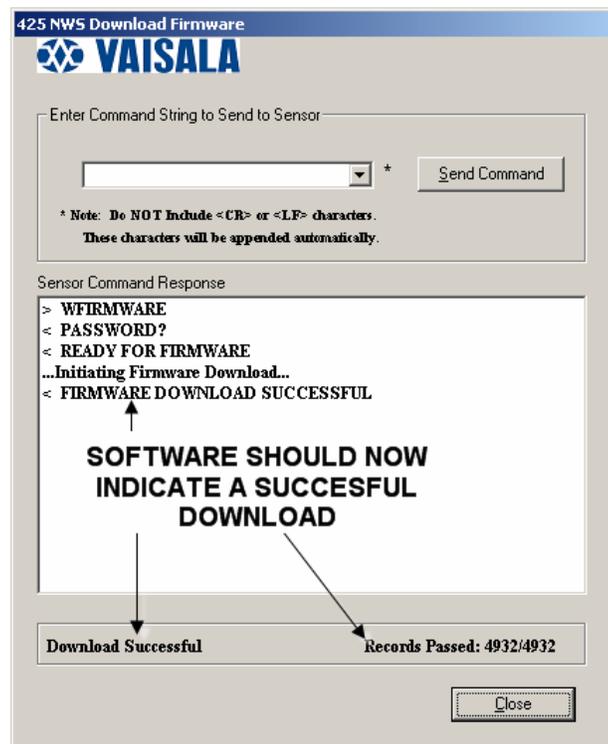


Figure 11 Successful Firmware Download Dialog Box

17. Select **Close** on the *425 NWS Download Firmware* dialog box (see [Figure 11](#)).

18. Select **Close** on the *425 Download Program* dialog box (see [Figure 12](#)).

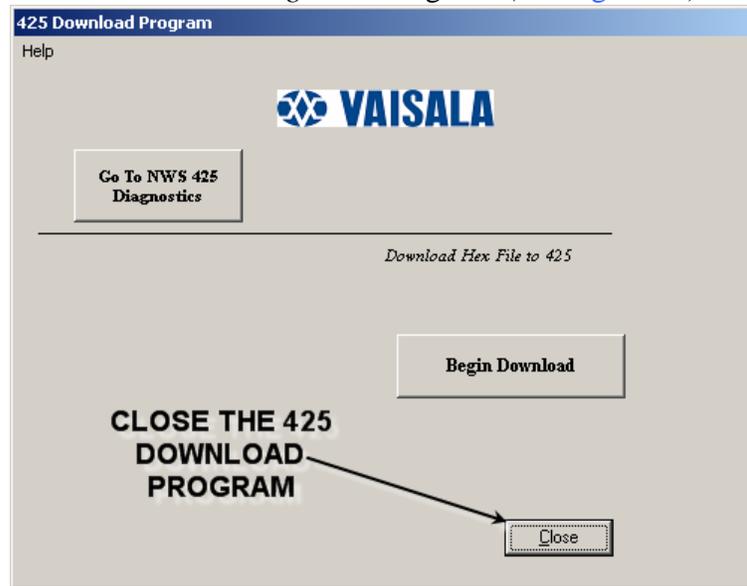


Figure 12 Close Download Program

19. Change the laptop computer COM port baud rate back to **2400**. Under *Change Commport Baudrate*, select the **2400** radio button, and then select the **Change Commport Baudrate** button. (See [Figure 13](#).)

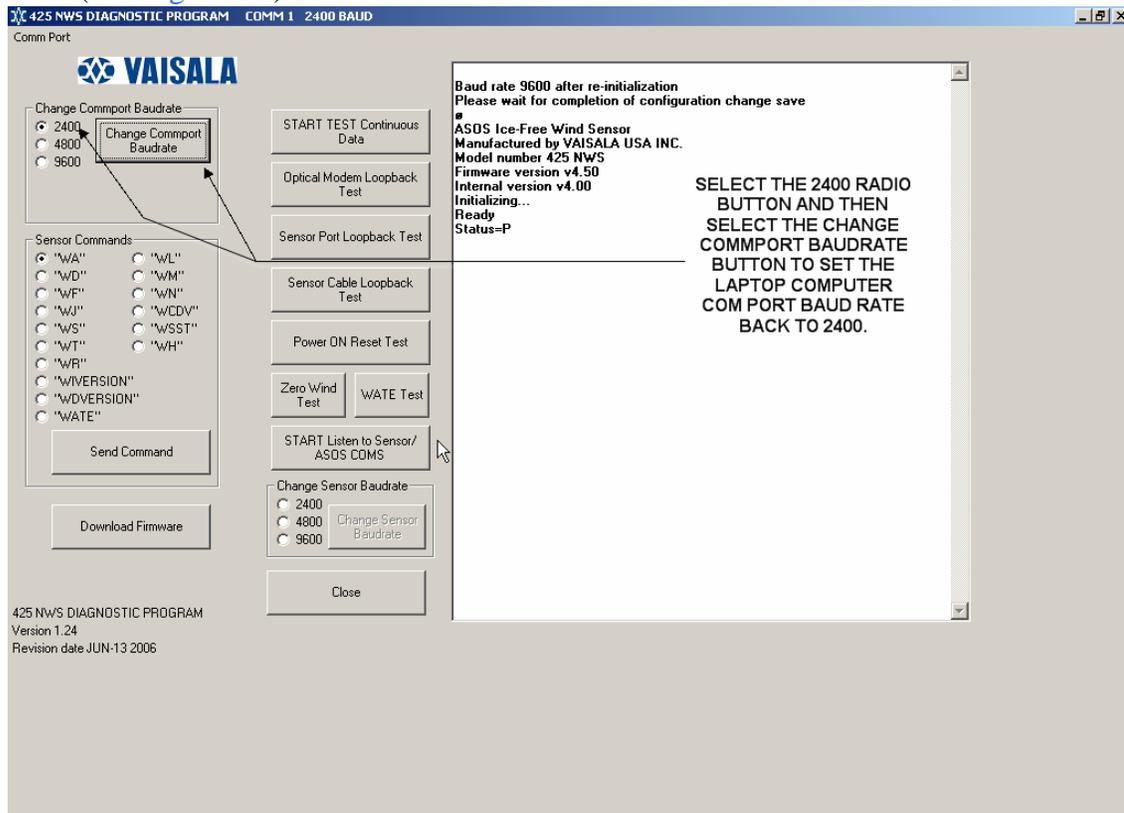


Figure 13 Change Computer COM Port Baud Rate

20. Issue both **WA** and **WD** poll commands and check for fail flags.
21. Under *Sensor Commands*, select the **WA** radio button, and then select the **Send Command** button.
22. Observe the response (see Figure 14) and document any fail flags.

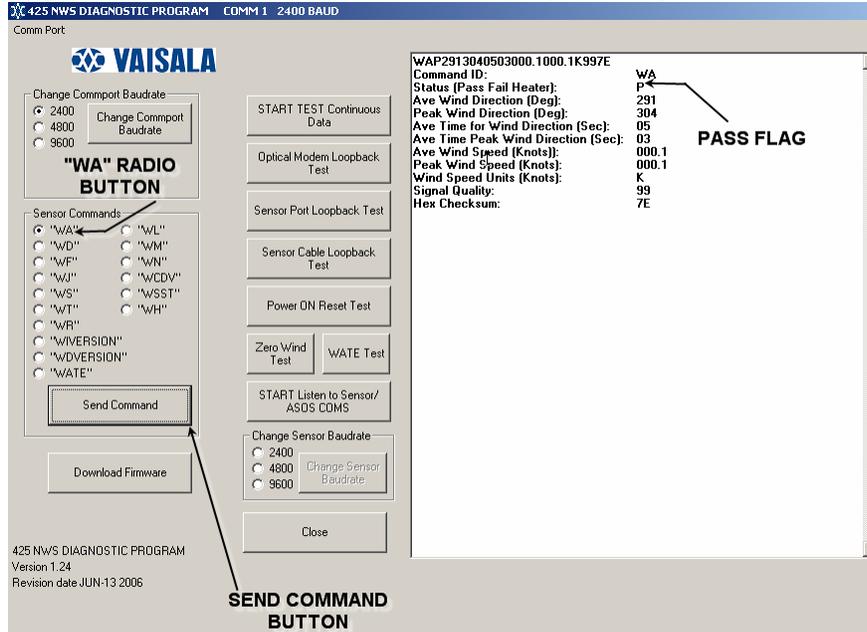


Figure 14 WA Poll Command Response Sensor Status Pass

23. Select the **WD** radio button, and then select the **Send Command** button.
24. Observe the response (see Figure 15) and document any fail flags. Are fail flags present?
Yes Refer to **ASOS STM Revision A, Change 2, Paragraph 4A.5.3.1, "Fault Isolation Overview."**
No Proceed to step 25.

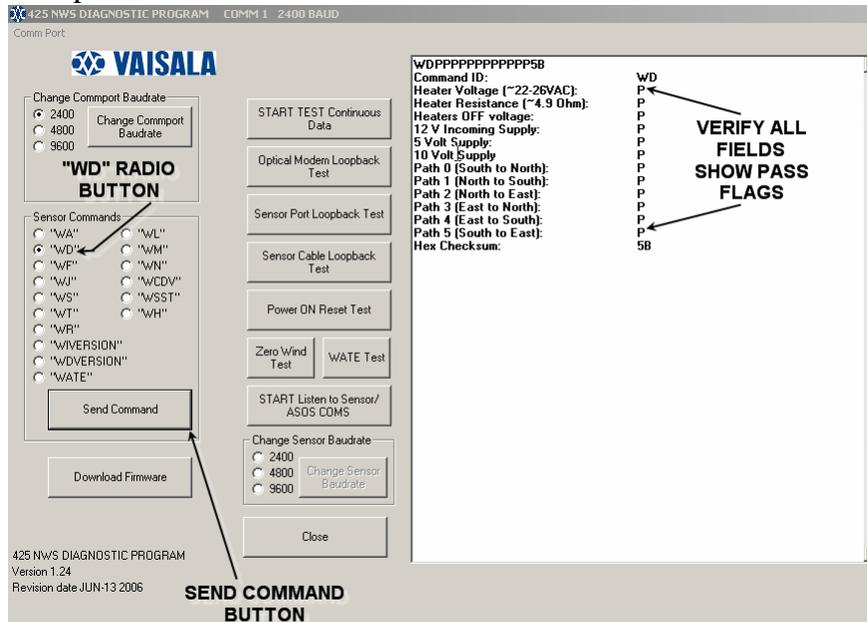


Figure 15 WD Poll Command Response Sensor Status Pass

25. Issue a **WDVERSION** command and verify firmware version **V4.50** is currently running. Under *Sensor Commands*, select the **WDVERSION** radio button, and then select the **Send Command** button. **V4.50** displays (see [Figure 16](#)), indicating the correct firmware version.

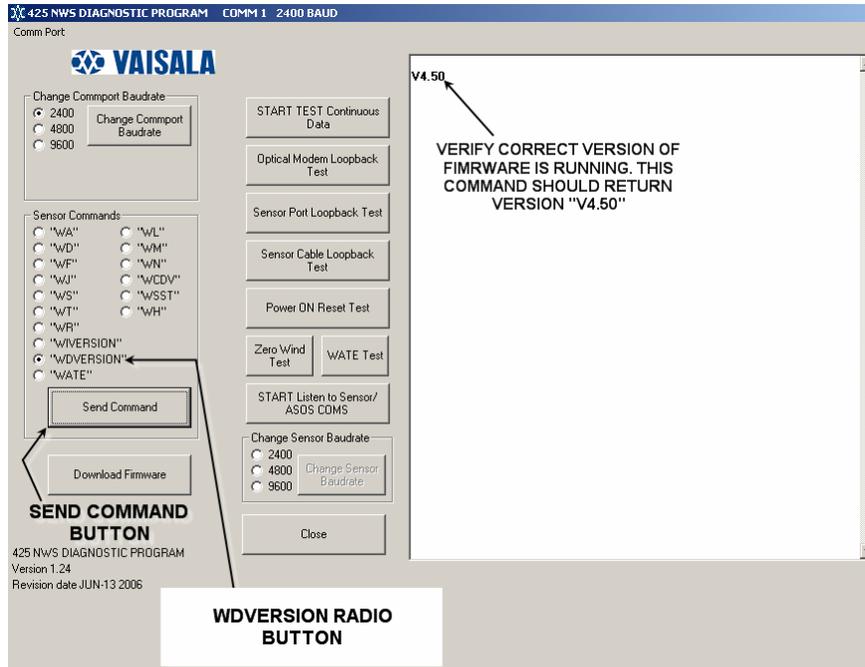


Figure 16 Show Firmware Version

26. Select **Close** to close out of the *425 NWS DIAGNOSTIC PROGRAM*.
27. Remove **RS-232** cable and close the electronics enclosure door.

Attachment B – Sample EMRS Report

| | | | | | | | | | |
|--|-------------------------------|-----------------------------|--|---------------------------|-------------------|---------------|-------------|-------------|---------|
| New A26 Commit A26 Place on Hold Copy A26 Delete A26 Detail Report Document Summary Create USOS Help | | | | | | | | | |
| GENERAL INFORMATION | | | | | | | | | |
| NEW RECORD | | WFO* ABR | | Document No.* ABR60727001 | | | | | |
| 1. Open Date | Open Time | 2. Op Initials | 3. Response Priority | | | 4. Close Date | Close Time | | |
| 07/27/2006 | 09:00 | WSH | <input type="radio"/> Immediate <input type="radio"/> Low <input type="radio"/> Routine <input checked="" type="radio"/> Not Applicable | | | 07/27/2006 | 09:50 | | |
| 5. Maintenance Description | | | | | ASOS | | | | |
| 426 characters left | | | | | | | | | |
| ASOS Mod Note 85 - ASOS Ice Free Wind Sensor (IFWS) Sensor Firmware Update | | | | | | | | | |
| EQUIPMENT INFORMATION | | | | | | | | | |
| 6. Station ID* | 7. Equipment Code* | 8. Serial Number | | | 9. TM | 10. AT | 11. How Mal | | |
| ABR | AIFWS | A0123 | | | M | M | 999 | | |
| Alert: Time Remaining: (For Block 12 use only) | | | | | | | | | |
| 13. PARTS USAGE and CONFIGURATION MANAGEMENT REPORTING | | | | | | | | | |
| ASN | Vendor Part No. (New Part) | Serial Number (Old Part) | Serial Number (New Part) | New Row | | | | | |
| | | | | Delete Row | | | | | |
| 14. WORKLOAD INFORMATION | | | | | | | | | |
| a. Routine | | b. Non-Routine | | c. Travel | | d. Misc | | e. Overtime | |
| Hours | Minutes | Hours | Minutes | Hours | Minutes | Hours | Minutes | Hours | Minutes |
| | | | | | | | 50 | | |
| MISCELLANEOUS INFORMATION | | | | | | | | | |
| 15. Maintenance Comments | | | | | 16. Tech Initials | | | | |
| 675 characters left | | | | | BKA | | | | |
| ASOS Mod Note 85 - Updated ASOS Ice Free Wind Sensor (IFWS) Sensor Firmware | | | | | | | | | |
| 17. SPECIAL PURPOSE REPORTING INFORMATION | | | | | | | | | |
| a. Mod No. | b. Mod Act/Deact Date | c. Block C | d. Trouble Ticket No. | e. USOS Outage Doc No. | | | | | |
| 85 | 07/27/2006 | | | | | | | | |
| Expand | | | | | | | | | |
| Commit A26 | | Place on Hold | | Copy A26 | | New A26 | | Cancel | |

Appendix C – IFW V4.54 FW Regression Tests Checklist

| # | TEST # | Test Description | Duration | Pass/ Fail | Date |
|---|--------|--|----------|---------------|------|
| 1 | 02_14 | Review-Sensor - This procedure tests the REVUE-SENSR function is available to all users except the Air Traffic Controller (ATC). The REVUE-SENSR function enables the user to view the 12 hour archive of raw sensor data, the last 10 minutes of algorithm processed sensor data, and sensor status information such as turning report processing on or off and whether the sensor is in automated or manual mode. | 15 min | | |
| 2 | 02_15 | Review SYSLOG - This procedure tests the ASOS System Logging capability. | 15 min | | |
| 3 | 06_13 | Review 5-MIN Screen - This procedure verifies characteristics of the REVUE RPT 5MIN Screen | 20 min | | |
| 4 | 06_15 | Review RPT OBS Screen Verification – This procedure is to verify valid data is properly displayed using keypads such as PRINT, DATE, BACK, etc. | 20 min | | |
| 5 | 04_39 | Wind Remark/Repro – This test procedure is to verify the operator is able to modify the magnetic declination and edit the wind direction/speed data | 1 hour | | |
| 6 | 04_40p | Wind Edit Data Validation – This test procedure is to verify the operator can manually properly edit the wind data, and ASOS will alert the operator when improper wind data is entered in the ASOS. | 30 min | | |

Appendix D – ASOS Test Trouble Report

| | | |
|---|--|--|
| TYPE OF DEFECT: <input type="checkbox"/> System Deficiency <input type="checkbox"/> Enhancement <input type="checkbox"/> Modify Current Feature <input type="checkbox"/> Documentation/Procedure <input type="checkbox"/> Hardware <input type="checkbox"/> Watch Item | PRIORITY: <input type="checkbox"/> Emergency <input type="checkbox"/> Urgent <input type="checkbox"/> Routine <hr/> SUBSYSTEM/COMPONENT: <input type="checkbox"/> Algorithm <input type="checkbox"/> Comms <input type="checkbox"/> Sensor <input type="checkbox"/> Simulator <input type="checkbox"/> User interface <input type="checkbox"/> Voice <input type="checkbox"/> Other | SEVERITY: <input type="checkbox"/> No Impact <input type="checkbox"/> Cosmetic <input type="checkbox"/> Inconvenience <input type="checkbox"/> System Up -w/no workaround <input type="checkbox"/> System Up -w/workaround <input type="checkbox"/> CRASH - w/no workaround <input type="checkbox"/> CRASH -w/workaround |
| TEST ACTIVITY: <input type="checkbox"/> FAT <input type="checkbox"/> SAT <input type="checkbox"/> OT&E <input type="checkbox"/> Demonstration <input type="checkbox"/> Other | REPEATABILITY: <input type="checkbox"/> Could not repeat <input type="checkbox"/> Didn't try <input type="checkbox"/> One time occurrence <input type="checkbox"/> Sometimes <input type="checkbox"/> Always | ATTACHMENT: <input type="checkbox"/> pages |
| CONFIGURATION/TEST DATA: <input type="checkbox"/> Live data feed <input type="checkbox"/> Simulator | | |

TTR NO: *(Assigned by Test Track program)*

LOCATION (SID): _____

SOFTWARE VERSION:

TITLE/SUMMARY:

DATE/TIME DISCOVERED: _____

ORIGINATOR:

DESCRIPTION, CAUSE OF PROBLEM:

(References: ECPs/RCs/OTRs: _____ Test procedure/steps: _____)