



DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
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Silver Spring, Maryland 20910-3283

MEMORANDUM FOR: Distribution

FROM: W/OPS24 – Jae Lee (Acting)

SUBJECT: Systems Test (ST) Report for the National Weather Service Automated Surface Observing System (ASOS) All-Weather Precipitation Accumulation Gauge (AWPAG) LogoSense Version (V) 3.61 Firmware (FW) and orifice heater controller V2.1 Erasable Programmable Read-Only Memory (EPROM) upgrades.

Attached is a copy of the subject test report. The System Test (ST) report documents Government tests performed to verify the AWPAG and ASOS operations are not negatively affected by changes in the new AWPAG LogoSense controller V3.61 and orifice heater controller V2.1 EPROM.

The AWPAG LogoSense Controller V3.61 and Orifice Heater Controller V2.1 EPROM upgrades ST began on Monday, August 17, 2009 and ended on Friday, September 18, 2009 at the Sterling Field Support Center (SFSC), Sterling, VA, and NWS Training Center (NWSTC), Kansas City, MO. All the test objectives in the ST plan were verified successfully during the ST.

At the ASOS Test Review Board (ATRB) AWPAG meeting on September 29, 2009, the ATRB unanimously recommended moving forward with a Field Demonstration at limited operational field sites.

Direct Comments and questions about this test report to Harry Tran (W/OPS24), the ST Director at 301-713-0326x105, e-mail harry.tran@noaa.gov or Jae Lee (W/OPS24) at 301-713-0326x158, e-mail jae.lee@noaa.gov

Attachment



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SYSTEM TEST REPORT

For

**The Automated Surface Observing System
(ASOS)OTT All-Weather Precipitation Accumulation
Gauge (AWPAG) Firmware Version (V) 3.61 and
Orifice Heater Controller Erasable Programmable
Read-Only Memory (EPROM) V2.1 Upgrades**

October 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 report documents Government tests performed during the System Test (ST) of the ASOS All-Weather Precipitation Accumulation Gauge (AWPAG) LogoSense Controller Firmware V3.61 and Orifice Heater Controller V2.1 EPROM. The Government conducted the ST to verify the AWPAG and ASOS operations are not negatively affected by the new AWPAG LogoSense controller firmware V3.61 and orifice heater controller V2.1 EPROM.

The Development test has been completed successfully prior to the System Test by Product Improvement Program (PIP) Office to verify AWPAG V3.61 FW and V2.1 EPROM to correct problems such as false tips, heaters cycling on and off, and overall reporting accuracy improvement. For more information, the final development test report is available on the OPS24 Web page:

<http://www.weather.gov/ops2/ops24/documents/AWPAG%20Final%20Report%2007-08v3.pdf>

The ST Plan, for *AWPAG LogoSense Controller Firmware V3.61 and Orifice Heater Controller V2.1 EPROM Upgrades*, dated August 2009, contains detailed background information for conducting the ST. The Government conducted the ST following this plan.

The AWPAG LogoSense Controller Firmware V3.61 and Orifice Heater Controller V2.1 EPROM ST began on Monday, August 17, 2009 and ended on Friday, September 18, 2009 at the Sterling Field Support Center (SFSC), Sterling, VA, and at the NWS Training Center (NWSTC), Kansas City, MO.

Based on the review of the final AWPAG LogoSense Controller V3.61 and Orifice Heater Controller V2.1 EPROM upgrades test results and conclusions. The ST was successfully completed; all the test objectives in the ST plan were verified. There were no Test Trouble Reports (TTRs) generated for problems found during the ST. Therefore, the TRG recommended the ASOS Test Review Board (ATRB) moving forward with the Field Demonstration at limited ASOS operational sites.

Table of Contents

	<u>Page</u>
Executive Summary.....	iii
Acronyms	v
1.0 Introduction	1
2. Purpose	1
3. Test Objectives	1
4. Test Methodology.....	2
5. Conclusions	2
6. Recommendations	3

Attachments

	<u>Page</u>
Attachment A – AWPAG Regression Test Checklist.....	1

Acronyms

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
AWPAG	All-Weather Precipitation Accumulation Gauge
DCP	Data Collection Platform
Demo	Demonstration
EPROM	Erasable Programmable Read-Only Memory
FW	Firmware
METAR	Meteorological Aviation Routine Weather Report
NWS	National Weather Service
NWSTC	NWS Training Center
OID	Operator Interface Device
OOS	Office of Operational Systems
OST	Office of Science and Technology
PIP	Product Improvement Program
SCA	Single Cabinet ASOS
SFSC	Sterling Field Support Center
SPECI	Aviation Selected Special Weather Reports
ST0	Sterling, VA ASOS System 2
ST1	Sterling , VA ASOS System 3
ST2	Sterling, VA SCA
SYSLOG	System Log
TRG	Test Review Group
V	Version

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1.0 Introduction

The Office of Operational Systems, Field systems Operations Center, Test and Evaluation Branch (OPS24), with support from the test personnel at Sterling Field Support Center (SFSC), Sterling, VA, and NWS Training Center (NWSTC), Kansas City, MO, has completed a System Test (ST) for the Automated Surface Observing System (ASOS) All-Weather Precipitation Accumulation Gauge (AWPAG) LogoSense Controller Firmware V3.61 and Orifice Heater Controller EPROM V2.1 upgrades.

The AWPAG LogoSense V3.61 FW was developed to:

- Change the “hard-coded value” inside the current version of the LogoSense controller’s heater low temperature cut-off (18°F) to be programmable to any desired temperatures below 30°F. Especially to 9°F.
- Eliminate false tips due to high temperature gradient algorithm problems.
- Enhance accuracy of reported value during extremely light precipitation events spanning more than 24 hours.

The Orifice Heater Controller V2.1 FW was developed to:

- Allow programmable orifice heater low temperature cut-off value to be used to control the orifice heater.

The Development test has been completed successfully prior to the System Test by Product Improvement Program (PIP) Office to verify AWPAG V3.61 FW and V2.1 EPROM to correct problems listed above. Due to the test environment limitation, tests to verify fixes and enhancement of AWPAG V3.61 FW and V2.1 EPROM were not required during the ST. For more information, the final development test report is available on the OPS24 Web page: <http://www.weather.gov/ops2/ops24/documents/AWPAG%20Final%20Report%2007-08v3.pdf>

The Observing Systems Branch (W/OPS22) was working with the NWS regional ASOS focal points on a policy decision for a low temperature threshold value requirement for the AWPAG orifice heater’s cut-off based on LogoSense controller FW V3.61 and the orifice heater controller FW V2.1. It’s determined the low threshold value should be set at 9°F.

2. Purpose

This report documents Government tests performed during the AWPAG LogoSense Controller Firmware V3.61 and Orifice Heater Controller EPROM V2.1 upgrades ST. The ST was conducted in accordance to the *AWPAG LogoSense Controller V3.61 and Orifice Heater Controller V2.1 EPROM upgrades ST Plan*, dated August 2009. The ST began on August 17 and ended September 18, 2009.

3. Test Objectives

The specific objectives of this ST were to:

- a) Verify the draft ASOS Modification Note 94 (Installing Instruction for LogoSense controller firmware V3.61 and orifice heater controller V2.1 EPROM)
- b) Verify AWPAG operation is not negatively affected
- c) Verify the ASOS operation is not negatively affected

4. Test Methodology

Because of limited changes affect AWPAG. Only test systems (ST0, ST1, and ST2) at SFSC, and the Single Cabinet ASOS (SCA) at NWSTC were used in the ST. The ST0 and ST1 are the test systems with Acquisition Control Unit/Data Platform Collection (ACU/DCP) configuration. The ST2 at SFSC and the test system at NWSTC have the SCA configuration which does not require a DCP. In addition, the ASOS Acquisition Control Unit (ACU) software versions used during the ST were: V3.01, V2.79X, V2.79E, and V2.79D.

The LogoSense controller V3.61 firmware and orifice heater controller V2.1 EPROM were installed into AWPAGs. After the firmware installation, the following verifications were performed to verify AWPAG and ASOS are not negatively affected by the new software:

- Verify the LogoSense controller's heater low cut-off (18 °F) threshold temperature is programmable to any desired temperature values below 30 °F.
- Verify the threshold temperature is programmable to 9 °F
- Verify AWPAG passes all diagnostics tests.
- Verify the AWPAG data meet all accuracy specifications using a volumetric flask.
- Complete a 24-hour stability test.
- Perform Regression tests (see Appendix A); verify AWPAG data are correctly reported in the ASOS OID one-minute observation, 5-minute page, 12-hour archive data, METAR/SPECIs and ADAS/ALDARS transmissions.

5. Conclusions

ST conclusions are supported by the following examination of the original test objectives:

- a. Verify the draft ASOS Modification Note 94 (Installing Instruction for LogoSense controller firmware V3.61 and orifice heater controller V2.1 EPROM)

CRITERIA: The draft ASOS Modification Note 94 (Installing Instruction for LogoSense controller firmware V3.61 and orifice heater controller V2.1 EPROM) is complete and accurate.

PASS: *The initial ASOS Modification Note 94, delivered to OPS24 was incomplete. It had been updated three times to include instructions to install the Orifice Heater Controller V2.1 EPROM upgrade, comments and recommendations from OPS24. The final draft ASOS Modification Note 94 was complete, accurate, understandable, and easy to follow.*

No problems were experienced during the later AWPAG LogoSense controller firmware V3.61 and orifice heater controller V2.1 EPROM installation on the test system as the final copy of ASOS Modification Note 94 was used.

b. Verify AWPAG operation is not negatively affected

CRITERIA: The AWPAG operation is not negatively affected (i.e. AWPAG passes all diagnostic tests, AWPAG data meet all the accuracy specifications, and true AWPAG data are correctly reported in OID one-minute observation, 5-minute page, 12-hour archive data, and in METAR/SPECIs and ADAS/ALDARS transmissions.

PASS: *AWPAG passes all the diagnostic and stability tests, all the diagnostic parameter fall within the specifications for the AWPAG, and AWPAG data meet all the accuracy specifications.*

c. Verify the ASOS operation is not negatively affected

CRITERIA: The interfaces between AWPAG/ASOS are working properly. True AWPAG data are correctly reported in the Operator Interface Device (OID) one-minute observation, 5-minute page, 12-hour archive page, METAR/SPECIs and ADAS/ALDARS transmissions, and SYS LOG messages will be generated, if anything that is abnormal with ASOS.

PASS: *The interfaces between AWPAG/ASOS are still working properly. True AWPAG data are correctly reported in the Operator Interface Device (OID) one-minute observation, 5-minute page, 12-hour archive page, METAR/SPECIs and ADAS/ALDARS transmissions. There were no abnormal SYS LOG messages generated during the ST.*

6. Recommendations

Based on the review of the final AWPAG LogoSense Controller V3.61 and Orifice Heater Controller V2.1 EPROM upgrades test results and conclusions. All the test objectives in the ST plan were successfully verified. There were no Test Trouble Reports (TTRs) generated for problems found during the ST. Therefore, the TRG recommends the ASOS Test Review Board (ATRB) moving forward with the Field Demonstration.

Attachment A – AWPAG Regression Test 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		