# OPERATIONAL TEST AND EVALUATION (OT&E) FINAL REPORT

For

## Automated Surface Observing System (ASOS) Axel Thin Client OID/VDU Logistics Replacement

**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 test report contains the test and evaluation results from the Operational Test & Evaluation (OT&E) for the Automated Surface Observing System (ASOS) Operator Interface Device (OID)/ Visual Display Unit (VDU) Axel Thin Client Logistics Replacement. The purpose of the OT&E was to confirm the suitability of the Axel thin client in both the OID and VDU applications at operational ASOS locations under the auspices of the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS), the Federal Aviation Administration (FAA), and U.S. Air Force (USAF).

The OT&E started on August 5, 2009, and concluded on September 21, 2009. OT&E was performed at 10 ASOS sites representing a diverse set of ASOS hardware configurations, ASOS regions, FAA sites, and U.S. Air Force sites. Weekly Test Review Group (TRG) meetings were held via teleconference with the TRG members during the OT&E, and the detailed minutes from each TRG meeting were recorded and are available on the OPS24 website:

http://www.nws.noaa.gov/ops2/ops24/documents/asos_oid-vdu.htm

No TTR's were found during the OT&E. Two minor issues noted during OT&E were resolved by the sites during OT&E. Questionnaires and comments received from Electronic Technicians, and Air Traffic Controllers/Observers gave very good to excellent ratings on the new thin client OID/VDU's for display brightness, general appearance, and ease of installation.

OT&E successfully concluded on September 21, 2009 with all TRG members voting yes on whether to move to recommend limited logistics replacement with the Axel thin client OID/VDU. Since the OT&E was successful, the Axel thin client OID/VDUs' will remain in place at the ten OT&E sites, and will be used as the operational OID/VDU's at these sites.

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# Acronyms

| | |
|---|---|
| ACU | Acquisition Control Unit |
| ACCB | ASOS Configuration Control Board |
| AFB | Air Force Base |
| ASOS | Automated Surface Observing System |
| ATRB | ASOS Test Review Board |
| DoD | Department of Defense |
| ET | Electronics Technician |
| FAA | Federal Aviation Administration |
| FTI | Federal Telecommunications Infrastructure |
| NLSC | National Logistics Support Center |
| NOAA | National Oceanic and Atmospheric Administration |
| NWS | National Weather Service |
| OT&E | Operational Test and Evaluation |
| OPS24 | Office of Operational Systems, Test & Evaluation Branch |
| TRG | Test Review Group |
| TRR | Test Readiness Review |
| TTR | Test Trouble Report |
| USAF | United States Air Force |
| WFO | Weather Forecast Office |

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# 1.0 Introduction

This test report contains the test and evaluation results from Operational Test & Evaluation (OT&E) for the Automated Surface Observing System (ASOS) Axel Thin Client Logistics Replacement.

The OT&E started on August 5, 2009, and concluded on September 21, 2009. Weekly Test Review Group (TRG) meetings were held via teleconference with the TRG members during the OT&E, and the detailed minutes and other supporting documentation from each TRG meeting were recorded and are available on the OPS24 website:

http://www.nws.noaa.gov/ops2/ops24/documents/asos_oid-vdu.htm

The ASOS Axel Operator Interface Device (OID)/ Visual Display Unit (VDU) Thin Client Logistics Replacement OT&E was conducted at the following 10 OT&E sites:

ABE – Allentown, PA (OID, VDU)
ACY – Atlantic City, NJ (OID)
IAD – Washington Dulles, VA (OID)
IND – Indianapolis, IN (2 OID's, VDU)
HSV – Huntsville, AL (OID)
MSO – Missoula, MT (OID)
ORD – Chicago O'Hare (OID, VDU)
RAP – Rapid City, SD (Ellsworth Air Force Base (AFB)) (VDU)
FAY – Fayetteville, NC (VDU)
BOI – Boise, ID (2 VDU's)

Before the start of the OT&E, a Test Readiness Review (TRR) meeting was conducted by OPS24 on August 5, 2009, and confirmed all prerequisites listed from the test strategy were met.

# 2.0 Purpose

The purpose of the OT&E was to confirm the suitability of the Axel thin client in both the OID and VDU applications at operational ASOS locations under the auspices of the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS), the Federal Aviation Administration (FAA), and Department of Defense (DoD) U.S. Air Force (USAF).

# 3.0 OT&E Summary

The OT&E was performed at 10 specific ASOS sites listed in the introduction (see Appendix A for details) representing four NWS regions. The sites included NWS ASOS sites, Federal Aviation Administration (FAA) ASOS sites, and a USAF ASOS site. The OT&E started in August 5, 2009 and officially ended on August 21, 2009. The last site to install the Axel thin client OID and VDU was Allentown, PA on September 3, 2009. The thin clients were installed at a diverse set of ASOS sites with various communication interfaces including sites with Federal Telecommunication Infrastructure (FTI) circuits. The Electronic Technicians (ET's) used Mod Note 90 (OID) and 91 (VDU) to install the Axel thin clients. The ET's generally found the Mod Notes easy to follow and

they made a few suggestions to include in the Mod Notes, which have been incorporated into the Mod Notes.

There were two minor issues noted and resolved during the OT&E. The first issue occurred at Chicago O'Hare (ORD) and involved a problem with the FTI circuit in the tower at ORD. The ETs from Weather Forecast Office (WFO) Romeoville discovered the problem when they had an ASOS SIO error on the ACU port where the thin client OID was installed. There is a line driver in the tower at ORD between the ACU (which is at the WFO) and the FTI circuit in the tower. This line driver has been in the ORD tower for a long time, and was most likely used to boost the power due to the long cable run from the ACU to the tower. With the help of the FAA technician at ORD, the line driver was unplugged and re-plugged back in; this action fixed the problem in the tower. ORD's OID has been working correctly since 9/4/09.

The second issue occurred at Ellsworth AFB in Rapid City, SD. The VDU at RAP experienced occasional garbled characters and double line text on the VDU. The problem at Ellsworth AFB was not associated with the thin client VDU. The problem also existed with the old VDU. The ETs at WFO RAP performed a line check and modem level test on the modems at RAP. They found the level on the modem in the ACU (at the WFO) was -9db, and the level of the modem in the tower was 0 db. They reset the level to -3 db on both modems, and the garbled characters and double line text went away.

# 4.0 OT&E Activities

### 4.1 Test Objectives

The following test objectives were validated during the OT&E:

- Thin client hardware are 'initial issued" by OPS12 through the National Logistics Support Center (NLSC) and shipped to WFO's participating in OT&E -PASS
  - Successfully Demonstrated
- Spare thin client hardware also shipped to appropriate WFO's from NLSC by OPS12. - PASS
  - Successfully Demonstrated
- The Mod Notes 90 (OID) and 91 (VDU) must be complete and accurate, providing all information required for the installation. - PASS
  - Successfully Demonstrated
- Communication interfaces between the ASOS Acquisition Control Unit (ACU) and the OID/VDU -PASS
  - Successfully Demonstrated
- Inventory hardware received from NLSC using the list of required hardware provided in the Mod Notes -PASS
  - Successfully Demonstrated
- Display functions for the OID/VDU -PASS
  - Successfully Demonstrated - bright and easy to read display one site said display was too bright (BOI)
- Audio alarms -PASS
  - Successfully Demonstrated - one site said alarm was too loud (MSO)
- Keyboard functionality for the OID -PASS

  - Successfully Demonstrated – no lock ups reported
  - NOTE: several sites said a keyboard lock up would be a serious problem if it took long to reboot the thin client – however no lock ups were experienced
- Power loss recovery (Power loss and recovery will only be evaluated if it occurs naturally)
  - Unable to verify during OT&E
  - Was verified during ST at SFSC

**4.2 Conclusions and Recommendations**

On September 21, 2009, the Test Review Group (TRG) voted to inform the ASOS Test Review Board (ATRB) that they recommend moving forward with the Axel Thin Client as a limited logistics replacement for ASOS OID/VDUs. The following TRG members voted "Yes":

Eastern Region (Kevin Murray)
Southern Region (Lew Harrington)
Western Region (Son Nguyen)
Pacific Region (John Bush)
U.S. Air Force (Paula Kribell)
FAA (Jerry Kranz for Paul Armbruster)
NWSEO representative (Chris Kornkven)
AOMC – Tony Weiss

The Central Region, Alaska Region, and U.S. Navy were not present at the TRG meeting, but they were contacted after the meeting and they also voted "yes".

On September 29, 2009 the ATRB voted unanimously to recommend limited logistics replacement with the Axel Thin Client. The chairman of the ATRB sent an official letter to the chairman of the ASOS Configuration Control Board (ACCB) recommending limited logistics replacement using the Axel Thin Client.

The TRG had the following recommendations at the end of the OT&E:

- Add a note to Mod Note to say it may take up to two minutes for OID to boot up.
- Thin clients will be physically marked as OID or VDU to avoid confusion.
- Make sure the modems levels are set to the correct level.

OPS12 will put out a Tech Tip covering the brightness, the alarm level and color, Caps Lock, and the F12 key.

To avoid possible Thin Client OID keyboard lock up the following suggestions were implemented.

- Press the ScrLk or Pause key again because pressing those keys inadvertently can lock up the OID keyboard.
- If pressing the ScrLk or Pause key doesn't free up the OID keyboard: reset the SIO comm Port on which the OID Thin Client is located.

# Appendix A - OT&E Sites and Characteristics

| Site | Comms Port (OID/VDU Identifier) | SIO Board#-Port# | Modem/Hardwire | Connection | User/Location | Notes |
|---|---|---|---|---|---|---|
| Allentown (KABE), PA **WFO PHI** | OID 2 | 5-2 | Modem 2 | Hardwire (configured as leased but most likely a hardwire connection) | Tower | Confirmed |
| Atlantic City (KACY), NJ **WFO PHI** | OID-1 | 6-2 | Modem 3 | Leased line | FAA Tower | Confirmed |
| Washington Dulles (KIAD), VA (ACU in ATCT base bldg) **WFO LWX** | OID-1 | 3-4 | Hardwire | Hardwire | OID in CWO office in ATCT bldg | Confirmed |
| Indianapolis (KIND), IN (ACU in ATCT) **WFO IND** | OID-1 | 3-4 | Hardwire | Hardwire 200 ft CAT5 | OID in CWO office in ATCT | Confirmed |
| Indianapolis (KIND), IN (ACU in ATCT) **WFO IND** | OID-6 | 5-4 | Hardwire | FTI (Intraplex) | OID in WFO | Confirmed |
| Huntsville (KHSV), AL (ACU in ATCT base bldg) **WFO HUN** | OID-2 | 5-4 | Hardwire | Fiber optic network | OID in Tower | Confirmed |
| Missoula (KMSO), MT (ACU in NWS FO) **WFO MSO** | OID-7 | 6-1 | Hardwire | FTI (GDC modem) | OID in Tower | Confirmed |
| Chicago (KORD), IL (ACU in Post Office bldg) **WFO LOT** | OID-2 | 6-2 | Hardwire | FTI (GDC modem 9.6 kbps service) | OID in admin room on floor below Tower cab | Confirmed |
| | | | | | | |
| Chicago (KORD), IL (ACU in Post Office bldg) **WFO LOT** | VDU-1 | 4-1 | Modem 1 | Leased line | WFO | Confirmed |

| | | | | | | |
|---|---|---|---|---|---|---|
| Allentown (KABE), PA<br>**WFO PHI** | VDU-1 | 6-2 | Hardwire | Hardwire | TRACON | Confirmed |
| Indianapolis (KIND), IN<br>(ACU in ATCT)<br>**WFO IND** | VDU-1 | 5-3 | Hardwire | Hardwire 200 ft CAT5 | OID in FAA CWO office | Confirmed |
| Rapid City (KRAP), SD<br>(ACU in FAA RTR bldg)<br>**WFO UNR** | VDU-2 | 4-3 | Modem 7 | Leased line | VDU in Ellsworth AFB Radar Approach Control | Confirmed |
| Fayetteville (KFAY), NC<br>**WFO RAH** | VDU-1 | 5-3 | Hardwire | Hardwire | TRACON | Confirmed |
| Boise (KBOI), ID<br>(ACU in NWS FO)<br>**WFO BOI** | VDU-1 | 4-3 | Hardwire | Hardwire cable (<50') | VDU in WFO | Confirmed |
| Boise (KBOI), ID<br>**WFO BOI** | VDU-3 | 5-1 | Hardwire | FTI (Intraplex) | TRACON | Confirmed |