
# Automated Weather Observing System (AWOS)

## Maintenance Manual

903-027

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# CONTENTS

# Overview

This manual provides instructions for maintaining and revalidating All Weather Inc. AWOS systems. It includes forms for recording the results of monthly, quarterly, and annual maintenance procedures, the complete instructions for which are provided in the individual sensor and system component manuals. The following sections explain the requirements for maintenance of an AWOS system, and direct the user to where the appropriate information can be found.

# System Description

A full description of the AWOS system can be found in the Model 2090 Central Data Platform (CDP) Manual (2090-001), which includes system drawings, descriptions of software operation and operator terminal screens, and the possible sensor and component configurations of an AWOS.

# System Performance Parameters

System performance parameters are given in the individual sensor and component manuals. Detailed specifications are provided for each component, along with the maintenance and corrective action procedures required. An overall description of the AWOS system's performance parameters can be found in the Model 2090 Central Data Platform (CDP) Manual (2090-001).

# Maintenance Procedures

Monthly, quarterly, and annual maintenance procedures for all AWOS components are found in the individual sensor and component manuals. Maintenance procedures for the Model 2020 Wind Vane, for example, are found in the Model 2020 User's Manual (2020-001). The Technical Performance Records and the Comprehensive Facility Performance and Adjustment Data Form included in this manual are used in conjunction with these instructions to record the results of the specified tests and procedures.

# Data Recording Forms

Three data recording forms are included in this manual: The Comprehensive Facility Performance and Adjustment Data Form is to be completed at system commissioning, after major repair work, and during annual revalidation. The Monthly Technical Performance Record, Quarterly Technical Performance Record, and Annual Technical Performance Record are used during periodic maintenance, and include space to record the results of the monthly, quarterly, and annual maintenance procedures described in the individual sensor and component manuals.

# Installation & Checkout Manual

Rather than a system-wide Installation & Checkout Manual, each sensor and AWOS component manual includes specific installation and checkout procedures for that instrument. This provides a simple means of easily locating the required procedures for a given component or sensor.

# Operating Instructions

Operating instructions for each sensor and AWOS component are found in their respective manuals. The ***Operation*** chapter of each manual provides full instructions for using a component and interpreting the data, where applicable, for that instrument.

# Training Program

AWOS technicians are fully qualified in electronic and electrical applications, with a comprehensive knowledge of the operations, testing, and maintenance of the AWOS down to the board component level. They have the capabilities to evaluate and make recommendations for system component changes that would enhance the reliability or functionality of the AWOS. All Weather Inc. provides a comprehensive training and certification program for all AWOS technicians to ensure thorough knowledge and competence in working with AWOS systems.

### Annual System Revalidation Plan

Annual system revalidation is carried out by following the instructions for annual maintenance provided in the individual manuals, taking any required corrective action, and recording the results on the Comprehensive Facility Performance and Adjustment Data Form.

## Annual Revalidation Test Equipment

The following list gives the test equipment required during validation and annual revalidation of the AWOS.

| **Description** | **Part/Model No.** | **Specifications** |
|---|---|---|
| Visibility calibrator | M104744 | |
| Psychrometer | 5211 (Sling)<br>or<br>5230 (Assmann) | °C |
| Psychrometric calculator | 5282-A | °C |
| Pressure standard | Z003919 | 600-1000 mb |
| Wind Speed Calibrator | 1231 | |
| Vis. Sensor Handheld Terminal | M403321 | required for all vis. sensors but 8364-E |
| Zero Wind Chamber | M105548-00 | required for 2040 Ultrasonic Wind Sensor |

## Annual Revalidation Tools and Supplies

The following list gives the tools and supplies required during validation and annual revalidation of the AWOS.

| Description | Part/Model No. | Specifications |
|---|---|---|
| Assorted hand tools | | |
| Extension cord, 50' | | 18-3 |
| Digital voltmeter, 4-1/2 digit | | |
| Clean dry cloth | | Lint free |
| Lens cleaning solution | | Non-ammonia-based |
| Lightweight greaseless oil | | (e.g., 3-in-1 or equivalent) |
| 8329 Ceilometer desiccant cartridge | M028113 | |
| 8329 Ceilometer blower filter (fine) | M028121 | |
| 8329 Ceilometer blower filter (coarse) | M103966 | |
| 8339 Ceilometer desiccant cartridge | M028181-00 | |
| Black component bag | | |
| RTV sealant | RTV 162 | |
| Paint | | |
| Sandpaper | | |

### *Optional Sensor Simulator*

An optional Sensor Simulator (11920) is available from All Weather Inc. that connects directly to the DCP and can be used to simulate sensor outputs during maintenance of the AWOS.

## Radio Annual Revalidation

The procedures required for annual revalidation of UHF and VHF radios should be performed by a qualified radio shop equipped with the necessary test equipment and staffed by FCC certified technicians.

## AWOS Lowest Replaceable Units (LRUs)

The following list shows the lowest replaceable units (LRUs) for the 900 Series AWOS. When a sensor is replaced, the annual procedure for that sensor should be performed.

NOTES:
** Indicates Optional Equipment

| Description | Model # |
|---|---|
| AUTOMATED WEATHER OBSERVING SYSTEM | 900 Series |
| | |
| DATA COLLECTION PLATFORM | 1190 |
| PCB AWOS Data Collection | M404804 |
| DCP Firmware | M469050 |
| Sensor Interface Controller | M404806 |
| Ceilometer Interface Firmware | M469052 |
| Visibility Interface Firmware | M469051 |
| Present Weather Interface Firmware | M469053 |
| Freezing Rain Interface Firmware | M469066 |
| Power Supply Assembly | M403318 |
| Fuse 1/2A Slow Blow | M442060 |
| Fuse 10A Slow Blow | M442071 |
| Fuse 5A Slow Blow | M442070 |
| AC Power PCB Assembly | M404802 |
| ** Data Link Radio | 20980-A |
| Barometric Pressure Sensor | 7190 |
| Quad Plate Pressure Port | M105037 |
| | |
| CENTRAL DATA PLATFORM | 2090 |
| System Unit | 20901 |
| Software | 20908 |
| Display | 20902 |
| Voice Synthesizer PCB | 20903 |
| Speakers | 20904 |
| Telephone Voice PCB | 20905 |
| Time Standard PCB | 20907 |
| Peripheral Interface Unit | 20909 |
| ** NADIN Interface Processor | M404806 |
| NADIN Interface Firmware | M469054 |
| ** Data Link Radio | 20980-A |
| ** Ground-to-Air Radio | 1791 |

| Description | Model # |
|---|---|
| AWOS SENSORS | |
| Wind Direction Sensor | 2020 |
| Tail Vane | T802000 |
| Pot, 5K | M480114 |
| Bearings (1) | T710100 |
| Wind Speed Sensor | 2030 |
| Cup Assembly | T800303 |
| Photon Chopper Assembly | T801600 |
| Bearings (2) | M025057 |
| Skyvane Wind Sensor | 2100 |
| Transducer, H.F. Tach., Skyvane | M100227 |
| Propeller, Skyvane | M104500 |
| Pot., 5K, Skyvane | M480114 |
| Ultrasonic Wind Sensor (unheated) | 2040 |
| Ultrasonic Wind Sensor (heated) | 2040-H |
| Heater Kit | M488274-00 |
| Motor Aspirated Radiation Shield (MARS) | 8190 |
| Temperature Sensor/RH Sensor | 5190-D |
| Fan | M444021 |
| Rain Gauge (heated) | 6021-A |
| Rain Gauge (unheated) | 6011-A |
| Day/Night Detector | |
| (with 8364-C Vis.) | 83339-A |
| (with 8364-E Vis.) | M403326 |
| Visibility Sensor | 8364-C |
| Emitter Assembly | M104863 |
| Detector Assembly | M104864 |
| Controller Assembly | M403261 |
| Firmware | M596031 |
| Fuse 1/4A Slo Blo | M442027 |
| Fuse 5A Slo Blo | M442059 |
| Fuse 4A | M442058 |
| Visibility Sensor | 8364-E |
| Emitter Assembly | M105061 |
| Detector Assembly | M105060 |
| Controller Assembly | M403322 |
| Firmware | M469058 |
| Fuse 10A Slo Blo | M442071 |
| Fuse 5A Slo Blo | M442070 |
| Fuse 2A | M442046 |
| Fuse 4A | M442048 |
| Fuse .5A | M442057 |

| Description | Model # |
|---|---|
| 8329 Cloud Height Sensor | 8329-A |
| Transmitter | M403194 |
| Receiver | M403197 |
| Electro-Optics Assy w/laser | M403200 |
| CPU PCB | M404602 |
| Master Firmware | M595060 |
| Slave Firmware | M595061 |
| Control PCB | M404601 |
| Signal Detector PCB | M404605 |
| 8329 Cloud Height Sensor (Cont.) | |
| Power Supply | M438105 |
| Blower Fan/Heater Assy | 83291-C |
| Blower Filter-Coarse | M103966 |
| Blower Filter-Fine | M028121 |
| Desiccant Cartridge | M028113 |
| Fuse 2A | M442046 |
| Fuse 3.15A | M442047 |
| Fuse 4.0A | M442048 |
| Fuse 25A | M442062 |
| Outer Shield | M103950 |
| Inner Cover | M103951 |
| 8339 Cloud Height Sensor (CE version) | 8339-F |
| Optical and Laser Module | M403434-01 |
| DAC & Power PCB | M404848-02 |
| Blower 320 CFM, 110 Vac | M403414-00 |
| Fuse 5x20mm, 5A, 250V | M442088-00 |
| Fuse 5x20mm, 10A, 250V | M442089-00 |
| Desiccant | M028181-00 |
| Battery | 83395-00 |
| 8339 Cloud Height Sensor (non-CE version) | 8339-D |
| Optical and Laser Module | M403434-00/M403434-01 |
| DAC & Power PCB | M404848-01/M404848-02 |
| Blower 320 CFM, 110 Vac | M403414-00 |
| Fuse 5x20mm, 5A, 250V | M442088-00 |
| Fuse 5x20mm, 10A, 250V | M442089-00 |
| Desiccant | M028181-00 |
| Battery | 83395-00 |
| Present Weather Sensor | 6490 |
| Sensor Head Assembly | M482105 |
| Transmitter Modulator (TXM) Card | M406053 |
| Automatic Gain Control (AGC) Card | M406054 |
| Signal Processor 1 (SP1) Card | M406055 |
| Signal Processor 2 (SP2) Card | M406056 |
| Microprocessor (MPU) Card | M406057 |
| Electronics Power Supply | M438150 |

| | Description | Model # |
|---|---|---|
| | Heater Power Supply | M438151 |
| | PCB Sensor Interface | M404806 |
| | Present Weather Firmware EPROM | M469053 |
| | Lightning/Thunderstorm Sensor | 6500 |
| | Freezing Rain Sensor | 6495 |
| | | |
| | MISCELLANEOUS EQUIPMENT | |
| ** | Printer Ribbon | 20911 |
| ** | Printer | 20910-A |
| ** | Microphone | 20906 |
| ** | Speakers | 20904 |
| ** | UHF/VHF Antenna | M489103 |
| ** | VHF Radio | 1791 |
| ** | UPS, 10 Min CDP | 20913-A |
| ** | UPS, 60 Min CDP | 20913-C |
| ** | UPS, 5 Min CDP | 20913-E |

# Warranty

This equipment has been manufactured and will perform in accordance with requirements of FAA Advisory Circular 150/5220-16C. Any defect in design, materials, or workmanship which may occur during proper and normal use during a period of 1 year from date of installation or a maximum of 2 years from shipment will be corrected by repair or replacement by All Weather Inc..

# Forms

The following pages contain the Comprehensive Facility Performance and Adjustment Data Form and the Monthly and Quarterly Technical Performance Records. These master forms should be copied and sufficient copies stored at a convenient location in each site's Facility Reference Data File (FRDF). The Comprehensive Facility Performance and Adjustment Data Form is to be completed at system commissioning, after major repair work, and during annual revalidation. The Technical Performance Records are used during periodic maintenance, and include space to record the results of the monthly and quarterly maintenance procedures described in the individual sensor and component manuals.

# AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

| | | Accomplished |
|---|---|---|
| I | Notify local users | _____ |
| II | Complete monthly tasks and log | _____ |
| III | Power up pressure standard | _____ |
| IV | Apply touch-up paint where needed | _____ |
| V | Inspect Data Collection Platform | _____ |
| | a. Drain and clean pressure port | _____ |

b. Check reference voltages

| Item | Counts | Acceptable Range | Pass | Fail |
|---|---|---|---|---|
| +5.0V Reference | _____ | 4090-4095 | _____ | _____ |
| -5.0V Reference | _____ | 0-5 | _____ | _____ |

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VI Inspect tower and tower lights _____

a. 8518-A Foldover Tower, apply grease and oil _____

VII Wind Direction SN _____ 2100 _____ 2020 _____ 2040 _____

a. Align to benchmark (2020 & 2100)

| | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|
| Benchmark direction _____ | Visually aligned | _____ | _____ |

b. Direction linearity test (2020 & 2100)

Display wind direction on LCD display; rotate full 360°

Any dropouts observed? **Y** ____ **N** ____

Any sudden changes observed? **Y** ____ **N** ____

| | | |
|---|---|---|
| 360° | ±10° | Observed _____ |
| 90° | ±3° | Observed _____ |
| 180° | ±3° | Observed _____ |
| 270° | ±3° | Observed _____ |

c. Bearing wear test: Vane turns freely (2020 & 2100) _____ _____

VIII Wind Speed SN _____ 2100 _____ 2020 _____ 2040 _____

| | Pass | Fail |
|---|---|---|
| a. Using 1800 rpm run-up motor, DCP LCD reads: | | |
| 79-81 knots (2030) | _____ | _____ |
| 78-80 knots (2100) | _____ | _____ |
| b. Bearing wear test: Cups/Propeller turn freely (2020 & 2100) | _____ | _____ |

c. Lubricate felt washer (2100) Accomplished _____

d. Field Zero Wind Check (2040) 0 knots _____ _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

IX Temperature/Humidity SN _____

| Time | Psychrometer Temperature | AWOS Temperature | | Psychrometer Wet Bulb | AWOS Dew Point |
|---|---|---|---|---|---|
| 1.5 min | _____ | _____ | | _____ | _____ |
| 3.0 min | _____ | _____ | | _____ | _____ |
| 4.5 min | _____ | _____ | | _____ | _____ |
| 6.0 min | _____ | _____ | | _____ | _____ |
| 7.5 min | _____ | _____ | | _____ | _____ |
| Average Within ±1°F (±.55°C) | A_____ | B_____ | Average Within ±.5°F (±.28°C) | C_____ | D_____ |
| | | | Dew Point From A & C | E_____ | |

B-A _____ Acceptable Tolerance ±2°F (±1.1°C)

D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of 8190 MARS fan Pass _____ Fail _____

X Visibility SN _____

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

| Item | Initial Value | New Value | % Diff | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|---|
| Calibration | _____ | _____ | _____ | ±3% | _____ | _____ |

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

XI Day/Night Sensor SN _____

| Item | Indication (A) | Reference (B) | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|
| Nighttime | _____ | Night | A=B | _____ | _____ |
| Daytime | _____ | Day | A=B | _____ | _____ |

XII Precipitation Sensor SN _____

a. Check for level Accomplished _____

b. Check for internal damage Accomplished _____

c. Check heaters Accomplished _____

d. Switch test

| Item | Measured Value (A) | Reference Value (B) | A-B | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|---|
| 1 cycle | _____ | 2 counts | _____ | ±0 | _____ | _____ |

XIII Cloud Height Sensor SN _____

*Model 8329*

| Item | Value | | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|
| Check Desiccant | _____ | (Color) | Blue | _____ | _____ |
| Laser Indicator | _____ | (Cycles) | On/Off | _____ | _____ |
| Check Blower | _____ | (Turn-On Time) | 3 Minutes | _____ | _____ |

Replace Blower Filters Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XIII Cloud Height Sensor (cont.)

CDP Maintenance Menu:

Status errors _____

Clouds detected when rainfall reported? Yes ____ No ____

Any ceilometer pilot reports logged? Yes ____ No ____

If yes, note report(s): _____

Minimum ceiling check (white paper over lens) Expected: 100 feet Reported: _____ feet

*Model 8339*

| Item | Value | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Check Blower | _____ (Turns on) | Yes | _____ | _____ |
| Blower cleared of debris | | Accomplished | _____ | |
| Desiccant replaced | | Accomplished | _____ | |

XIV Barometric Pressure

| | Serial Number | Reference Standard (A) | Reading (B) | A-B | Acceptable Tolerance | Adjustment Required | Adj. Value A-B |
|---|---|---|---|---|---|---|---|
| BP1 | _____ | _____ | _____ | ____ | 0.005 | Y____N____ | _____ |
| BP2 | _____ | _____ | _____ | ____ | 0.005 | Y____N____ | _____ |

*Note: Adjustment is required if A-B is greater than the acceptable tolerance.*

Altimeter Setting Check Calculated _____inHg Reported _____inHg

XV Present Weather Checks

| Field | Display | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Present Weather (W) | _____ | Empty if no precip. | _____ | _____ |
| Status (Sssss) | _____ | S0000 | _____ | _____ |
| Xnnn | _____ | 405-420 | _____ | _____ |
| Lnnn | _____ | -30 to 50 | _____ | _____ |
| Knnn | _____ | 0 to 150 | _____ | _____ |
| Hnnn | _____ | 40 to 120 | _____ | _____ |
| Tnnn | _____ | Ambient ±5° F | _____ | _____ |

XVI Lightning/Thunderstorm Sensor SN _____

a. Check antenna for damage/corrosion Accomplished _____

b. Check antenna sealant Accomplished _____

c. Clean all surfaces Accomplished _____

d. Check hardware and cable connections Accomplished _____

XVII Freezing Rain Sensor SN _____

a. Check sensor and mast for damage/corrosion Accomplished _____

b. Check cables and hardware connections Accomplished _____

c. Clean all surfaces Accomplished _____

XVIII Hardware Inspection Accomplished _____

All rust, corrosion, etc. has been sanded and touch-up paint applied Accomplished _____

Defects: _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XIX UHF Radio at the Sensor Site (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 1.0W | ±0.5W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

XX Central Data Platform

a. Perform monthly procedures Accomplished _____

b. Barometric pressure adjustment

| Sensor | Correction | Accomplished |
|---|---|---|
| BP1 | _____ | _____ |
| BP2 | _____ | _____ |

c. Voice check (listen to telephone or radio message)

Voice data is clear, no data missing Pass _____ Fail _____
Record observations on monthly form Accomplished _____

d. Voice data check

Estimate the weather conditions, and compare the manual observation with the output of the AWOS obtained above. Agree _____ Disagree _____

If observations disagree, log and correct the failed condition.

_____

e. Voice remark check

Input a test remark using the microphone, verify using the speakers.

Acceptable if the same. Acceptable _____ Unacceptable _____

Delete the test remark. Verify using the speakers. Accomplished _____

XXI UHF Radio at the CDP (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 1.0W | ±0.5W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Comprehensive Facility Performance and Adjustment Data Form

Name and Location _____ Date _____

XXII UHF Radio at the CDP Antenna - for cables longer than 50' (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at ant.) | _____ | 0.20 W | ±0.15 W | _____ | _____ |
| VSWR (at ant.) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

XXIII VHF Radio (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 2.5 W | ±1.0 W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.0 kHz | _____ | _____ |
| Modulation | _____ | 80% | 65-95% | _____ | _____ |

XXIV VHF Radio at the Antenna - for cables longer than 50' (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at ant.) | _____ | 1.0 W | ±0.5 W | _____ | _____ |
| VSWR (at ant.) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.0 kHz | _____ | _____ |
| Modulation | _____ | 80% | 65-95% | _____ | _____ |

XXV NADIN Interface (as applicable)

Operation of the link confirmed with CLH — Accomplished _____

XXVI Monthly and Quarterly Logs Review

Review all monthly and quarterly log sheets for compliance with manual — Accomplished _____

System Checked and Verified By: _____ Date/Time: _____

# AWOS Monthly
# Technical Performance Record

Name and Location _____ Date _____

| Data Collection Platform | | Accomplished |
|---|---|---|
| I | Toggle maintenance switch | _____ |
| II | Inspect system and: | |
| | a) Clean cloud height, Day/Night, Visibility Sensor, and Present Weather Sensor optics | _____ |
| | b) Remove debris from system | _____ |
| | c) Check for mechanical damage | _____ |
| | d) Check for movement of wind speed and direction sensors | _____ |
| | e) Check obstruction lights | _____ |
| | f) Check operation of fan on Temperature/RH enclosure | _____ |

| Central Data Platform | | |
|---|---|---|
| I | Inspect system and: | |
| | a) Check display operation | _____ |
| | b) Check keyboard operation | _____ |
| | c) Check printer operation; check and replace ribbon and paper as necessary | _____ |
| | d) Check microphone operation | _____ |
| | e) Check dial-up telephone operation | _____ |
| | f) Check VHF radio operation | _____ |
| | g) Check system clock; adjust if error >1 minute | _____ |
| | h) Check speaker operation | _____ |
| | i) Check UPS operation, if installed | _____ |
| II | Listen to and view the observation | _____ |
| III | Record observation | |

_____ _____ _____ _____ _____
Location Time Wind Visibility Present Weather

_____ _____ _____ _____
Sky Condition Temperature Dew Point Alt. Setting

_____
Remarks

General

| | | |
|---|---|---|
| I | Note any "missing" parameter or any other obvious failures. | _____ |
| II | Inform AWI of any discrepancies above. (Note: Failures must be logged on Facilities Maintenance Log) | _____ |

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Quarterly Technical Performance Record

Name and Location _____ Date _____

| | | Accomplished |
|---|---|---|
| I | Notify local users | _____ |
| II | Complete monthly tasks and log | _____ |
| III | Apply touch-up paint where needed | _____ |
| IV | Drain and clean pressure port | _____ |
| V | Perform CDP monthly procedures | _____ |
| VI | Inspect Data Collection Platform | _____ |

VII Sensor Interface Processor

| Item | Counts | Acceptable Range | Pass | Fail |
|---|---|---|---|---|
| +5.0V Reference | _____ | 4090-4095 | _____ | _____ |
| -5.0V Reference | _____ | 0-5 | _____ | _____ |

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VIII Wind

Quarterly procedures performed per sensor manual **Y** ____ **N** ____

IX Temperature/Dew Point

Clean probe filter Accomplished _____

| Time | Psychrometer Temperature | AWOS Temperature | Psychrometer Wet Bulb | AWOS Dew Point |
|---|---|---|---|---|
| 1.5 min | _____ | _____ | _____ | _____ |
| 3.0 min | _____ | _____ | _____ | _____ |
| 4.5 min | _____ | _____ | _____ | _____ |
| 6.0 min | _____ | _____ | _____ | _____ |
| 7.5 min | _____ | _____ | _____ | _____ |

Average Within ±1°F (±.55°C) A_____ B_____ Average Within ±.5°F (±.28°C) C_____ D_____

Dew Point From A & C E_____

B-A _____ Acceptable Tolerance ±2°F (±1.1°C) D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of MARS fan Pass _____ Fail _____

X Visibility

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

| Item | Initial Value | New Value | % Diff | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|---|
| Calibration | _____ | _____ | _____ | ±3% | _____ | _____ |

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Quarterly Technical Performance Record

Name and Location _____ Date _____

XI Day/Night Sensor

Quarterly procedures performed per sensor manual ____

XII Precipitation Sensor

Quarterly procedures performed per sensor manual ____

XIII Barometric Pressure Sensor

| | Serial Number | Reference Standard (A) | Reading (B) | A-B | Acceptable Tolerance | Adjustment Required | Adj. Value A-B |
|---|---|---|---|---|---|---|---|
| BP1 | _____ | _____ | _____ | ____ | 0.005 | Y___ N___ | _____ |
| BP2 | _____ | _____ | _____ | ____ | 0.005 | Y___ N___ | _____ |

*Note: Adjustment is required if A-B is greater than the acceptable tolerance.*

XIV Cloud Height Sensor

*Model 8329*

| Item | Value | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Check Desiccant | _____ (Color) | Blue | _____ | _____ |
| Laser Indicator | _____ (Cycles) | On/Off | _____ | _____ |
| Check Blower | _____ (Turn-On Time) | 3 Minutes | _____ | _____ |

*Model 8339*

| Item | Value | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Check Blower | _____ (Turns on) | Yes | _____ | _____ |
| Desiccant replaced | | Accomplished | _____ | |

XV Reasonableness of Output Data

| Item | AWOS | Observation Estimate | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|
| Sky Condition* | _____ | _____ | Consistency | _____ | _____ |
| Visibility | _____ | _____ | ±2 Increments | _____ | _____ |
| Temperature—Measured Value | | | | | |
| Dew Point—Measured Value | | | | | |
| Wind Direction | _____ | _____ | ±30° | _____ | _____ |
| Wind Speed | _____ | _____ | ±5 Knots | _____ | _____ |

* If observation is clear (no clouds), AWOS must be CLR.
If observation has clouds below 12,000, AWOS must be the same.

XVI Present Weather Checks

| Field | Display | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Present Weather (W) | _____ | Empty if no precip. | _____ | _____ |
| Status (Sssss) | _____ | S0000 | _____ | _____ |
| Xnnn | _____ | 405-420 | _____ | _____ |
| Lnnn | _____ | -30 to 50 | _____ | _____ |
| Knnn | _____ | 0 to 150 | _____ | _____ |
| Hnnn | _____ | 40 to 120 | _____ | _____ |
| Tnnn | _____ | Ambient ±5° F | _____ | _____ |

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Quarterly
# Technical Performance Record

Name and Location _____ Date _____

XVII Lightning/Thunderstorm Sensor

Quarterly procedures performed per sensor manual ___

XVIII Freezing Rain Sensor

Quarterly procedures performed per sensor manual ___

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Annual Technical Performance Record

Name and Location _____ Date _____

| | | Accomplished |
|---|---|---|
| I | Notify local users | _____ |
| II | Complete monthly tasks and log | _____ |
| III | Power up pressure standard | _____ |
| IV | Apply touch-up paint where needed | _____ |
| V | Inspect Data Collection Platform | _____ |
| | a. Drain and clean pressure port | _____ |

b. Check reference voltages

| Item | Counts | Acceptable Range | Pass | Fail |
|---|---|---|---|---|
| +5.0V Reference | _____ | 4090-4095 | _____ | _____ |
| -5.0V Reference | _____ | 0-5 | _____ | _____ |

When any values are out of acceptable range, the original value shall be noted, the adjustments performed, and the new values noted, separated from the originals by a slash, with "pass" noted.

VI Inspect tower and tower lights _____

a. 8518-A Foldover Tower, apply grease and oil _____

VII Wind Direction SN _____ 2100 _____ 2020 _____ 2040 _____

a. Align to benchmark (2020 & 2100)

| | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|
| Benchmark direction _____ | Visually aligned | _____ | _____ |

b. Direction linearity test (2020 & 2100)

Display wind direction on LCD display; rotate full 360°

Any dropouts observed? **Y** ____ **N** ____

Any sudden changes observed? **Y** ____ **N** ____

| | | |
|---|---|---|
| 360° | ±10° | Observed _____ |
| 90° | ±3° | Observed _____ |
| 180° | ±3° | Observed _____ |
| 270° | ±3° | Observed _____ |

c. Bearing wear test: Vane turns freely (2020 & 2100) _____ _____

VIII Wind Speed SN _____ 2100 _____ 2020 _____ 2040 _____

| | Pass | Fail |
|---|---|---|
| a. Using 1800 rpm run-up motor, DCP LCD reads: | | |
| 79-81 knots (2030) | _____ | _____ |
| 78-80 knots (2100) | _____ | _____ |
| b. Bearing wear test: Cups/Propeller turn freely (2020 & 2100) | _____ | _____ |
| c. Lubricate felt washer (2100) Accomplished _____ | | |
| d. Field Zero Wind Check (2040) 0 knots | _____ | _____ |

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Annual Technical Performance Record

Name and Location _____ Date _____

IX Temperature/Humidity SN _____

| Time | Psychrometer Temperature | AWOS Temperature | | Psychrometer Wet Bulb | AWOS Dew Point |
|---|---|---|---|---|---|
| 1.5 min | _____ | _____ | | _____ | _____ |
| 3.0 min | _____ | _____ | | _____ | _____ |
| 4.5 min | _____ | _____ | | _____ | _____ |
| 6.0 min | _____ | _____ | | _____ | _____ |
| 7.5 min | _____ | _____ | | _____ | _____ |
| Average Within ±1°F (±.55°C) | A_____ | B_____ | Average Within ±.5°F (±.28°C) | C_____ | D_____ |
| | | | Dew Point From A & C | E_____ | |

B-A _____ Acceptable Tolerance ±2°F (±1.1°C)

D-E _____ Acceptable Tolerance ±3°F (±1.7°C)

Temperature Pass _____ Fail _____ Dew Point Pass _____ Fail _____

Check operation of 8190 MARS fan Pass _____ Fail _____

X Visibility SN _____

Rotate sensor to avoid direct sunlight on receiver optics Accomplished _____

| Item | Initial Value | New Value | % Diff | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|---|
| Calibration | _____ | _____ | _____ | ±3% | _____ | _____ |

Note: Accept calibration if passed. Report non-acceptance to AWI.

Rotate sensor to original position Accomplished _____

XI Day/Night Sensor SN _____

| Item | Indication (A) | Reference (B) | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|
| Nighttime | _____ | Night | A=B | _____ | _____ |
| Daytime | _____ | Day | A=B | _____ | _____ |

XII Precipitation Sensor SN _____

a. Check for level Accomplished _____

b. Check for internal damage Accomplished _____

c. Check heaters Accomplished _____

d. Switch test

| Item | Measured Value (A) | Reference Value (B) | A-B | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|---|
| 1 cycle | _____ | 2 counts | _____ | ±0 | _____ | _____ |

XIII Cloud Height Sensor SN _____

*Model 8329*

| Item | Value | | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|---|
| Check Desiccant | _____ | (Color) | Blue | _____ | _____ |
| Laser Indicator | _____ | (Cycles) | On/Off | _____ | _____ |
| Check Blower | _____ | (Turn-On Time) | 3 Minutes | _____ | _____ |

Replace Blower Filters Accomplished _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XIII Cloud Height Sensor (cont.)

CDP Maintenance Menu:

Status errors _____

Clouds detected when rainfall reported? Yes ____ No ____

Any ceilometer pilot reports logged? Yes ____ No ____

If yes, note report(s): _____

Minimum ceiling check (white paper over lens) Expected: 100 feet Reported: _____ feet

*Model 8339*

| Item | Value | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Check Blower | _____ (Turns on) | Yes | _____ | _____ |
| Blower cleared of debris | | Accomplished | _____ | |
| Desiccant replaced | | Accomplished | _____ | |

XIV Barometric Pressure

| | Serial Number | Reference Standard (A) | Reading (B) | A-B | Acceptable Tolerance | Adjustment Required | Adj. Value A-B |
|---|---|---|---|---|---|---|---|
| BP1 | _____ | _____ | _____ | ____ | 0.005 | Y____N____ | _____ |
| BP2 | _____ | _____ | _____ | ____ | 0.005 | Y____N____ | _____ |

*Note: Adjustment is required if A-B is greater than the acceptable tolerance.*

Altimeter Setting Check Calculated _____inHg Reported _____inHg

XV Present Weather Checks

| Field | Display | Acceptable Tolerance | Pass | Fail |
|---|---|---|---|---|
| Present Weather (W) | _____ | Empty if no precip. | _____ | _____ |
| Status (Sssss) | _____ | S0000 | _____ | _____ |
| Xnnn | _____ | 405-420 | _____ | _____ |
| Lnnn | _____ | -30 to 50 | _____ | _____ |
| Knnn | _____ | 0 to 150 | _____ | _____ |
| Hnnn | _____ | 40 to 120 | _____ | _____ |
| Tnnn | _____ | Ambient ±5° F | _____ | _____ |

XVI Lightning/Thunderstorm Sensor SN _____

a. Check antenna for damage/corrosion Accomplished _____

b. Check antenna sealant Accomplished _____

c. Clean all surfaces Accomplished _____

d. Check hardware and cable connections Accomplished _____

XVII Freezing Rain Sensor SN _____

a. Check sensor and mast for damage/corrosion Accomplished _____

b. Check cables and hardware connections Accomplished _____

c. Clean all surfaces Accomplished _____

XVIII Hardware Inspection Accomplished _____

All rust, corrosion, etc. has been sanded and touch-up paint applied Accomplished _____

Defects: _____

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XIX UHF Radio at the Sensor Site (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 1.0W | ±0.5W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

XX Central Data Platform

a. Perform monthly procedures Accomplished _____

b. Barometric pressure adjustment

| Sensor | Correction | Accomplished |
|---|---|---|
| BP1 | _____ | _____ |
| BP2 | _____ | _____ |

c. Voice check (listen to telephone or radio message)

Voice data is clear, no data missing Pass _____ Fail _____

Record observations on monthly form Accomplished _____

d. Voice data check

Estimate the weather conditions, and compare the manual observation with the output of the AWOS obtained above. Agree _____ Disagree _____

If observations disagree, log and correct the failed condition.

_____

e. Voice remark check

Input a test remark using the microphone, verify using the speakers.

Acceptable if the same. Acceptable _____ Unacceptable _____

Delete the test remark. Verify using the speakers. Accomplished _____

XXI UHF Radio at the CDP (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 1.0W | ±0.5W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

System Checked and Verified By: Date/Time:

_____ _____

# AWOS Annual Technical Performance Record

Name and Location _____ Date _____

XXII UHF Radio at the CDP Antenna - for cables longer than 50' (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at ant.) | _____ | 0.20W | ±0.15W | _____ | _____ |
| VSWR (at ant.) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.5 kHz | _____ | _____ |
| Deviation | _____ | 3.0 kHz | 2.4-3.8 kHz | _____ | _____ |

XXIII VHF Radio (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at Xmtr) | _____ | 2.5 W | ±1.0 W | _____ | _____ |
| VSWR (at Xmtr) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.0 kHz | _____ | _____ |
| Modulation | _____ | 80% | 65-95% | _____ | _____ |

XXIV VHF Radio at the Antenna - for cables longer than 50' (performed by FCC certified shop)

| Parameter | Measured Value (A) | Standard Value (B) | Acceptable Tolerance (A-B) | Pass | Fail |
|---|---|---|---|---|---|
| Radio Pwr (at ant.) | _____ | 1.0 W | ±0.5 W | _____ | _____ |
| VSWR (at ant.) | _____ | 1.0:1 | Initial value 2.0:1 (max.) | _____ | _____ |
| | | | Operating value 3.0:1 (max.) | _____ | _____ |
| Frequency | _____ | _____ | ±1.0 kHz | _____ | _____ |
| Modulation | _____ | 80% | 65-95% | _____ | _____ |

XXV NADIN Interface (as applicable)

Operation of the link confirmed with CLH — Accomplished _____

XXVI Monthly and Quarterly Logs Review

Review all monthly and quarterly log sheets for compliance with manual — Accomplished _____

System Checked and Verified By: _____ Date/Time: _____

# TEMPERATURE/DEW POINT WORK SHEET

VERIFICATION EXPERIMENT NUMBER: _____ DATE: _____ OBSERVER: _____

## TABLE I, EXPERIMENTAL DATA

| PROCEDURE STEP | TIME | AWOS TEMPERATURE/ DEW POINT SENSOR INDICATIONS | | CORRECTED VALUES | | | |
|---|---|---|---|---|---|---|---|
| | | | | REFERENCE PSYCHROMETER #1 IDENTIFICATION: _____ | | REFERENCE PSYCHROMETER #2 IDENTIFICATION: _____ | |
| | | TEMP $T_{ind}$ (°F) | DEW POINT $DP_{ind}$ (°F) | $T_{dry}$ (°F) | $T_{wet}$ (°F) | $T_{dry}$ (°F) | $T_{wet}$ (°F) |
| AFTER 1.5 MIN. | | | | | | | |
| AFTER 2.5 MIN. | | | | | | | |
| AFTER 3.5 MIN. | | | | | | | |
| AFTER 4.5 MIN. | | | | | | | |
| AFTER 5.5 MIN. | | | | | | | |

## TABLE II, REFERENCE VALIDITY CHECK

| IS $T_{dry}$ FROM REFERENCE #1 WITHIN 1°F OF REFERENCE #2? (YES/NO) | IS $T_{wet}$ FROM REFERENCE #1 WITHIN 1°F OF REFERENCE #2? (YES/NO) | IS $T_{wet}$ FROM REFERENCE #1 WITHIN 0.5°F OF FOLLOWING $T_{wet}$? (YES/NO) | IS $T_{wet}$ FROM REFERENCE #2 WITHIN 0.5°F OF FOLLOWING $T_{wet}$? (YES/NO) | IF ALL 'YES' ENTER 'PASS', OTHERWISE ENTER 'FAIL' | NUMBER EACH 'PASS' CHECK * |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | X | X | X | X |

*NOTE:
IF NUMBER OF PASS CHECKS IN TABLE II IS LESS THAN 3, DO NOT CONTINUE WITH EXPERIMENT. IF PASS CHECKS NUMBER 3 OR MORE, CONTINUE ON TO TABLE III, AND COMPUTE DEW POINT TEMPERATURE FROM CORRESPONDING WET/DRY TEMPERATURE DATA. (USE STANDARD PSYCHROMETRIC TABLES).

## TABLE III, DEW POINT CALCULATION

| NUMBER OF PASS CHECK | REFERENCE PSYCHROMETER #1 | | REFERENCE PSYCHROMETER #2 | |
|---|---|---|---|---|
| | TEMP $T_{dry}$ (°F) | DEW POINT (°F) | TEMP $T_{dry}$ (°F) | DEW POINT (°F) |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |

## TABLE IV, TEMPERATURE ANALYSIS

| AVERAGE REFERENCE TEMP $T_{ref}$ (°F) | CORRESPONDING AWOS SENSOR TEMP. INDICATION $T_{ind}$ (°F) | $T_{ref} - T_{ind}$ (°F) | $(T_{ref} - T_{ind})^2$ (°F) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## TABLE V, DEW POINT ANALYSIS

| AVERAGE REFERENCE DEW POINT $DP_{ref}$ (°F) | CORRESPONDING AWOS SENSOR DEW PT. INDICATION $DP_{ind}$ (°F) | $DP_{ref} - DP_{ind}$ (°F) | $(DP_{ref} - DP_{ind})^2$ (°F) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## TABLE i, UNCORRECTED VALUES

| REFERENCE PSYCHROMETER #1 IDENTIFICATION: _____ | | REFERENCE PSYCHROMETER #2 IDENTIFICATION: _____ | |
|---|---|---|---|
| $T_{dry}$ (°F) | $T_{wet}$ (°F) | $T_{dry}$ (°F) | $T_{wet}$ (°F) |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| | | |
|---|---|---|
| ADD ALL $(T_{ref} - T_{ind})^2$ VALUES | | |
| DIVIDE ABOVE VALUE BY NUMBER OF 'PASS' CHECKS | | |
| CALCULATE SQUARE ROOT | | °F RMSE |

| | | |
|---|---|---|
| ADD ALL $(DP_{ref} - DP_{ind})^2$ VALUES | | |
| DIVIDE ABOVE VALUE BY NUMBER OF 'PASS' CHECKS | | |
| CALCULATE SQUARE ROOT | | °F RMSE |

AWOS-WS.DWG


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