

SECTION V. MAINTENANCE

5.5.1 INTRODUCTION

This Section contains the preventive and corrective maintenance procedures for the temperature/dewpoint sensor. Preventive maintenance consists of checking/cleaning the aspirator air passages and mirror and calibrating the instrument. Corrective maintenance consists of those procedures required to fault isolate to a faulty field replaceable unit (FRU) in the temperature/dewpoint sensor. Malfunctions within the temperature/dewpoint sensor are identified by the ASOS diagnostic test. When performing preventive and corrective maintenance on the model 1088 sensor, display switch S2 must be pressed to display TA or TD readings. Pressing this switch interrupts serial data to the DCP, which may result in SIO port failure indications. This is normal, and these failures should be cleared by the technician after completing maintenance actions.

5.5.2 PREVENTIVE MAINTENANCE

5.5.2.1 **General.** A list of the preventive maintenance functions for the temperature/dewpoint sensor is provided in table 5.5.1.

Table 5.5.1. Temperature/Dewpoint Sensor Preventive Maintenance Schedule

Interval	What To Do	How To Do It
90 days	Clean/inspect aspirator air passages.	Paragraph 5.5.2.2
	Clean/inspect aspirator mirror.	Paragraph 5.5.2.2
	Perform optical loop adjustment.	Paragraph 5.5.2.3
	Verify temperature and dewpoint readings.	Paragraph 5.5.2.4
Semiannually	Test and adjust fan fail monitoring circuit (1088 only).	Paragraph 5.5.2.5
	Check dc power supplies.	Paragraph 5.5.2.6
	Calibrate sensors.	Paragraph 5.5.2.7

5.5.2.2 **Aspirator Cleaning and Inspection.** Because of the continuous flow of outside air through the aspirator, the air passages on the aspirator may become clogged with dust, leaves, etc. The optical mirror also gradually acquires a film of contamination, which, if not removed, impairs performance. The performance of the dewpoint sensor is directly dependent on the use of the proper cleaning agents and procedures for the mirror. Many dewpoint maintenance problems can be traced directly to improper mirror cleaning even though they appear to be hardware failures. The various contaminants that can accumulate on the mirror surface have different effects on sensor performance. Contaminants that consist primarily of particles such as dust and pollen have the least effect on performance; the sensor tolerates a substantial layer of these contaminants because they have a relatively small effect on the formation of the dew layer. There are other types of contaminants, however, that have a disastrous effect on the sensor. The contaminants known to cause serious performance problems are cleaning compounds such as detergents, soaps, and ammonia; oily substances such as skin oil and petroleum products; and substances that have an affinity for water (e.g., any of the various salts including common salt). By interfering with the formation of the dew layer, these contaminants cause performance problems that include mirror icing and elevated dewpoint temperatures. To prevent these problems, the aspirator must be cleaned using the procedure provided in table 5.5.2.

Table 5.5.2. Aspirator Cleaning

Step	Procedure
	<p>Tools and materials required:</p> <ul style="list-style-type: none"> Large flat-tipped screwdriver Cotton swabs Distilled water Kit Carnauba Wax (Northern Labs Inc.) Isopropyl alcohol (ASN 052-C-12) <p style="text-align: center;">CAUTION</p> <p>Internal components of aspirator are delicate and must be handled with care. Excessive mechanical shocks can cause permanent damage.</p> <p style="text-align: center;">NOTE</p> <p>Laptop computer initialized as DCP OID (Chapter 3) or any other available OID may be used for the following procedure.</p> <p>Wax the mirror after every cleaning. Do not wax the mirror if the mirror has not been cleaned. In a cold environment, the waxing procedure should be performed in a warm enclosed area.</p>
1	At OID, sign on as a maintenance technician and display sensor status page (sequentially press REVUE-SENSOR-STAT function keys from 1-minute display).
2	On sensor status page, set report processing for temperature/dewpoint sensor to OFF.
3	Using large flat-tipped screwdriver, open transmitter access door and remove ac power by setting POWER switch to OFF (down) position.
4	Remove dewpoint sensor assembly from aspirator by loosening captive screw on side of unit. Slide dewpoint sensor assembly downward and out of aspirator housing.
5	Clean unit air passages by wiping with clean rag or blowing clean with compressed air.
	<p style="text-align: center;">CAUTION</p> <p>Do not scratch mirror surface when cleaning. Under no circumstances should soap or soapy detergent be used on the mirror. Soap seriously impairs the ability of the mirror surface to form a film of condensate necessary for dewpoint detection.</p>
6	Apply power to sensor by setting POWER switch to ON (up) position.
7	Set DISPLAY SELECTOR switch to TD position. While monitoring seven-segment display, heat mirror above ambient temperature (for model H083R, use TEST switch; for model 1088, use MODE switch). Remove power from sensor by setting POWER switch to OFF (down) position.
8	Set autobalance potentiometer to 0 position.
9	Using clean cotton swab and distilled water, thoroughly wet mirror surface and wash with gentle circular motion. Using clean dry swab, immediately wipe the wet surface until dry and all loosened material is removed. Continue the wet swab and dry swab process until it no longer has a cleaning effect. The use of the dry swab is essential to the cleaning process because it removes the loosened contaminants which would otherwise remain on the mirror. For colder temperatures, it may be necessary to disconnect dewpoint sensor assembly from transmitter enclosure and perform the cleaning in a warmer place.
10	Repeat step 9 using the approved isopropyl alcohol (ASN 052-C-12). Repeat the wet swab and dry swab process until it no longer has a cleaning effect.
11	Use a clean swab to apply a small amount of wax to mirror surface. Use a circular motion to ensure that a thin, even coat of wax is applied to the mirror surface. Use care to prevent wax from getting into the optic block holes for the LED and photo transistors.
12	Allow wax to dry to a hazy finish.
13	Use a clean swab to buff mirror to a smooth, shiny surface free of any excess wax.

Step	Procedure
14	Use another clean swab to clean up any access wax around the mirror especially around the edge of the card around the mirror and on the optical block. Confirm that the optic block holes for the LED and photo transistors are not blocked by wax.
15	Install sensor/fan assembly in aspirator housing and secure with captive screw.
16	At transmitter, apply ac power to sensor by setting POWER switch to ON (up) position. Seven-segment display illuminates and fan in aspirator begins to operate.
17	Repeat step 7 to heat mirror to 20 degrees Fahrenheit (°F) above ambient temperature or 52°F, whichever is higher.
18	Using procedures provided in paragraph 5.5.2.3, perform optical loop adjustment.

5.5.2.3 Optical Loop Adjustment. The optical loop adjustment consists of adjusting the gains of the direct and indirect sensor amplifiers so that the mirror thermocontrol loop can properly maintain the mirror temperature at dewpoint. The optical loop adjustment should be performed whenever the aspirator or transmit logic board is serviced or replaced. Optical loop adjustment procedures for the model H083R and model 1088 are provided in tables 5.5.3 and 5.5.4, respectively.

Table 5.5.3. Model H083R Temperature/Dewpoint Sensor Optical Loop Adjustment

Step	Procedure
	<p>Tools required: Small flat-tipped screwdriver Large flat-tipped screwdriver</p> <p style="text-align: center;">CAUTION</p> <p>Internal components of aspirator are delicate and must be handled with care. Excessive mechanical shocks can cause permanent damage.</p>
1	Clean aspirator using the procedure in table 5.5.2. Do not reapply ac power.
2	Install the sensor/fan assembly in aspirator housing and secure with captive screw.
3	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
4	Reset autobalance variable resistor to zero.
5	Apply power to sensor by setting POWER switch to ON (up) position.
	<p style="text-align: center;">NOTE</p> <p>The adjustments made in this Section must be performed with a completely dry mirror. Ensure that mirror is dry by heating it for a minimum of 1 minute initially, then keeping the mirror temperature above ambient (TA) using the HEAT position of the TEST switch. The measurements and adjustments described in steps 6 and 7 must not be made while heating the mirror. Therefore, it is necessary to monitor the mirror temperature (TD), via the seven-segment display, and heat as necessary to ensure that TD is greater than TA, while making the measurements and adjustments between the heating cycles.</p>
6	Turn SD GAIN variable resistor (R21) CCW until SD LEVEL LED (CR5) extinguishes then turn CW until SD LEVEL LED illuminates.
7	Adjust SI GAIN variable resistor (R22) CW until SI LEVEL LED (CR9) illuminates, then turn CCW until SI LEVEL LED extinguishes.
8	Ensure that CALIBRATOR switch is set to OPR position.
9	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
10	On sensor status page at OID, turn on report processing for temperature/dewpoint sensor.

Table 5.5.4. Model 1088 Temperature/Dewpoint Sensor Optical Loop Adjustment

Step	Procedure
	<p>Tools required: Small flat-tipped screwdriver Large flat-tipped screwdriver</p> <p style="text-align: center;">CAUTION</p> <p>Internal components of aspirator are delicate and must be handled with care. Excessive mechanical shocks can cause permanent damage.</p>
1	Clean aspirator using the procedure in table 5.5.2. Do not reapply ac power.
2	Install the sensor/fan assembly in aspirator housing and secure with captive screw.
3	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
4	Reset autobalance variable resistor to zero.
5	Apply power to sensor by setting POWER switch to ON (up) position.
	<p style="text-align: center;">NOTE</p> <p>The adjustments made in this Section must be performed with a completely dry mirror. Ensure that mirror is dry by heating it for a minimum of 1 minute initially, then keeping the mirror temperature above ambient (TA) using the HEAT position of the TEST switch. The measurements and adjustments described in steps 6 and 7 must not be made while heating the mirror. Therefore, it is necessary to monitor the mirror temperature (TD), via the seven-segment display, and heat as necessary to ensure that TD is greater than TA, while making the measurements and adjustments between the heating cycles.</p>
6	Turn SD GAIN variable resistor (R21) CCW until SD LEVEL LED (CR5) extinguishes then turn CW until SD LEVEL LED illuminates.
7	Adjust SI GAIN variable resistor (R22) until SI LEVEL LED (CR9) illuminates, then back off until SI LEVEL LED extinguishes.
8	Ensure that MODE switch is set to OPR position.
9	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
10	On sensor status page at OID, turn on report processing for temperature/dewpoint sensor.

5.5.2.4 Verify ASOS Temperature and Dewpoint Readings. The Temperature and Dewpoint Readings Test is a confidence test, which verifies that ASOS H083R/1088 air temperature and dewpoint temperature readings compare reasonably with readings taken by a Psychron Model 566-2 psychrometer. The 90-day test consists of recording psychrometer temperatures and recording ASOS H083R/1088 temperatures. Psychrometer temperatures are converted to air and dewpoint temperatures. These temperatures are then compared with ASOS H083R/1088 corresponding results to determine if the ASOS readings are within tolerance. The test procedure is provided in table 5.5.5.

Table 5.5.5. Verification of ASOS H083R/1088 Temperature/Dewpoint Sensor Readings Using Psychron Model 566-2 Psychrometer

Step	Procedure
<p style="text-align: center;">Test Equipment Required: Laptop Computer Psychron Model 566-2 Laptop Computer with BASIC Software Program "PSYCHRO411"</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>For Psychron Model 566-2, the center contact post of each battery must be inserted first to ensure correct rotation of the fan.</p>	
OBTAINING AND CONVERTING PSYCHRON MODEL 566-2 READINGS	
INITIAL PREPARATION	
1	Open sliding door halfway, remove water bottle, and close sliding door.
2	Remove sliding air intake.
3	Examine wet-bulb wick to ensure that it is clean. If it is clean, proceed to step 7. If it is dirty, remove old wicking, clean thermometer bulb, and install new wick by performing the following steps.
4	Slip a length of tubular wicking over bulb. Secure at top of bulb with a thread at the constriction between bulb and stem, using a loop and square knot.
5	Form a loop in a second thread and place it approximately in middle of bulb. Tighten thread and pull toward bottom of bulb, stretching wick firmly and snugly against bulb. Tie with a double loop and square knot.
6	Clip ends of thread and cut off excess wicking about 1/8 inch below bottom of bulb.
7	Thoroughly saturate wet-bulb wick, ensuring that water does not contact either thermometer tube or dry-bulb.
8	If water has contacted dry-bulb, remove and dry the dry-bulb, then reinstall it.
9	Replace sliding air intake, ensuring that small circular holes in air intake are positioned against thermometer holder. Replace water bottle.
OPERATION	
<p>NOTE</p> <p>The following position is recommended during operation.</p>	
1	While standing at the ASOS H083R/1088 unit, hold Psychron Model 566-2 at temperature/dewpoint sensor aspirator intake.

Table 5.5.5. Verification of ASOS H083R/1088 Temperature/Dewpoint Sensor Readings Using Psychron Model 566-2 -CONT

Step	Procedure
	<u>CAUTION</u>
	The air intake and both exhaust ports must be entirely free of obstruction. Because the instrument samples the air to which it is exposed, care must be taken to use the psychrometer far enough away from any source that may cause erroneous thermometer indications.
2	Turn switch knob clockwise to start aspiration.
3	If thermometer illumination is desired, turn knob to extreme clockwise position.
	<u>CAUTION</u>
4	Ensure that motor is turned off after each observation as unnecessary usage greatly shortens the life of the batteries.
	When wet-bulb temperature stabilizes at a minimum value, observe readings of both thermometers as well as time of readings, and switch motor off by turning knob fully counterclockwise. For a wet-bulb temperature below 32 degrees Fahrenheit, check if the wick is frozen. If wet-bulb temperature stabilization does not occur within 2-1/2 minutes of aspiration, the fan motor is probably running too slow due to weak batteries.
§	VERIFYING ASOS H083R/1088 TEMPERATURE (T_a)/DEWPOINT (T_d) READINGS
	<u>NOTE</u>
	Wet-bulb temperature is not the dewpoint temperature. Wet-bulb temperature is used to derive the dewpoint temperature.
§	1 Convert the psychrometer readings to a dewpoint (T _d) temperature using the ASOS calibration program.
	2 At the DOS prompt, type: ASOS then, enter menu item 3 to execute the psychrometer calculation program.
	<u>NOTE</u>
	Steps 3 through 7 are the written procedures that are performed in the psychrometer calculation program. Follow the instructions in the calculation program and use steps 3 through 7 as a reference. When the calculation program is complete, return to step 8 of this procedure.
	3 Enter the station pressure in inches of mercury and hit return.
	4 Enter the dry- and wet-bulb temperature readings obtained from Psychron Model 566-2 and hit return after each entry.
§	5 If a wet-bulb temperature is entered which is higher than the dry-bulb temperature (T _a), the program will beep to alert the user that an invalid entry was entered. The cursor will return to the dry-bulb temperature location to enable the user to reenter the correct values.
	6 If the wet-bulb temperature is below freezing, the program will beep and ask the user if the wick is frozen. Enter a "y" or an "n" (The answer is not case sensitive).
	7 The dewpoint temperature and relative humidity will be displayed on the subsequent lines.
	8 Record the calculated dewpoint temperature for comparison with ASOS H083R/1088 dewpoint temperature.
§	9 Obtain ASOS H083R/1088 temperature (T _a)/dewpoint (T _d) readings. Record air temperature and dewpoint temperature in °F from the OID. Use 5-minute observation reading (from REVIEW-RPT-5MIN screen) closest in time to the time of the psychrometer readings.

Table 5.5.5. Verification of ASOS H083R/1088 Temperature/Dewpoint Sensor Readings Using Psychron Model 566-2 -CONT

Step	Procedure
10	<p>After air temperatures and dewpoint temperatures for ASOS H083R/1088 and Psychron Model 566-2 have been obtained, use the following criteria to verify validity of ASOS H083R/1088 readings:</p> <ul style="list-style-type: none"> a. If the difference between the ASOS H083R/1088 air temperature and the Psychron Model 566-2 air temperature is within $\pm 5^{\circ}\text{F}$, the ASOS H083R/1088 reading is valid. If the difference is more than $\pm 5^{\circ}\text{F}$, the ASOS H083R/1088 temperature reading is invalid and corrective maintenance should be performed. For corrective maintenance, perform procedure under "Symptom: Either the ambient or dewpoint temperature reading is incorrect" in table 5.5.12. b. For dewpoint comparison, use table 5.5.6 to determine maximum allowable difference between ASOS H083R/1088 dewpoint temperature and Psychron Model 566-2 dewpoint temperature recorded in step 8. c. If the difference between the ASOS H083R/1088 dewpoint temperature and the Psychron Model 566-2 dewpoint temperature is within the maximum allowable difference (determined from table 5.5.6), the ASOS H083R/1088 reading is valid. d. If the difference between the dewpoint temperatures exceeds the maximum allowable difference, the ASOS H083R/1088 reading is invalid and corrective maintenance should be performed. For corrective maintenance instructions, refer to the procedure in table 5.5.12, entitled: "Symptom: Either the ambient or dewpoint temperature reading is incorrect."

Table 5.5.6. Maximum Allowable Difference Between ASOS H083R/1088 and Psychron Model 566-2 Dewpoint Temperatures

Dewpoint Depression	If Dewpoint $>32^{\circ}\text{F}$	If Dewpoint $\leq 32^{\circ}\text{F}$
$(T_a - T_d) \leq 23^{\circ}\text{F}$	6°	10°
$23^{\circ}\text{F} < (T_a - T_d) < 36^{\circ}\text{F}$	9°	16°
$36^{\circ}\text{F} \leq (T_a - T_d)$	16°	26°

Example: If the ASOS H083R/1088 air temperature (T_a) and dewpoint temperature (T_d) are 55°F and 30°F respectively, the $(T_a - T_d)$ spread would be 25 and the maximum allowable difference between the ASOS H083R/1088 dewpoint and the Psychron Model 566-2 dewpoint would be $\pm 16^{\circ}\text{F}$.

5.5.2.5 Deleted.

Table 5.5.7. Deleted

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5.5.2.6 DC Power Supply Check. The dc power supplies are checked by first checking fuse F1 on the transmitter and then testing the 5V and $\pm 12V$ outputs from the 5-volt power supply and auxiliary power supply, respectively. The power supplies require no adjustment. If a power supply fails the check, it must be replaced. The outputs of the dc power supplies are checked using the procedures provided in table 5.5.8.

Table 5.5.8. DC Power Supply Check

Step	Procedure
TEST	
<u>WARNING</u>	
Dangerous voltages (110 vac) are present within the models H083R and 1088 temperature/dewpoint sensors. Exercise standard safety procedures.	
1	At temperature/dewpoint power control module in DCP, remove power from sensor by setting circuit breaker on power control module to the off (right) position.
2	At transmitter, open access door.
3	Check fuse F1.
4	Apply power to sensor by setting circuit breaker on power control module to the on (left) position.
5	<p style="text-align: center;">NOTE</p> <p>Power supply checks are made with full heater power applied. For the model H083R sensor, the TEST switch must be manually held in HEAT position while voltage measurements are being made.</p> <p>Ensure that POWER switch S1 is set to ON (up) position. For model 1088 sensor, place MODE switch in HEAT position. For model H083R, hold TEST switch in HEAT position.</p>
6	At terminal board TB1, set DMM for ac reading and connect between pins 1 and 2. DMM should indicate 120 ± 10 vac. If correct indication is not obtained, check DCP. If correct indication is obtained, proceed to step 7.
7	At +5V power supply, connect DMM between pins 1 and 3. DMM should indicate 120 ± 10 vac. If correct indication is not obtained, replace transmitter. If correct indication is obtained, proceed to step 8.

Table 5.5.8. DC Power Supply Check - CONT

Step	Procedure
8	<p>At +5V power supply, set DMM for dc reading and connect between pins 6 (+) and 5 (-). DMM should indicate $+5 \pm 0.5V$. If correct indication is not obtained, perform the following:</p> <ol style="list-style-type: none"> a. Remove power from sensor and remove transmitter board. b. Reapply power and check power supply output at pins 6 and 5. If normal indication is obtained, replace transmitter board. If normal indication is not obtained, proceed to step c. c. Remove power from sensor and disconnect connector X6 from Fiberoptic Module A5. d. Reapply power and check power supply output at pins 6 and 5. If normal indication is obtained, replace fiberoptic module. If not, proceed to step e. e. Remove power from sensor and disconnect aspirator cable P1 from J1. f. Reapply power and check power supply output at pins 6 and 5. If normal indication is obtained, replace dewpoint sensor. If not, proceed to step g. g. Remove power and replace +5V power supply. h. Reapply power and check power supply output at pins 6 and 5. If normal indication is obtained, remove power from sensor and connect or install the units removed or disconnected above. Reapply power and check power supply output. If normal indication is not obtained, replace transmitter.
9	<p style="text-align: center;">NOTE</p> <p>When connecting DMM, use pin 9 as ground for the model 1088 and pin 7 as ground for the model H083R.</p> <p>At transmit logic board, connect DMM between pins 6 (+) and ground. DMM should indicate $+12 \pm 0.5$ vdc. Connect DMM between pins 12 (+) and ground. DMM should indicate -12 ± 0.5 vdc. If correct indication is not obtained, perform the following:</p> <ol style="list-style-type: none"> a. Remove power from sensor and remove transmitter board. b. Reapply power and check power supply outputs at pins 6 and ground and 12 and ground. If normal indications are obtained, replace transmitter board. If not, proceed to step c. c. Remove power from sensor and disconnect aspirator cable P1 from J1. d. Reapply power and check power supply outputs at pins 6 and ground and 12 and ground. If normal indications are obtained, replace dewpoint sensor. If not, proceed to step e. e. Remove power from sensor and replace auxiliary power supply. f. Reapply power and check power supply outputs at pins 6 and ground and 12 and ground. If normal indications are obtained, remove power from sensor and connect or install the units removed or disconnected above. Reapply power and check power supply outputs. If normal indication is not obtained, replace transmitter.

5.5.2.7 **Calibration.** The temperature/dewpoint sensor must be calibrated semiannually or whenever an FRU is replaced. The temperature/dewpoint sensor calibration procedures for the model H083R and model 1088 are provided in tables 5.5.9 and 5.5.11, respectively. For the model 1088 sensor, a calibration check can be performed automatically using extended diagnostics (pressing TEST key on 1088 page at OID), or the individual functions can be commanded by "T" commands from the 1088 page as listed in table 5.5.10. The results of the last automatic calibration check are retained on the 1088 page.

Table 5.5.9. Model H083R Temperature/Dewpoint Sensor Calibration

Step	Procedure
	Tools required: Large flat-tipped screwdriver Small flat-tipped screwdriver
	NOTE Laptop computer initialized on DCP OID (Chapter 3, Section III), or any other available OID, may be used for the following procedure.
1	At OID, display sensor status page (sequentially press REVIEW-SENSR-STAT function keys from 1-minute display).
2	On sensor status page, turn report processing for temperature/dewpoint sensor to off.
3	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door. With power on, set the calibrate switch to 0 position.
4	At transmit logic board, set DISPLAY SELECTOR switch S1 to TA position.
5	Adjust TA0 trimpot for a 32.0 ±0.1 indication on transmit logic board seven-segment display. This represents 0°C.
6	Set DISPLAY SELECTOR switch S1 to TD position and adjust TD0 trimpot for a 32.0 ±0.1 indication on transmit logic board seven-segment display. This represents 0°C.
7	Set the calibrate switch to +50 position. Set DISPLAY SELECTOR switch S1 to TA position.
8	Adjust TA+ trimpot for a 22.0 ±0.1 indication on transmit logic board seven-segment display.
9	Set DISPLAY SELECTOR switch S1 to TD position and adjust TD+ trimpot for a 22.0 ±0.1 indication on transmit logic board seven-segment display.
10	Set the calibrate switch to -50 position. Verify that transmit logic board seven-segment display indicates -67.7 ±0.5.
11	Set DISPLAY SELECTOR switch S1 to TA position and verify that transmit logic board seven-segment display indicates -58 ±0.5.
12	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
13	On sensor status page at OID, turn report processing for temperature/dewpoint sensor to on.

Table 5.5.10. "T" Commands for Model 1088 Checkout

Command	Function
T1	Prompts current ambient temp (Ta) & dewpoint (Td); but during Autobalance cycle, prompts Mirror Temp response.
T2	At minute 50, prompts response of cal values Ta & Td @ 0°C, and again @50°C, so that the next following hourly observation will have been validated prior to transmission.
T3	Prompts Ta & Td diagnostic response in case of fail.
T4	Prompts diagnostic response in case of failure.
T5	Initiates an abbreviated, 24-hour cycle response, beginning with the Autobalance cycle. (Inhibits T6 and overrides all other commands.)
T6	Initiates mirror heat cycle.
T7	Initiates Autobalance cycle.

Table 5.5.11. Model 1088 Temperature/Dewpoint Sensor Calibration

Step	Procedure
	<p style="text-align: center;">Tools required: Large flat-tipped screwdriver Small flat-tipped screwdriver</p> <p style="text-align: center;">NOTE</p> <p>Laptop computer initialized on DCP OID (Chapter 3, Section III), or any other available OID, may be used for the following procedure.</p>
1	At OID, display sensor status page (sequentially press REVIEW-SENSR-STAT function keys from 1-minute display).
2	On sensor status page, turn report processing for temperature/dewpoint sensor to off.
3	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door. With power on, set MODE switch to TEST 0 position.
4	On transmit logic board, set DISPLAY SELECTOR switch S1 to TA position and press and hold DISPLAY switch S2.
5	Adjust TA0 trimpot for a 32.0 \pm 0.1 indication on transmit logic board seven-segment display.
6	Set DISPLAY SELECTOR switch S1 to TD position, press and hold DISPLAY switch S2, and adjust TD0 trimpot for a 32.0 \pm 0.1 indication on transmit logic board seven-segment display.
7	Set MODE switch to TEST 50 position. Set DISPLAY SELECTOR switch S1 to TA position and press and hold DISPLAY switch S2.
8	Adjust TA+ trimpot for a 22.0 \pm 0.1 indication on transmit logic board seven-segment display.
9	Set DISPLAY SELECTOR switch S1 to TD position, press and hold DISPLAY switch S2, and adjust TD+ trimpot for a 22.0 \pm 0.1 indication on transmit logic board seven-segment display.
10	Set MODE switch to OPR position.
11	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
12	On sensor status page at OID, turn report processing for temperature/dewpoint sensor to on.

5.5.3 CORRECTIVE MAINTENANCE

5.5.3.1 Troubleshooting Procedures. Unlike the model 1088, the model H083R temperature/dewpoint sensor does not contain internal diagnostics. Therefore, standard troubleshooting procedures must be used. The troubleshooting procedures provided in table 5.5.12 assist the technician in isolating a fault to an FRU in the sensor. These procedures may also be used on the model 1088 if the diagnostic fails to identify the correct FRU.

5.5.3.2 Running Diagnostics. The model 1088 ASOS diagnostic program monitors the ambient and dewpoint temperature readings received from the temperature/dewpoint sensor. If the acquisition control unit (ACU) does not receive data from the sensor or the sensor readings are outside acceptable limits, the ACU flags the sensor as malfunctioning and marks it off-line. The fault condition is verified by running the temperature/dewpoint sensor diagnostic as described in Chapter 1, Section V.

5.5.3.3 Dewpoint Sensor Assembly Removal and Installation. The dewpoint sensor assembly removal and installation procedures are provided in table 5.5.13.

5.5.3.4 Aspirator Housing Removal and Installation. The aspirator housing removal and installation procedures are provided in table 5.5.14.

5.5.3.5 Transmit Logic Board Removal and Installation. The transmit logic board removal and installation procedures are provided in table 5.5.15.

5.5.3.6 **Autobalance Module Removal and Installation.** The autobalance module removal and installation procedures are provided in table 5.5.16.

5.5.3.7 **Power Supplies Removal and Installation.** The +5 volt power supply and auxiliary power supply removal and installation procedures are provided in tables 5.5.17 and 5.5.18, respectively.

5.5.3.8 **Fiberoptic Module Removal and Installation.** The fiberoptic module removal and installation procedures are provided in table 5.5.19.

Table 5.5.12. Temperature/Dewpoint Sensor Troubleshooting

Step	Procedure
<p>WARNING</p> <p>Dangerous voltages (110 vac) are present within the model 1088 and H083R temperature/dewpoint sensors. Exercise standard safety procedures.</p>	
<p>Symptom -No measurement data being received from sensor. Seven-segment display is not illuminated.</p>	
1	At transmitter, check fuse F1. Replace fuse if blown. If fuse blows a second time, fault isolate to either the +5V power supply, the auxiliary power supply, or the fan in the aspirator, and replace fuse.
2	With power applied to transmitter, remove power connector from J1 and connect DMM between pins A and B. DMM should indicate 120 ± 10 vac. If correct indication is not obtained, troubleshoot cabling between DCP and sensor. If correct indication is obtained, install power connector and proceed to step 3.
3	Ensure that POWER switch S1 is set to on (up) position.
4	At +5V power supply, connect DMM between pins 1 and 3. DMM should indicate 120 ± 10 vac. If correct indication is not obtained, replace transmitter. If correct indication is obtained, proceed to step 5.
5	At +5V power supply, connect DMM between pins 6 (+) and 5 (-). DMM should indicate $+5 \pm 0.5$ vdc. If correct indication is not obtained, replace +5 Volt Power Supply 2A3. If correct indication is obtained, proceed to step 6.
<p>NOTE</p> <p>When connecting DMM, use pin 9 as ground for the model 1088 and pin 7 as ground for the model H083R.</p>	
6	At transmit logic board, connect DMM between pin 6 (+) and ground. DMM should indicate $+12 \pm 0.5$ vdc. Connect DMM between pin 12 (+) and ground. DMM should indicate -12 ± 0.5 vdc. If either reading is incorrect, replace auxiliary power supply.
<p>Symptom -No measurement data being received at ACU. Seven- segment display on transmitter logic board is illuminated, but readings are incorrect.</p>	
1	At +5V power supply, connect DMM between pins 6 and 5. DMM should indicate $+5 \pm 0.5V$. If correct indication is not obtained, replace +5 Volt Power Supply 2A3. If correct indication is obtained, proceed to step 2.
2	At auxiliary power supply, connect DMM between pins 13 and 10. DMM should indicate $+12 \pm 0.5V$. Connect DMM between pins 12 and 10. DMM should indicate $-12 \pm 0.5V$. If either indication is incorrect, replace auxiliary power supply.
3	On transmit logic board, set monitor display switch to TA position. If seven-segment display indicates the correct outside temperature, troubleshoot sensor-DCP fiberoptic link per Chapter 1, Section V).

Table 5.5.12. Temperature/Dewpoint Sensor Troubleshooting -CONT

Step	Procedure
4	At transmitter, set the calibrate switch to 0 position. Seven-segment display should indicate 32.0 ± 0.3 . Set the calibrate switch to -50 position. Seven-segment display should indicate -58 ± 0.5 . If either indication is incorrect, replace transmit logic board. If one of the indications is correct, a dirty or faulty calibrator switch is suspect. Clean the switch contacts and retest. If correct indication is still not obtained, replace temperature/dewpoint sensor.
Symptom -Either the ambient or dewpoint temperature reading is incorrect.	
1	At transmitter, set the calibrate switch to 0 position. Set monitor display switch to display the incorrect temperature value (TA or TD). Seven-segment display should indicate 32.0 ± 0.3 . If correct indication is not obtained, replace transmit logic board. If correct indication is obtained and sensor is measuring the TA values incorrectly, replace temperature/dewpoint sensor in the aspirator. If sensor is measuring TA values correctly and SI LEVEL LED is flashing, replace temperature/dewpoint sensor. If SI LEVEL LED is not flashing or if either or both of the LIMIT LED's are illuminated, replace transmit logic board.

Table 5.5.13. Dewpoint Sensor Assembly Removal and Installation

Step	Procedure
REMOVAL	
Tools required: Diagonal cutting pliers	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to off (right) position.
2	Disconnect connector P1 of dewpoint sensor assembly cable from connector J1 of Transmitter A2.
3	Using diagonal cutting pliers, remove tie wraps securing dewpoint sensor assembly cable to aspirator support bracket.
<u>CAUTION</u>	
Dewpoint sensor assembly components are delicate and must be handled with care. Sensor can be permanently damaged by excessive mechanical shocks.	
4	Remove dewpoint sensor assembly from aspirator by loosening captive screw on side of unit. Slide dewpoint sensor assembly downward and out of aspirator housing.
INSTALLATION	
Materials required: Cable tie wraps	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
2	Align key on dewpoint sensor assembly with slot in aspirator housing, and slide dewpoint sensor assembly into aspirator housing. Secure with captive screw.

Table 5.5.13. Dewpoint Sensor Assembly Removal and Installation -CONT

Step	Procedure
3	Connect connector P1 of dewpoint sensor assembly to connector J1 of Transmitter A2.
4	Using cable tie wraps, secure cable of dewpoint sensor assembly as shown on figure 5.2.1. Be sure to leave service loop to allow removal of dewpoint sensor assembly without cutting tie wraps.
5	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
6	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).
7	Perform fan fail monitoring circuit test and adjustment in accordance with table 5.5.7 (model 1088 only).

Table 5.5.14. Aspirator Housing Removal and Installation

Step	Procedure
REMOVAL	
Tools required: No. 1 Phillips screwdriver 5/16-inch nut driver 3/8-inch nut driver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to off (right) position.
2	Remove Dewpoint Sensor Assembly A1A1 from aspirator housing in accordance with table 5.5.13. To prevent damage, store dewpoint sensor assembly in a safe place.
3	Using No. 1 Phillips screwdriver and 5/16-inch nut driver, loosen (but do not remove) hardware securing four angle irons on top, bottom, left, and right of aspirator mounting brackets.
4	Using 3/8-inch nut driver, remove four locknuts securing aspirator housing to mounting brackets. Carefully remove aspirator housing.
INSTALLATION	
Tools and materials required: No. 1 Phillips screwdriver 5/16-inch nut driver 3/8-inch nut driver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
2	To facilitate mounting of aspirator housing, ensure that hardware securing four angle irons to aspirator mounting brackets have been loosened (but not removed).
3	Position aspirator housing on mounting brackets with nameplate facing outward (away from transmitter).
4	Using 3/8-inch nut driver, install four locknuts securing aspirator on mounting brackets. Do not tighten locknuts.
5	Using 5/16-inch nut driver and No. 1 Phillips screwdriver, tighten locknuts securing angle irons to aspirator mounting brackets.

Table 5.5.14. Aspirator Housing Removal and Installation -CONT

Step	Procedure
6	Using 3/8-inch nut driver, tighten four locknuts securing mounting brackets to aspirator housing.
7	Install Dewpoint Sensor Assembly A1A1 into aspirator housing in accordance with table 5.5.13.
8	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
9	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).
10	Perform fan fail monitoring circuit adjustment in accordance with table 5.5.7 (model 1088 only).

Table 5.5.15. Transmit Logic Board Removal and Installation

Step	Procedure
REMOVAL	
Tools required: Large flat-tipped screwdriver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to off (right) position.
2	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
3	Grasp ejector ears at top corners of board and turn outward to force the board out of its socket.
4	Slide board out on its guides.
INSTALLATION	
Tools required: Large flat-tipped screwdriver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
2	Slide new board on guides and press ejector ears toward socket until board is firmly seated.
3	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
4	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to on (left) position.
5	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
6	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).

Table 5.5.16. Autobalance Module Removal and Installation

Step	Procedure
REMOVAL	
Tools required: Large flat-tipped screwdriver No. 0 Phillips screwdriver No. 2 Phillips screwdriver	
WARNING	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to off (right) position.
2	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
3	Using No. 0 Phillips screwdriver, remove two screws and lockwashers securing connector J2 to calibrator assembly.
4	Using No. 2 Phillips screwdriver, remove two screws and lockwashers securing autobalance module to top of calibrator assembly. Remove autobalance module.
INSTALLATION	
Tools required: Large flat-tipped screwdriver No. 0 Phillips screwdriver No. 2 Phillips screwdriver	
WARNING	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
2	Position autobalance module in upper right corner of transmitter. Using No. 2 Phillips screwdriver, install two screws and lockwashers securing autobalance module to calibrator assembly.
3	Connect connector J2 to connector located on side of calibrator assembly. Using No. 2 Phillips screwdriver, install two screws and lockwashers securing connector J2.
4	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
5	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to on (left) position.
6	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
7	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).

Table 5.5.17. +5V Power Supply Removal and Installation

Step	Procedure
REMOVAL	
<p style="text-align: center;">Tools required: Large flat-tipped screwdriver No. 2 Phillips screwdriver</p>	
<p><u>WARNING</u></p> <p>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.</p>	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control panel to off (right) position.
2	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
3	Disconnect 2X1 and lift +5V power supply out of chassis.
4	Using Phillips screwdriver, remove four corner mounting screws and insulated flat washers securing +5V power supply.
INSTALLATION	
<p style="text-align: center;">Tools required: Large flat-tipped screwdriver No. 2 Phillips screwdriver</p>	
<p><u>WARNING</u></p> <p>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.</p>	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
2	Position +5V power supply on four corner mounting posts.
3	Connect 2X1 and using Phillips screwdriver, install four insulated flat washers and corner mounting screws securing +5V power supply to corner mounting posts.
4	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.
5	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
6	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).

Table 5.5.18. Auxiliary Power Supply Removal and Installation

Step	Procedure
REMOVAL	
<p>Tools required: Large flat-tipped screwdriver No. 0 Phillips screwdriver No. 2 Phillips screwdriver</p>	
<u>WARNING</u>	
<p>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.</p>	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control panel to off (right) position.
2	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
3	Using No. 0 Phillips screwdriver, remove two screws and lockwashers securing autobalance module connector J2 to calibrator assembly.
4	Using No. 0 Phillips screwdriver, remove two screws and lockwashers securing autobalance module to top of calibrator assembly. Remove autobalance module.
5	Using No. 2 Phillips screwdriver, remove four screws and lockwashers securing auxiliary power supply to transmitter mounting plate.
6	Disconnect connector X2 from auxiliary power supply. Remove auxiliary power supply.
INSTALLATION	
<p>Tools required: Large flat-tipped screwdriver No. 0 Phillips screwdriver No. 2 Phillips screwdriver</p>	
<u>WARNING</u>	
<p>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.</p>	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.
<u>CAUTION</u>	
<p>When positioning auxiliary power supply in transmitter, do not crimp wires attached to the calibrator assembly.</p>	
2	Connect connector X2 to auxiliary power supply and position auxiliary power supply over four mounting holes in transmitter mounting plate.
3	Using No. 2 Phillips screwdriver, install four screws and lockwashers securing auxiliary power supply to transmitter mounting plate.
4	Position autobalance module in upper right corner of transmitter. Using No. 0 Phillips screwdriver, install two screws and lockwashers securing autobalance module to top of calibrator assembly.
5	Connect connector J2 to the connector located on side of calibrator assembly. Using No. 0 Phillips screwdriver, install two screws and lockwashers securing connector J2.
6	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.

Table 5.5.18. Auxiliary Power Supply Removal and Installation -CONT

Step	Procedure
7	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control module to on (left) position.
8	Perform temperature/dewpoint sensor optical loop adjustment in accordance with table 5.5.3 (for model H083R) or table 5.5.4 (for model 1088).
9	Calibrate temperature/dewpoint sensor in accordance with table 5.5.9 (for model H083R) or table 5.5.11 (for model 1088).

Table 5.5.19. Fiberoptic Module Removal and Installation

Step	Procedure
REMOVAL	
Tools required: Large flat-tipped screwdriver Small flat-tipped screwdriver No. 1 Phillips screwdriver No. 0 Phillips screwdriver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, set circuit breaker on temperature/dewpoint sensor power control panel to off (right) position.
2	Using large flat-tipped screwdriver, open temperature/dewpoint sensor transmitter access door.
3	Using small flat-tipped screwdriver, loosen two retaining screws on connector located on side of fiberoptic module. Remove connector.
4	Using CCW rotation, remove two fiberoptic cables from bottom of fiberoptic module. Install protective plastic covers over board connectors.
5	Using No. 1 Phillips screwdriver, remove two screws and lockwashers securing fiberoptic module mounting bracket to calibrator assembly.
6	Using No. 0 Phillips screwdriver, remove two screws, lockwashers, and gaskets securing fiberoptic module to mounting bracket. Remove fiberoptic module.
INSTALLATION	
Tools required: Large flat-tipped screwdriver Small flat-tipped screwdriver No. 1 Phillips screwdriver No. 0 Phillips screwdriver	
<u>WARNING</u>	
Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breaker (located in DCP) supplying power to sensor is set to off (right) position.	
1	Inside DCP equipment cabinet, ensure that circuit breaker on temperature/dewpoint sensor power control module is set to off (right) position.

Table 5.5.19. Fiberoptic Module Removal and Installation -CONT

Step	Procedure
2	Position fiberoptic module and gaskets over mounting holes in mounting bracket. Using No. 0 Phillips screwdriver, install two screws and lockwashers securing fiberoptic module to mounting bracket.
3	Using No. 1 Phillips screwdriver, install two screws and lockwashers securing fiberoptic module mounting bracket to calibrator assembly.
4	Remove any protective covers from fiberoptic connectors and install the receive (RX) and transmit (TX) connectors on fiberoptic module. RX cable mates with fiberoptic connector nearest DB-9 electrical connector.
5	Install signal cable on connector on fiberoptic module and using small flat-tipped screwdriver, tighten two retaining screws.
6	Using large flat-tipped screwdriver, close and secure temperature/dewpoint sensor transmitter access door.