Calibrating the Humidity System

Introduction

The method used below is a comparison of readings with those of a sling psychrometer. To ensure accuracy, the psychrometer must meet certain standards and the proper technique must be used.

Description

A sling psychrometer consists of a pair of thermometers equipped with a handle so they can be whirled rapidly in the air near the recorder. The psychrometer must have two thermometers with graduations of at least 1°F. Their calibration should match, but they need not have perfect accuracy so long as the same error applies to both and allowances are made for this.

One thermometer, the wet bulb, is covered by a piece of muslim which is wrapped around the bulb. This bulb must be moistened before using. The second, or dry bulb, is uncovered.

After whirling, the difference between their readings is a measure of the relative humidity as determined from the tables included in Appendix B in this manual.

Preliminary Preparations

1. Check the psychrometer. Make sure it spins freely.
2. Check the wick. It must be kept clean. If new, wash it in distilled water to remove the sizing. Clean or replace the old wick if dust or dirt has accumulated.
3. Keep the wick clean. Do not handle with oily or soiled fingers. Do not allow the wick to become contaminated with dust or chemicals.
4. Install the wick on the wet bulb as follows:
   a. Wet the wick thoroughly with distilled water.
   b. Install the wick on the bulb. It should extend over the stem as far as the length of the bulb (Figure 11).
   c. Tie the wick firmly with heavy duty string, first at the end of the wick, then in the middle of the top of the bulb (Figure 11).
   d. Draw the wick tight and tie it to obtain firm contact over the bulb surface.
   e. Cut off the surplus wick.

Procedure

1. Dip the wick of the wet bulb into distilled water.

   NOTE: Dip the wick once before each reading. Never dip the wick during readings.

2. Whirl the psychrometer for thirty seconds. Read immediately, wet bulb first. Continue whirling psychrometer and noting readings at 30-second intervals. Take at least five readings or until the lowest reading has been obtained for two or more whirls.

   CAUTION: Always take readings in the same spot, as close as safe or convenient to the recorder. If readings are taken too far from the recorder location, or in different spots, the temperature gradients may result in variations.

3. Consult the tables in Appendix B in this manual which give per cent relative humidity in terms of dry bulb temperature and the difference between wet and dry bulb temperatures.
4. Compare the values found in the tables with the recorder readings at several points from high to low humidities. Expose the recorder to various humidities for periods of at least one-half hour.

   CAUTION: The recorder and psychrometer readings will seldom agree exactly, since the psychrometer's accuracy must be taken into consideration. For example, the recorder accuracy should be within ±3% of total span from 15% to 95% RH, so if the psychrometer has a guarantee of one scale division equal to ±1°, their respective readings could vary as much as ±9% RH and still be within the rated tolerance of the recorder.

5. If the recorder readings differ appreciably more than ±9%, See "Calibration Adjustments" on page 9.

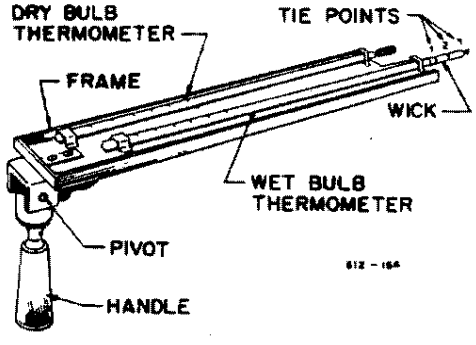

Figure 11

Calibrating the Temperature System

Measure the ambient temperature close to the recorder with any suitable device, for example, an indicator with a mercury filled thermal system. Compare the readings of both instruments. If necessary, adjust the temperature measuring system. See "Calibration Adjustments" on page 9.

Calibration Adjustments

Fine Zero

A fine zero adjustment is on the arm of each pen (Figure 12). Insert a screwdriver into the hole and move the pen arm with respect to the pivot point in a direction that will correct the error.

Coarse Zero

Both sensing elements also have a coarse means of adjusting zero which can be used if calibration cannot be corrected using the fine zero adjustments on the pen arms. To reach coarse zero, you must first remove the chart plate. On the humidity element, the adjustment is on the side of the element (Figure 13). Turn the screw clockwise to shift the zero downscale; or counterclockwise to shift the zero upscale.

On the temperature element, you can change the zero point by physically turning the bracket in the desired direction. Loosen the two large screws at the edge of the disc to free the bracket (Figure 14). Move the bracket clockwise to shift the zero downscale; counterclockwise to shift the zero upscale.

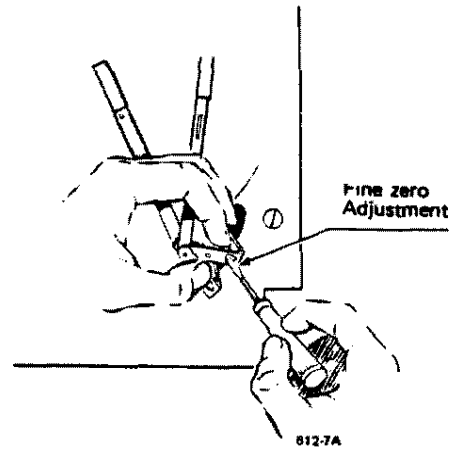

Figure 12

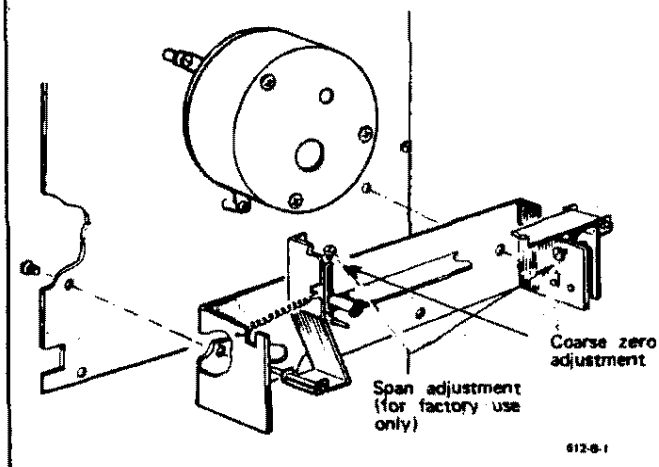

Figure 13

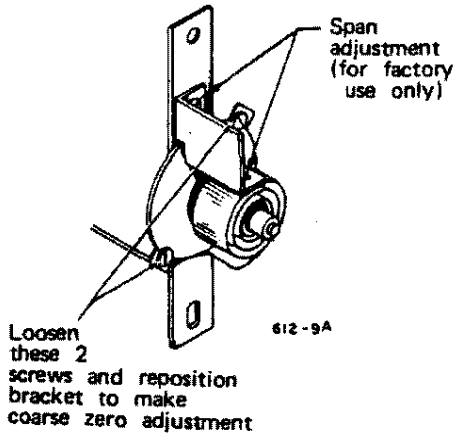

Figure 14