

BMA Behind the Scenes

Summer 2012

The Keeper of the Hygrothermographs



Every Thursday, Lauren Ross makes the rounds of the BMA's galleries and storage vaults to check on 19 mysterious-looking metal boxes called *hygrothermographs*. Day in and day out, the mechanical apparatus inside each box quietly records the temperature and humidity of the surrounding air. (*Hygro* refers to humidity and *thermo* refers to temperature.)

Lauren lifts up the lid of the box to reveal a chart that looks like a piece of graph paper wrapped around a cylinder. [See photo below.] Two arm-like pens trace lines across the chart as the cylinder revolves. The top pen records the temperature, and the bottom pen

tracks humidity. Lauren hopes that both lines on the chart will be flat, indicating that the temperature and humidity readings in the gallery have remained stable for the previous week, no matter what the weather was like outside. On a hot humid summer day or a frosty day in winter, the air inside the BMA galleries and storage vaults should always be in the vicinity of 70 degrees Fahrenheit and 50 percent relative humidity.

Why is this important? Lauren explains that artworks are made of materials that swell or shrink in response to frequent or sudden changes in climate. The consequences of such fluctuations may not be obvious at first, but over time they take their toll, resulting in flaking paint, warping wood, or other misfortunes. As one of the BMA's monitors of air quality, Lauren is committed to insuring a healthy environment for all of the Museum's treasures.

Connecting to 21st-Century Skills

Museums need staff members who know how to interpret and act upon the kind of technical information that mechanical and digital equipment provide. Eventually the BMA's mechanical hygrothermographs may be replaced by sophisticated digital "dataloggers" that will work like little weather stations in the galleries. Museum staff must be able to use all available equipment to insure the best care of the BMA's precious collection.

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Conservation Technician Lauren Ross checks a hygrothermograph in a BMA gallery.

Photo by Mitro Hood.

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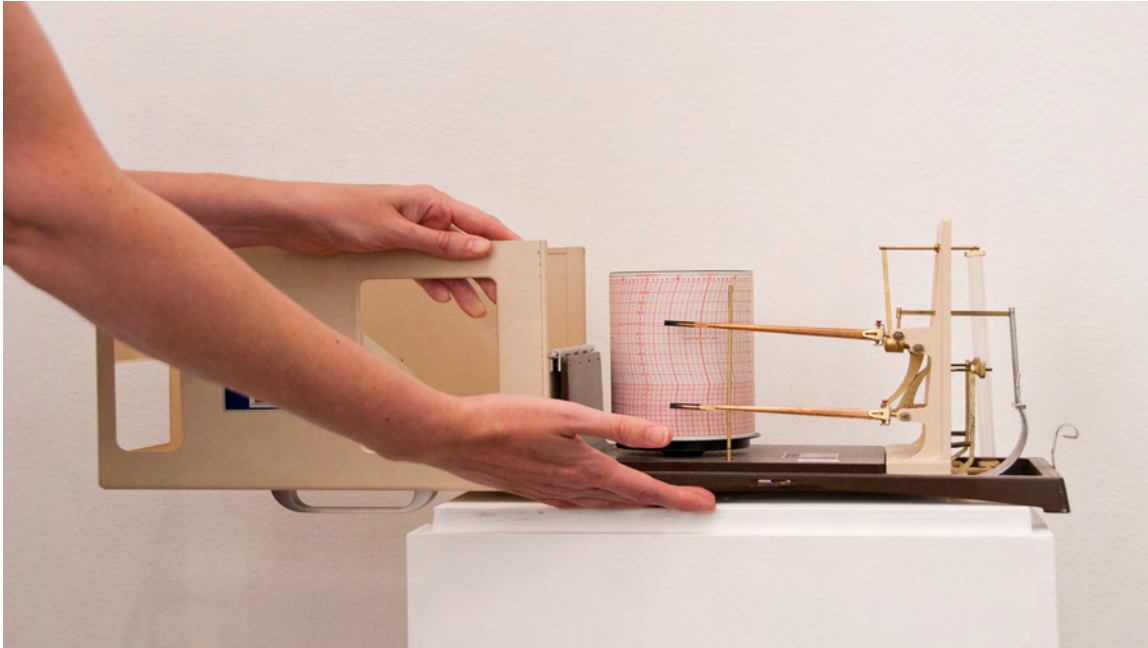


Photo by Mitro Hood.

How does the hygrothermograph record TEMPERATURE?

In the lower right corner, find a curved piece of metal called a *bimetallic strip* (two metals welded together), which is attached to a lever. As the temperature rises, the metal strip bends. As it bends, it causes the lever to move the pen arm that records temperature on the chart.

How does the hygrothermograph record HUMIDITY?

On the right side, find a tall vertical bundle of very fine human hairs (looks light gray in the photo). The hair expands and contracts with increasing or decreasing water vapor in the air. This movement is transmitted to the lower pen arm through a series of linkages.

A battery-run **clock** underneath the rotating chart causes the pens to record the temperature and humidity in real time, demarcated on the chart in two-hour intervals.

If Lauren needs to find out whether a certain part of a gallery is too warm, too cool, too damp, or too dry for a particular artwork, she can easily run a test by moving one of the hygrothermographs to that location.

As part of her weekly routine, Lauren replaces the past week's chart with a new chart for the upcoming week. She keeps all the used charts for 10 years so that she can answer questions that may arise regarding the physical condition of an artwork. The charts also serve as documentation of the BMA's high standards for climate control and its commitment to keeping its artworks safe.

WORD PROBLEM

If Lauren changes the charts in 19 hygrothermographs every week for 10 years and keeps them neatly filed away, how many charts does she have in all?