Barometer

CORRECTIONS TO BE APPLIED

The most important correction to be applied to the observed indication of the barometer is the temperature correction. Temperature correction tables in both English and metric units, condensed from the "Smithsonian Meteorological Tables", are included in this booklet. These are combined corrections to take care of both the density of the mercury and the length of the scale. The scale on this barometer consists primarily of a brass channel on one end of which is mounted the white zero pointer and on the other end the scale vernier. The correction for density of mercury at room temperature is always a negative correction. The correction for length of scale at room temperature considered separately would be a positive correction. Since the mercury density correction is always much greater than the scale length correction, the combined figure is always subtractive.

For an example in applying the temperature correction, suppose the reading of the barometer in the English system is 30.00" and the temperature 71°F. The correction (interpolating) is -.115". Subtracting this from the reading (30.00"-.115") we get the corrected value of 29.885". For an example using the metric scale, suppose the reading is 760.0 mm and the temperature is 22.5°C. The correction (again interpolating) is -2.78 mm. Subtracting this from the reading (760.0 mm - 2.78 mm) we get the corrected value of 757.22 mm. The standard temperature of the English scale is 62°F and that of the metric scale is 0°C. If it is desired to convert an English reading to a metric reading, or vice versa, always apply the temperature correction before making the conversion.

The other correction to apply is the correction for gravity. This correction is not as important as the temperature correction because its magnitude is less. The correction may be either additive or subtractive depending on whether your location is greater or less than 45° 32' 40" latitude. For example, let us suppose your barometer indication (corrected for temperature) is 29.885". If you are at a latitude of 40° the gravity correction is -.015". The corrected barometric value is therefore 29.87".

The correction for scale error has been taken care of, by an adjustment made at the factory. Each barometer is tested and its reading compared and adjusted to agree with those of a Fortin type barometer which has been tested by the National Bureau of Standards. This assures traceability to the NBS. The scales are also adjusted for the average condition of capillarity. Since the amount of capillary depression is different for a falling mercury column than for a rising column, it is well to bring this to its average condition by tapping the barometer lightly with the fingers near the mercury meniscus before setting the vernier to the height of the mercury column.

To get a true barometer indication at the place of observation it is not necessary to correct for altitude. However, if you wish to correct to sea level pressure for comparison with National Weather Service values, a sea level differential (approximately 0.09 mm per metre of elevation, 0.027 mm or 0.001" per foot of elevation) would have to be added to the barometric pressure at your altitude.

MOVING THE BAROMETER

The barometer will give longer service if not moved too frequently from place to place. When it is necessary to move it, certain care should be taken to prevent breakage or admission of air into the barometer tube.

Screw the adjusting screw up slowly until the mercury level in the reservoir rises to near the top of the cistern. This gives a more ample mercury coverage of the open end of the tube. Then remove the barometer from the mounting brackets and tilt it 45°. While watching the air space at one side of the cistern turn the adjusting screw slowly again until the air space approximately disappears. Do not tighten the screw any more. Now slowly invert the barometer so that the weight of the mercury rests on the top of the barometer tube. In this position the mercury column will not oscillate in the barometer tube and no air will enter the tube. The barometer can then be safely carried about in either an inverted or horizontal position.