

UNITED STATES DEPARTMENT OF COMMERCE — WEATHER SERVICE

INSPECTION AND CARE OF ALCOHOL-FILLED MINIMUM THERMOMETERS
(Abridged from U.S. Weather Bureau Circular B, 1952)

Inspection.—Inspect new thermometers upon receipt. Inspect all thermometers when they are placed in use and as frequently as necessary to insure proper functioning.

- (1) Inspect for small bubbles in alcohol column, especially for bubbles around the index.
- (2) Inspect the bore (especially the upper end) for segments of alcohol that have become detached from the principal column.

Defective Thermometers.—None of the following methods should be continued so long or so forcefully as to risk breakage (not over 15 to 20 minutes). When these methods are unsuccessful, reorder and replace with a serviceable thermometer. After reuniting a defective alcohol column, suspend the thermometer vertically, bulb end down, for several hours to permit drainage of small drops clinging to the sides of the bore.

Methods of Reuniting Alcohol Columns.—

- (1) Hold the thermometer securely below the middle (bulb end down when hand is raised above the elbow). Strike narrow edge of metal back opposite break in column sharply against fleshy portion of palm of hand (see Fig. 1). Repeat as necessary. While holding thermometer, do not apply pressure against glass stem, such as with fingers or other parts of hand.

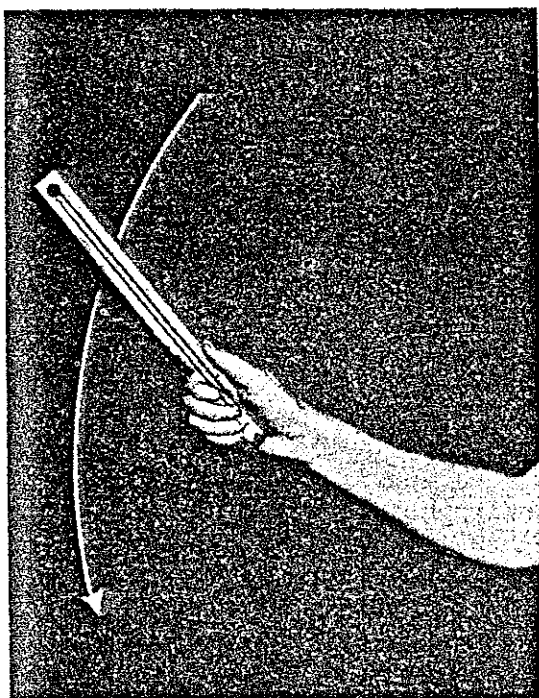


Fig. 2

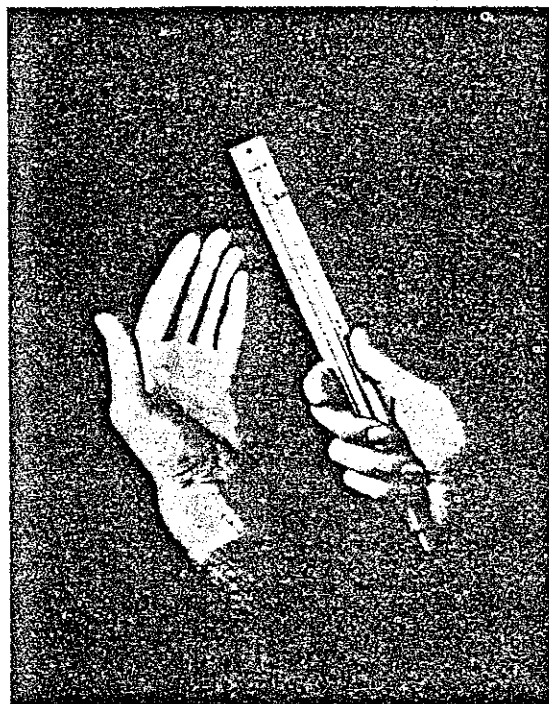


Fig. 1

- (2) Hold thermometer overhead (bulb end upward) securely by edge of metal back and a little above the mid-point toward the high-temperature end. Avoid pressure on stem. Quickly swing thermometer downward through an arc of 3 or 4 feet (see Fig. 2), stopping motion rapidly as thermometer approaches the vertical. Repeat as necessary.
- (3) Pass a strong cord through hole in top of metal back. Tie ends securely. Firmly grasp the cord 6 to 8 inches from thermometer and whirl it rapidly. Inspect the cord as frequently as necessary to insure that the metal back does not cut the cord as the thermometer is whirled.

PACKING SLIP

THE MAXIMUM THERMOMETER

Mercurial maximum thermometers have a constriction in the bore just above the bulb, like the familiar "fever" thermometer. As the ambient air becomes warmer, the mercury expands and is forced through the constriction into the graduated tube above. When the temperature falls, the mercury contracts, but the restriction above the bulb prevents the mercury from flowing back into the bulb without some force. Accordingly, the small column of mercury in the graduated portion remains at the highest point reached until forcibly disturbed.

Because of the size of this restriction and the force exerted by the surface tension of mercury, there is normally a complete separation of the mercury in the bulb and the mercury in the graduated tube (except under conditions of expansion under heat). This "break" in the mercury column at the restriction is not a defect; rather it is the normal result of an essential feature of mercurial maximum thermometers. However, if a separation does develop within the mercury column above the constriction, which cannot be removed by tilting and whirling, then the thermometer is faulty and must be replaced. But the gap between the portions of mercury at the constricted section of the bore is normal and should cause no concern.

If the maximum thermometer is tilted with the bulb end higher, the column of mercury will flow toward the top of the thermometer, making a very large gap between the bulb and the upper segment of mercury. This emphasizes the need to read the maximum thermometer only after it has been gently lowered to a vertical position so that the top of the upper segment is definitely opposite the proper highest degree reading it reached during the period of exposure. If this is not done, a false high reading can be obtained. Perhaps vibration from wind may have joggled the mercury segment higher than the true maximum while in its horizontal position. To restore it to the proper point, the thermometer must be turned slowly to the vertical, and then the reading can be made confidently.

On a very hot day when the mercury rises high in the tube, it is possible, on whirling to reset the thermometer, to break the segment in the middle. If the thermometer happens to be mounted about half way along its length, centrifugal force of whirling sends half the mercury down toward the bulb and the other half to the top of the thermometer. To overcome this, mount the thermometer closer to the upper end.

In some maximum thermometers, the constriction above the bulb is too large and allows mercury to run back into the bulb as the temperature drops. These are "retreaters" and worthless. You can test your thermometer for this by holding it in a vertical position and warming the bulb with your fingers. If the mercury runs back into the bulb when you let the bulb cool, rather than staying at the highest point reached, it should be replaced. Some thermometers have too small a constriction and are hard to reset. If you have one of these, it should likewise be replaced.

With care, separated mercury columns may be reunited with centrifugal force. Methods (2) and (3) for reuniting alcohol columns are applicable.