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# NASA TECH BRIEF

*Ames Research Center*

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## Psychrometric Chart for Physiological Research

### The problem:

To facilitate the use of graphical techniques for solving problems involving the thermodynamic properties of moist air. Previously, charts designed for engineering applications were used, and were supplemented by the conversion of units from the engineering system to the metric system.

### The solution:

A chart which incorporates the standard system of units formulated for thermal physiology.

### How it's done:

The chart shows graphically the quantitative interrelationships among the thermodynamic properties of a given sample of moist air. Only those items of interest to physiologists are presented, and each item is carefully defined.

The coordinates are standard for a psychrometric chart. The ordinate is the humidity ratio scale, and the abscissa is the dry bulb temperature scale. The properties presented, and their units of measurement, are as follows:

- (1) Humidity ratio    grams water per gram dry air
- (2) Dry bulb temperature    Celsius
- (3) Water vapor pressure    millimeters of mercury
- (4) Dew point    Celsius
- (5) Wet bulb temperature    Celsius (Wet bulb lines are identically equal to sigma function lines.)
- (6) Enthalpy    joules per gram of dry air (The

scale is shown, but the lines are not drawn. For easier reading, the wet bulb temperature lines are used and a correction is applied from the enthalpy deviation curves.)

- (7) Specific volume    liters per gram of dry air
- (8) Relative humidity    percent
- (9) Sensible heat factor    dimensionless
- (10) Moisture ratio    joules per gram.

The most useful chart is the one which presents conditions at the standard atmosphere pressure at sea level. Similar charts can be constructed for any desired total pressure.

### Reference:

Chambers, A. B.: A Psychrometric Chart for Physiological Research. *J. Appl. Physiology*, vol. 29, no. 3, 1970, p. 406.

### Note:

Requests for further information may be directed to:

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### Patent status:

No patent action is contemplated by NASA.

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Category 03