ment of the families of curves of constant dry-bulb temperature, wet-bulb temperature, volume, relative humidity and degree of saturation, are shown in Fig. 4.

Mass and energy balances deal only with net changes between definite states; the detailed history of a change is not involved. A chart used to facilitate such calculations must primarily aid in clearly establishing states. Lines drawn on the chart to connect different states need have

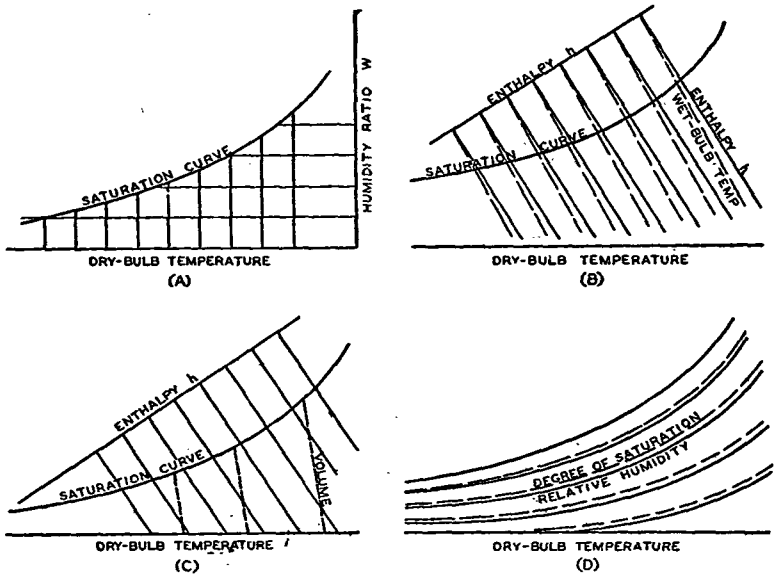

FIG. 4. ARRANGEMENT OF FAMILIES OF CURVES ON A.S.H.A.E. PSYCHROMETRIC CHART

no other significance than being loci lines, that is, lines which contain the two terminal points of a change according to the particular overall conditions imposed. Loci lines are commonly called *condition lines* for the processes concerned. On the A.S.H.A.E. chart a condition line is characterized by the ratio $(h_2 - h_1)/(W_2 - W_1)$.

An abridgment of the A.S.H.A.E. Psychrometric Chart appears in Fig. 5. A large size (24 x 32) chart will be found on the inside of the back cover.

The chart is drawn for standard atmospheric pressure. Steady flow changes commonly involve pressure drops with the flow, but so long as these pressure drops remain a small fraction of the barometric pressure, no appreciable errors need arise from using a constant pressure chart For many design problems, the use of the standard pressure chart will not incur any undue error up to about 2000 ft above sea level.

The region above the saturation curve is a two-phase region giving equilibrium states for water in both the liquid and vapor phases. The ordinate of a point in this region is the weight of water in both phases per pound of dry air in the vapor phase, neglecting any dissolved air

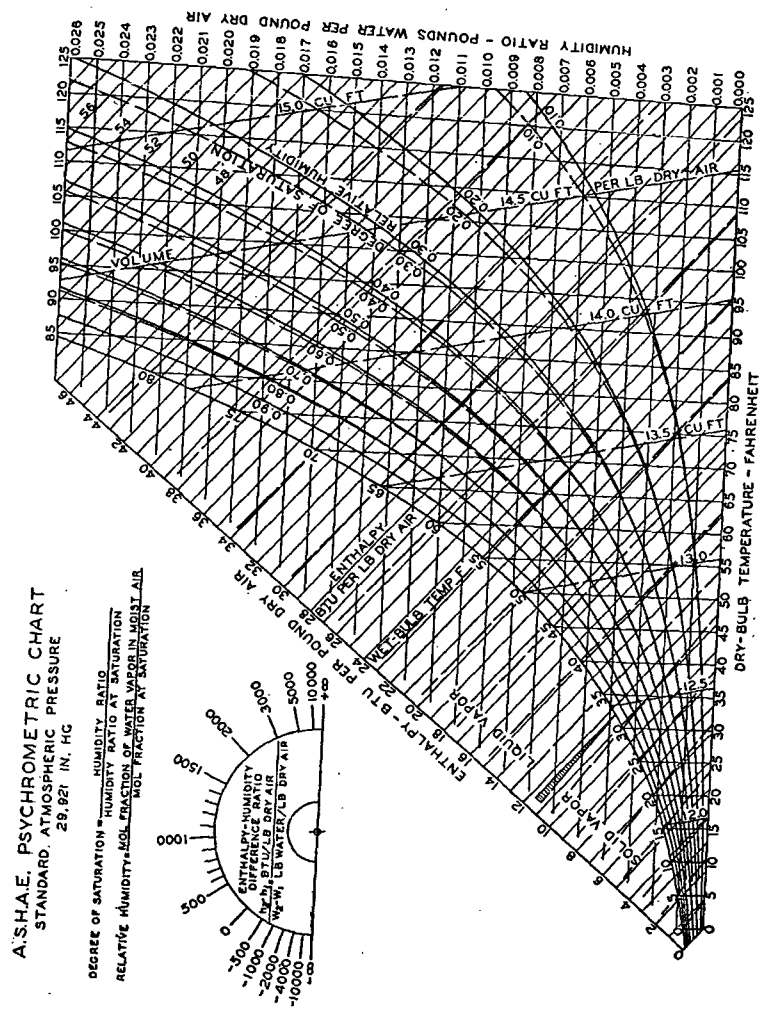

FIG. 5. ABRIDGMENT OF A.S.H.A.E. PSYCHROMETRIC CHART

in the condensed phase. The ordinate at the saturation curve, or the point at which the break in the isotherm through the point in question occurs, is the weight of water per pound of dry air in the vapor phase. Consequently, the difference between the two ordinates is the weight of condensed moisture per pound of dry air in the vapor phase.

The shaded solid-liquid-vapor region at 32 F is an isothermal three-phase zone, and separates the liquid-vapor zone from the solid-vapor zone. The temperature is 32 F throughout the shaded area.