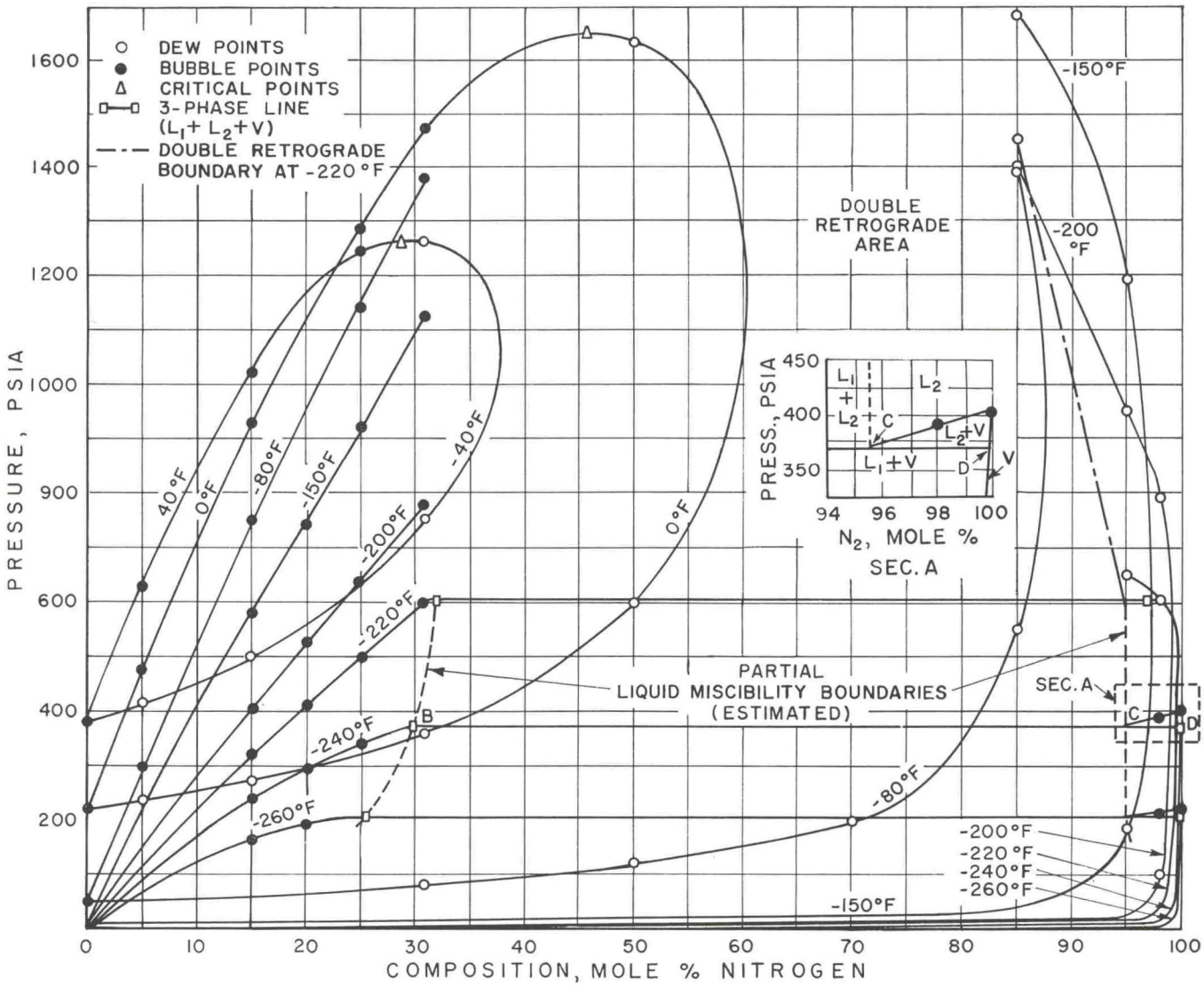

Fig. B.—ISOTHERMAL PRESSURE-COMPOSITION DIAGRAMS, ETHANE-NITROGEN SYSTEM

exhibited by mixtures of 50 and 30% ethane, and the very high pressures reached by the phase envelope, it was not possible to complete the phase boundary curve in the low-temperature region; the required pressures would have exceeded the 2000 psia maximum working pressure of the equilibrium cell. The portions of the phase boundary curves for these two mixtures shown as dashed lines were obtained with P-V-T apparatus.

B. Pressure-Composition Diagrams

Isothermal pressure-composition (P-X) diagrams were constructed from the phase boundary curves; the pressure values were taken from the intersection of the given constant temperature lines and the dew and bubble curves for each mixture. Fig. B presents P-X diagrams for selected temperatures from —260° to +40°F.

The straight line sections of the —220°, —240° and —260° loops (such as BCD) represent the range of composition at constant temperature and pressure over which three phases coexist. The estimated compositions of the immiscible liquid phases at various temperatures are indicated by dashed lines. At temperatures above the maximum three-phase coexistence temperature (—220°F), but below 0°F, the loops are not closed, as equipment limitations prevented obtaining the necessary data in this (the double retrograde) region.

The dot-dash line represents the estimated pressure behavior at a temperature of —220°F for various mixtures in the composition range between 85 and 95% nitrogen. It is expected that mixtures in the composition range of 40 to 85% nitrogen will exhibit similar phenomena at low temperatures (—80°F and below).

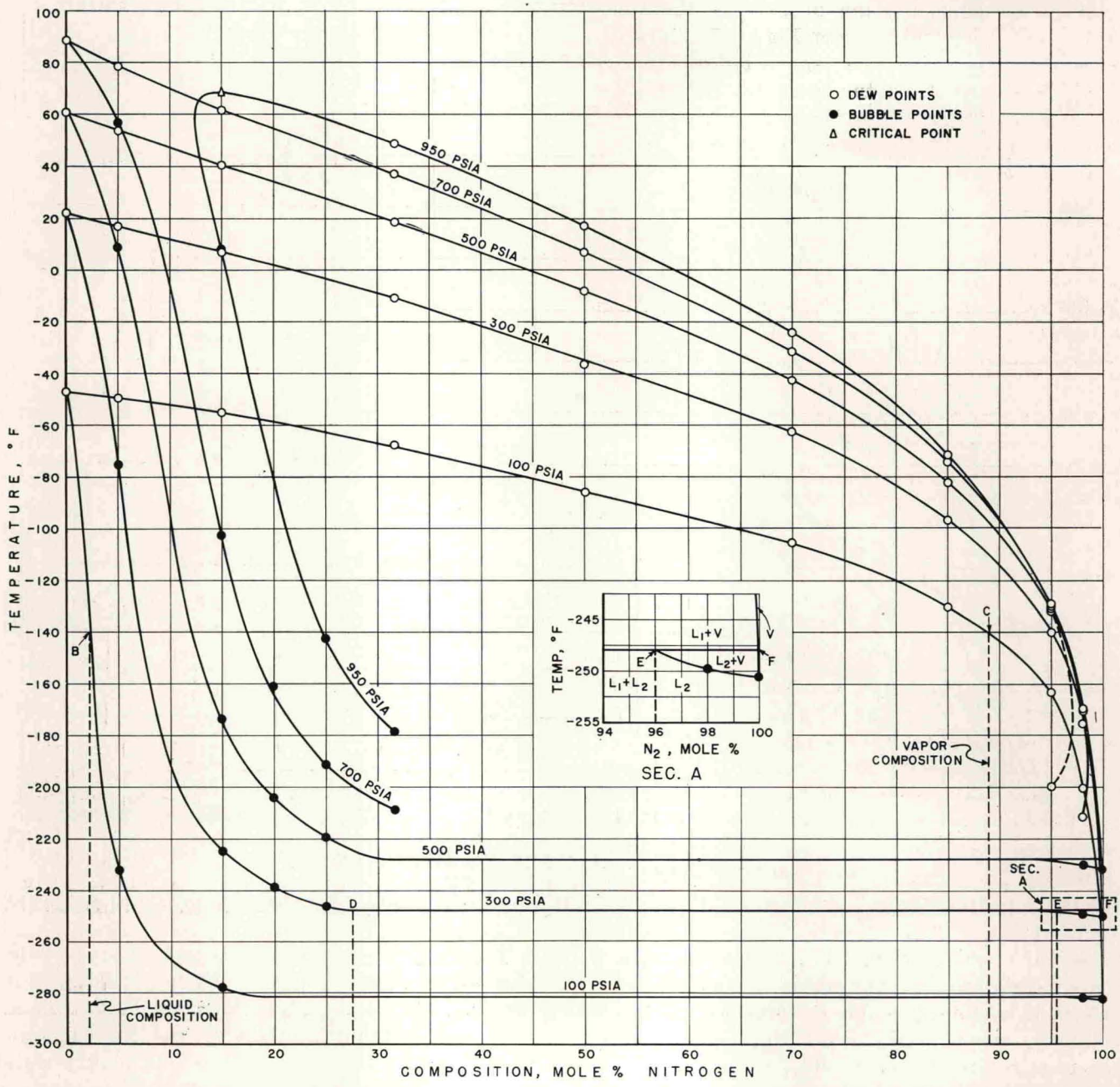

Fig. C.—ISOBARIC TEMPERATURE-COMPOSITION DIAGRAMS, ETHANE-NITROGEN SYSTEM

C. Temperature-Composition Diagrams

Values of the temperature at which various constant pressure lines intersect the dew and bubble point curves were read from a large-scale plot of the phase boundary curves, and are recorded in Table B. These are plotted as temperature-composition (T-X) isobars in Fig. C for pressures of 100, 300, 500, 700 and 950 psia. The straight lines on the 100, 300 and 500 psia curves (such as **DEF**) represent the range of compositions, at constant temperature and pressure, through which three phases coexist. Above the maximum three-phase coexistence pressure (605 psia), the T-X curves are not closed, since equipment limitations prevented accumulation of sufficient data for complete definition of this (double retrograde) region.

In the three-phase coexistence region the com-