was repeated at different ΔP's up to the freezing point. Measurements were also taken for pressure decrements.

For redeterminations of the melting curves below 200 kg cm^2, the apparatus and technique described in a preceding paper (*20*) were employed. Determination of the solid-solid transition line for He^3, however, was carried out in the ΔV_m apparatus as follows. With the He^3 pressure held constant at some value below the triple point, the bath was lowered out of contact with the cell. The bath temperature was then adjusted to a value just below the expected transition line, and the bath level was raised slowly until the cell was about one-half immersed. This filled the lower portion of the cell with solid. The existing temperature gradient in the upper part of the cell kept the cell opening from plugging with solid. With the bath temperature and level held constant, small weights were added stepwise to the piston gauge. The piston dropped by small decrements due to the compressibility of the system until the transition line was reached, at which point an additional weight caused the piston to drop by a large amount corresponding to the volume change of solid-solid transition, ΔV_{trans}, which took place in the lower portion of the cell. Unfortunately the measurement of ΔV_{trans} could not be made quantitative by this method since the exact amount of solid in the cell was indeterminable. A different method for determining ΔV_{trans} is discussed in Section IV-B-1.

The room temperature density of gaseous He^3 and He^4 was measured at three different pressures up to 200 kg/cm^2 by simply emptying an equilibrated cell content into the low-pressure metering system. Fluid density along the melting curve was measured as before (*15*).

The procedures outlined above will, in general, succeed only at temperatures which can be maintained by boiling liquid baths. No attempt was made to obtain ΔV_m and related data in the region 4.7°K to 14.7°K.

C. Temperature Measurement and Control

The liquid baths used were helium (1.2–5°K), hydrogen (14–24.5°K), and neon (24.5–31°K). Constant homogeneous temperature was effected by maintaining constant vapor pressure above the bath while stirring the bath with bubbles generated by a small heater at the bottom. In the helium region, temperatures were computed to 0.001° on the 1958 scale described by Van Dijk and Durieux (*21*). In the other regions, temperatures were computed to 0.001° on the scales used previously in the melting curve determinations (*1*).

D. Volume Calibrations

The volume of the large, thin-walled cell was determined to be 0.48252 cm^3 at 300°K and 1 atmos from the weight of mercury required to fill it. As indicated previously (*15*), corrections to the volume were made for: (1) the decrease