We measured T_c at pressures up to some $25 \cdot 10^3$ kg/cm^3 to determine this function.

At these high pressures lattice defects are produced by the inevitable plastic deformation that results, and previous observations indicate that this may also affect the transition temperature /4/. To escape this influence of lattice defects, we have to employ a pressure apparatus that enables us to apply and remove the pressure at He temperatures. Traversing the T_c (p) curve several times enables us to effectively separate the irreversible changes due to pressure from the irreversible influences of lattice defects.

2. EXPERIMENTAL

The niobium was procured as wire from the Vakuumschmelze company.* After wires had been rolled out to a thickness of about 0.02 mm, the specimens were cut out, their length being about 2 mm, and their width about 0.2 mm. After this pretreatment the residual resistance ratio R_n/R_{273} approximated 0.05, and the transition temperatures of the specimens lay between 9.4 and 9.5°K. Residual resistance ratios of as little as 10^{-3} could be attained by annealing the rolled out strip in ultrahigh vacuum ($p \approx 10^{-9}$ Torr).

The transition temperature was measured as a function of pressure in a pressure vise, described by Buckel and Gey /5/. This enabled us to apply pressures as high as some $25 \cdot 10^3$ kg/cm^2 at He temperatures repeatedly and then remove them.

The transition to superconductivity was determined by a current-voltage measurement. The measuring current used was 10 milliamps. Varying the measuring current between 5 and 20 milliamps merely shifted the transition temperature, the shift lying within the margin of error in measurement. In order to avoid thermoelectric voltages as much as possible, the voltage taps were connected to the d-c amplifier through a continuous Cu wire. The voltages produced in the annealed specimens of low residual resistance were about 1 microvolt.

Temperature was measured with an Allen & Bradley carbon resistor, whose resistance was 100 ohms at room temperature. It was calibrated at the boiling point and triple point of hydrogen and the boiling point of helium. The requirement that measurement be done in He gas represented a difficulty in the determination of the temperature. Although the thermistor was inserted in a hole in the vise directly adjacent to the pressure cell, appreciable temperature differences between the specimen and the thermistor appeared when the temperature changed rapidly in the cryostat. We therefore established identical conditions within the cryostat prior to each measurement. Moreover, we traversed the transition point as slowly as possible. Under these conditions we were able to measure shifts of the transition temperature exactly down to about 10^{-2} °K.

A dotted-line recorder was used for recording the voltages at the specimen and at the thermistor.

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* It was 99.9% pure.