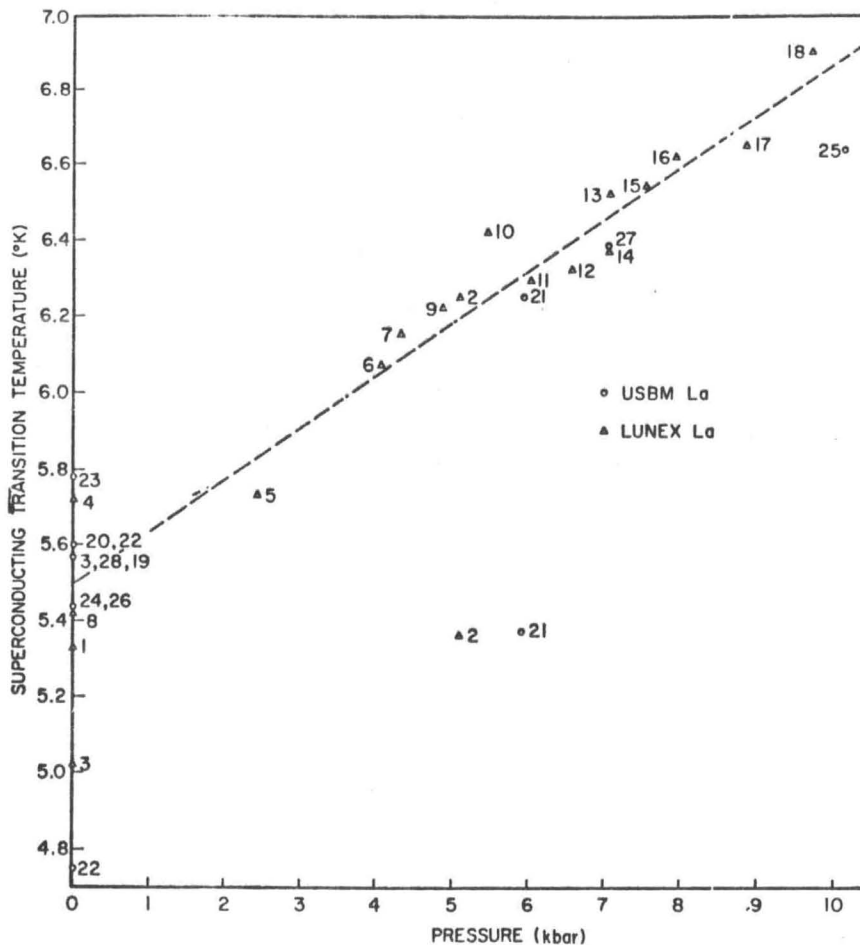


FIG. 1. The variation of the superconducting transition temperature of lanthanum with applied pressure.



in the base of the pressure capsule. The superconducting transition was detected by a standard ac bridge technique, with a signal frequency of 1 kc. The amplified and rectified off-balance signal, due to the onset of superconductivity, was used to drive the *Y* axis of a Moseley Autograf X-Y recorder. The potential drop across the carbon resistor was used to drive the *X* axis. In this manner superconducting transitions could be continuously recorded.

The "as received" U.S.B.M. and Lunex samples were subjected to mechanical and thermal treatment respectively to render as much as possible of the sample into the hcp phase.¹¹ Before the initial T_c of the U.S.B.M. sample was measured, it was strained by the brief application of a pressure equal to the maximum used. The Lunex sample was sealed in an evacuated quartz tube, annealed at 250°C for 25 h, and quenched in water. Following these treatments both samples had transition temperatures of about 5.5°K which is higher than the accepted value for the hcp phase of lanthanum as determined by resistive¹² and calori-

metric^{13,14} measurements. However, the transition temperature, as determined by induction measurements^{15,16} is in slightly better agreement. It was also observed that all subsequent atmospheric-pressure transitions were distributed about 5.5°K.

The majority of the superconducting transitions measured were relatively sharp for a "hard" superconductor, even at the highest pressures used in this investigation. At least 90% of the atmospheric pressure transitions took place over a temperature interval of 0.1–0.2°K, the transitions at high pressure being about 0.2°K wider. If we attributed the entire increase in transition with to a departure from hydrostatic pressure conditions, this would correspond to a pressure inhomogeneity of 10–20%.

Transition temperatures for a number of pressures up to 10 kbar are plotted in Fig. 1. The sequence of the measurements is indicated by the number beside

¹³ A. Berman, M. W. Zemansky, and H. A. Boorse, Phys. Rev. **109**, 70 (1958).

¹⁴ D. K. Finnemore, D. L. Johnson, J. E. Ostenson, F. H. Spedding, and B. J. Beaudry (to be published).

¹⁵ G. S. Anderson, S. Legvold, and F. H. Spedding, Phys. Rev. **109**, 243 (1958).

¹⁶ J. Müller and M. Risi, Helv. Phys. Acta **33**, 459 (1960).

¹¹ W. T. Ziegler, R. A. Young, and A. L. Floyd, Jr., J. Am. Chem. Soc. **75**, 1215 (1953).

¹² K. Schwidtal, Z. Physik **169** 564 (1962).