

In accordance with the original research proposal, a tetrahedral-anvil, high-pressure apparatus has been designed and constructed with the necessary modifications and adaptations to allow X-ray diffractometry analysis of samples while they are subjected to pressures to 100,000 Kb. The construction phase of the work has been completed, and the preliminary testing of the completed system has been carried out. No refinements have yet been made to indicate the accuracy or limits of operation of the apparatus, but no major difficulties have arisen. Preparatory to taking reliable data the following work is in progress: (a) pressure calibration, (b) X-ray system alignment, (c) optimization of X-ray intensity and resolution, and (d) study of sample geometry and construction.

A high-current, low-voltage internal heating system has been built into the apparatus, and exploratory investigations have been made to check the adaptability of the system to temperature. Due to the delays incident to construction, initial testing with temperature has not been started but will be initiated within a few weeks.

The complete system, as shown in Fig. 1, includes the tetrahedral-anvil press itself, the control console, the X-ray counting systems, and the X-ray high-voltage generator (not shown). Two photos of the press itself are shown in Figs. 2 and 3. These photos were taken in the direction shown by arrows (2) and (3) in Fig. 1. Some of the finer details of the X-ray detectors and slit system, the X-ray tube mount, and the scanning carriage and track are shown in close-up photographs in Figs. 4, 5, and 6. These photographs were taken in directions (4), (5), and (6) as indicated in Figs. 2 and 3. A study of these photographs in connection with the schematic drawing discussed below will aid in correlating the three-dimensional geometry of the tetrahedral press and the X-ray diffraction geometry.