

H. J. Hall  
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## TETRAHEDRAL X-RAY PRESS, 300 TON, WITH ANVIL GUIDE

for use with Westinghouse Rotating Anode Tube

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1. General - This press is designed for making "powder" x-ray diffraction measurements on a specimen subjected to high pressures simultaneously with high or low temperatures. Temperatures to about 200°C are available by circulating hot fluid from a thermostated bath (not supplied) through channels in the positioning ring. Cold fluids may be circulated through these same channels for low temperature work. Temperatures above 200°C are produced inside the sample tetrahedron by electrical resistance heating of a small furnace surrounding the specimen under study. Temperatures available by this means depend on the properties of the material used for the tetrahedral cell and on the size of the furnace. Electrical contact is made to each anvil assembly. All anvils are electrically insulated from each other and are each supplied with an electrical connector and six feet of 100 ampere flexible cable.

The x-ray press is built along the general lines of that described by J. Dean Barnett and H. Tracy Hall (Rev. Sci. Instr., 35, 175-182, 1964) with the x-ray tube mounted in Geometry B. The dimensions of the press are specifically designed to accommodate the Westinghouse high intensity, rotating anode, demountable x-ray tube.

The Tetrahedral Press is covered by H. T. Hall's U. S. Patent No. 2,918,699, assigned to Research Corporation; H. T. Hall's Anvil Guide, with patents pending, is also assigned to Research Corporation. Patents are pending on the x-ray diffraction aspects of

the press with J. Dean Barnett and H. Tracy Hall as inventors. The McCartney Manufacturing Company is licensed to use all these inventions.

2. General Dimensions of the Press -

- a. Perpendicular distance from center of tetrahedral press to inside of tie bar - 15 in.
- b. Distance from center of press to back of ram base - 22-3/4 in.
- c. Piston diameter - 8 in.
- d. Cylinder, outside diameter - 10 in. (Note that the high pressure oil is confined within the recessed portion of the ram base where the cylinder serves primarily as a "liner" and the ram base provides radial support to the liner.)
- e. Cylinder height (above face of ram base, including top-plate)- 8 in.
- f. Piston rod diameter - 4 in.
- g. Piston travel - 1-3/4 in.
- h. Tie bar diameter - ~~3.1 in (3.25 thread diam.)~~ 4 in.
- i. Tie bar length - <sup>37</sup>~~38~~ in; threaded each end for 12 in. length.
- j. Bottom of ram base to apex formed by tie bar axes - 5-3/4 in.
- k. Ram base 19 in. diam x <sup>8</sup>~~7~~ in. thick.

3. Hydraulics - The press generates a maximum thrust of 300 tons with an oil pressure of 12,000 psi. The hydraulic fluid is oil. The high pressure oil fittings and valves are Autoclave Slimline (15,000 psi) used with 9/16 in O.D. by 5/16 in I.D. stainless steel pressure tubing. High pressure oil is simultaneously supplied to all rams by a Sprague, air driven pump. Rapid advance of the rams is provided by air pressure

on the oil reservoir. Retraction of the rams is provided by air pressure on a separate oil reservoir. Appropriate valving is provided to accomplish the functions of rapid advance, high pressure advance, and retraction. The Sprague pump gages, reservoirs, and hydraulic controls are located in a separate console which may be located any desired distance from the press.

4. Anvils - Anvils are supplied in three sizes: 1/2 in., 3/4 in., and 1 in. (Size is designated by the length of an edge of the triangular anvil face.) All anvils, regardless of face size are 1-1/2 in. diameter and are 1-1/2 in. from the anvil base to the apex formed by the three planes of the sloping anvil shoulders. Twelve (12) cemented tungsten carbide anvils of each size are supplied with the press. Four anvils constitute a set.

5. Binding Rings - All anvils fit the same steel binding ring. Twelve (12) binding rings (3 sets of 4) are supplied with the press. The anvils are press-fit inside the binding rings. The binding ring with its anvil is readily removed from the press by loosening three set screws. The binding ring is keyed to the positioning ring and guide plate so is always properly located when replaced in position atop the backing block. The anvil-binding ring assemblies may be removed from the press and replaced in a matter of minutes, thus allowing easy interchange of anvil sizes.

6. Anvil Guide - This press is equipped with anvil guide. This device maintains perfect alignment of the anvils at all times. All

anvils move simultaneously, symmetrically, and synchronously toward or away from the center of the press as the hydraulic controls are set for advance or retraction of the rams. Ordinarily, six guide pins are used in the Tetrahedral Press anvil guide assembly and three guide holes are used in each guide plate. However, in order to accommodate the x-ray tube and a place for detecting the exiting, diffracted beam, this Tetrahedral Press utilizes only four guide pins and two guide holes in each plate.

7. Mounting - This press is mounted, apex down, on <sup>a cylindrical post</sup> ~~an angle-iron~~ ~~frame~~ appropriately constructed to accommodate the Westinghouse high intensity tube and its mounting and adjusting brackets. (These mounting and adjusting brackets are not supplied with this press.)

8. X-ray tube - The Westinghouse high intensity x-ray tube is not supplied with this press.

9. X-ray Goniometer - An x-ray goniometer is not supplied with this press. However, one is available and is detailed in a separate proposal.

10. Price, terms, delivery.- The price of this press, as detailed above, is \$ \_\_\_\_\_ f. o. b. Baxter Springs, Kansas. Applicable taxes are not included. Estimated delivery, after receipt of order is 4 months.

Terms: