There are two main features of the design of this pressure system:

1) Since the specimen is to be strained at constant hydrostatic pressure, the pressurizing system and the specimen loading systems are completely independent of one another. In the system shown in Figure 1, hydrostatic pressure will be produced by motion of the top and bottom pistons, while compression of the test specimen will be achieved by motion of the container.

2) A hydrostatic pressure of 400 ksi is to be attained using a liquid medium. The maximum container pressure in a piston-cylinder type apparatus is about 170 ksi at which point the material of the bore surface is at its yield stress. The design figure of 170 ksi is based on a 300 ksi yield stress for maraging steel and a maximum distortion energy failure criterion. Taupel* has shown this failure criterion to be in good agreement with experimental data. Consequently, either a two-stage compression device or some means of pre-stressing the pressure bearing cylinder is needed to attain pressure values higher than the 170 ksi figure. In the present design, the maximum pressure of 400 ksi is attained by a two-stage compression with the maximum container pressure of about 200 ksi per stage.

The c-axis compression test will be carried out essentially as described previously (Q-C1880-1). The design allows that at full pressurization the top piston will not yet contact the test specimen. At this time raising the container will effect the compression test. Any pressure variations occurring during the test may be corrected using the 100 ton ram actuator.

*J. H. Taupel, "Yield and Bursting Characteristics of Heavy Walled Cylinders," Trans. ASME, July 1956.