

Fig. 2.3 Active Brace System

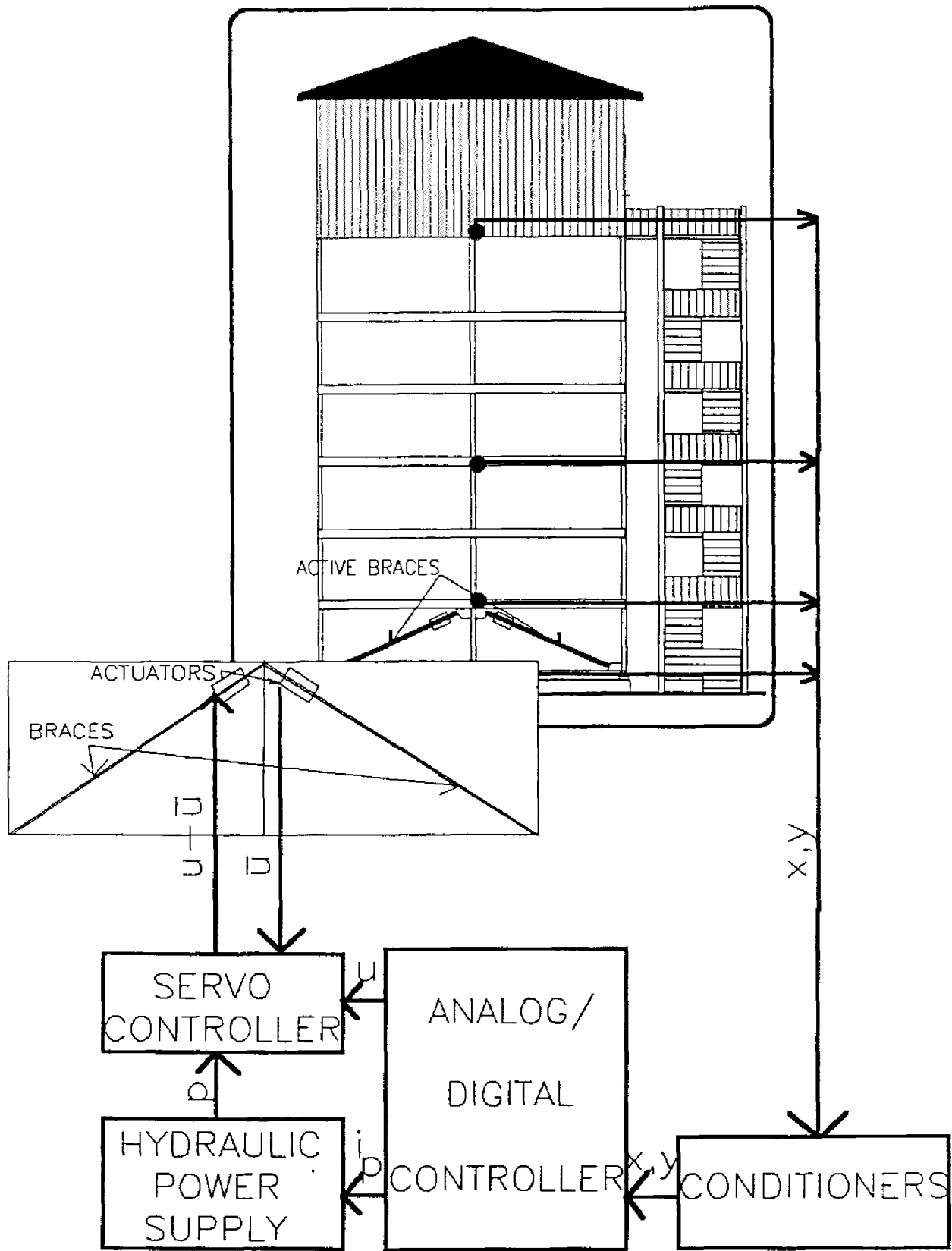


Fig. 2.5 Block Diagram of Control System

2.2.1 Braces

The design of the braces was based on the maximum control force and the anticipated stiffness with the assurance that buckling will not occur under actuator actions. The active brace and the joint configuration are shown in Figs. 2.6 and 2.7. Circular steel tubes were used as bracing members with the following specification: length = 360.5 cm, diameter = 165.2 mm, thickness = 4.5 mm, and strength = 564 kN. The measured stiffness of the braces is 98.4 kN/mm in the x-direction and 73.8 kN/mm in the y-direction.

2.2.2 Hydraulic Actuators

Four units of Parker, heavy-duty hydraulic cylinder series 2H--style TC (NFPA style Mx2) were selected as actuators with the following specifications: length = 735 mm, piston diameter = 152.4 mm, rod diameter = 63.5 mm, stroke = ± 50 mm, and average capacity = 344 kN. Figure 2.8, shows the manner in which the actuator is connected with the brace. Although the expected movement in the actuators is only ± 12 mm, larger size actuators were chosen to enable length corrections during construction. In future applications, a much shorter actuator would be sufficient.

The average capacity of the actuator is based on the working pressure [20.68 MPa (3,000 psi)] of the hydraulic oil and the average piston area, i.e., the average of the piston area on one side and the same area minus the rod area on the opposite side of the piston. The capacity can be improved by increasing the working pressure of the hydraulic oil.

Two hydraulic actuators are coupled in series in each direction and are monitored by one servovalve, which is shown in Fig. 2.9, and one servovalve-controller of type

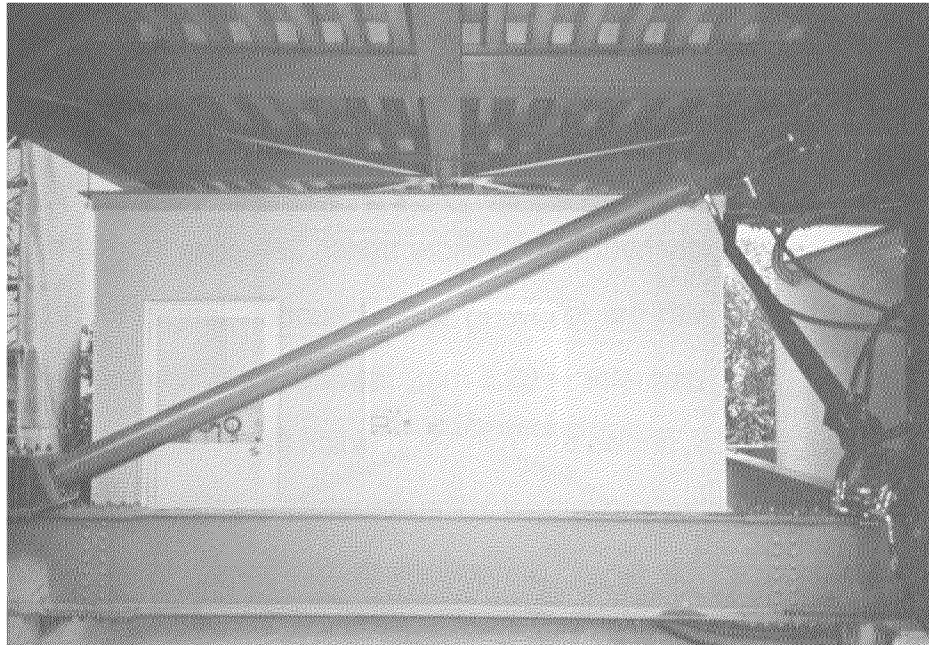


Fig. 2.6 Member of Active Brace