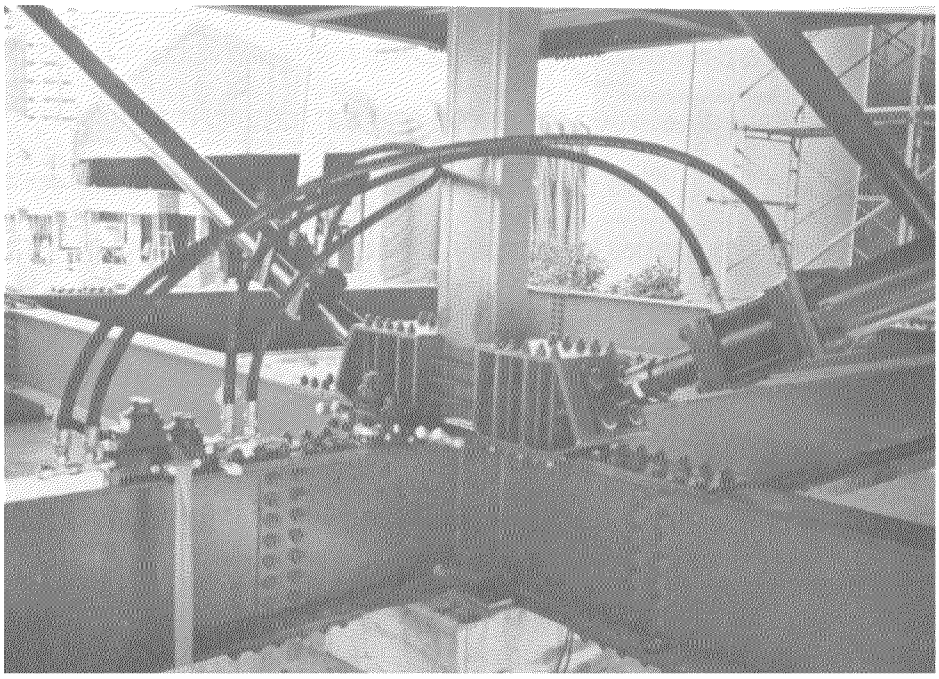

Fig 2.9 A Set of Actuators with a Servovalve

MTS 458. The inner control loop for the hydraulic actuators is used for position feedback. The servovalve MTS252.2x can supply up to 55 liter/min (15 gpm) at a pressure drop of 6.89 MPa (1000 psi).

### 2.2.3 Hydraulic power supply

The final design of the hydraulic system allows the active system to remain ready for full power controlled operation, while requiring the hydraulic pump to operate for only a few seconds each hour, to keep the system fully charged. As shown in the simplified block diagram of the control system hardware (see Fig. 2.10), hydraulic accumulators, which are shown in Fig. 2.11, are placed between the pump and a hydraulic manifold, and are kept charged by the hydraulic pump. This stored power is used when the active control is first started so that full hydraulic pressure is instantly available. The accumulators can supply enough power to allow the hydraulic pump to reach full pressure operation, and can drive the actuators for approximately one minute, longer than most major earthquakes, in the event of a power failure.

The actuators use oil at pressures varying between 19 and 21 MPa (2700 - 3000 psi). The hydraulic pump with a capacity of 120 liter/min (~30 gpm) operates between the upper and lower pressure limits. The hydraulic power system was designed to operate almost passively, i.e., the accumulator battery of 38 liters (10 gallons) is inserted in the line to maintain continuous pressure and to supply the required oil for an event of up to 60 seconds. The hydraulic manifold (an electrically controlled valve) opens the hydraulic system in case of an event, while the accumulators supply the required oil. When the pressure on the hydraulic lines drops below the lower operating pressure limit, the hydraulic pump starts its operation to restore the pressure and charge the accumulators. According to this design

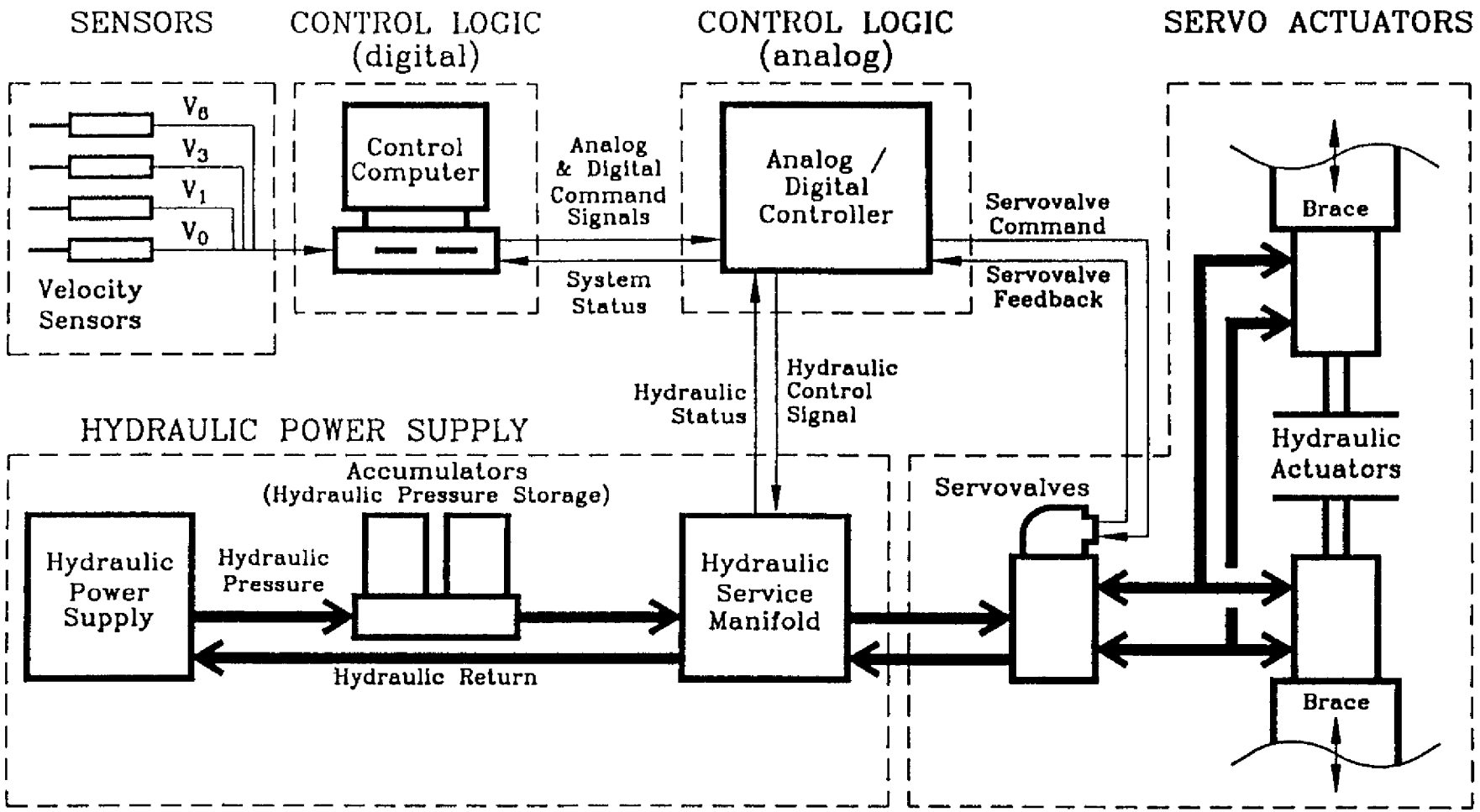


Fig. 2.10 Details of Control System for Active Bracing System

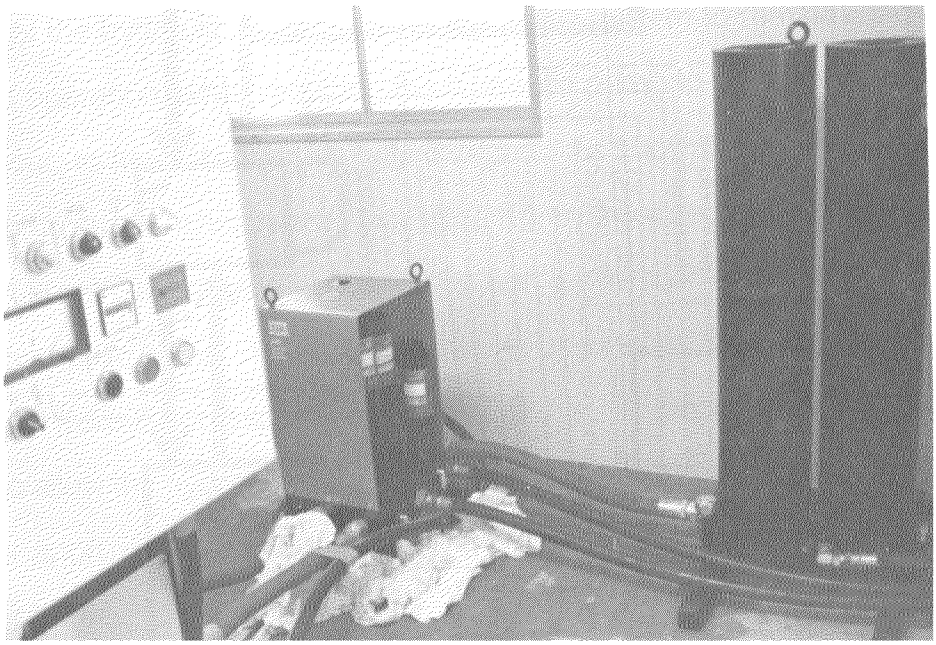

Fig. 2.11 Manifold and Accululators