3.0 Critical Operations

Many times there are certain extreme conditions the system or component may be exposed to during a duty cycle. Knowing how a system will respond to these conditions is very important to system design. With HyPneu many of these system responses can be anticipated or even predicted before metal is ever cut. HyPneu has a unique way of simulating such things as water hammer and end of stroke as the following examples illustrate.

3.1 Shock Absorbtion System Analysis

Shock loading on a hydraulic system can be very dangerous. Hydraulic systems are designed to be very stiff, and therefore the effects of shock loads will be multiplied and can cause catastrophic failure. The peak pressures imposed by shock loading cannot be calculated using steady state techniques and, in fact, many dynamic simulation programs will not produce satisfactory analysis of this situation.

The schematic used to demonstrate HyPneu's capability in this application used a shock force generator (CTT) and a mass (SM1100) to represent a shock load on a ram type cylinder. It can be seen in the curves that by using only a relief valve to protect the pump and cylinder, the pressure will peak very high and will reveal a low pressure excursion. However, the appropriate use of an accumulator will greatly improve the performance. This is a typical example of component selection basis in a shock loading application.
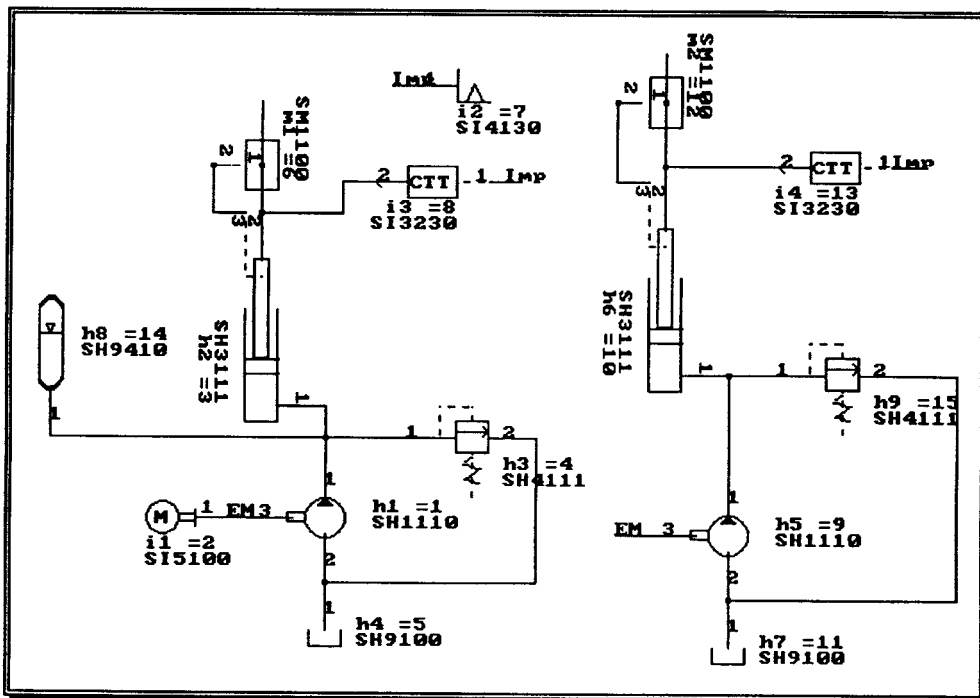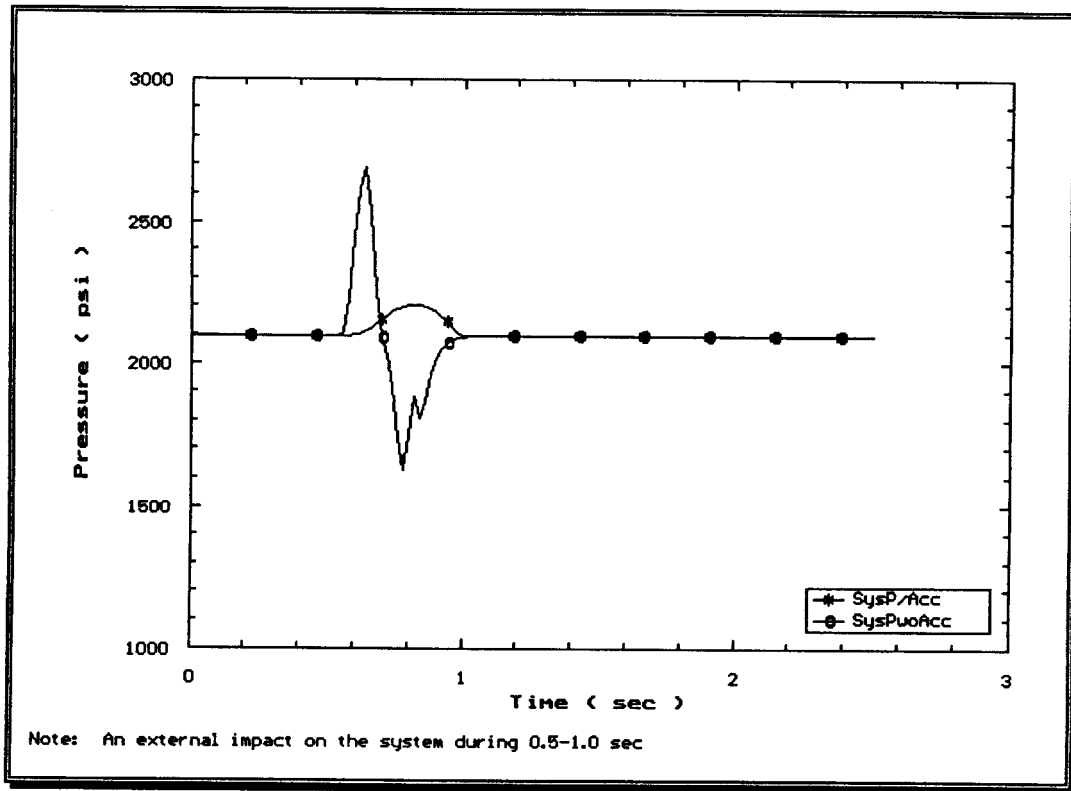
Figure 3.1a. Shock Absorbsion System Schematic.

Figure 3.1b. Shock Absorption Analysis.