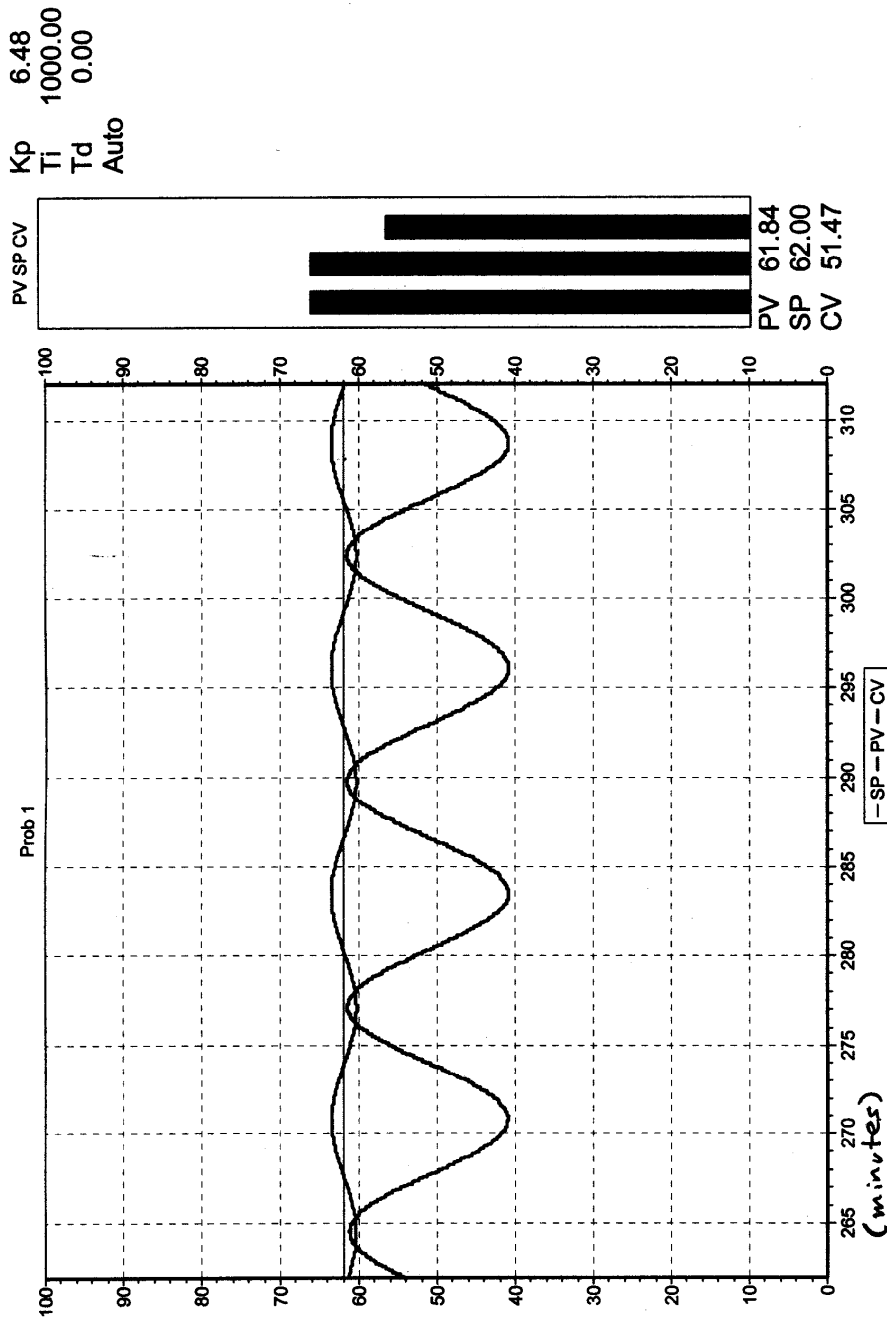


Plot of sustained oscillations.



$$G_u \approx 6.48$$

$$P_u \approx 12.6 \text{ min.}$$

PI control:

$$K_P = 0.45 G_u = 0.45(6.48) = 2.92$$

$$T_I = P_u / 1.2 = 12.6 / 1.2 = 10.5 \text{ min.}$$

PID control:

$$K_P = 0.6 G_u = 0.6(6.48) = 3.89$$

$$T_I = P_u / 2 = 12.6 / 2 = 6.3 \text{ min.}$$

$$T_D = P_u / 8 = 12.6 / 8 = 1.6 \text{ min.}$$