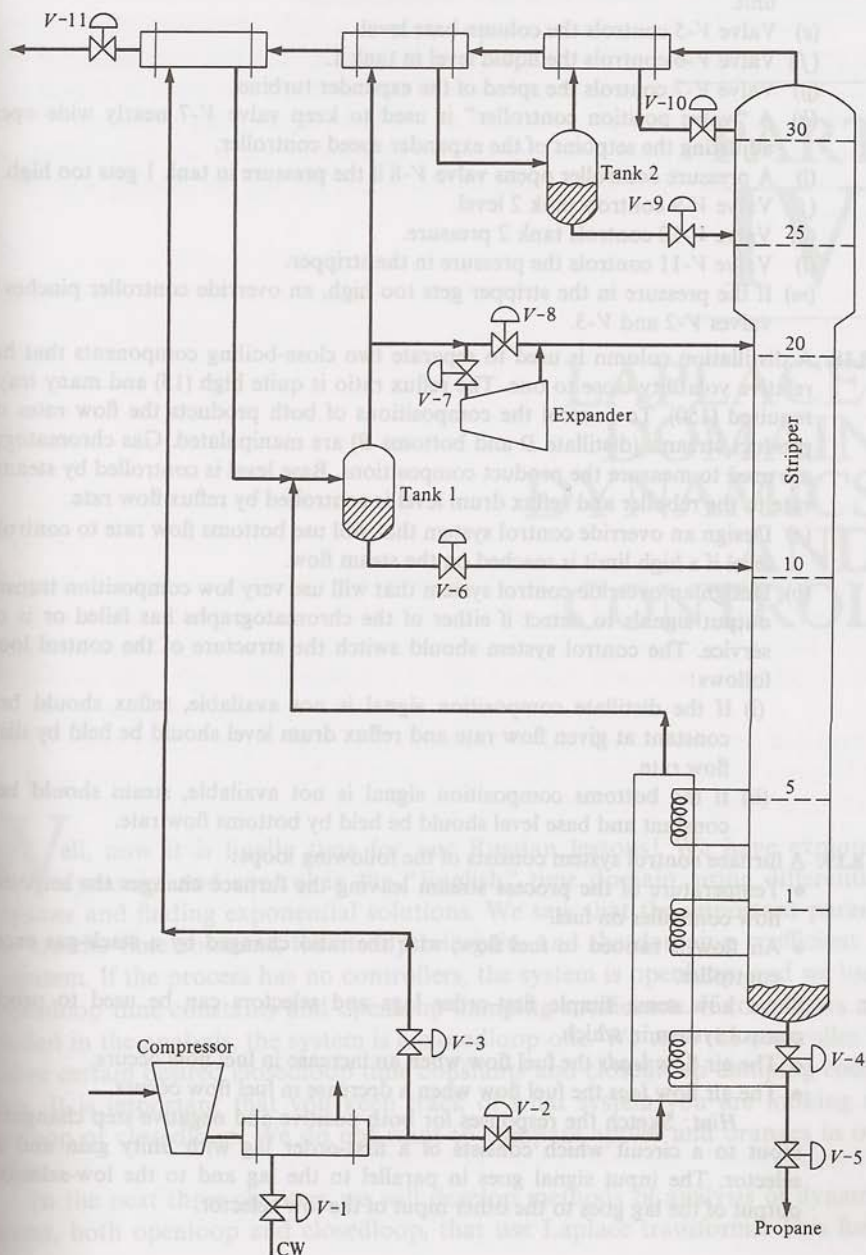


**8.17.** Sketch a control scheme for the cryogenic stripper shown below that is used for removing small amounts of propane from natural gas.



**FIGURE P8.17**

- (a) Cooling-water valve  $V-1$  is manipulated to control the gas temperature leaving the cooler.
- (b) Valve  $V-2$  controls a temperature on tray 15 in the stripper.
- (c) Valve  $V-3$  controls the total flow rate of gas into the compressor.
- (d) Valve  $V-4$  controls the temperature of the propane bottoms product leaving the unit.
- (e) Valve  $V-5$  controls the column base level.
- (f) Valve  $V-6$  controls the liquid level in tank 1.
- (g) Valve  $V-7$  controls the speed of the expander turbine.
- (h) A "valve position controller" is used to keep valve  $V-7$  nearly wide open by adjusting the setpoint of the expander speed controller.
- (i) A pressure controller opens valve  $V-8$  if the pressure in tank 1 gets too high.
- (j) Valve  $V-9$  controls tank 2 level.
- (k) Valve  $V-10$  controls tank 2 pressure.
- (l) Valve  $V-11$  controls the pressure in the stripper.
- (m) If the pressure in the stripper gets too high, an override controller pinches both valves  $V-2$  and  $V-3$ .