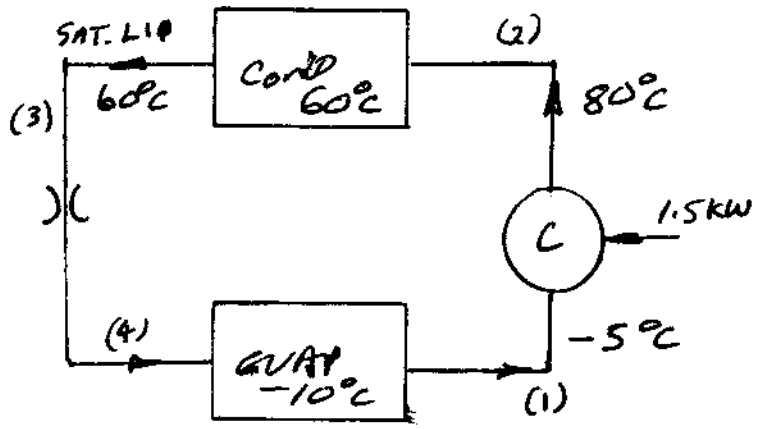
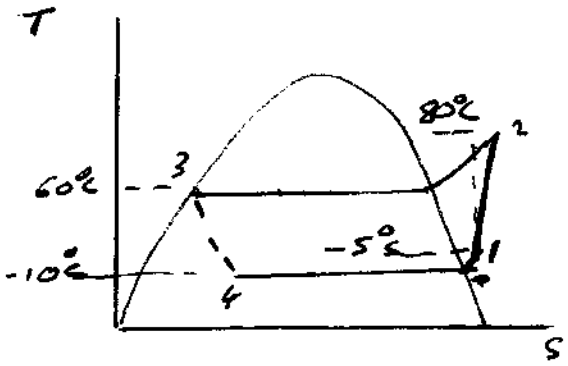
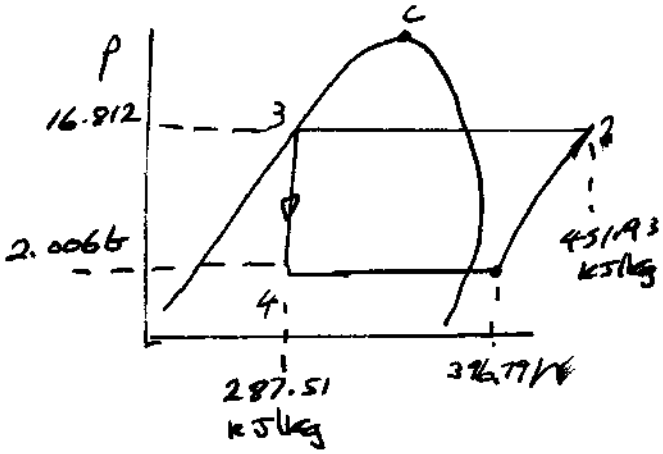
Q1 2001



R134a

$\dot{M}_r = 0.025$ kg/s





To find h_1

At	2.006 bar	−10°C	h = 392.51
		−5°C	Mid Point h = 396.79
	10K Superheat	0°C	h = 401.07

h_2 @ 16.812 bar $T_s = 60°C$

$\therefore$ 80°C is 20K Superheat

h_2 @ 16.812 bar 20K S.H. is 451.93 kJ/kg

$h_3 = h_f$ @ 16.812 bar = 287.51 kJ/kg

HEAT PUMP $\quad C_{of}P = \dfrac{\dot{Q}_{(out)}}{P_{(in)}}$

$\dot{Q}_{(out)} = m_r (h_2 - h_3)$
$= 0.025 (451.93 - 287.51)$
$= 4.11 \text{ kW}$

$C_{of}P = 4.11 / 1.5 = \underline{\underline{2.74}}$

POWER PASSED INTO THE REFRIGERANT IS $m_r (h_2 - h_1)$

$= 0.025 (451.93 - 396.79)$
$= 1.3785 \text{ kW}$

POWER LOSS FROM CASING $= 1.5 - 1.3785$
$= \underline{\underline{0.01215 \text{ kW}}}$

IF COOLED TO 55°C AT POINT (3)

$h_3 \simeq h_f$ @ 55°C (NEAREST WE CAN GET)

$h_3 \simeq 279.46 \text{ kJ/kg}$

$\dot{Q}_{(out)} = 0.025 (451.93 - 279.46) = 4.311 \text{ kW}$

$C_{of}P = 4.311 / 1.5 = 2.874$

AN IMPROVEMENT AS EXPECTED BUT WE WOULD NEED MORE EVAPORATION TO MAINTAIN STATED CONDITIONS.