

MEBS6008
Environmental Services II

**Heat Rejection And
Sea Water Cooling**
(Supplementary Notes)

Dr. C.Y. Chu

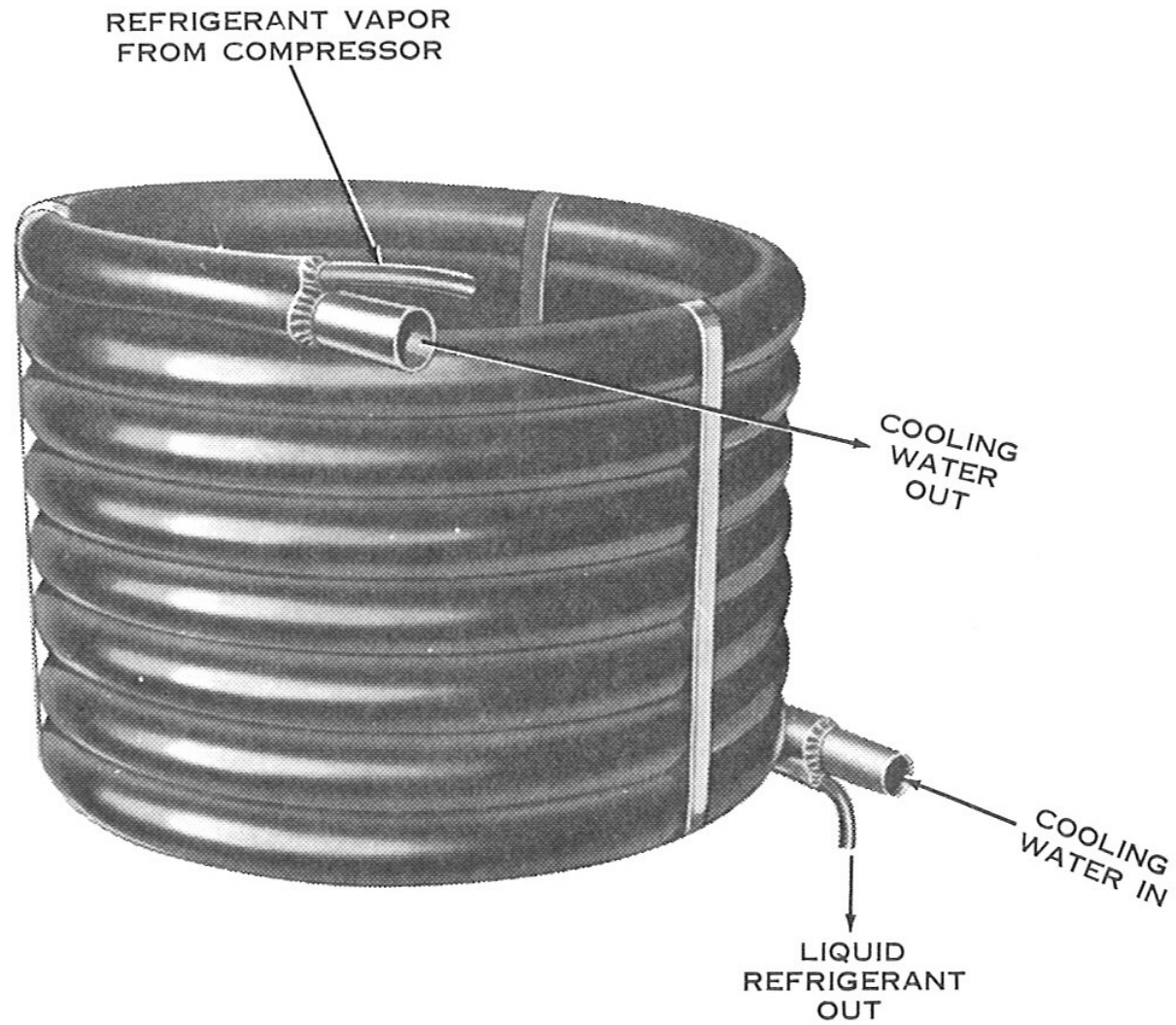


FIGURE 6-FF
DOUBLE-TUBE CONDENSER

Source from Trane Air Conditioning Manual

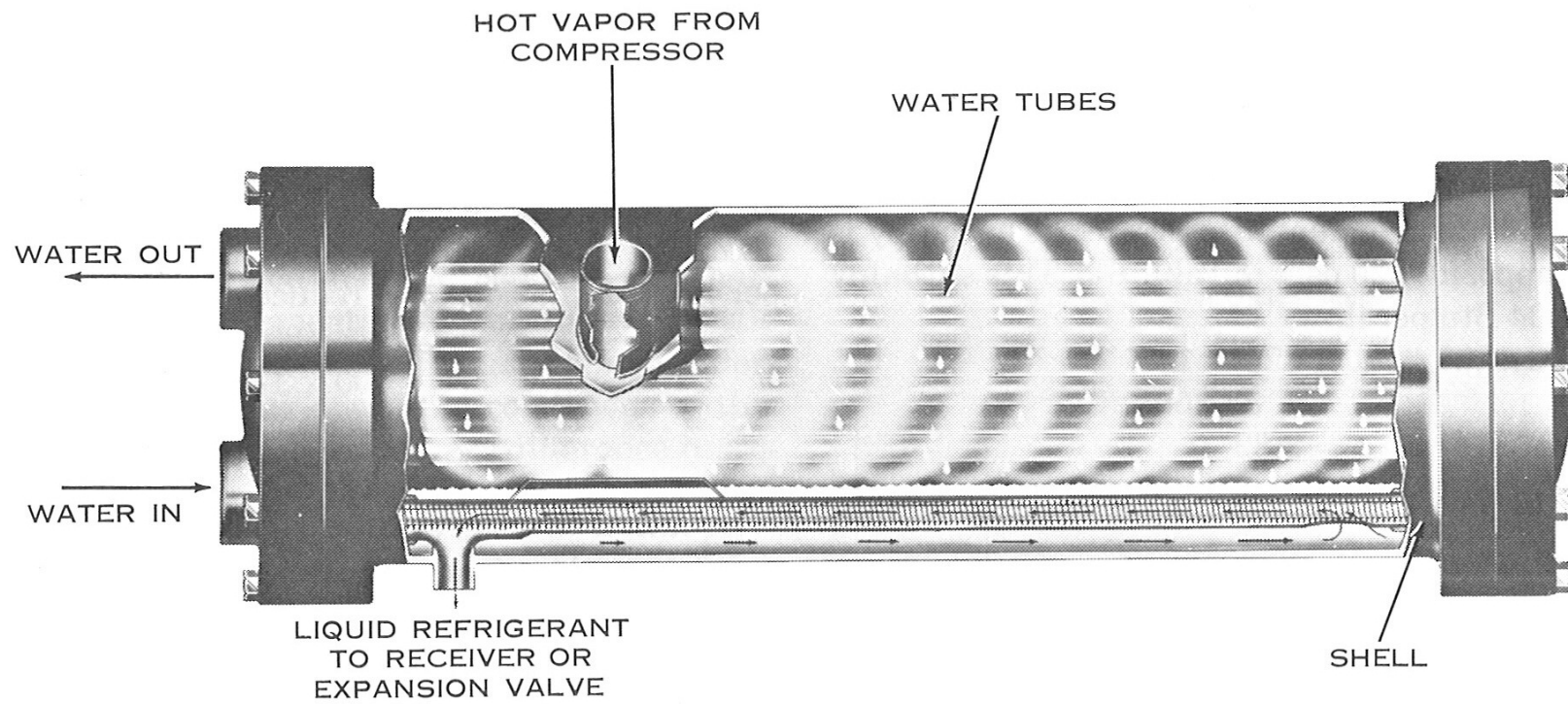
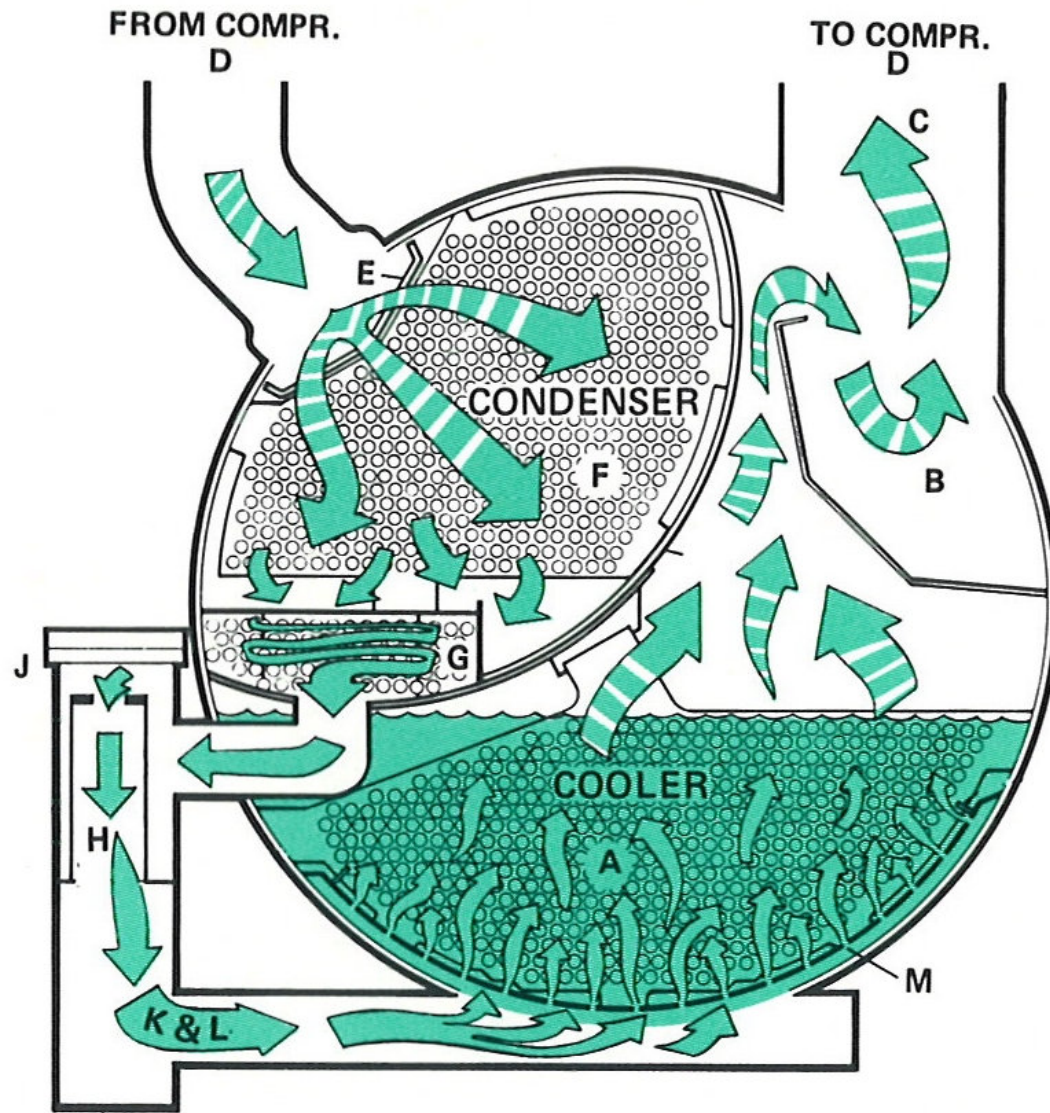
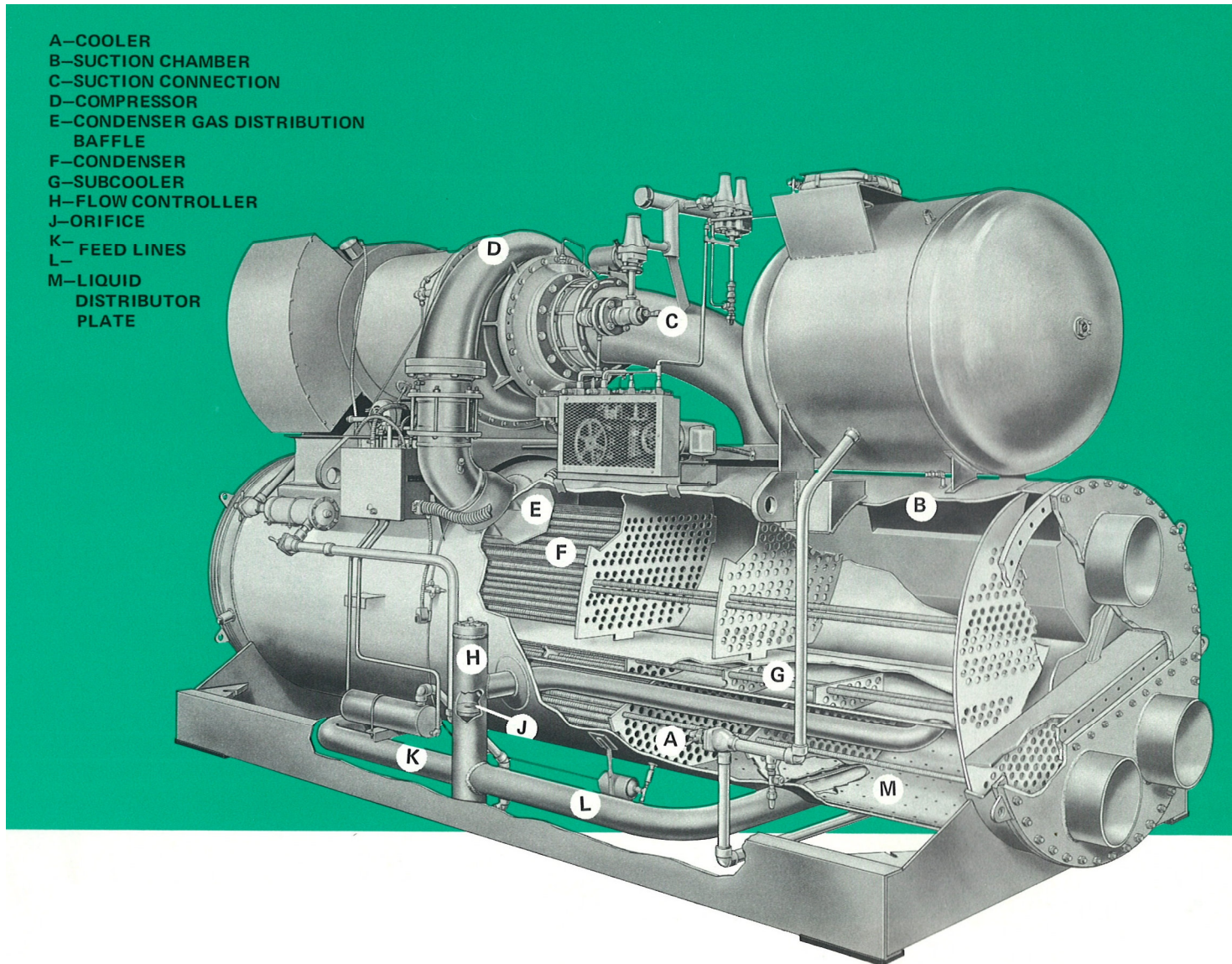


FIGURE 6-GG
SHELL-AND-TUBE CONDENSER



Source from York Hermetic Turbopak 650-1250 TR



Source from York Hermetic Turbopak 650-1250 TR

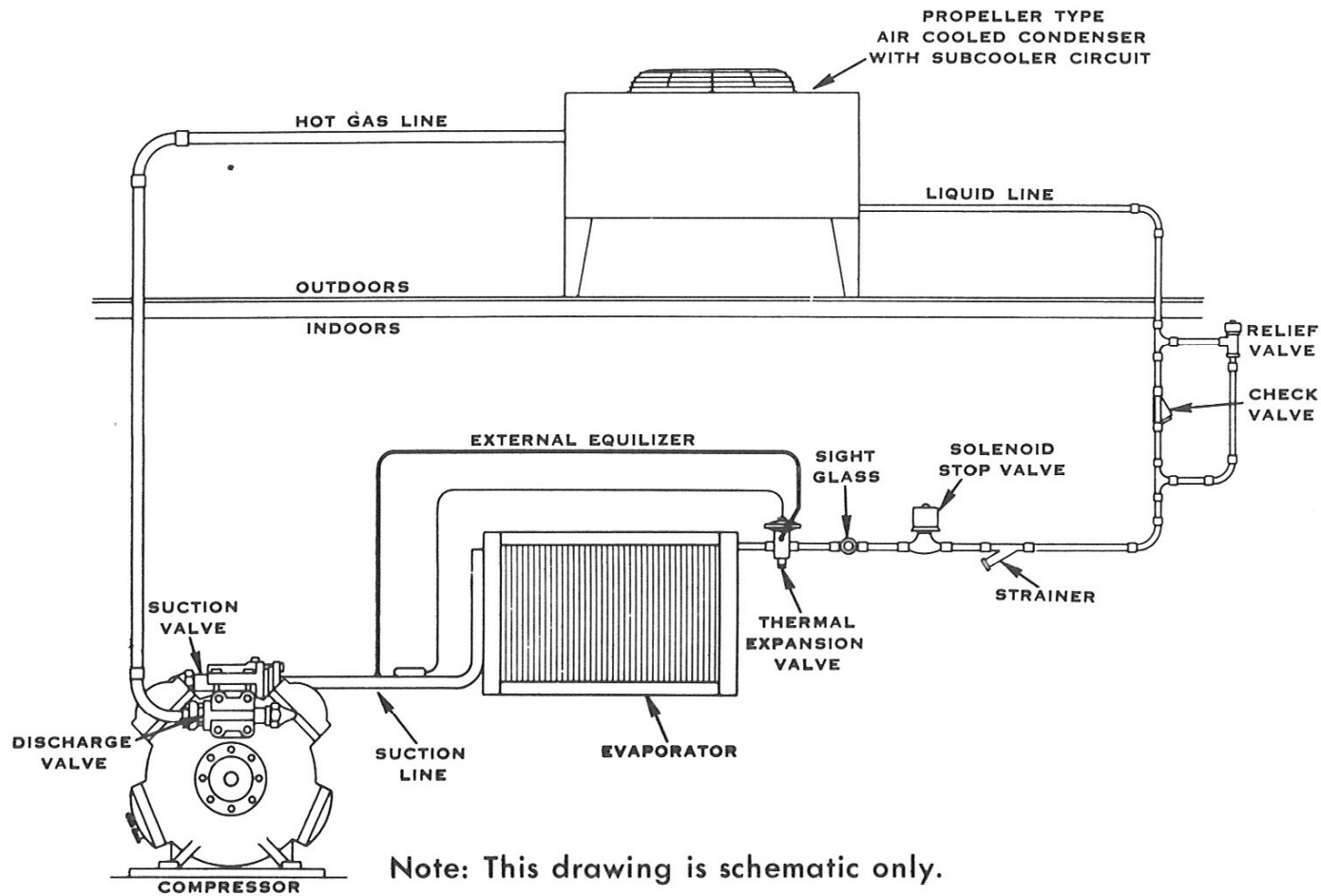
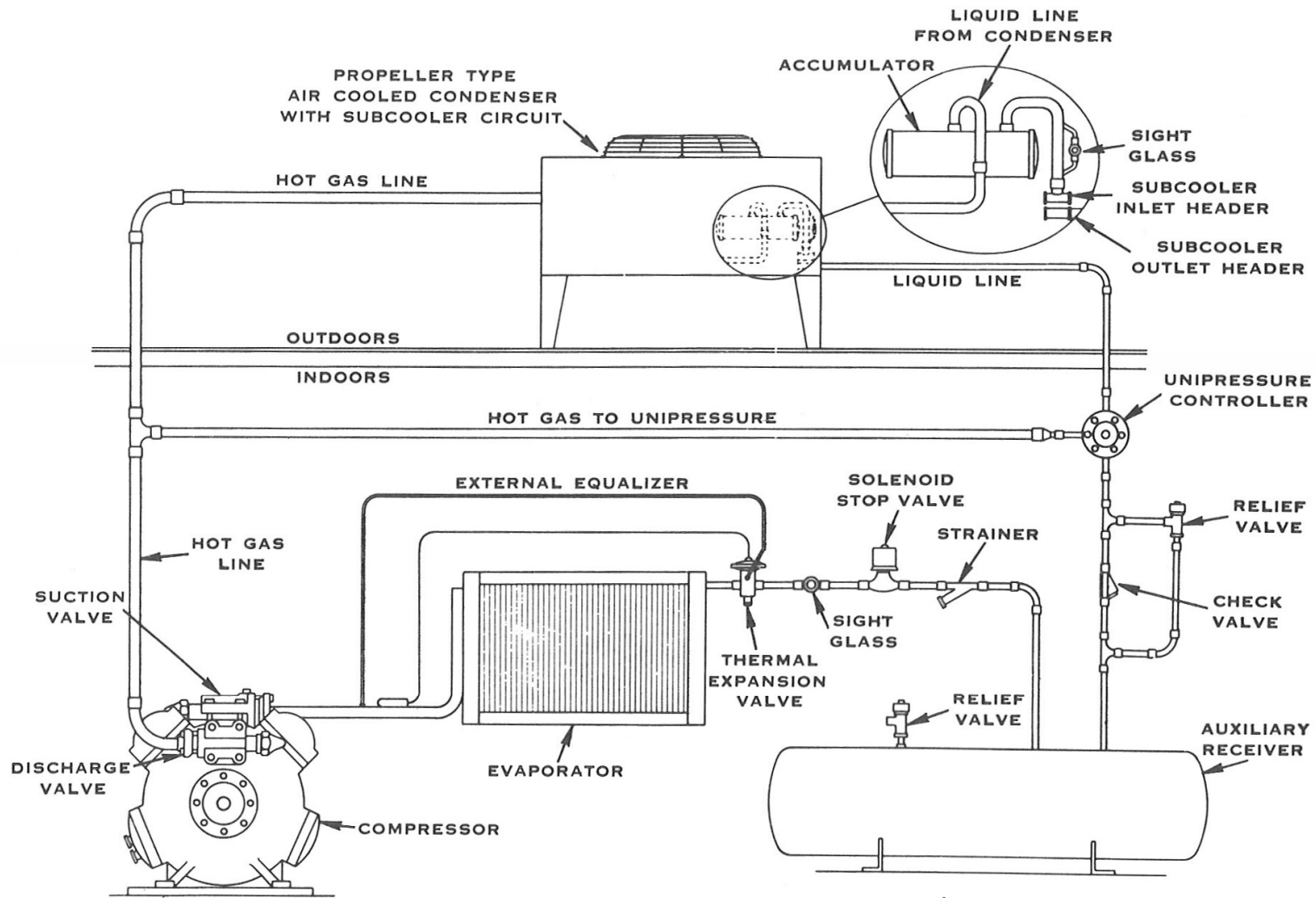


FIGURE 6-MM

TYPICAL PIPING ARRANGEMENT OF SYSTEM WITH AIR-COOLED CONDENSER AND SUBCOOLING.
NO HEAD PRESSURE CONTROL, OR HEAD PRESSURE CONTROL MAY BE WITH SHUTTERS.



Note: This drawing is schematic only.

FIGURE 6-NN

TYPICAL PIPING ARRANGEMENT OF SYSTEM WITH AIR-COOLED CONDENSER AND SUBCOOLING FOR OPERATION IN AMBIENTS BELOW 70 F WITH UNIPRESSURE, HEAD PRESSURE CONTROL.

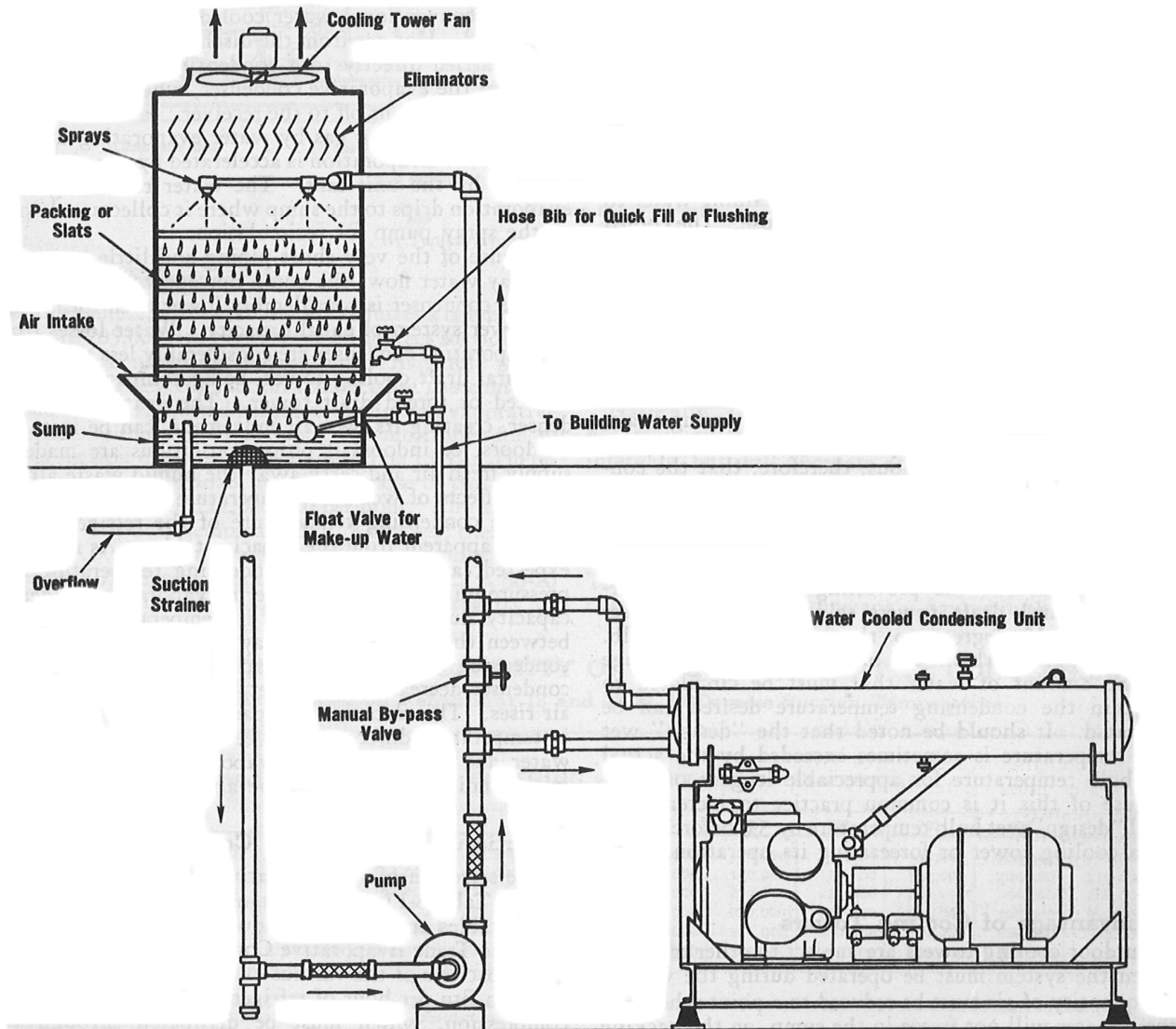
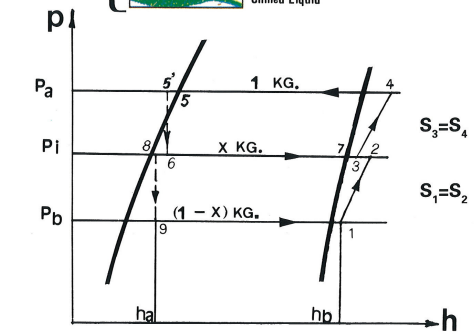
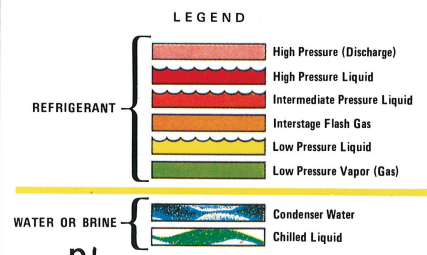
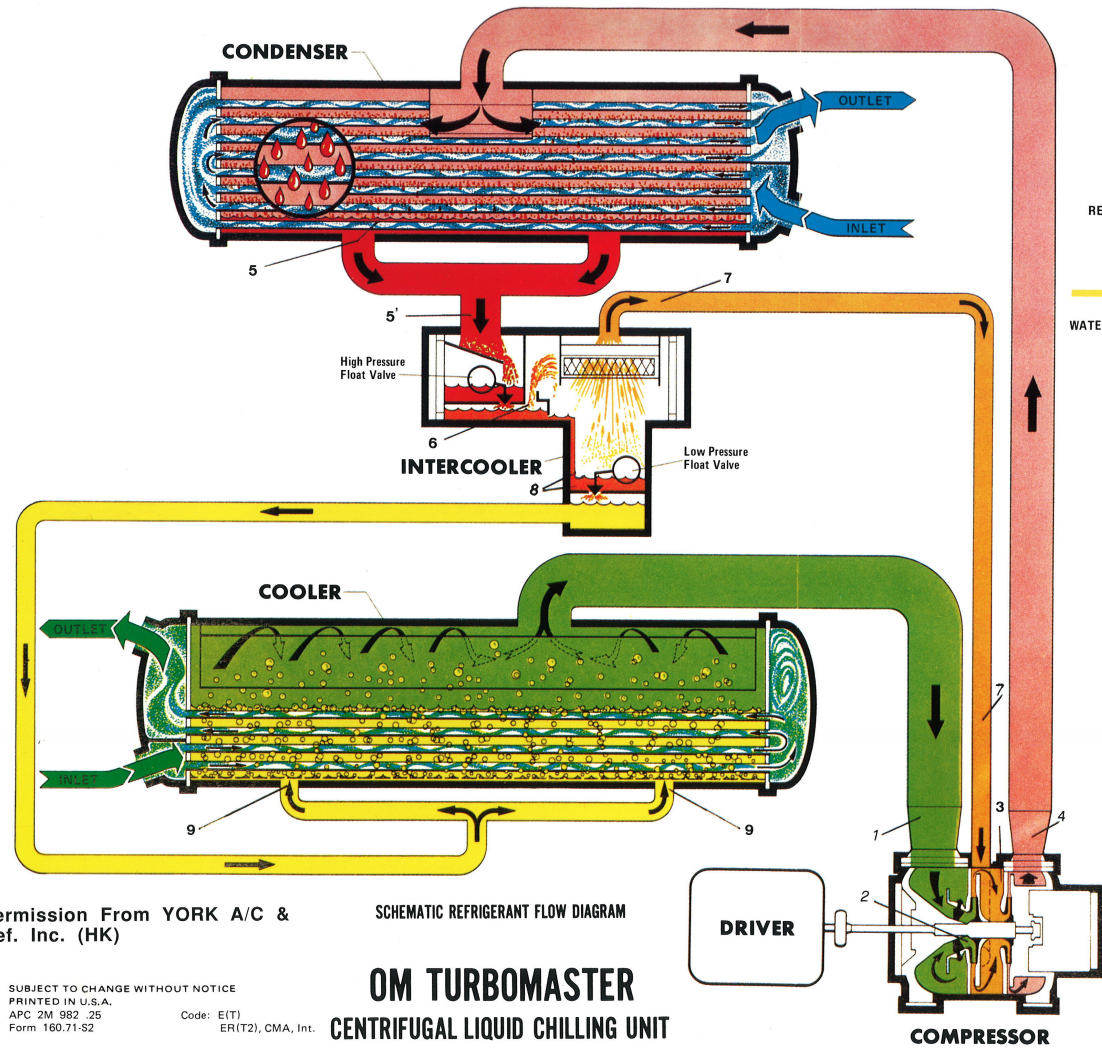


FIGURE 8-1
Typical Cooling Tower System.

Source from Trane Reciprocating Refrigeration Manual

Form 160.71-S2 (874)



REFRIGERATION CYCLE

$$COP = \frac{q_{rf}}{w_{in}}$$

$$= \frac{(1-x)(h_1 - h_9)}{(1-x)(h_2 - h_1) + (h_4 - h_3)}$$

$$x = \frac{h_5' - h_8}{h_7 - h_8} \quad \begin{matrix} h_5' = xh_7 + (1-x)h_8 \\ h_3 = (1-x)h_2 + xh_7 \end{matrix}$$

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SCHMATIC REFRIGERANT FLOW DIAGRAM

OM TURBOMASTER

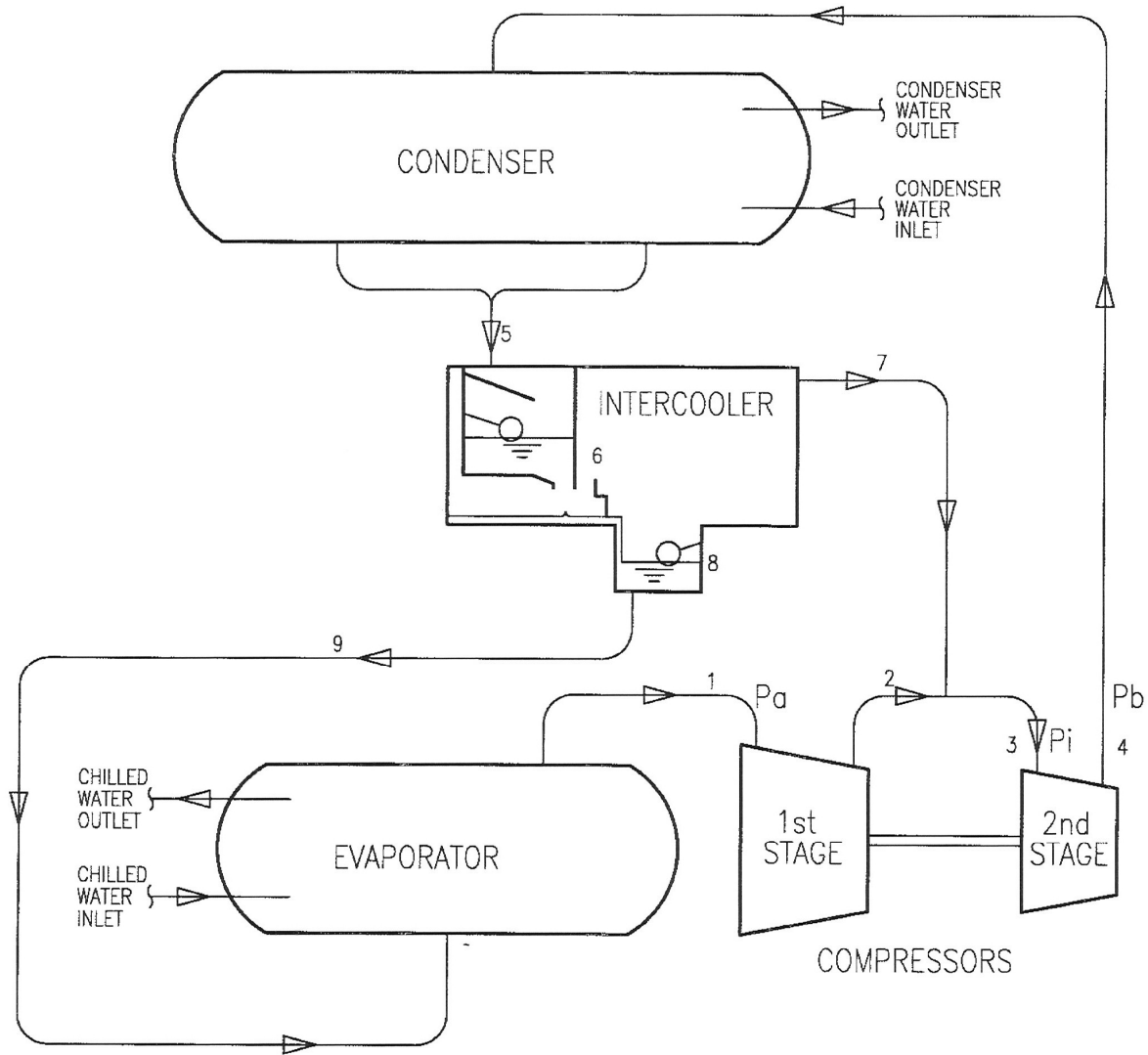
CENTRIFUGAL LIQUID CHILLING UNIT

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 APC 2M 982 .25
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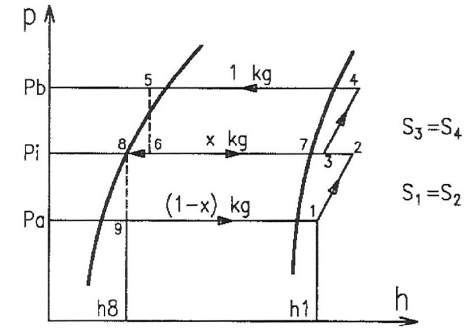
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TWO-STAGE CENTRIFUGAL CHILLER



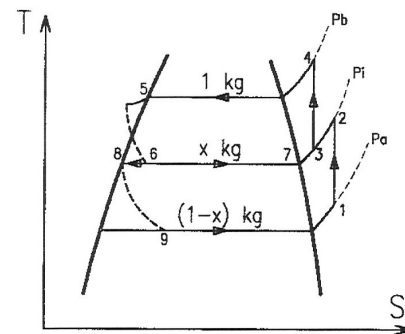
REFRIGERATION CYCLE

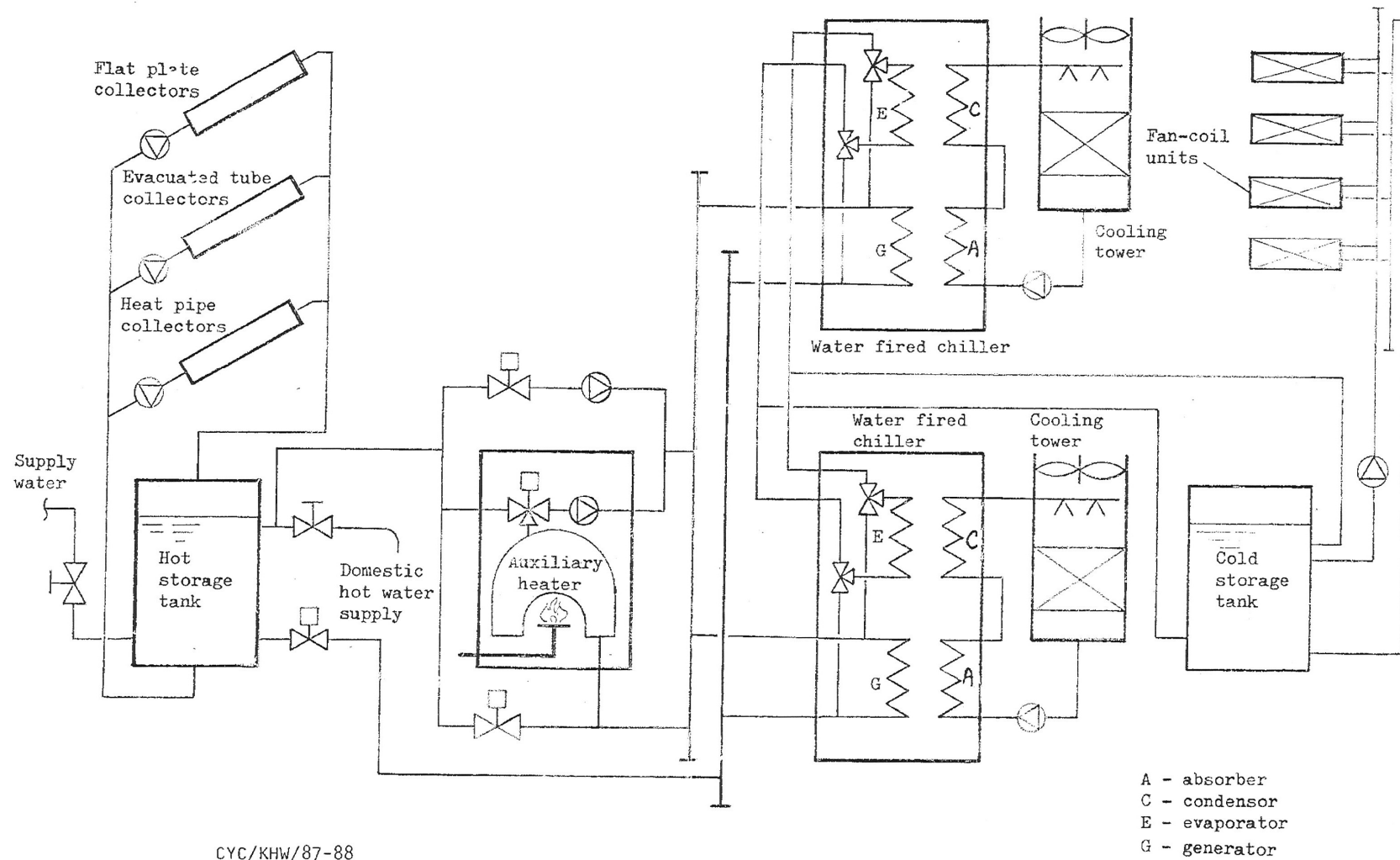
$$(i) \text{ COP} = \frac{q_{rf}}{w_{in}} = \frac{(1-x)(h_1 - h_9)}{(1-x)(h_2 - h_1) + (h_4 - h_3)}$$

$$(ii) \quad h_5 = h_6 = xh_7 + (1-x)h_8$$

$$x = \frac{h_5 - h_8}{h_7 - h_8}$$

$$(iii) \quad h_3 = (1-x)h_2 + xh_7$$





CYC/KHW/87-88

Heat Rejection in Solar Cooling System