¾ in. wood	$k = 0.8$	$\frac{x}{k} = \frac{0.75}{0.8}$	= 0.9350
Inside air film			= 0.6080
Total			= 4.8296

$$U_s = \frac{1}{4.8296} = 0.207 \text{ Btu per hour per square foot per degree Fahrenheit.}$$

Window Coefficient = U_w = Btu per hour per square foot per degree Fahrenheit.

Outside air film			= 0.286
⅛ in. glass	$k = 1.13$	$1/k$	= 0.889
1½ in. air space	$a = 1.06$	$1/a$	= 0.940
⅛ in. glass			= 0.889
Inside air film			= 0.608
Total			= 3.612

$$U_w = \frac{1}{3.612} = 0.278 \text{ Btu per hour per square foot per degree Fahrenheit.}$$

Floor Coefficient = U_f = Btu per hour per square foot per degree Fahrenheit.

Outside air film			= 0.2860
¹⁄₁₆ in. steel			= 0.0002
½ in. air space	$a = 1.2$	$1/a = 1/1.2$	= 0.8320
1 in. hairfelt	$k = 0.25$	$1/k$	= 4.0000
¹⁄₁₆ in. steel			= 0.0002
1 in. composition	$k = 6$	$1/k$	= 0.1666
Inside air film			= 0.6080
Total			= 5.8930

$$U_f = \frac{1}{5.893} = 0.170 \text{ Btu per hour per square foot per degree Fahrenheit.}$$

Heat Leakage:

Through roof	= 880 × 0.232 = 204
side walls	= 865 × 0.207 = 180
floor	= 687 × 0.170 = 117
windows	= 190 × 0.278 = 53
end walls	= 147 × 0.207 = 31
	585 Btu per hour per degree Fahrenheit.

Total heat gain = $585\,(t_o - t) = 585 \times 15 = 8775$ Btu per hour.

Sensible heat gain from make-up air = $Q \times 60 \times d \times C_p \times (t_o - t)$
= $500 \times 60 \times 0.07356 \times 0.241 \times 15 = 7950$ Btu per hour.

Latent heat gain from outside air = $L \times 60 \times Q \times d \times M$
= $1060 \times 60 \times 500 \times 0.07356 \times 0.00314 = 7350$ Btu per hour.

Heat gain from passengers = $(68 \times 400) + (1 \times 650) = 27{,}850$ Btu per hour.

Heat gain from evaporator motor = $\frac{0.50}{0.65} \times 0.746 \times 3415 = 1960$ Btu per hour.

Heat gain from solar radiation:

Heat gain through roof = $U_r \times A_r \times 40 = 0.232 \times 880 \times 40 =$ 8150 Btu per hour.
Heat gain through side wall = $0.207 \times 433 \times 25$ = 2230 Btu per hour.

Heat gain through window = $0.7 \times \frac{190}{2} \times 60$ = 4000 Btu per hour.
Total heat gain from solar radiation = 14380 Btu per hour.

Summary of Total Heat Gains:

Leakage	8,775
Sensible heat from outside air	7,950
Latent heat from outside air	7,350
Heat from passengers	27,850
Heat from evaporator fan motors	1,960
Solar radiation	14,380
Total	68,265 Btu per hour.

This would require a refrigerating capacity of $\frac{68{,}265}{12{,}000} = 5.7$ tons.

HUMIDITY CONTROL

The temperature to be maintained in a car depends upon the outside temperature and the desired humidity inside the car. With a low humidity it is necessary to maintain a higher temperature to establish a desirable comfort condition. Little humidity control has been attempted on cars up to the present time. A certain degree of automatic humidity control is secured with cooling, but the relative humidity obtained depends largely on the temperature of the evaporator, which should be below the dew point temperature of the air. With certain outside atmospheric conditions it may not be possible to operate the conventional equipment with a sufficiently low evaporator temperature to reduce the humidity without dropping the temperature too low. One method has been developed whereby the evaporator temperature is carried below the dew point a sufficient amount to insure dehumidification and then the cold air is heated to the proper temperature by passing it over coils through which part of the high temperature liquid from the compressor is bypassed.

During the heating season humidification is desirable from a comfort standpoint, but the proper amount of humidification required would doubtless cause the windows to become frosted. A steam or water spray controlled by a humidistat will provide the necessary moisture if humidification is desired.

TEMPERATURE CONTROL

The control of the air conditioning equipment should be simple but at the same time as nearly automatic as possible. The use of a centralized control panel for all control switches, fuses, relay, etc., will simplify the installation and operation. Generally, separate thermostats are used for heating and cooling control. The best location for the thermostats depend upon the car layout and method of air distribution and can best be determined for any particular type of car and equipment by careful consideration of the several factors involved. The floor heat thermostats are usually located near the floor. The overhead heat and cooling thermostats are placed in the upper part of the car, sometimes in the air ducts. All thermostats should be located so that the air can circulate freely around them. Maintenance of uniform comfort conditions for cooling,