referral to Schedule F which is issued by the *Bureau of Internal Revenue* and summarized in Table 2.

Interest

The interest charged to the cost of ownership may be based upon the average interest rate for the period during which the first cost of the equipment will be amortized. While some accountants do not include interest in the annual fixed charges and consider it a negligible item, the money invested in air conditioning, heating, or ventilating equipment, must be either borrowed or diverted from the owner's funds and converted to the

TABLE 2. PROBABLE USEFUL LIFE OF EQUIPMENT[a]

	LIFE IN YEARS
1. HEAT PRODUCING EQUIPMENT	
(a) Boilers	20
(b) Stokers and burners	20
2. HEAT DISTRIBUTING EQUIPMENT	
(a) Piping—copper	same as bldg.
(b) Piping—iron	20
(c) Radiation—concealed	25
(d) Radiation—direct	25
(e) Valves and specialties	10
3. AIR HANDLING EQUIPMENT	
(a) Filters—automatic	20
(b) Heating and cooling coils	20
(c) Spray humidifiers and dehumidifiers	10
(d) Fans	15
(e) Air conditioning units	10
(f) Motors	20
(g) Electrical starting equipment	20
(h) Pneumatic control systems	15
(i) Electric control systems	15
4. AIR DISTRIBUTING EQUIPMENT	
(a) Ductwork	same as bldg.
(b) Outlets, grilles	15
(c) Duct insulation	20
5. REFRIGERATING EQUIPMENT	
(a) Centrifugal refrigerating machines	20
(b) Reciprocating refrigerating machines	20
(c) Motors and starters	20
(d) Piping—copper	20
(e) Piping—steel	20
(f) Pumps	20
6. WATER SAVING DEVICES	
(a) Evaporative condensers	15
(b) Cooling towers	15
(c) Wells	25

[a] Taken from *U. S. Bureau of Internal Revenue* Schedule of Probable Useful Life, revised 1942.

purpose of making the installation. Whether it is borrowed or taken from surplus funds, the money that might have been earned as interest is properly chargeable to the operation of the system.

The formulas for computing interest and amortization are given in Table 3. This table also serves as a check list for the various items to be considered in calculating the cost of ownership and operation.

Taxes

The taxes which may be charged to the property as a result of the improvement due to the installation of an air conditioning system will vary according to the practice of the official agencies levying property taxes.

Insurance

Insurance against losses by fire is ordinarily secured by increasing the building fire insurance coverage to cover all or part of the first cost of installing the air conditioning and other mechanical systems. Various types of extended coverage are available for protection against a number of other types of losses.

Boiler insurance may be extended to cover the air conditioning equipment to protect against losses due to explosion, rupture of piping, and similar hazards. Since insurance rates vary widely depending upon the type of structure in which the equipment is located and the nature of the owner's business, the rates are usually set by rating organizations specializing in this work. Exact figures on insurance cannot be determined without consultation with the owner's underwriter.

TABLE 3. OWNING AND OPERATING COST

FIRST COST	
Cost of mechanical system	
Other costs	
First Cost (FC)—Total	
ANNUAL FIXED CHARGES	
Amortization—Depreciation period Y years	
Interest rate i%	
Amortization and Depreciation $\frac{FC}{Y} =$	
Interest: $\frac{Y+1}{2Y} \times i \times \text{cost} =$	
Taxes	
Insurance	
Rent	
Annual Fixed Charges: (Total)	
ANNUAL MAINTENANCE COSTS	
Replacement or servicing of air filters	
Outside Maintenance service	
Water Treatment	
Lubricating oil and grease	
Painting for corrosion protection or other purposes	
Replacement of worn parts	
Refrigerant	
Wages of engineer or operator	
Annual Maintenance Cost—Total	

ANNUAL SERVICE COST	
Electric Power Costs	
Fans	
Pumps—Chilled water	
Pumps—Condenser water	
Pumps—Well water	
Cooling tower fans	
Cooling tower pumps	
Refrigeration machines	
Miscellaneous or other	
Gas	
Coal	
Oil—for boilers or Deisel engines	
Steam	
For Direct Heating	
For Ventilation—preheaters	
For Ventilation—reheaters	
For Turbine driven equipment	
For Engine driven equipment	
Sewers	
Charges for discharging water into public drainage systems	
Condenser water	
Annual Service Costs: Total	
SUMMARY	
Annual Fixed Charges	
Annual Service Costs	
Annual Maintenance Costs	
Annual Owning and Operating Costs—Total	

Rent

If the equipment under consideration is to be located in rented or leased quarters, or if additional space must be rented, such expense becomes a fixed charge.

MAINTENANCE COSTS

Maintenance charges consist of expense for labor and material necessary to make repairs and replace parts, as well as cleaning, painting, inspection, etc. for the purpose of eliminating or minimizing the need for repairs. Generally, routine maintenance labor requirements will be the function of an operating engineer or staff. If the responsibility of this group may