



## Lab 9

# Air Conditioning Maintenance

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### Adjusting the system for optimum efficiency

Proper service, troubleshooting, and planned maintenance will keep a system operating at peak efficiency. It is recommended that air conditioning systems be serviced at least once a year, both indoor and outdoor units.

#### Indoor Unit

1. Clean the unit, specifically the coil, squirrel cage, and condensate drain.
2. Replace or clean the filter.
3. Check all electrical connections and make sure they are tight.
4. Test for voltage and/or amperage at each part and make sure that the components are functioning within the manufacturer's specifications.
5. Make sure the thermostat is functioning properly.

Note: Do not use an acid based chemical to clean the indoor coil.

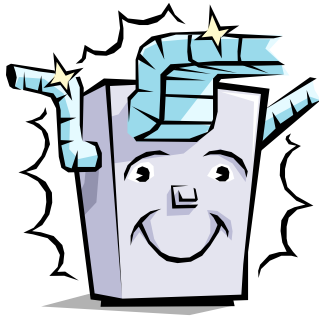
#### Outdoor Unit

1. Clean the coil.
2. Remove restrictions from around the coil, if applicable.
3. Check all electrical connections and make sure they are tight.
4. Test for voltage and/or amperage at each part and make sure that the components are functioning within the manufacturer's specifications.
5. Check the fan blade for stress cracks.

#### Refrigerant Charge

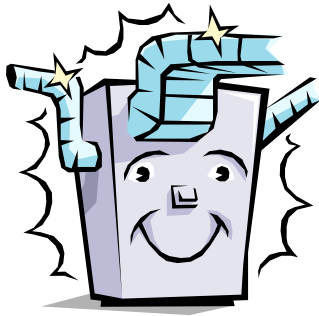
1. Make sure that the unit is charged according to the manufacturer's specifications.
2. Measure the air flow.
3. Determine ATD (air temperature drop) and/or ATR (air temperature rise).

The attached "Service Check List" can be useful when adjusting a system for optimum efficiency or when performing annual maintenance.



## Lab 9 Air Conditioning Maintenance

Air Conditioning Maintenance Service Check List	Manufacturer's Specifications	Actual Values	Adjustments
<b>Indoor Unit</b>			
Line Voltage Control Voltage			
Filter Condition (Clean or Dirty)			
Evaporator Coil (Clean or Dirty)			
Squirrel Cage Fan (Clean or Dirty)			
Air Flow across the Coil (CFM)			
Condensate Drain (Clean or Dirty)			
Blower Motor (Voltage & Amps) Bearings (Oiled or Need Replacing)			
Return Air Temperature			
Discharge Air Temp @ Point A			
Air Temperature Drop			
<b>Outdoor Unit</b>			
Line Voltage			
Condenser Coil (Clean or Dirty)			
Debris around the Condenser (Clear or Restricted)			
Temp Touch Test (Ambient, Cool, Warm, or Hot) Suction Line leaving the Evaporator Suction Line entering the Compressor Top of Compressor Sides of Compressor Discharge Line leaving the Compressor Liquid Line leaving the Condenser			
Fan Motor (Voltage & Amps) Bearings (Oiled or Need Replacing)			
Fan Blade (Stress Cracks, Tight or loose hub)			
Capacitor MFD Rating Condition (Open, Shorted, Leaking, or Good)			
Compressor (Voltage & Amps)			
Outside Ambient Temperature			
<b>Refrigerant Charge</b>			
Discharge Pressure & Temperature			
Liquid Line Temperature			
Subcooling			
Suction Pressure & Temperature			
Suction Line Temperature			
Superheat			



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### Planned Maintenance

Planned maintenance is routine work that needs to be done in order to preserve the life of your equipment and/or property. A well established planned maintenance program will allow you to control the work load, the budget, and personnel. Plus, it will help minimize emergency work that involves costly repairs. Most work assignments should be scheduled; e.g.: grounds daily, punch-out and inspections weekly, inventory control monthly, filter cleaning or replacement quarterly, and HVAC maintenance seasonally.

We recommend preseason maintenance on your air conditioning equipment. Caution: Disconnect power to the outdoor unit before performing service.

1. Clean condensing coils. Dirty condensing coils will increase head pressure and decrease the operating efficiency of the equipment by approximately 20%. Dirty condensing coils are also the number one cause of capillary tube failure. Such failures require extensive and costly repairs.

Note: Most suppliers stock coil cleaners. Select a solution that is acid based for the outdoor coil and non-acid based for the indoor coil. Follow the manufacturer's instructions when applying the application; for example: dilute one part coil cleaner with three parts water, spray the solution into the coils from the bottom up using an acid resistant sprayer, wait three to five minutes, and rinse the coils thoroughly with water. Allow the unit to dry for 30 minutes before placing back into service.

2. Lubricate all motors and bearings, if applicable. Motors with oiling ports add 10 drops of electric motor oil for each bearing every two years. A few drops of oil can avoid timely and expensive repairs. Motors without oiling ports are pre-lubricated and sealed. No further lubrication is required.

Also, check the motor bearings by moving the shaft up and down, in and out, and side to side. A maximum of 1/8 inch endplay is acceptable, but the side to side motion should be zero. Excessive end play from the shaft may prompt a replacement.

Clean the motor housing to prevent the possibility of overheating.

3. Check fan blades for stress cracks. When stress cracks form, the blade eventually breaks and when that happens, the blade usually slings into the condensing coil causing major damage. It is much easier to change a fan blade before it breaks rather than repairing a damaged condensing coil.
4. Check all electrical connections. Loose connections in the service disconnect, the compressor, contractor, etc. will increase amp draw in the electric circuit. High amp draw leads to overheated motors, pitted and discolored contacts, blown fuses, and eventual system failure.



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# Air Conditioning Maintenance

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5. Clean the evaporator coil because the unit will not cool properly if dirty. Cooling takes place in the evaporator by absorbing heat into the refrigerant, and if the evaporator coil is dirty, the air flow will be restricted not allowing the heat to be absorbed.

Use a non-acid based solution to clean these coils. Follow the manufacturer's instructions when applying the application; for example: [1] turn the system OFF, [2] dilute one part cleaner with four parts water, [3] spray the solution into the coils using a low or high pressure sprayer, saturate thoroughly, [4] condensate will rinse the coils.

6. Replace dirty filters or rinse dirty filters with clear water. Also, don't forget to check v-belts, pulleys, and blower wheels. When not maintained these components will lead to icing and/or freezing coils, followed by reduced efficiency.

A properly installed and well-maintained air conditioning system can last well beyond guarantees offered by the manufacturer and the contractor. More importantly, a well-established maintenance program is cost effective and will save money. Service calls will be reduced, homeowners and/or tenants will be happier, and it will free you to perform other duties.