HVAC 101

Module 1 of 10

What is HVACR?

Mechanical Service Contractors of America's HVAC 101 curriculum gives non-trade personnel a better understanding of HVACR terms, basic systems and the visual tools they need in successful day-to-day interactions with customers and coworkers.

Each webinar-and-workbook module includes the most fundamental industry concepts, presented in a thorough real-world way that will help your workforce to better understand our business.

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What Is HVACR?

Learning Objectives

At the end of this webinar, you will be able to:

1. Explain the acronym HVACR.
2. Identify the five goals every HVAC system tries to accomplish.
3. Describe the types of buildings and facilities where technicians work.
4. List the three primary methods of heating a room or facility.
5. Explain the difference between natural ventilation and forced ventilation.
6. Determine the four functions of an air conditioning system.
7. Explain the goal of refrigeration systems.
8. Explain the type and amount of training required for a journeyman.

Welcome to the world of HVACR, or mechanical services as it is called by those of us in the business. Your decision to pursue a career in this industry is one which will provide you with exciting growth opportunities, stimulating challenges, and a great deal of job satisfaction as you strive to meet the day-to-day needs of those customers who use your company's services. While this work can be demanding – and even stressful at times – you are likely to find it a highly gratifying occupation where your own contributions can have an immediate and positive impact on your career, your company and its operations.

Over the next few months you will be participating in a series of webinars that will give you a greater understanding of what is involved in running an HVACR service business. You will be taken through all aspects of the operation, including what kinds of services are provided, the types of systems and equipment involved, the different ways services are provided to customers, who is responsible for the various service functions, and what resources are available to you in doing your job. By using the ten **HVAC 101** webinars and workbooks produced for you by the **Mechanical Service Contractors of America**, you will be able to do this from the comfort of your own desk or conference room. Rest assured, the technology, mysterious acronyms, and other confusing aspects of this business will quickly start to make sense. Soon you will develop a greater understanding of the inner workings of the business through this webinar series, allowing you to become more confident and effective in your job.

What Mechanical Service Companies Do

What is the first thing that comes to mind when you hear the words "mechanical services"? To those outside the industry, the words are probably most often associated with automobiles and individuals who work on them. However, the only similarity between automobile mechanics and the technicians who are employed in mechanical services is that they maintain and repair things. But that's only a small part of what HVACR businesses do for customers.

The mission of the service company is very simple: to control the environment inside a building to insure the comfort of its occupants. While it is not generally feasible for anyone to control the outside environment – Mother Nature takes care of that! – mechanical service companies do have the ability to control the environment inside the building, making it possible for the occupants to conduct their day-to-day activities effectively, and for certain systems or processes to continue to operate properly. Most of us take "air" for granted. As long as we are comfortable, little thought is given to the equipment that allows us to function without impediment.

The mission of the mechanical services company is to control the environment inside a building to ensure the comfort of its occupants.

But what does comfort really mean to most people, and why is it so important to accurately control the indoor environment to assure their comfort? Studies conducted by The American Society of Heating, Refrigerating and Air-Conditioning Engineers, the technical society for the HVACR industry have determined that on average, people working in an indoor environment are most comfortable when the temperature stays within a few degrees of the range of 72 to 77 degrees Fahrenheit, depending on the season.

ASRHAE studies have also found that the indoor humidity and the air flow around people must be controlled within a similarly narrow range to be considered comfortable for most individuals. If the temperature is even a few degrees hotter or colder than this allowable range, the humidity becomes a little too high, or the air is contaminated with annoying odors, the level of discomfort rises quickly and effectiveness at our jobs and other activities can be dramatically reduced. It is the goal of mechanical services companies to make sure this comfort range is always maintained in the narrow range satisfactory to their customers.

The Language of HVACR

Learning the language of the mechanical services industry may be intimidating to outsiders. At first glance it almost seems like learning a foreign language because many of the terms used are unique and exclusive to this field. To the newcomer, this can make communication frustrating when unusual acronyms and abbreviations are routinely used by service technicians and other experienced professionals who assume everyone around them speaks the same language. Regardless, you can develop a good basic understanding of the business by taking a little time to become familiar with the different systems and the terminology that goes with them.

THE MECHANICAL SERVICES FAMILY

Heating
Ventilation
Air
Conditioning
Refrigeration

Let's begin with the simplest and most often used acronym: HVACR. Building climate is determined by three functions: **Heating**, **Ventilation**, and **Air Conditioning**, which are all closely interrelated. This discipline is often shortened to simply HVAC, referring primarily to environment control for the comfort of occupants in a building. The letter R, which stands for **Refrigeration**, is often included at the end of this abbreviation. This reflects the fact that mechanical services companies may also provide environment control for applications like food coolers, storage freezers, or ice rinks where the purpose is not people comfort, but rather safe and efficient operation of a manufacturing process or commercial activity. In some companies, plumbing and electrical services related to the HVACR installation are also included under the mechanical services umbrella.

Early HVACR systems were primarily mechanical, thus the name mechanical services. However, modern HVAC installations are sophisticated systems using complex electronic controls, so **controls** are another important area that HVACR companies provide support for and something that will be discussed in future webinars.

HVACR System Goals

There may be a great deal of complexity surrounding systems the technician is charged with fixing or maintaining, but the ultimate goal of these systems is easy to understand. A properly functioning HVACR system will do the following:

1. Regulate temperature and humidity
2. Circulate appropriate volumes of fresh air
3. Filter contaminants from air
4. Be unobtrusive and quiet
5. Operate efficiently and economically

Services Offered

HVACR companies may choose to offer a variety of services to customers, depending on their available resources and marketing focus. While smaller companies may choose to offer limited services, established HVACR companies usually try to be **one-stop shops** that can provide a complete range of services, starting at the "drawing board" where a system is first designed, continuing with construction and installation of the designed system, and concluding with ongoing maintenance needed to keep installations in peak operating condition. Generally, these services can be classified into three functional areas:

DESIGN	Creating and planning out in graphic form a system for a particular purpose
CONSTRUCTION	Building and putting the designed system in place
MAINTENANCE	Maintaining and keeping the system in good condition so it operates at maximum efficiency

Besides these functional areas, each company may elect to focus on different categories of customers, such as residential, health care, education, or government, and also develop special capabilities with different types of equipment or technology, like solar or geothermal systems, for example. The systems that may be serviced can vary greatly due to such factors as age, construction, use, occupancy, geographic area, and original design. Heating, ventilation, and air conditioning operations may each be provided as independent systems that are inter-connected or as combinations where all functions are integrated in one or more pieces of equipment. In general, each HVACR company develops a business

strategy that determines which functional services, customer types, and markets it elects to address. Opportunity and profit potential will vary across these different business areas, but these strategy choices will determine the total range of services the company ultimately offers to customers.

Where Mechanical Services Providers Work

Service technicians normally work on HVACR systems that provide comfortable indoor climates for people or perhaps stabilize environments for safe food storage or efficient industrial processes. The types of environments they are called to work in are as varied as the buildings and manufacturing processes being supported. Depending on age, size and purpose for which the building is used, technicians might find themselves working in an equipment room, on the roof, in a walk-in freezer, or in the basement of a major facility. The most common types of buildings and facilities where technicians work are:

- Commercial Buildings
- Manufacturing Plants
- Single and Multi-family Residences
- Industrial Processing Plants
- Institutional Facilities
- Food and Retail Establishments

Heating Systems

When the weather is cold outside, people want their indoor room temperature to be warm and comfortable. Buildings may use **gas boilers**, **electric heating coils**, or even **geothermal** sources of heat, with water, steam, or air as the transfer medium carrying heat as desired to different zones throughout the building. The system consists of **piping** and **ductwork** which takes the heated fluid or forced heated air into different parts of the building. Often the same piping or ducting may be used for heating or air conditioning to add or remove heat from various building zones people occupy. In typical commercial installations, equipment for the heating system is usually housed in a **central mechanical room**.

Ventilation

Ventilation simply refers to the changing of air in any space to remove stale air, moisture, odors, smoke, heat, bacteria, or other airborne contaminants. At home we simply open a window to clear the air of unwanted smoke or odors. This is referred to as **natural ventilation** because we are ventilating a space without using a fan or other mechanical system. However, because windows in most commercial buildings cannot be opened, a mechanical system, or **forced ventilation** is used to control indoor air quality. Ventilation includes both the exchange of air to the outside as well as circulation of air within the building. Forced air that is carried through ductwork is usually filtered or sometimes put through more elaborate air cleaners to keep it fresh and prevent irritating particles or odors from entering the working environment. Proper ventilation is one of the most important factors for maintaining acceptable indoor air quality in buildings. Ventilation related equipment is often distributed in the central mechanical room, on rooftops, and in the indoor zones serving building occupants.

Air Conditioning

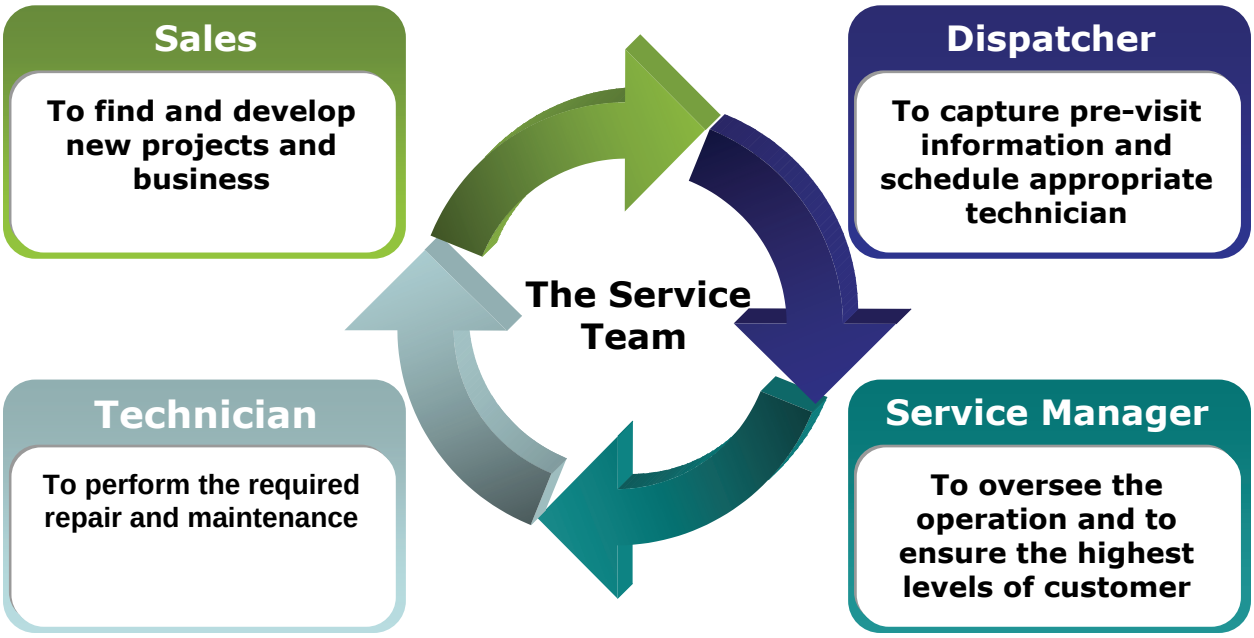
When the weather is too warm, occupants want their indoor spaces to be cooler, and sometimes less humid than the outside air. An air conditioning system provides heating, cooling, ventilation, and humidity control for all or part of a building. It does this by moving heat and humidity taken from zones people occupy to someplace outside the building environment. We often think of an air conditioning system as being one that only cools an area. On the contrary, air conditioning simply "conditions air" to whatever temperature is required. Central air conditioning systems are often installed in offices and public buildings. Older buildings sometimes require a **retrofit** which means new equipment or systems must be installed in a building that was not designed to receive them. This equipment is most often located on the rooftop or in a location outside the building.

Refrigeration Systems

The goal of **refrigeration** is to cool a space or substance so that it is below the environmental temperature. Refrigeration systems are used chiefly to store food and other perishables at low temperatures in order to prevent bacteria, yeasts and molds from growing. Technicians who work on these systems often cool spaces to a temperature as low as minus 190 degrees Fahrenheit. In addition to freezers and walk-in coolers used in restaurants and other food service establishments, refrigeration specialists may work on skating rinks, hockey arenas, food production, or industrial processes that require lower temperatures.

The Mechanical Service Team

Operating a mechanical service company is similar to running a medical clinic. Just as there is a team of doctors, nurses, and support staff required to attend to the patient, the broken mechanical system requires a well-educated MD, or "mechanical doctor" to fix it as well. While doctors meet with patients to determine their illnesses, technicians usually visit the customer site, using their knowledge to assess the situation and perform additional tests or measurements to "diagnose" HVACR system problems. Based on the results, they offer a "prescription" for the best solution, and "implement a resolution" for the problem. The diagram below shows how HVACR business gets developed, service gets requested, customer satisfaction is maintained, and HVACR problems are resolved.



It takes an entire team of professionals to make the service organization operate efficiently and effectively. For further information regarding roles and responsibilities of each team member, see the job descriptions in the appendix at the end of this section.

Training and Education

Like any other working professional, service technicians go through a rigorous and extensive training program to gain competence required to work on mechanical systems. As with medical doctors, their training consists of a combination of classroom training and on-the-job experience. In this case, training is conducted under the guidance of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada.

The **UA**, as it is commonly known, is a multi-craft union whose members are engaged in fabrication, installation and servicing of piping systems. There are approximately 326,000 highly-skilled United Association members who belong to over 300 individual local unions across North America.

It serves as a collective voice for workers through negotiation and collective bargaining with employing contractor groups, such as this association and the Mechanical Contractors Association of America. In addition to HVACR service technicians, the United Association also provides training for pipefitters, plumbers and sprinkler fitters, and other trades that work on mechanical systems.

ON-THE-JOB EXPERIENCE		UA TRAINING * CURRICULUM		RESULT
5 YEARS 	**+**	▪ Mechanical and Electrical Principles ▪ Controls ▪ Air Conditioning and Refrigeration ▪ Heating ▪ Steam Systems ▪ Ventilation ▪ Piping ▪ Lifting Equipment ▪ Safety and Environmental ▪ Applied Math and Blueprint Reading ▪ Customer Service	**=**	**JOURNEYMAN'S CARD**

* See Appendix for five year HVACR Service Technician Apprentice Curriculum

The following table outlines different stages of training and types of work that can be performed by individuals holding each classification.

JOB CLASSIFICATION	DESCRIPTION ACCORDING TO AGREEMENT
SERVICE JOURNEYMAN *Highly qualified service technician who has completed apprenticeship and passed journeyman test. Possesses overall knowledge of all types of HVAC systems.*	▪ Skilled craftsman in their trade ▪ Minimum of five (5) years actual practical working experience ▪ May be required to pass an examination as to their skills ▪ Allowed to perform all work covered under the agreement
SERVICEMAN *Less experienced service technician qualified to perform preventative maintenance on existing installations. Not yet certified to carry a journeyman card. Labor costs are lower than those of a Journeyman.*	▪ Must have practical working experience in their trade ▪ May be required to pass an examination ▪ Work scope includes all work necessary to keep residential and unitary systems operating in an efficient manner ▪ May assist journeymen in the repair of centrifugal and absorption machines, screw chillers and ammonia systems for the purpose of further developing their technical skills ▪ May attain journeyman status with sufficient training and work experience.
SERVICE APPRENTICE *An entry-level technician serving an apprenticeship, who works at the direction and guidance of a service journeyman or serviceman.*	▪ Governed by the local apprenticeship committee ▪ Allowed to perform all work in the service and maintenance field, limited only by their capabilities ▪ Shall be under the direction of a Serviceman or Service Journeyman
TRADESMAN *A stand-alone job classification typically performing routine maintenance tasks. May attain advanced classification through a service apprenticeship program.*	▪ Allowed to perform routine maintenance and inspections on all existing systems, including systems operations under contract with customer; filter changing; oiling and greasing; belt adjusting or replacement; cleaning of cooling towers, coils, evaporator and condenser tubes; water treatment; general housekeeping; truck driving, including pick-up and delivery of parts or equipment; indoor air quality (IAQ) related work; installation and replacement of all residential single unitary heating, air conditioning and plumbing systems; and drain and sewer cleaning

One other member of the trade not to be overlooked is the **pipefitter**, who is also sometimes called a **steamfitter**. Their responsibility is to lay out, assemble, fabricate, maintain and repair piping systems for industrial processes and heating and cooling. Pipefitters require a separate license and are trained and tested to a different standard.

Education and training do not end when the technician obtains his or her journeyman's license. Today's mechanical professional faces a challenging dilemma. Technology being designed into today's buildings is ever-changing, requiring technicians to have more advanced, updated knowledge of how to maintain them. At the opposite end of the spectrum from the latest equipment are older systems that may require a completely different skill set due to their obsolete nature, the age of the building, or original design limitations. Both categories of systems, the newest and the oldest, may require the services of "specialists" – those who have additional training and experience on specific types of equipment. In addition to understanding the complexities of each **original equipment manufacturer's (OEM)** products, technicians may further specialize in other areas of the mechanical industry such as those listed below.

SPECIFIC AREAS OF TECHNICAL EXPERTISE

Absorption Units	Air Distribution	Air Filtration	Air Washers
Automation Systems	Boilers	Burners	Centrifugal Chillers
Computer Rooms	Controls	Convectors	Converters
Cooling Towers	Electrical	Evaporative Cooling	Fire Alarm Systems
Heat Recovery	Heat Pumps	Humidifiers Ice	Machines
Make-Up Air Units	Package Systems	Pumps	Reciprocal Chillers
Refrigeration	Screw Chillers	Solar Systems	Sprinkler Systems
Water Balancing	Water Treatment		

It takes a great deal of time, energy, talent, and dedication to acquire skills necessary to be an effective technician. To the non-technical person who works in this industry, the types of systems, the vocabulary, and the names of parts that go into those systems can seem overwhelmingly complex. Future webinars are designed to give you a better understanding and confidence level, allowing you to feel more comfortable when conversing with those who are more technically savvy.

MSCA and Its Education Opportunities

The **Mechanical Service Contractors of America (MSCA)** is a national trade association of more than 1,400 HVACR service contractors. The common bond for all these companies is that their technicians have completed the highly acclaimed UA training and apprenticeship programs. MSCA provides training opportunities and management education for all levels of personnel in this industry. Seminars, conferences, and webinars are offered to members at the local and national levels throughout the year. The training calendar, books and other resources available for managing and growing service businesses can be found at the association website, www.msca.org.

The Future of Mechanical Services

When you think about it, there will always be a demand for services that make us more comfortable and productive in our working environments. Today's modern buildings and systems require skilled technicians who understand the mission with which they have been tasked. Price-conscious building owners and managers are looking for mechanical service providers that can enhance energy efficiency, decrease operating costs and prolong building life.

As a result, more skilled technicians are needed to provide repairs and maintenance every year. In fact, the U.S. Department of Labor *Occupational Outlook Handbook* predicts the HVACR service technician industry will grow by 18 to 26 percent between 2004 and 2014. This means skills learned in the HVACR training program are likely to always be in demand.

The Green Movement

The mechanical services industry plays an important role in advancing new technology, higher levels of efficiency, and new environmental standards that benefit users of HVACR systems. One area currently of great interest involves the "green" building performance standards program, known as LEED, established by the U. S. Green Building Council (USGBC).

LEED stands for **L**eadership in **E**nergy and **E**nvironmental **D**esign. It is a third-party certification program that provides nationally accepted benchmarks for the design, construction, and operation of high performance green buildings in five key areas of human and environmental health. Those areas are: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. For mechanical services companies that choose to address LEED requirements, this represents an additional specialization and business opportunity as customers request greater focus on building energy efficiency and environmental responsibility represented by LEED standards.

Test Yourself

Name: _____
Company: _____

Complete this test and return to: Mechanical Service Contractors of America
1385 Piccard Drive, Rockville, MD 20850-4340
Or fax to MSCA: (301) 990-9690

1. Which of the following goals does a technician try to achieve when designing, installing, or maintaining a mechanical system?

    a. Circulate and filter fresh air
    b. Operate efficiently and economically
    c. Be unobtrusive and quiet
    d. Regulate indoor temperature
    e. All of the above

2. Which of the following is **not** a way in which commercial buildings are typically heated?

    a. Lava rock
    b. Water
    c. Steam
    d. Air

3. Resources and other information regarding the operation of a service business can be found at which of the following websites?

    a. www.msca.org
    b. www.mcaa.org
    c. www.ua.org
    d. All of the above
    e. None of the above

4. A person who has completed the classroom training, five years of on-the-job work experience and met other UA and local licensure requirements is a(n):

    a. Serviceman
    b. Tradesman
    c. Journeyman
    d. Apprentice

5. Natural ventilation is achieved by using a fan near an open window to either draw cool air in or force warm air out.

    a. True
    b. False

[continued on next page]

6. Hospitals, jails, schools, and government facilities are examples of what type of building?

   a. Commercial
   b. Manufacturing
   c. Industrial
   d Institutional

7. An air conditioning system may perform which of the following functions?

   a. Ventilation, cooling, humidity control, heating
   b. Humidity control, ventilation, cooling, water pressurization
   c Heating, water pressurization, humidity control, cooling
   d Cooling, humidity control, gas pressurization, ventilation

8. All of the following are part of the HVACR acronym except:

   a. Air
   b. Ventilation
   c. Conditioning
   d. Reciprocal

9. Refrigeration technicians may be required to cool a space to temperatures as low as minus 190 degrees Fahrenheit.

   a. True
   b. False

10. LEED refers to which of the following:

    a. Air conditioning equipment
    b. Heating system
    c. An HVAC industry group
    d. Green building certification

Appendix

JOB DESCRIPTIONS
For a typical Mechanical Service Company

These are sample job descriptions of positions normally found in a mechanical service company. The size of the company will dictate which of these positions may be filled. If the company is small some functions may have to be combined and if the company is very large other functions may have to be added.

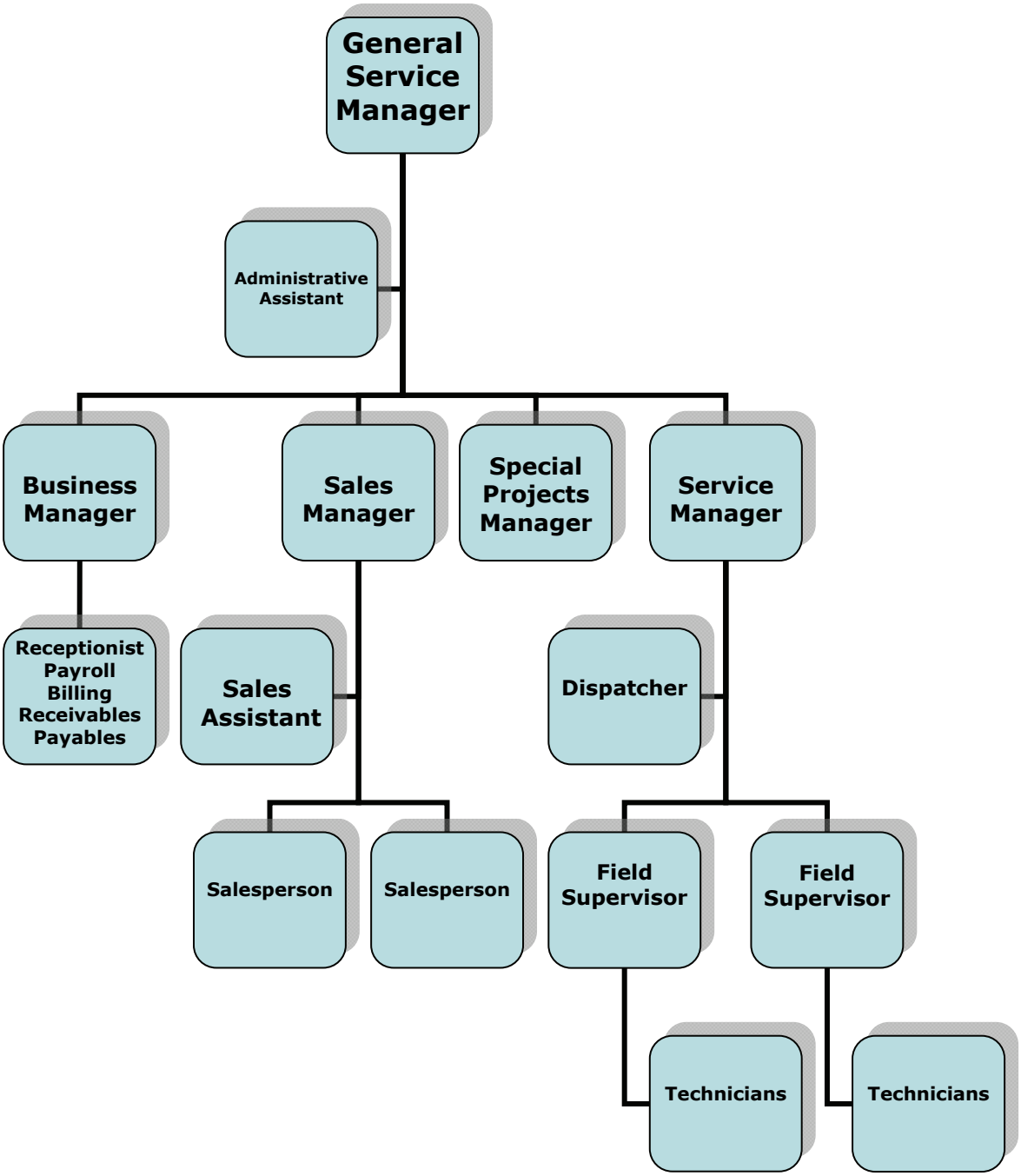
Job descriptions and organizational charts help explain reporting relationships and provide for rational salary ranges. Job descriptions however, do not explain the role of the job function.

Organizational chart #1 is typical of a very large multifaceted mechanical service company. Positions will vary as to the particular plateau the company has achieved.

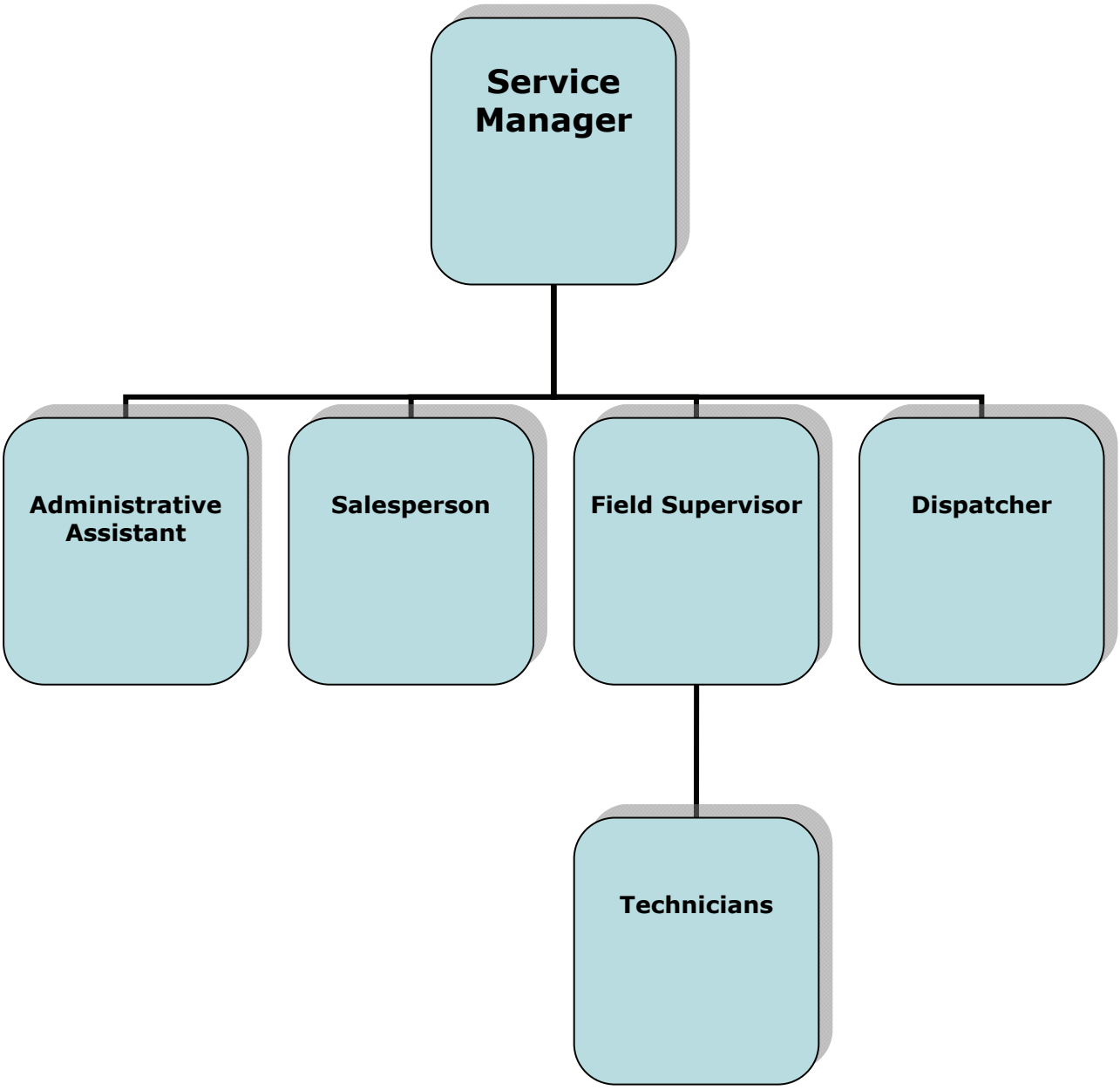
Organizational chart #2 is representative of a small service company where the service manager has to perform all of the functions, with some clerical support.

In summary, individual companies must modify these sample job descriptions to fit their company's situation.

ORGANIZATIONAL CHART #1
Typical Large Multifaceted Mechanical Service Company



ORGANIZATIONAL CHART #2
Typical Small Service Company



TITLE: SERVICE GENERAL MANAGER

PURPOSE
General management of a major product line business unit. Responsible for planning, business development, marketing, engineering, financial planning and control. Operates within the overall company strategic business plan and is responsible for developing an operating plan for the business unit. Works within company guidelines for capital investment, resource allocation, general accounting and human resource policies.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Bachelor's degree in business or engineering or equivalent, with a minimum of ten (10) years in the mechanical service industry. Management, organizational, administrative and strong communication skills are a prerequisite.

PRINCIPAL GOALS AND RESPONSIBILITIES
Within the limits of company policies, the General Manager of Service plans and approves budgets and, consistent with the company management philosophy, has the responsibility and commensurate authority to implement the company's operating plans -- both directly and through subordinates.

PHYSICAL REQUIREMENTS
Employees hired for this position must be able to perform essential functions of this job without imposing significant risk of substantial harm to the health or safety of themselves or others. This position is sedentary in nature, requires minimal physical movement, and requires frequent use of a personal computer.

TITLE: ADMINISTRATIVE ASSISTANT

PURPOSE:
Provide administrative support to the Service Manager. Assist department managers with personnel, capital expenditures and coordinate customer service complaints.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Associate degree or equivalent with a minimum of five to eight (5 to 8) years secretarial experience. Solid knowledge of business-related software along with good communication skills is required.

PRINCIPAL GOALS AND RESPONSIBILITIES
Within the limits of company policies and consistent with management philosophy, the Administrative Assistant Service has the responsibility and commensurate authority to accomplish directly or through subordinates the following duties:

Review all contract documents for quotes and bids to the private sector and governmental agencies; read and evaluate all contracts before signing for hold harmless and indemnification clause; communicate with insurance and bonding company for all major contracts; assist management to prepare subcontracts.

- Assist the Service Manager in daily activities, marketing, advertising, sales meetings, and planning.
- Supervise clerical personnel.
- Write help-wanted advertisements; prescreen and test applicants; prepare annual reviews.
- Prepare advertisements for publication; interact with the marketing agency; prepare and maintain the advertising file for mailing to customers and potential clients.
- Accept and perform special assignments as required.

PHYSICAL REQUIREMENTS
This position is secondary in nature. Heavy use of a personal computer is required.

TITLE: BUSINESS MANAGER

PURPOSE:
Provide additional financial support and analysis to the General Manager and company department managers.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Bachelor's degree in Business Administration, Accounting or equivalent, with a minimum of seven to ten (7 to 10) years experience in a service environment. Good understanding of computers and business related systems are required.

PRINCIPAL GOALS AND RESPONSIBILITIES
Within the limits if company policies, and approved budgets and consistent with the management philosophy, the Business Manager has the responsibility and commensurate authority to accomplish directly or through subordinates the following:

- Furnish general and cost accounting services and analysis, such as low profit, customer profitability, service agreement analysis, truck operating, labor hour analysis, project cash flow review, bid preparation, etc.

- Perform financial analysis and audits including, status of customer billings and receivables; coordinate account receivables with appropriate sales engineers or department managers; execute credits, redistribution of labor and material; and maintain write-off account balance sheet.

- Assist department managers as necessary in establishing controls and systems to increase cash flow and streamline accounting procedures.

- Attend weekly staff meetings; report on financial results and recommend controls, which would improve overall efficiency.

- Coordinate entire process of new customers, service agreement write-ups, agreement renewals, and facility agreement job set-ups, project and quoted jobs.

PHYSICAL REQUIREMENTS
Position is of a sedentary nature. May be required to use a personal computer.

TITLE: DISPATCHER

PURPOSE
Coordinate customer service requests and preventive maintenance programs with the assignment of appropriate field service personnel.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Vo-Tech or High School diploma or applied experience in the mechanical service industry. Excellent communication and organizational skills necessary. Good telephone skills as well as good customer relations are required.

JOB RESPONSIBILITIES

- Coordinate with the service operations manager the assignment of appropriate field personnel for service calls, start-ups, and warranty jobs.
- Direct the assignment of field personnel to perform preventive maintenance and fixed price repairs.
- Coordinate the assignment of field personnel to perform inspections of air conditioning and heating equipment, air conditioning units, chillers, boilers, refrigeration equipment, and rooftop units.
- Assign field personnel to service calls according to availability of appropriate equipment and closest location to projects.

Order materials and coordinate back-ordered parts and filters delivery.

PHYSICAL REQUIREMENTS
This job is primarily sedentary in nature. Requires heavy use of a personal computer.

TITLE: FIELD SUPERVISOR

PURPOSE
Provide supervision and technical support to the technicians working within their area. Ensure quality workmanship.

EDUCATION, SKILLS AND EXPERIENCE REQUIRED
Seven (7) years relevant experience supervising trade technicians. Sales and customer service experience in a mechanical service environment preferred.

PRINCIPAL GOALS AND RESPONSIBILITIES
Provide technical assistance and on-site training for team members.

Ensure completion of maintenance and repair within the scheduled time frame and provide for the response to unscheduled calls in the absence of the assigned technician.

In collaboration with the dispatcher ensure adequate manpower to accomplish work within team area. Keep the Service Manager and dispatcher advised of needs and performance of mechanics.

Carry out quality checks on work performed by technicians. Report deficiencies to the Service Manager.

Ensure compliance to the company Safety Program and other policies and procedures. Ensure team members are informed and practice safe work habits and use the appropriate safety equipment.

PHYSICAL REQUIREMENTS
Employees hired for this position must be able to perform the essential functions of this job without imposing significant risk of substantial harm to the health or safety of themselves or others. This position requires lifting, bending and stooping. Requires the ability to lift up to 30 pounds alone and more than 30 pounds with additional assistance. The position also requires the ability to drive, move in and out of vehicles, and climb ladders.

TITLE: OPERATIONS MANAGER

PURPOSE
Manages the production side of the service department, including the execution of service products, by the efficient use of field personnel. Collaborates with the Sales Manager and other management personnel to maximize customer satisfaction.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Bachelor's degree or equivalent with eight (8) years experience in a service environment. Excellent communication and demonstrated management skills.

JOB RESPONSIBILITIES
Plan, organize, direct and control all customer service obligations, including purchasing, office production, and parts distribution, special contracts and technical activities.

Assure all departments within all branches are properly organized, staffed and directed. Approve manpower allocations and insure all personnel are properly qualified, trained, and supervised to perform their duties respectively.

Manage and control resources to achieve profitability and growth goals.

Work closely with the service sales manager to ensure customer commitments are met.

Conduct training sessions addressing technical problems, policies, procedures, safety, hygiene and governmental requirements.

PHYSICAL REQUIREMENTS
Employees hired for this position must be able to perform the essential functions of this job without imposing significant risk of substantial harm to the health or safety of themselves or others. Ability to drive, move in and out of vehicles, climb ladders, traverse steps, move through a facility and operate a personal computer.

TITLE: SALES MANAGER

PURPOSE
Develops and implements marketing programs to achieve objectives for sales growth and margin contribution. Directs the sales activities and coordinates information and support from all other departments.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Bachelor's degree or equivalent work experience with a successful record in service contract, repair and modernization sales. Must possess excellent communication, administration and management skills.

PRINCIPAL GOALS AND RESPONSIBILITIES

- Meet Company service sales objectives through the development and execution of the service sales plan, including staffing levels and compensation programs.

- Promote company image, cultivate and maintain strong customer relationships and seek customer feed back as to the company's service products and quality.

- Monitor, evaluate and report all major competitive activities and ensure continuous improvement of the companies' products and services. Maintain an active sales account list, which will include key customer accounts and a cross section of the industry by various market niches.

- Increase the effectiveness of the sales team through continuous training, coaching and development.

PHYSICAL REQUIREMENTS
Employees hired for this position must be able to perform the essential functions of this job without imposing significant risk of substantial harm to the health or safety of themselves or others. Ability to drive, move in and out of vehicles, climb ladders, traverse steps, move throughout a facility and use a personal computer.

TITLE: SALES REPRESENTATIVE

PURPOSE
Prospect and obtain maintenance service and retrofit sales contracts within assigned territory to meet company volume and profit objectives. Promote the company's name, image and capabilities.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
BA/BS or equivalent plus a minimum of five (5) years experience in selling or mechanical maintenance services. Position requires excellent communication, negotiating, account management and selling of tangible and intangible products and services.

PRINCIPAL GOALS AND RESPONSIBILITIES

- Continually develop qualified maintenance/service and retrofit prospects to ensure consistent flow of business, maintain good will of current sources and accounts through periodic call-back and entertain clients as required.

- Prepare itinerary, make calls, and follow up on sales leads and opportunities within the assigned market or territory; solicit information from building owners developers, maintenance personnel, and business contacts regarding the nature of the work, budget limitations, method of qualifying, bid process, and identity of competition.

- Organize relevant technical data, brochures, and service manuals; develop or assist in the preparation of bid proposals; make sales presentations to prospective customers to qualify the company for inclusion on a select bid list or consideration as an exclusive party to the contract maintenance agreement.

- Assist in the collection of delinquent accounts; resolve customer complaints; render corrective action within the realm of authority.

PHYSICAL REQUIREMENTS
Employees in this position must be able to perform the essential functions of this job without imposing significant risk of substantial harm to the health or safety of themselves or others. Ability to drive, move in and out of vehicles, climb ladders, traverse steps, move throughout a facility and use a personal computer.

TITLE: SPECIAL PROJECTS MANAGER

PURPOSE
Manage all aspects of the Service Projects Department including securing mechanical design and Installation work of a modernization nature. Provide leadership and direction for maintaining customer satisfaction.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
B.A./B.S. in Engineering or equivalent. Technical mechanical background along with five to seven (5 to 7) years experience in the mechanical/service industry. Strong administrative and communication skills required. Knowledge of business software preferred.

PRINCIPAL GOALS AND RESPONSIBILITIES
Within the limits of company policies, plans and approved budgets and consistent with management philosophy, the Special Projects Manager has the responsibility and authority to accomplish directly or through subordinates the following duties.

- Directly supervise Project Managers, Estimators, clerical staff and field personnel.
- Review all estimates and participate in negotiating for better vendor/subcontractor pricing.
- Supervise and support air and water balancing work.
- Responsible for all business areas associated with the Service Projects Group, i.e., revenue, gross profit, budgets, personnel, etc.
- Coordinate with the Operations Manager staffing levels of steamfitters, plumbers and electricians to deliver prompt, high quality service project work to customers.
- Provide technical and supervisory assistance on all project work and inspect job sites routinely to ensure quality control and safety procedures are followed.

PHYSICAL REQUIREMENTS
The person in the position must be able to perform the essential functions without imposing significant risk or substantial harm to the health or safety of themselves or others. Position requires frequent field visits and must drive, move in and out of vehicles, climb ladders and generally move throughout a facility.

TITLE: SERVICE TECHNICIAN

PURPOSE
Responsible for servicing, maintaining, modifying, renovating and repairing all mechanical equipment, such as air conditioning, ventilation, heating and refrigeration systems on a regular or emergency basis.

EDUCATION, EXPERIENCE AND SKILLS REQUIRED
Trade school or apprentice training, with experience in the mechanical equipment trade and possessing good communication skills, including oral and written communication.

PRINCIPAL GOALS AND RESPONSIBILITIES
Consults with supervisor and dispatcher on a timely basis regarding job requirements and obtain customer approval for work not previously authorized.

Responsible for keeping neat and clean while on company business.

Follows industry and hygiene and safety practices and utilizes protective equipment furnished by the company.

Responsible for performing all work in accordance with company standards and adheres to all company policies and procedures.

Keeps current on equipment and systems knowledge by maintaining service manuals and attending union and company training classes.

Completes payroll and customer reports in a neat and professional manner.

Responsible for maintaining a valid driver's license.

Responsible for caring and maintaining company tools and vehicle in accordance with company procedures.

PHYSICAL REQUIREMENTS
Employees employed for this position must be able to perform the essential functions of the job without imposing significant risk or substantial harm to the health and safety of themselves and others. The position requires lifting up to 30 pounds alone and over 30 pounds with additional assistance. Ability to drive, move in and out of vehicles, climb ladders, traverse steps and move through a facility is required.

UA Five Year HVACR Service Technician Apprenticeship Curriculum

YEAR 1	Training Hours	Lab Hours
General Safety Practices/OSHA Ten Hour Certification	30	45
UA Heritage	30	
Thermal Dynamic Theory and Application		
Theory	10	15
Matter and Energy	10	15
Refrigeration Cycle and Refrigerants	10	15
Tools and Equipment		
Tools and Equipment	7	10.5
Fasteners	5	7.5
Tubing and Piping	10	15
Calibrating Instruments	8	12
Basic Electricity and Magnetism	30	45
Copper Tube Soldering and Brazing	30	45
Basic Math		
Basic Math Review	5.5	
Common Fractions	5.5	
Decimal Fractions	6	
Ratio and Proportion	6	
Percent, Percentage and Discount	6	
Units of Measurement	6	
Formulas for Related Mathematics	6	
Basics of Customer Service	18	
YEAR 2		
Refrigerant Safety	8	
Refrigerant Characteristics and Handling		
Refrigerant Oil Chemistry and Management	18	27
System Evacuation	18	27
System Charging	17	25.5
Electric Motors		
Types of Electric Motors	14.25	21
Application of Motors	13	19.5
Motor Controls	13	19.5
Troubleshooting Electric Motors	13	19.5
Controls		
Introduction to Automatic Controls	26	39
Automatic Control Components and Application	27	40.5
Basic Commerical Refrigeration		
Evaporators and the Refrigeration System	14	21
Condensers	13	19.5
Compressors	13	19.5
Expansion Devices	13	19.5
Customer Relations	9	13.5
EPA Universal Certification (CFC)	20	
R-410A Certification	20	

YEAR 3			
Air Conditioning (Heating and Humidification)			
	Electric Heat	18	27
	Gas Heat	7	10.5
	Oil Heat	7	10.5
	Hydronic Heat	8	12
	Indoor Air Quality	7.5	11.25
Air Conditioning (Cooling)			
	Comfort and Psychometrics	18	27
	Refrigeration Applied to Air Conditioning	18	27
	Air Distribution and Balance	18	27
	Installation	18	27
	Controls	18	27
	Typical Operating Conditions	18	27
	Troubleshooting	18	27
Mechanical		36	
Blueprint Reading		36	
Controls		36	54
Customer Relations		18	27
YEAR 4			
Intermediate Commercial Refrigeration			
	Special Refrigeration System Components	22	33
	Applicaton of Refrigeration Systems	22	33
	Commercial Ice Machines	22	33
	Special Refrigeration Applications	22	33
	Troubleshooting and Typical Operating Conditions for Commercial Refrigeration	22	33
All Weather Systems			
	Electric, Gas and Oil Heat for Electric A/C	35	52.5
	Air Source Heat Pumps	36	54
	Geothermal Heat Pumps	36	54
Lifting and Rigging		8	
Customer Relations		9	13.5
YEAR 5			
Chilled Water Air Conditioning Systems			
	High Pressure, Low Pressure and Absorption Chilled Water Systems	92	138
	Cooling Towers and Pumps	30	45
	Operation, Maintenance and Troubleshooting of Chilled Water A/C Systems	30	45
Pneumatic Controls		30	
UA STAR Exam Review		20	
Steam Systems		12	
Advanced Automatic Controls		14	21
Customer Relations		8	12
Final Exam - UA STAR HVACR Exam			

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