Carrier University
Training Materials Catalog

Service, Controls and HVAC System Design

Theory, Skills and Equipment Training
for teaching, self-study and presentations
Willis Carrier
a sustaining vision

Over 100 years ago, a humble but determined engineer solved one of mankind's most elusive challenges by controlling the indoor environment. A leading engineer of his day, Carrier would file more than 80 patents over the course of his career. His genius would enable incredible advancements in health care, manufacturing processes, research, building capacities, food preservation, transportation, art and historical conservation, general productivity, indoor comfort and much more.

Carrier's foresight changed the world forever and paved the way for over a century of once-impossible innovations. Yet in addition to being an accomplished inventor, he was also an avid outdoorsman. Carrier recognized the power and beauty of the natural environment. This appreciation of our world and its resources continues to guide Carrier Corporation today.

Harnessing the same vision and determination Willis did so many years ago, the men and women of Carrier work every day to accomplish more with less, and preserve resources for future generations. We have a unique willingness to develop new technology, the confidence to revise proven designs, and the ability to deliver results with every new installation.

Above all, we will never rest on our accomplishments, but instead consistently look for ways to improve—our products, our environment and our world.

Willis wouldn’t have it any other way.
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If you are a Carrier/Bryant distributor, please contact Carrier University for information on obtaining training materials that are no longer available in the catalog.

Phone: 800-644-5544
Fax: 860-660-6087
Email: carrieruniversity@carrier.utc.com
ABC’s of Air Conditioning
This training course has two major parts. Part 1 has four sections that describe the basic principles of air conditioning systems. In the first section of Part 1 it describes how the ambient environment influences human body comfort. The next section covers the air cycle and how air is used to deliver and maintain comfort. The last two sections of Part 1 cover the refrigeration cycles used to control temperature and humidity. Part 2 covers the types of equipment used in residential and commercial buildings to control comfort conditions. Knowledge skill checks are provided in this text.

Basic Refrigeration Cycles
This training course describes the three basic types of vapor compression refrigeration cycles: positive displacement, non-positive displacement and absorption. The operation of the compression used in each cycle is explained and where each type is typically applied. The compressor types covered include scroll, reciprocating, rotary, screw and centrifugal. The training also addresses single and double effect absorption systems. Knowledge skill checks are provided in this text.

Inside the Heat Pump
This training program provides a broad overview of air source heat pumps. Topics covered include theory of operation, components and their function, and proper installation techniques. Knowledge skill checks are provided in this text.

Introduction to Air Conditioning – Module 1
This module explains HVAC terminology and covers: heat, molecules, heat and temperature, heat transfer and kinds of heat. Skill checks of the material covered are included.

Temperature and Pressure – Module 2
This second module covers basic concepts of temperature and pressure including: measuring heat, graphing heat, rate of heat transfer and pressure. Skill checks of the material covered are included.

The Refrigeration Cycle – Module 3
This module introduces the function of the four major components including: basic refrigeration cycle, closed cycle, mechanical refrigeration system components, and how to read a P-H (Pressure-Enthalpy) diagram. Skill checks of the material covered are included.

Systems – Module 4
This module describes various types of air conditioning systems including: types of systems, refrigeration systems, packaged systems, split systems and other systems. Skill checks of the material covered are included.

Compressors — Module 5
This module introduces basic compressor types, construction, function and capacity including: reciprocating, rotary, scroll and centrifugal. Skill checks of the material covered are included.

Condensers — Module 6
This module covers operation of condensers, condenser types, construction, condenser capacity and how condenser problems relate to system troubleshooting. Skill checks of the material covered are included.

Evaporators — Module 7
This module covers the evaporation process, DX and chilled water types and construction, capacity, relationship to the PH chart and troubleshooting. Skill checks of the material covered are included.

Metering Devices — Module 8
This module covers metering devices both modulating and fixed orifice control including: operation, types, construction, troubleshooting and shows the expansion process and superheat control within the refrigeration cycle. Skill checks of the material covered are included.

Electrical and Refrigerant Controls — Module 9
This module introduces primary, secondary and safety controls including: thermostats, pressurestats, solenoids, reversing valves, timers, overloads and relays. Skill checks of the material covered are included.

HVAC Introductory Basics
For individuals new to the HVAC industry, these training materials will give the student a better understanding of fundamental HVAC topics. These materials are appropriate for individual study or by instructors of HVAC training. Topics include mechanical refrigeration cycle, comfort, heat pump basics, HVAC equipment types, HVAC system types and compressors. These programs have books, PowerPoint presentations, quizzes and self-study materials.

HVAC Theory Training

For HVAC service technicians starting their career, these training materials provide the student fundamental knowledge to become more effective in servicing mechanical air conditioning systems. Key topics include: HVAC terminology, refrigeration cycle, system types, compressors, condensers, evaporators, metering device, refrigerant system controls and basic troubleshooting. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

General Air Conditioning Training – Fundamentals

For HVAC service technicians starting their career, these training materials provide the student fundamental knowledge to become more effective in servicing mechanical air conditioning systems. Key topics include: HVAC terminology, refrigeration cycle, system types, compressors, condensers, evaporators, metering device, refrigerant system controls and basic troubleshooting. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

Inside the Heat Pump
This training program provides a broad overview of air source heat pumps. Topics covered include theory of operation, components and their function, and proper installation techniques. Knowledge skill checks are provided in this text.

Book .............................................................. 06-020-528 .............. 10.00
*Instructor USB ................................................. 06-020-530A ............ 50.00

Includes a non-printable copy of the book, PowerPoint presentation, narrated version for self-study, a version of the self-study suitable for use on a learning management system, instructor support material and quizzes.

Evaporators — Module 7
This module covers the evaporation process, DX and chilled water types and construction, capacity, relationship to the PH chart and troubleshooting. Skill checks of the material covered are included.

Systems – Module 4
This module describes various types of air conditioning systems including: types of systems, refrigeration systems, packaged systems, split systems and other systems. Skill checks of the material covered are included.

Compressors — Module 5
This module introduces basic compressor types, construction, function and capacity including: reciprocating, rotary, scroll and centrifugal. Skill checks of the material covered are included.

Condensers — Module 6
This module covers operation of condensers, condenser types, construction, condenser capacity and how condenser problems relate to system troubleshooting. Skill checks of the material covered are included.

Inside the Heat Pump
This training program provides a broad overview of air source heat pumps. Topics covered include theory of operation, components and their function, and proper installation techniques. Knowledge skill checks are provided in this text.

Book .............................................................. 06-020-537 .............. 10.00

HVAC Introductory Basics
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HVAC Theory Training

For HVAC service technicians starting their career, these training materials provide the student fundamental knowledge to become more effective in servicing mechanical air conditioning systems. Key topics include: HVAC terminology, refrigeration cycle, system types, compressors, condensers, evaporators, metering device, refrigerant system controls and basic troubleshooting. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

General Air Conditioning Training – Fundamentals

For HVAC service technicians starting their career, these training materials provide the student fundamental knowledge to become more effective in servicing mechanical air conditioning systems. Key topics include: HVAC terminology, refrigeration cycle, system types, compressors, condensers, evaporators, metering device, refrigerant system controls and basic troubleshooting. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

Inside the Heat Pump
This training program provides a broad overview of air source heat pumps. Topics covered include theory of operation, components and their function, and proper installation techniques. Knowledge skill checks are provided in this text.

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Includes a non-printable copy of the book, PowerPoint presentation, narrated version for self-study, a version of the self-study suitable for use on a learning management system, instructor support material and quizzes.

Evaporators — Module 7
This module covers the evaporation process, DX and chilled water types and construction, capacity, relationship to the PH chart and troubleshooting. Skill checks of the material covered are included.

Systems – Module 4
This module describes various types of air conditioning systems including: types of systems, refrigeration systems, packaged systems, split systems and other systems. Skill checks of the material covered are included.

Compressors — Module 5
This module introduces basic compressor types, construction, function and capacity including: reciprocating, rotary, scroll and centrifugal. Skill checks of the material covered are included.

Condensers — Module 6
This module covers operation of condensers, condenser types, construction, condenser capacity and how condenser problems relate to system troubleshooting. Skill checks of the material covered are included.

Inside the Heat Pump
This training program provides a broad overview of air source heat pumps. Topics covered include theory of operation, components and their function, and proper installation techniques. Knowledge skill checks are provided in this text.

Book .............................................................. 06-020-537 .............. 10.00
Refrigeration Cycle Accessories — Module 10
This module addresses eight of the most common accessories used in refrigeration systems including: filter driers, sight glass/moisture liquid indicators, accumulators, crankcase heaters and mufflers. Skill checks of the material covered are included.

Textbook of Modules 1 to 10
Bound book which contains a copy of each of the modules 1 to 10 of the General Air Conditioning Training Fundamentals books.
Book ................................................................. 022-025 ............... 58.75

Introduction to Air Conditioning – Module 1
Book ................................................................. 022-001 ............... 7.75

Temperature and Pressure – Module 2
Book ................................................................. 022-003 ............... 7.75

The Refrigeration Cycle – Module 3
Book ................................................................. 022-005 ............... 7.75

Systems – Module 4
Book ................................................................. 022-007 ............... 7.75

Instructor Set USBs Modules 1 to 10
Instructor versions of all 10 modules are available for free download on Carrier University Online under Training Resources.

General Air Conditioning Training – Applied
For HVAC service technicians with some experience or who have completed the modules of Fundamental AC Service training, these materials will help build basic troubleshooting skills. Key topics include: refrigerants, refrigerant piping, dehydration, charging, recovery, installation procedures, heat pumps, part load and troubleshooting. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

Refrigerant Characteristics – Module 1
This module discusses refrigerant types, characteristics, properties, environmental impacts, and proper application and safe handling for new and replacement refrigerants used in air conditioning and refrigeration systems. Skill checks of the material covered are included.

Refrigerant Oils – Module 2
This module covers refrigerant oils including kinds, performance qualities, problems and how they are properly applied with new, replacement refrigerants and change out procedures. Skill checks of the material covered are included.

Refrigerant Piping – Module 3
This module covers refrigerant piping to help you spot and modify obvious field piping errors. Topics covered are piping requirements, sizing, flash gas, insulation, support, piping loops and vibration and noise. Skill checks of the material covered are included.

System Dehydration – Module 4
This module discusses problems with moisture and their effect on air conditioning systems. Topics include: how moisture gets in, keeping moisture out and the importance of moisture elimination during evacuation. Skill checks of the material covered are included.

Charging, Recovery, Recycling and Reclamation – Module 5
This module explains how to charge, recover and recycle halocarbon refrigerants. Topics covered include: tools and equipment used, refrigerant recovery and charging procedures. Skill checks of the material covered are included.

Installation Procedures – Module 6
This module covers system installation practices including planning, piping, brazing, wiring, pump down, prestart checks, and startup and safety essentials. Skill checks of the material covered are included.

Heat Pumps – Module 7
This module covers the heat pump including: types, its operation, benefits and disadvantages, operating economics, servicing concerns and how water-source heat pumps can provide heat reclaim in commercial buildings. Skill checks of the material covered are included.

Part Load – Module 8
This module discusses operation at part load and how problems often show up at part load rather than at full capacity. Topics include: capacity control strategies, equilibrium, capacity control methods, impacts on various systems and effect of equipment oversizing. Skill checks of the material covered are included.

Troubleshooting – Module 9
This module covers basic troubleshooting techniques including: diagnostic tools, mechanical troubleshooting, electrical troubleshooting. Also included are several practical exercises along with troubleshooting, logic, information, and charts. Skill checks of the material covered are also included.

Textbook of Modules 1 to 9
Bound book which contains a copy of each of the modules 1 to 9 of the General Air Conditioning Training – Applied books.
Book ................................................................. 022-125 .......... 58.75

Set of Instructor USBs Modules 1 to 9
Instructor versions of all 9 modules are available for free download on Carrier University Online under Training Resources.

Trouble Diagnosis Chart
This diagnostic tool helps isolate common mechanical refrigeration system problems quickly and incorporates both the Basic Symptom Analysis and Refrigerant-side Troubleshooting form used in Module 9.
Chart ................................................................. 022-050 ............... 8.00
General Heating Training

For HVAC service technicians starting their career, these training materials will give the student fundamental knowledge to become more effective in servicing gas heating systems. Key topics include: combustion process, gas furnaces, ignition systems, burners and controls, installation practices, venting and troubleshooting. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

Introduction to Gas Heating – Module 1
This module introduces four of eight foundation blocks to understanding gas heating systems: 1) Heat; 2) Molecules, Heat and Temperature; 3) Heat Transfer; 4) Pressure. Skill checks of the material covered are included.

Principles of Gas Combustion – Module 2
This module introduces the remaining four foundation blocks building on the first four introduced in Module 1: 5) Gas Properties; 6) Combustion Theory; 7) Practical Combustion; and 8) Efficiency. Skill checks of the material covered are included.

Gas Furnaces – Module 3
This module discusses basics of gas furnaces and heating systems including furnace design, gas system components, furnace controls, and heating system controls and components. Skill checks of the material covered are included.

Gas Burners – Module 4
This module covers gas burners and the part they play in the combustion process. Topics include: theoretical flame characteristics; burner design; actual flame characteristics; combustion system; and pilot burners. Skill checks of the material covered are included.

Gas Controls – Module 5
This module focuses on the components of the system that provide gas in a controlled combustion process. Covered are: gas pressure regulators, manual and automatic gas valves, combination gas controls and troubleshooting gas valves. Skill checks of the material covered are included.

Gas Ignition Systems – Module 6
This module explains the three types of ignition systems commonly used in furnaces. Topics covered include: standing pilot, re-ignition pilot and direct burner ignition. Skill checks of the material covered are included.

Gas Safety and Operating Controls – Module 7
This module covers the common safety controls and operating controls required to safely and efficiently operate a gas furnace system. Covered are: safety controls, limit switches, fan controls, operating controls, thermostats and zoning controls. Skill checks of the material covered are included.

Furnace Installation Practices – Module 8
This module covers gas furnace installation practices. Topics include: planning, designing and selecting equipment; proper gas piping techniques; and installation practices. Skill checks of the material covered are included.

Ventilation and Combustion Air – Module 9
This module discusses proper system design to provide ventilation air for combustion and venting of combustion gases. Topics include: vent categories, Category I vent design basics, Category I vent design, flue sizing and combustion air requirements, and Category IV venting, sizing and combustion air. Skill checks of the material covered are included.

Gas Troubleshooting – Module 10
This module covers basic troubleshooting practices. Topics covered include: basic adjustments of gas input and primary air, making efficiency checks, troubleshooting furnace combustion problems, and identify and correct heating system operation problems. Skill checks of the material covered are included.

Textbook of Modules 1 to 10
Bound book which contains a copy of each of the modules 1 to 10 of the General Heating Training books.

Instructor USBs Modules 1 to 10
Instructor versions of all 10 modules are available for free download on Carrier University Online under Training Resources.
General HVAC Electricity Training

For HVAC service technicians starting their career, these training materials help build their skills in the most important area of technician training, electrical troubleshooting. Key topics include: electrical components, Ohm’s law, reading wiring diagrams, DC and AC circuits, meters and electrical test equipment, motors, electrical troubleshooting and electronic controls. These materials can also be used by instructors of HVAC training. Most topics contain programs for self-study and instructor-led training with skill assessment tests.

Introduction to Electricity – Module 1
This module introduces electrical terminology and basic electricity concepts. Covers Ohm’s Law, power, series and parallel circuits. Skill checks of the material covered are included.

Electrical Components and Their Symbols – Module 2
This module introduces basic air conditioning circuits and introduces electrical diagrams and symbols. Topics include: magnetism, use of magnesium in electrical components, transformers, relays, electrical circuit protection, thermostats and switches and wiring diagrams with their symbols. Skill checks of the material covered are included.

Wiring Diagrams – Module 3
This module discusses safety practices and introduces additional electrical components. Step-by-step construction of a simplified wiring diagram, covering power, control, and load circuits for a typical packaged air conditioner with electric heat. Skill checks of the material covered are included.

Wiring Diagram Exercises – Module 4
This module covers step-by-step construction of a wiring diagram for a heat pump to teach more advanced electrical diagram reading skills and control circuit concepts. Skill checks of the material covered are included.

Electric Meters and Their Uses – Module 5
This module discusses the construction of various types of meters and explains their applications. Meters covered include ammeters, voltimeters and Ohmmeters. Sample problems illustrate the use of meters in electrical troubleshooting and testing. Skill checks of the material covered are included.

Alternating Current Fundamentals – Module 6
This module explains alternating current and its use in air conditioning systems. Topics covered include: basic concepts, generators, motors, capacitors, phase shift, and alternating current (AC) power distribution systems. Skill checks of the material covered are included.

Motor Fundamentals and Motor Protection – Module 7
This module covers basic theory and operation of common single-phase and three-phase AC induction motors, including motor starting circuits. Describes the various types of protective devices used with motors. Skill checks of the material covered are included.

Electronic Devices and Circuits – Module 8
This module discusses basic concepts, packaging, and troubleshooting of electronic circuits used in comfort air conditioning. Topics covered include: semiconductors, timing and sensing devices, and the use of microprocessor controls in comfort applications. Skill checks of the material covered are included.

Electrical Troubleshooting – Module 9
This module describes and illustrates techniques for troubleshooting electrical and electronic circuits with a focus on control circuits, motors and compressors. A number of troubleshooting practice exercises are included along with troubleshooting charts. Skill checks of the material covered are included.

Textbook of Modules 1 to 9
Bound book which contains a copy of each of the modules 1 to 9 of the General HVAC Electricity Training books.

Book ......................................................... 022-225 ............... 58.75

Introduction to Electricity – Module 1
Book ......................................................... 022-201 ................. 7.75
Book* ..................................................... 06-022-270 ............. 7.75
Instructor Guide* ...................................... 06-022-299 ............. 7.75
*Not included in Textbook of Modules 1 to 9 (022-225)

Electrical Components and Their Symbols – Module 2
Book ......................................................... 022-203 ................. 7.75

Wiring Diagrams – Module 3
Book ......................................................... 022-205 ................. 7.75

Set of Instructor USBs Modules 1 to 9
Instructor versions of all 9 modules are available for free download on Carrier University Online under Training Resources.
**Servicing Training**

### Service Skills

For HVAC service technicians desiring to improve their basic skills, these training materials will cover the following topics: safety, understanding wiring diagrams, electronic controls, brazing, air measurement and electrical troubleshooting. These materials can also be used by HVAC instructors as part of an HVAC training program.

### Safety Guide for Refrigeration and Air Conditioning Equipment

Use this guide to promote safety awareness for people who own, operate or maintain refrigeration and air conditioning equipment.

- Book ............................................................... 020-111 ............... 15.00

### Air Properties and Measurement

This program analyzes and defines the properties of air, illustrates use of a psychrometric chart, discusses air measurement procedures and instruments, reviews fan laws and airflow calculations used to solve air side problems. Quizzes with answers are provided.

- Book ............................................................... 020-253 ............... 9.00

### Charging Procedures for Residential Condensing Units

This program covers superheat and subcooling charging methods and procedures for assuring correct system airflow using the Superheat/Subcooling Charging Calculator/Slide Rule. Quizzes with answers are provided.

- Book ............................................................... 020-122 ............ 12.50

### Refrigerant Service Techniques

This training program covers: refrigerants, safety, minimizing contamination of systems, management and containment systems, charging tools and equipment, and service procedures used on centrifugal and reciprocating refrigeration equipment. Quizzes with answers are provided.

- Book ............................................................... 020-650 ............. 10.25

### Electrical Troubleshooting

Program describes a practical step-by-step path, the hopscotch method, to quickly diagnose and correct electrical circuit problems. Quizzes with answers are provided.

- Book ............................................................... 020-057 ............. 5.25

### Troubleshooting Residential Cooling Systems

This program covers common problems encountered with residential cooling systems and how to correct them. Quizzes with answers are provided.

- Book ............................................................... 020-107 ............ 15.00

### Troubleshooting Heat Pumps (Residential-Light Commercial)

Covers preliminary inspection, insufficient air, improper defrost, excessive electrical consumption, proper refrigerant charge and special components. Quizzes with answers are provided.

- Book ............................................................... 020-111 ............ 15.00

### Troubleshooting Furnaces

This training program describes common service problems encountered with gas furnaces and how to correct them. Topics covered include: pilot lighting problems, limit switch cycling, indoor comfort issues, furnace and venting corrosion, and condensing furnace problems. Quizzes with answers are provided.

- Book ............................................................... 020-109 ............ 15.00

### Troubleshooting Rooftops

Program helps technicians to troubleshoot rooftop units and to identify common problems. Use of a maintenance log and diagnostic trend chart is stressed to help technicians recognize abnormal operating conditions. Quizzes with answers are provided.

- Book ............................................................... 020-125 ............ 15.00

### Troubleshooting Reciprocating Liquid Chillers

This program presents typical chiller operation, operation checks, symptoms of common problems, troubleshooting examples and exercises. This program assumes the student has an understanding of basic principles of chiller operation. It features a typical job visit and use of a maintenance log to compare design temperatures to actual system readings. Quizzes with answers are provided.

- Book ............................................................... 020-115 ............ 15.00

PowerPoint presentations for the topics in this series are available for free download at Carrier University Online under Training Resources.

### HVAC Service Handbooks

These service training materials provide a ready reference source to processes and procedures every service technician needs to know. These books cover procedures for HVAC service, installation and maintenance. These handbooks can also be used as a textbook for HVAC training courses.

### HVAC Installation Procedures

This reference handbook covers the installation procedures encountered in residential and light commercial HVAC systems. The book is printed on specially coated paper so it may be kept as a resource in the service truck. This handbook includes sections on hand and power tools, piping practices, electrical hook-ups and duct installation. Additional sections cover installation of split systems, furnaces and packaged heating and cooling products. Valuable startup and checkout sheets are included.

- Book ............................................................... 020-038 ............ 34.00

### HVAC Servicing Procedures

This reference handbook covers the typical service procedures encountered in residential and light commercial HVAC systems. This book is printed on specially coated paper so it may be kept as a resource in the service truck. This handbook includes four major sections: Instruments and Devices, Safety, General Service Considerations, and Service Procedures, plus a Full Glossary and set of Pressure Temperature Charts.

- Book ............................................................... 020-040 ............ 34.00
HVAC Maintenance Procedures
This reference handbook covers the typical maintenance procedures encountered in most residential and light commercial HVAC systems. This book is printed on specially coated paper so it may be kept as a resource in the service truck. The book’s eight sections include well-illustrated, step-by-step maintenance information in: preventive, safety, general procedures, electrical, gas furnace, oil furnace, split and packaged systems and accessories maintenance.

Service Calculators and Forms
These tools and materials support HVAC service procedures and many are referenced in our HVAC service training books and training classes. Materials include superheat and subcooling calculators, gas manifold calculators and chiller maintenance logs.

Superheat/Subcooling Charging Calculator/Slide Rule for R-410A Systems
Slide rule helps calculates proper charge for R-410A systems with TXV metering device (subcooling method) or non-TXV metering devices (superheat method).
For use with R-410A systems.......................... 020-517 .............. 4.00

Refrigerant R-22 Superheat/Subcooling Charging Calculator/Slide Rule
Slide rule helps calculates proper charge for R-22 systems with TXV metering device (subcooling method) or non-TXV metering devices (superheat method).
For use with R-22 systems............................. 020-434 .............. 4.00

Puron® Subcooling Calculator
Puron® R-410A on one side and R-22 on the other. Also includes TXV troubleshooting tips.
Calculator ...................................................... 06-020-640 ........ 4.00

Natural Gas Furnace Manifold Pressure Calculator
Uses slide rule calculator to determine gas furnace manifold pressure in residential furnace applications.
Calculator ...................................................... 020-444 .............. 4.75

Compressor Training
Training materials covering general knowledge and troubleshooting of scroll, hermetic and semi-hermetic reciprocating compressors. Product-specific training for Carrier 06D and 06E compressors is also in this section.

Why Compressors Fail II
This program will help the technician servicing semi-hermetic compressors to identify the cause of a compressor failure and the associated symptoms, identify the root cause of the failure and take corrective action to prevent a repeat failure. Text also includes troubleshooting tips, an analysis section and a quiz on the materials in the program.
Book English Version................................. 020-346 .............. 9.50

Cleanup After Burnout
This program will act as a guide to show a technician how to diagnose a burnout, how to determine the type mild or severe burnouts and how to clean up the system to prevent repeat failures. Text includes a quiz on the materials in the program.
Book .......................................................... 020-262 .............. 7.75

Carlyle 06D, 06E, 06CC Semi-Hermetic Compressors
This training program covers Carrier’s 06D, 06E and 06CC semi-hermetic compressors. The program covers product-specific features and components, servicing procedures, troubleshooting and other product-specific characteristics. The text includes a text and troubleshooting tips.
Book .......................................................... 020-338 .............. 7.75

06D & 06E Compressor (Pocket) Service Guide
Handy reference for 06D and 06E compressors includes model identification, service procedures, parts and electrical data.
Book .......................................................... 020-611 .............. 4.25

Carlyle 5, 6 Line Compressors Capacity Control
This program explains the installation, operation and troubleshooting of bypass and suction cutoff unloaders used in Carlyle open drive and semi-hermetic compressors. Text includes a quiz on the materials in the program.
Book .......................................................... 020-300 .............. 7.75

Carlyle 5-Line Compressor
The program describes the procedure to tear down and rebuild the Carlyle 5 line open drive compressors. Covered are procedures for lubrication system, head and valve assemblies and internal components.
Book .......................................................... 020-502 .............. 7.75

Troubleshooting (Semi-Hermetic) Compressors and Systems
This program describes a three-step approach to determining interrelated compressor and system problems. Text relates pressure, temperature and electrical readings to possible problems. Text includes system analyzer and quiz.
Book .......................................................... 020-113 .............. 15.00
Technical HVAC Design Training

HVAC Design Fundamentals
These training materials are designed to help HVAC contractors, engineers and designers to effectively design, specify, sell and apply HVAC equipment in commercial applications. Materials in this group cover basic topics that all HVAC system designers need to understand. Topics include: load estimating, duct design, psychrometrics, system selection, water piping and pumps, and controls.

Industry Overview
This training program provides a general overview of the commercial HVAC industry, providing an awareness of: the design process, participants in the design and construction process, documents involved in construction, a typical timeline of activities in the design and construction process, and how these activities are influenced by the different participants in the process including regulatory agencies and legal concerns. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 06-796-025 .............. 18.00

ABCs of Comfort
This program deals primarily with the design and operation of comfort air conditioning and is intended to introduce system designers to the parameters that influence human comfort, and how the air system and mechanical refrigeration system work together to control these conditions. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-026 .............. 18.00

Concepts of Air Conditioning
This program deals with the functions an air conditioning system must perform to provide comfort air conditioning. Topics covered include: air conditioning definitions, classification of systems, types of systems, with their components, building zoning considerations and how systems control multiple building zones. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-027 .............. 18.00

Psychrometrics Level 1: Fundamentals
Psychrometrics is the study of the air and water vapor mixture. Proficiency in the use of the psychrometric chart is an important tool for designers of air conditioning systems. This program is an introduction to air-vapor mixtures, the information obtained from the chart, and plotting the eight basic air conditioning processes. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-030 .............. 18.00

Load Estimating Level 1: Overview
An overview of commercial load estimating includes: what a load estimate is and how it is used, heat transfer methods, building load components, solar radiant energy and other climatic conditions, and explains how external site-related conditions affect building heat gains and losses. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 06-796-085 .............. 18.00

Load Estimating Level 2: Fundamentals
The fundamentals of commercial load estimating are covered in this program. Topics include: understanding the various load components, the data necessary to select heating and cooling equipment, how the load estimate determines cooling capacity and airflow cfm. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-034 .............. 18.00

Principles of Mechanical Refrigeration Introduction
This module deals with the way heat is moved from a place of lower temperature to a place of higher temperature in a process called mechanical refrigeration. Topics covered include: basic heat transfer, principles of the refrigeration system, mechanical refrigeration cycle, four basic components, heat pumps and refrigerants. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 06-796-037 .............. 18.00

Duct Design Level 1: Fundamentals
This module discusses commercial duct design presenting a step-by-step design process covering such aspects of duct design as zoning, load determination, layout, sizing and determining static pressure losses for system fan selection. After completing the module, participants will be able to manually size ductwork using either a friction chart or a duct calculator. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-043 .............. 18.00

Water Piping and Pumps
In this module the design of water piping and pumping systems for chilled and hot water are addressed. Topics include: layout, selection, and sizing of the piping system; associated hydronic components required and types, application and selection of pumps. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-045 .............. 18.00

System Selection
This module on system selection presents one method that can be used by designers on most commercial projects. Topics include: assembling and documenting all available project data, determining the delivery method, budgets and schedules, running rough heating and cooling loads, developing an initial list of potential HVAC systems, and using a rating method called the Systems Scoresheet. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 06-796-066 .............. 25.00

Controls Level 1: Fundamentals
The fundamentals of HVAC controls introduces the basic concepts of control and the vocabulary necessary to understand HVAC controls that are part of the design of HVAC systems. This module will take the basic elements and building blocks of HVAC controls and show how comfort control systems create the desired equipment responses for maintaining room environmental condition set points. Work sessions with answers which cover the concepts covered are provided.

Book ................................................................. 796-074 .............. 18.00

Technical HVAC Design Training

Book I - Fundamentals
This bound copy of the first 11 books in the HVAC Design Fundamentals Technical Training is an introduction to the topics every HVAC system designer needs to know. Consists of two soft-bound volumes.

Book ................................................................. 06-796-104 .............. 175.00

Room Air Distribution
This module covers principles of room air distribution including blow, drop, induction and spread. Presents factors relative to the performance, rating and selection of sidewall, under-window and ceiling diffusers. This is a previous style TDP and not included in Book I – Fundamentals.

Book ................................................................. 791-224 .............. 5.50
HVAC Packaged Equipment Design

These training materials are designed to help HVAC contractors, engineers and designers to effectively design, specify, sell and apply HVAC equipment in commercial applications. Materials in this group cover topics on DX (Direct Expansion) unitary packaged equipment. Topics include: rooftop units, split systems and water source heat pumps (WSP).

Rooftop Units Level 1: Constant Volume

Smaller tonnage constant volume rooftop units are the most widely used units in the commercial air conditioning industry. This training module will explain their key features and applications. Topics covered include: components, ratings, control, impact of codes, selection and application tips. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 796-056 ........ 18.00

Rooftop Units Level 2: VAV Rooftops

A large VAV (Variable Air Volume) rooftop unit with VAV terminals can be used in the place of multiple smaller constant volume units as a way of providing multiple zones of temperature control. This training module discusses their key features and applications. Topics covered include: VAV system description, typical applications, VAV rooftop unit features, options and accessories, VAV terminals, application tips, controls, code considerations, and unit selection. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 06-796-057 ........ 18.00

Indoor Self-Contained Units

Indoor self-contained units are a unique segment of the packaged air conditioning industry. They are available in a variety of configurations for both air-cooled and water-cooled applications. This training module covers system types, unit components, applications, controls, code impacts and unit selection. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 06-796-058 ........ 18.00

Split Systems

Split systems are classified as a unitary, or packaged unit, and, as such, have many of the benefits of packaged equipment while offering the flexibility associated with applied products. This module will describe what split systems are, the components of the system and accessories frequently used. It will show the designer how systems are applied, explain common installation issues, and describe how to select a system. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 796-059 ........ 18.00

Variable Volume and Temperature Systems

Variable Volume and Temperature systems (VVT) are an all-air zoned system that allows zoning using constant volume rooftops and split systems. VVT systems are a good solution for heating and cooling multiple zone applications in small- to medium-size buildings. This training module will explain what VVT is, basic sequence of operation, system layout and controls. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 796-069 ........ 18.00

Water Source Heat Pumps

This training module will provide an understanding of the components in water source heat pump systems, configuration options, system benefits, and many applications associated with the overall system. Work sessions with answers which cover the concepts covered are provided.

Book .............................................................. 06-796-071 ........ 25.00

Technical HVAC Design Training

Book II – Packaged Systems

This bound copy of the first six books in the HVAC Packaged Equipment Design Technical Training is an introduction to the most common types of packaged equipment. Each module discusses the product with its features and application. Consists of two soft-bound volumes.

Book II .............................................................. 06-796-105 ........ 150.00

Refrigerant Piping Systems

This program covers the layout, sizing, materials, accessories, safety and limit controls and design practices for single and multiple circuit refrigerant piping systems. Topics discussed include oil circulation, refrigerant migration and their effect on design. This is a previous style TDP and not included in Book II – Packaged Systems.

Book .............................................................. 791-234 ........ 5.50

Air-to-Air Heat Pumps

This program explains the basic principles of the heat pump. The training program explains the concept, operation, energy advantages, selection, control and application of air-to-air heat pumps. Although the basis of the text is the air-to-air heat pump, many of the principles covered are universally applicable to other types of heat pumps. This is a previous style TDP and not included in Book II – Packaged Systems.

Book .............................................................. 791-085 ........ 5.50

Refrigerant Piping for Split Systems

This program presents the basic procedures used for designing and sizing refrigerant lines as applied to commercial split-systems. Also discussed are some of the typical issues involved in refrigerant piping systems which will aid the designer in avoiding the compounding of design errors. This is a previous style TDP and not included in Book II – Packaged Systems.

Book .............................................................. 791-064 ........ 5.50

PowerPoint presentations and instructor materials for the Technical Development Programs on these pages are available for free download at Carrier University Online.
HVAC Applied Equipment Design
These training materials are designed to help HVAC contractors, engineers, and designers to effectively design, specify, sell, and apply HVAC equipment in commercial applications. Materials in this group cover topics on applied chilled water equipment and systems. Topics include: air handlers, fans, coils, cooling towers, condensers, water cooled and air-cooled chillers.

Central Station Air Handlers
Air handlers do not just handle air. They also cool, heat, filter, and humidify. This module will explain the types of equipment and the sectional components that comprise an air handler, both indoor and outdoor types, discuss the best applications served by central station air handling units, and why, as well as the software programs used for selection. Work sessions with answers which cover the concepts covered are provided.

Fans: Features and Analysis
The heart of any air handling system is the fan. This module will describe fan characteristics and performance, reading fan curves and other fan related topics in order to provide designers with the knowledge to select the proper fan for various HVAC applications. Work sessions with answers which cover the concepts covered are provided.

Fans in Variable Air Volume Systems
One of the reasons that VAV (Variable Air Volume) systems are popular is because they provide fan energy savings. This module will explain the types of fans that can be used in VAV systems, as well as the controls that may be applied to regulate each. Work sessions with answers which cover the concepts covered are provided.

Coils: DX, Chilled Water and Heating
There are many coil applications used in HVAC design; heating coils may use electricity, hot water, or refrigerant hot gas, and cooling coils may use direct expansion of refrigerant (DX) or chilled water. In this module, a design engineer will learn about the components, features, and applications for direct expansion and chilled-water cooling, and hot water, steam and electric heating coils. Work sessions with answers which cover the concepts covered are provided.

Air-Cooled Chillers
Air-cooled chillers can range in size from small capacity models to several hundred-ton models. This module will cover both packaged single piece air-cooled chillers as well as split system types. The module will cover the components, application, and the available options and accessories, as well as criteria for selecting an air-cooled chiller. Work sessions with answers which cover the concepts covered are provided.

Water-Cooled Chillers
Water-cooled chillers range in size from small 20-ton capacity models to several thousand-ton models. This module concentrates on the larger chillers in the range of 200 tons and upward. Topics covered are both screw and centrifugal type compressor water-cooled chillers, their components, function, application, and will discuss the options and accessories available. Also covered is the criteria used when selecting a water-cooled chiller. Work sessions with answers which cover the concepts covered are provided.

Cooling Towers and Condensers
This module discusses the most common heat rejection methods: condensers and cooling towers. In order to apply systems to a design, HVAC designers must be aware of the different heat rejection methods. This module discusses total heat of rejection, its derivation, and how it applies to the air conditioning process, as well as the controls that may be used to regulate each. Work sessions with answers which cover the concepts covered are provided.

Technical HVAC Design Training
Book III – Applied Systems
This bound copy of the first seven books in the HVAC Applied Equipment Design Technical Training is an introduction to most equipment used in applied engineered systems. Each module discusses the product with its features and application. Consists of two soft-bound volumes.

Introduction to Variable Air Volume
This presentation of material covers the general application guidelines for variable air volume systems. The material covered includes background, space loads, apparatus loads, system arrangements, system components and advantages. This presentation would be particularly valuable to the better understanding of variable air volume systems by architects, consultants, contractors and owners.

HVAC Advanced Design Training
These training materials are designed to help HVAC contractors, engineers, and designers to effectively design, specify, sell and apply HVAC equipment in commercial applications. Materials in this group cover some of the more advanced topics on HVAC systems and applications for HVAC system designers desiring to enhance their skills. Topics include: advanced load estimating, filtration, energy recovery, acoustics, indoor air quality (IAQ), life cycle costing and DDC controls.

Load Estimating Level 3: Block and Zone Loads
Block and zone load estimates provide the data necessary to select heating and cooling equipment that can condition the spaces within a building. Using the outputs for the building block and zone load estimates, the HVAC system equipment selections can be made to complete the design. This module builds on the load estimating modules in the Technical HVAC Fundamentals Design Training and explains the methodology and components that are considered in doing block and zone loads. Work sessions with answers which cover the concepts covered are provided.

Filtration
Filtration is one part of a good IAQ strategy. This module addresses the methods and products available for removing contaminants from the air. Specifically, the types of mechanical and gas-phase filters, their capabilities, and applications and electronic air cleaners are covered. Work sessions with answers which cover the concepts covered are provided.

Energy Recovery
This TDP module deals with the methods and product types that are available for air-to-air recovery of energy in comfort air-conditioning applications. Topics include: the types of energy recovery technology, the best applications for each type, and how to identify recovery opportunities in comfort heating and cooling applications. Work sessions with answers which cover the concepts covered are provided.
Level 2: Principles of Mechanical Refrigeration
Cycle Analysis
This second module on mechanical refrigeration develops the pressure-enthalpy diagram and uses it to explain and analyze the mechanical refrigeration process. The pressure-enthalpy diagram is the tool used by designers of HVAC equipment to determine the size and performance of each system component. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-084 .......... 25.00

Compressor Types
An understanding of compressors and how they operate will help the designer better select and apply air-conditioning units. This training module has four major sections describing compressors and their operation and application. Topics covered include: the different refrigeration cycles, positive displacement cycle, dynamic cycle (centrifugal cycle), absorption cycle, terminology associated with compressors and compressor design and operational issues, the five major compressor types with principle of operation, construction, and performance. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-040 .......... 25.00

Comfort Control Principles
This module will discuss various temperature control strategies and HVAC systems that can be employed to maximize comfort provided to the building occupants. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-067 .......... 18.00

Controls Level 2: DDC Networking
This training module includes a refresher of the elements and building blocks of HVAC controls, basic control strategies, the workings of control system networks, the four key management methods available through DDC control networks, and how to specify network configuration and functionality. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-075 .......... 18.00

Acoustics and Vibration
This training module introduces system designers to the principles of acoustics and includes suggestions on how to address acoustic issues early in design. This module has seven sections including: acoustic terms, methods used to establish an acoustic rating both indoors and outdoors, how manufacturer sound data is generated, how to determine the acoustic design goal and how to estimate the sound at the receiver using the source-path-receiver concept. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-075 .......... 18.00

Indoor Air Quality
This training module looks at the importance of Indoor Air Quality (IAQ) to the occupants of a building. An HVAC system may contribute to the problem of poor IAQ or provide means to maintain proper IAQ. Covered in this training are the causes of poor IAQ, the steps in a three-step approach to controlling IAQ and the impact of ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-077 .......... 25.00

Life Cycle Costing for HVAC Systems
Decisions about the type of HVAC system or decisions related to making HVAC system modifications are often based on financial justification. This training module discusses the life cycle costing method and how it should be applied to HVAC-related decisions. Six sections describe the basic concepts behind the life cycle cost method, a recommended procedure to follow, what data should be included, where to find the data and several techniques to be used in evaluating the data and making a decision. Work sessions with answers which cover the concepts covered are provided.
Book ......................................................... 06-796-078 .......... 25.00

Technical HVAC Design Training
Book IV – HVAC Advanced Topics
This bound copy of the first 10 books in the HVAC Advanced Design Technical Training is an introduction to a number of topics and equipment types that supplement or build upon modules in the other sections of this series. Consists of four soft-bound volumes.
Book IV ......................................................... 06-796-107 .......... 175.00

Fundamentals of Psychrometrics
This training module presents the theory of psychrometrics and the derivation of the formula used to create the psychrometric chart. Once the fundamental concepts behind the psychrometric chart are understood, the text uses examples to demonstrate the use of psychrometrics to solve typical air conditioning processes.
Book ......................................................... 791-120 ............. 7.00

PowerPoint presentations and instructor materials for the Technical Development Programs on these pages are available for free download at Carrier University Online.
HVAC Design Manuals and Forms

These design training materials provide a ready reference source to design processes, procedures and charts important to every system designer. Topics include: load estimating, air distribution, duct design, water and refrigerant piping design, system design procedures for all-air, all-water, air-water and unitary systems, and system applications.

Part 1 – Load Estimating
A guide in the preparation of practical cooling and heating load estimates. Eight chapters include: survey and load estimate, design conditions, heat storage, solar heat gain glass, heat and moisture flow, infiltration and ventilation, internal and system heat gain, applied psychrometrics. (164 pages)

Part 2 – Air Distribution
Includes data and examples as a guide in practical design and layout of air handling equipment, ductwork and air distribution components. (94 pages)

Part 3 – Piping Design
Covers practical design and layout, including data and examples of normal air conditioning piping systems—piping design, water piping, refrigerant piping, steam piping. (110 pages)

Part 4 – Refrigerants, Brines, Oils
A presentation guide in the application and selection of refrigerants, brines and oils when used with air conditioning systems. (68 pages)

Part 5 – Water Conditioning
A background guide to a better understanding of the cause, effect and prevention of water problems in various water circulatory systems. Also discusses some of the more common practices for lessening the effect of scale and corrosion. (56 pages)

Part 6 – Air Handling Equipment
A discussion in the selection and application of air handling equipment for normal air conditioning systems—fans, air conditioning apparatus, unitary and accessory equipment. (72 pages)

Part 7 – Refrigeration Equipment
Covers the selection and application of refrigeration equipment for normal air conditioning systems: reciprocating centrifugal, absorption, absorption-centrifugal combination refrigeration machines, heat rejection equipment. (72 pages)

Part 8 – Auxiliary Equipment
Book is comprised of practical data for the selection and application of auxiliary equipment used with air conditioning systems—centrifugal pumps, motors and motor controls, boilers, miscellaneous drives. (76 pages)

Part 9 – Systems and Applications
A guideline for selecting the air conditioning system used with specific applications. (24 pages)

Part 10 – All-Air Systems
A presentation of data and engineering procedures to guide the engineer in the practical designing of all-air systems. The complete range covers the conventional, constant volume induction, multizone, dual-duct, variable volume and dual conduit systems. (60 pages)

Part 11 – Air-Water Systems
A guide to the engineer in the practical designing of air-water systems for use in perimeter rooms of multistory; in multiroom buildings where cooling or heating may be required simultaneously in adjacent rooms; where ductwork space is at a minimum. (36 pages)

Part 12 – Water and DX Systems
A guide, which includes data and engineering procedures, in the practical designing of water and DX systems. (22 pages)

Carrier System Design Manual
Complete manual consists of all 12 parts bound in 3 volumes.
System Design Manual (Complete set) .......... 590-367 ............ 125.00
System Design Manual
(Volume 1 contains Parts 1, 2 and 3) .......... 590-368 ........... 50.00
**Equal Friction Duct Calculator**
A simple duct calculator, pocket size, for sizing air distribution systems by the equal friction method. Instructions and design data are imprinted on calculator.

Calculator ........................................................ 794-036 ............. 4.00

**Commercial Systems Quick Reference (CSQR)**
The Commercial Systems Quick Reference (CSQR) is a desk reference which illustrates the integration of numerous systems with a few representative buildings. In addition to systems applied in the buildings, the CSQR also contains spreadsheets on 10 commonly used systems, a generic product feature rundown, and ballpark design guidelines.

Book ................................................................ 795-205 ........... 45.00

**Process Refrigeration**
This manual contains seven sections on the application of centrifugal, reciprocating and screw compressors in industrial and process applications covering the following subjects: process refrigeration cycles; refrigerants; heat transfer fluids; centrifugal system components, considerations, performance and control; reciprocating system components, considerations, performance and control; and screw compressor system components, considerations, performance and control.

Book ................................................................ 795-100 ........... 45.00

**Static Regain Duct Calculator Slide Rule**
Convenient simplified method of sizing duct by static regain, equal friction and volume reduction methods. Calculator is a multicolor easy-to-read slide rule that can be used by all duct system designers. Includes an eight-page book that describes the use of the duct calculator.

Calculator ........................................................ 599-922 ............ 18.80

**Small Rooftop VAV System Design Guide: New Construction**
This design guide provides a step-by-step approach to designing a Variable Air Volume system using Carrier’s 48 and 50 LC VAV rooftop units, VAV terminals and i-Vu® control system. This guide covers the design process from initial load estimate, through selection of diffusers, VAV terminal and rooftop unit, to the control system selection and operation.

Book ................................................................ 795-208 ............ 18.00
### Engineering Charts – IP English Units

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**Psychrometric Chart Package 06-794-021**

Contains 5 each of the following charts:

- Normal Temperature Sea Level
- Low Temperature Sea Level
- High Temperature Sea Level
- Normal Temperature 2,500 Feet
- Normal Temperature 5,000 Feet
- Normal Temperature 7,500 Feet
- Normal Temperature 10,000 Feet

Black and White 11 X 17 12.00 per set
## Engineering Charts – SI Metric Units

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### Psychrometric Chart Package

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- Normal Temperatures
- Low Temperatures
- High Temperature
- Normal Temperatures 750 Meters
- Normal Temperatures 1500 Meters
- Normal Temperatures 2250 Meters
- Normal Temperatures 3000 Meters

### Air Conditioning Load Estimate Form


Pad ................................................................. 794-006 ............ 7.50

### Heating Load Estimate Form


Pad ................................................................. 794-005 ............ 7.50
Applies to All Orders

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- Prices and offerings are subject to change without notice.
- Where items are padded or packaged in quantities of 10 or 25, the minimum order is one pad or package. We cannot split packages to fill an order.
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