

Pneumatic Troubleshooting

Course 310: Pneumatic Troubleshooting

Covers pneumatic systems, schematic symbols and diagrams, installing system components, planned maintenance, system diagnosis, and troubleshooting. Includes maintenance of air compressors, control valves, air motors, electrical components, and hybrid systems.

TPC Training is accredited by IACET to offer **1.0 CEU** for this program.



Lesson 1: Pneumatic Systems

Topics

The Pneumatic System; The Air-Supply System; Reciprocating Compressors; Regulation and Control; Rotary Compressors; Cooling; Compressor Preventive Maintenance; The Delivered-Air System; Air-Line Filters; Air-Line Lubrication; Troubleshooting the Pneumatic System

Objectives

- Explain the operation of linear actuators—cylinders—in a typical pneumatic circuit.
- Describe the various types of compressors and how they work.
- Define intercooling and aftercooling.
- Describe basic preventive maintenance procedures for compressors.
- List the components of an effective delivered-air system and explain how they work together.
- Describe the three main types of air-line lubrication.

Lesson 2: Pneumatic Schematic Diagrams

Topics

Types of Symbols; How Schematic Symbols are Constructed; Diagramming an Air-Supply System; A Simple System; Timing Circuits; Safety Circuits; Symbols for Special Devices; System Schematics

Objectives

- Explain the different types of symbols used in pneumatic schematic diagrams—how they are constructed and what they show.
- Describe the operation of timing and safety circuits.
- Analyze the schematic diagram of a fluid-power system.

Lesson 3: Installation of System Components

Topics

The Compressor and Auxiliaries; Compressor Intakes; Compressor Foundations; Aftercoolers; Receivers; Dryers; Pipe Installation; Pipe Support; Pipe Threads; Tubing; Tubing Fittings; Hose Installation; Control Systems; Control-Valve Installation; Solenoid Coils; Cylinder Installation

Objectives

- Describe the proper installation of the compressor and its auxiliaries.
- Describe the installation of aftercoolers, receivers, and dryers.
- Explain the correct procedures for installing pipes, tubes, and hoses in pneumatic systems.
- Describe the installation of control valves, solenoid coils, and cylinders.

Lesson 4: System Maintenance

Topics

Planned Maintenance; Compressor Maintenance; System Maintenance; Control-System Maintenance; Tool Maintenance; Maintenance Logs and Records

Objectives

- Explain the concept of planned maintenance.
- Describe the basic procedures for maintaining the compressor and other important components in a pneumatic system.
- Describe the maintenance of industrial control circuit components.
- Explain the proper maintenance of pneumatic tools.
- Discuss the various types of maintenance logs and explain what kind of information is recorded in each.

Lesson 5: Determining System Failures

Topics

Understanding the System; Troubleshooting Procedures; Locating Troubles; The Operations Manual; Checking the Air Supply; Troubleshooting the Actuator; Checking the Control Valve; Checking a Control-Valve Actuator; Checking Sequence Valves; Checking Master Control Valves; Checking Interlocks; Making Final Adjustments; System Operation

Objectives

- List, in proper sequence, the steps to be taken in troubleshooting a pneumatic system.
- Name and describe the five important parts of every pneumatic system's operations manual.
- Describe procedures for troubleshooting the actuator.
- Explain how to check control valves, sequence valves, and interlocks.

Lesson 6: Troubleshooting Air Compressors

Topics

Cooling Reciprocating Compressors; Compressor Lubrication; Compressor Valves; Crankcase Ventilation; Piston Rings and Bearings; Control Systems; Rotary Compressors; Vane Compressors; Rotary-Screw Compressors; Centrifugal Compressors

Objectives

- Describe methods of cooling and lubricating reciprocating compressors.
- Explain the proper maintenance of compressor valves.
- Identify problems associated with the control system of a compressor.
- Describe the basic maintenance requirements of rotary, vane, rotary-screw, and centrifugal compressors.

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Lesson 7: Troubleshooting Control Valves

Topics

Troubleshooting Controls; Troubleshooting a Circuit That Will Not Start; Checking Manual Overrides; Checking the Circuit Sequence; Checking for Locked Controls; Checking for Mechanical Interference; Electrical Solenoids; Checking an AC Solenoid; Checking a DC Solenoid; Troubleshooting Improper Sequence Operation; Improper Valve Shifting; Valves Shifting Without a Shift Signal; Changes in Control Timing; Miscellaneous Control-Element Problems; Lubrication Problems

Objectives

- Outline how to isolate a control malfunction in a pneumatic circuit.
- Explain how to troubleshoot a nonstarting or nonoperating circuit, improper sequencing of the circuit, and miscellaneous problems related to the equipment.
- Describe the proper procedures for checking electric solenoids.
- Explain how to check for problems related to valve shifting, control timing, and lubrication.

Lesson 8: Troubleshooting Cylinders

Topics

Cylinder Definitions; Cylinder Construction; Troubleshooting and Repair; Correct Cylinder Size; Adequate Air Pressure; Checking for Misalignment; Worn Packings; General Installation Techniques; Speed Controls

Objectives

- Define the different types of pneumatic cylinders.
- Describe the construction of a typical cylinder.
- Describe the proper procedures for troubleshooting cylinders, including checking for misalignment, worn packings, and adequate air pressure.
- Explain general installation techniques for cylinders and accessories.

Lesson 9: Troubleshooting Air Motors

Topics

Uses for Air Motors; Checking for Sufficient Air; Contaminated Air; Lubrication; Air-Motor Abuse; Hose and Clamp Maintenance; Air-Motor Troubleshooting; Vane Motors; Radial-Piston Motors; Axial-Piston Air Motors; Percussion Tools

Objectives

- Explain how to check for sufficient clean air when troubleshooting an inoperative air motor.
- Explain how to keep hoses, clamps, and couplings in good condition.
- Describe the operation and maintenance of vane, radial piston, and axial-piston air motors.

Lesson 10: Pneumatic/Hydraulic Systems

Topics

Air-Oil Tanks; Air-Hydraulic Boosters; Pressure Boosters; Single-Pressure Booster Systems; Dual-Pressure Booster Systems; Hydraulic-Control Cylinders; Fast-Advance Cylinders; Combined Air-Oil cylinders; Pneumatic Cushioning; Air-Hydraulic System Interlock; Pneumatic Servos; Troubleshooting Air-Oil Systems

Objectives

- Explain why and how compressed air and hydraulic pressure are combined.
- Describe the role of boosters in pneumatic/hydraulic systems.
- Explain how single-pressure and dual-pressure booster systems work.
- Describe the advantages and disadvantages of combined air-oil cylinders.
- Explain how pneumatic and hydraulic actions can be interlocked.
- Discuss the proper troubleshooting procedures for air-oil systems.