PRODUCT FACT SHEET

Pneumatics (40-assignment)

This is an integrated instructional module designed specifically to operate within the LJ ScanTEK Modular Technology Program environment. It includes a 10-assignment exploratory curriculum and a further 30-assignment in-depth curriculum. The exploratory curriculum and the in-depth curriculum are each split into two parts. Each part includes a pre-test and post test. The module includes hardware, software and curriculum materials sufficient to provide a complete learning experience.

The curriculum incorporates continuous assessment through questions. When used in conjunction with a ClassAct networked management system, this provides instant feedback of student performance. The assessments begin with a comprehensive pre-test. This quiz includes questions for each subsequent assignment, together with questions that will specifically test math and reading ability.

Every assignment starts with a series of questions designed to track inventory. These ensure that any missing items are located before they are needed.

Each assignment is divided into a series of tasks. Hands-on tasks form the core of the student work. Where appropriate, these are accompanied by research tasks based upon illustrated textbooks and on-screen applications. Assessment questions are incorporated into each task.

Typical 10-assignment topic areas include:

- Building and testing pneumatic circuits
- Pneumatic component symbols
- Operation of single acting and double acting cylinders
- Pressure, force and area relationship
- Operation of a 3-port valve
- Exhaust restrictors

Typical 10-assignment activities include:

- Identify the properties of fluids and evaluate the use of compressed air as a medium for transmitting power.
- Evaluate the idea of a pneumatic circuit and learn how to connect and operate the Pneumatics Trainer.
- Investigate pressure and the different scales used to measure it.
- Recognize how symbols can be used in pneumatics to simplify the design and drawing of circuits and components.
- Investigate the operation of a single acting cylinder and 3 port valve in designing circuits for pneumatic vise and stamping applications.
- Evaluate various type of pneumatic cylinders as the output component of a pneumatic circuit and investigate how they operate.
- Investigate valves in detail and recognize them as switch-like components.
- Investigate the relationship between force, pressure and area.
- Carry out a number of cylinder sizing calculations for real pneumatic systems.
- Design a pneumatic system to operate a sliding door.

Typical 10-assignment activities include (continued):

- Investigate how the flow speed of compressed air is controlled in a circuit and how this affects the performance of a pneumatic circuit.
- Design, test and evaluate a solution to an automatic sliding door application using pneumatics.

Typical 30-assignment topic areas include:

- Fluid power and compressed air
- Single and double acting cylinders
- Three port valve
- Pressure and force. Pascal's Law
- Absolute and gauge pressure
- Standard component symbols
- Flow charts
- Boyle's law
- Pneumatic logic, AND, OR, NOT, NAND, NOR and XOR
- The advantages and disadvantages of pneumatic systems
- Introduction to electro-pneumatics
- Solenoid valve
- Pumps and compressors
- Efficiency of energy input and output
- Pressure operated valves
- Remote control circuit
- Reservoirs for pneumatic time delay
- Sensing circuits, proximity sensing
- Troubleshooting pneumatic systems

Typical 30-assignment activities include:

- Identify the properties of fluids and evaluate the use of compressed air as a medium for transmitting power.
- Recognize the importance of safety when working with pneumatics.
- Build a simple pneumatic system using a cylinder and valve.
- Introduction to the use of graphical methods to analyze pneumatic systems.
- Introduction to air pressure.
- Discover Pascal's law.
- Investigate air pressure and the scales used to describe it.
- Discover Boyle's law, which relates temperature and volume.
- Investigate the use of symbols in communicating pneumatics systems.
- Recognize basic pneumatic component symbols.
- Investigate cylinders in detail.
- Recognize the difference between single and double acting cylinders and how they are controlled.
- Recognize how a shuttle valve can be used in a circuit so a cylinder can be controlled from either of two positions.
- Compare a shuttle valve to a pneumatic logic OR gate.
- Examine how logic can be used to simplify complex control tasks.
- Investigate the function and construction of pneumatic logic AND and NOT gates.

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Typical 30-assignment activities include (continued):

- Design, test and evaluate a solution to a door locking application using pneumatics and logic control.
- Examine the advantages and disadvantages of pneumatic systems.
- Compare pneumatic systems with other power systems such as mechanical, electrical and hydraulic.
- Examine how pneumatics technology can be interfaced with electronics technology.
- Investigate the theory and operation of a solenoid valve.
- Use electronics to control a pneumatic cylinder.
- Examine how electronics can enhance the control of a pneumatic system.
- Examine the function of pumps and compressors.
- Calculate the energy stored in a pneumatic receiver.
- Perform an energy analysis on a pneumatic compressor.
- Determine the factors that influence fluid flow and pressure drop in pipes.
- Examine the transmission pipes used in pneumatic systems.
- Determine how a pneumatic system can be controlled remotely.
- Examine the function and operation of a pressure operated valve.
- Design, test and evaluate a pneumatic system to operate in a hazardous area application.
- Build a basic electro-pneumatic system to sequence a cylinder.
- Analyze an electro-pneumatic system using a step-stroke diagram.
- Build simple AND, OR and NOT logic circuits using electronics.
- Combine simple logic gates to produce NAND, NOR and XOR gates.
- Build logic decision making into a simple electro-pneumatic sequencing system.
- Recognize the definition and components of automated control systems.
- Build a simple electro-pneumatic sorting system.
- Examine the use of microprocessors in automated control systems.
- Revise the formula F = P x A.
- Investigate SI units and use them to solve force, pressure and area problems.
- Select a cylinder for a bottle rejecting application based on performance and cost factors.
- Investigate how a reservoir can be used to produce a pneumatic time delay.
- Build and evaluate a pneumatic time delay circuit.
- Build and evaluate an electro-pneumatic time delay circuit.
- Compare an electro-pneumatic time delay circuit to a pneumatic only time delay.
- Define a sensor. Investigate air sensors.
- Determine the function of the sensors in an electro-pneumatic system.

Typical 30-assignment activities include (continued):

- Use flow charts to simplify the communication of a control problem.
- Design a electro-pneumatic system which will detect the presence of an imperfect part and halt the production process.
- Design, build and evaluate an electro-pneumatic system, which can sort parts based on whether they are black or clear using logic.
- Improve the design of an electro-pneumatic sorting machine.
- Investigate the theory and procedures for troubleshooting industrial machines.
- Perform a troubleshooting exercise on a faulty electro-pneumatic system.

Each assignment is designed around a list of performance objectives. These lists include academic, technical and occupational objectives. The assignments are written in such a way as to enable a student to attain the performance objectives, with the assessment questions linked to these in order to provide a measure of true competency.

The performance objectives are used by the ClassAct management system to generate a comprehensive portfolio of student competency reports. Default reports supplied with this module include:

- Entry report
- Technical/Occupational Exit report
- Basic Skills report based upon the federal SCAN's report.

The items supplied with this instructional module include:

- 10-assignment On-Screen Student Assignment Guide CD
- 10-assignment Student Assignment Guide
- 10-assignment Student Workbook
- 10-assignment Instructor's Guide
- 30-assignment Student Assignment Guide
- 30-assignment Student Workbook
- 30-assignment Instructor's Guide
- Hand Pump Compressor
- Electro-Pneumatic System

Additional items required:

- Computer

Module Facts

For Technology program, order as:
ST270/40 Pneumatics

	No.	Average time
Assignments	40	45 minutes
Extension Activities	4	45 minutes
	Total	33 hours

LJ Technical Systems
Web site: www.ljgroup.com

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