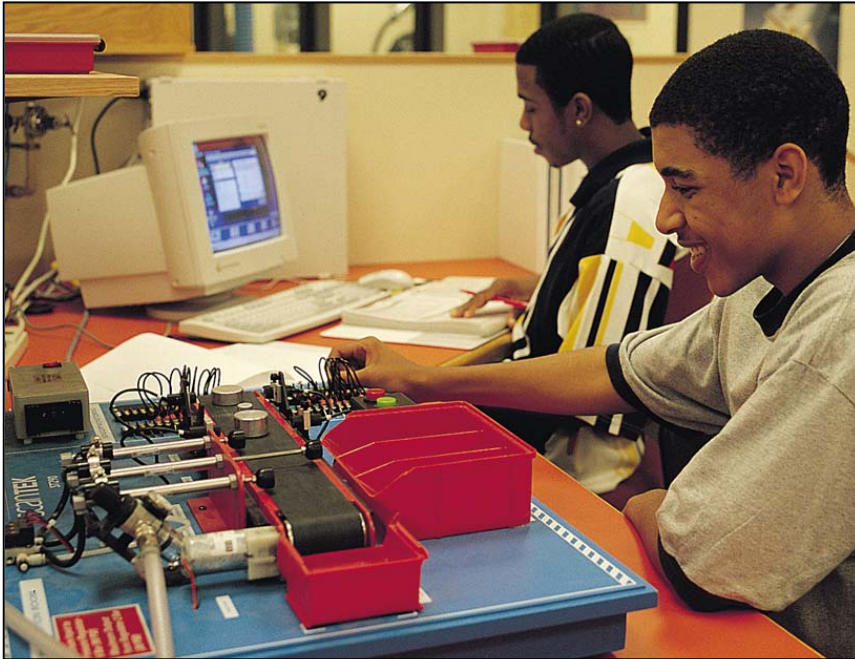


Industrial Control Technology (40-assignment)



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. Where appropriate, 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:

- Custom, batch and mass production methods
- Infrared sensor, Reed switch and push button sensing devices
- Logic AND, OR and NOT functions
- Pneumatic cylinder, electric motor and lamp actuators
- Ladder logic programming
- Latch function

Typical 10-assignment activities include:

- Use a custom production method to build three models.
- Use CAI to investigate the history of industrial control and explore the sensors and actuators on the Work-Cell.
- Use CAI to investigate automation and electrical, pneumatic and hydraulic power systems.
- Load and run a program that activates the Work-Cell actuators.
- Create a simple program that turns on the conveyor when a switch is pressed.
- Create a vending machine program and use it to select 'Soda Cans'.
- Discover logic gates and look at the use of ladder logic programs.
- Modify the 'latch' program so that the conveyor belt can be stopped.
- Edit a program to include the use of Reed switches.
- Create a program that can be used to eject bobbins into the appropriate storage bins by pressing red and green buttons.
- Create a program using timers to move a bobbin along the conveyor belt and stop in front of a cylinder piston, where it will be ejected.
- Create a program that will sort the Work-Cell bobbins.

Typical 10-assignment activities include (continued):

- Identify errors within a larger program. Correct the program according to given guidelines.

Typical 30-assignment topic areas include:

- Introduction to manufacturing systems
- Quantity, quality, cost and production time
- Mass production
- Manual control
- Programmable logic controllers
- Programming in ladder logic
- Step logic statements
- Timers and counters in control programs
- Truth tables
- Latching outputs
- Process sequence waveform diagrams
- The social impacts of manufacturing
- Troubleshooting
- Flow charts
- Auxiliary components
- Flow charts and waveforms
- The design process
- Careers in manufacturing
- Component sorting program design

Typical 30-assignment activities include:

- Gain experience in building the gearbox model.
- Explore the manufacturing resources applied to a simple task.
- Build three models using the custom and mass production methods.
- Decide which manufacturing system would best suit different products.
- Introduction to the Work-Cell.
- Use CAI to learn about the origin of the electromagnetic relay.
- With the 'Machine Cover' in place, use the 'Sensor Status' LEDs to determine the position of the bobbin on the conveyor belt.
- Use the Programmable Logic Control software.
- Place the 'Machine Cover' over the conveyor belt. Load a demonstration program showing the computer performing the manual control task more efficiently.
- Use CAI to learn about input interfaces and opto-couplers.
- Sort a list of Work-Cell elements into a table of inputs and outputs.
- Create a simple program to activate an output.
- Use CAI to find out how the Work-Cell works.
- Explore the use of logic AND, OR and NOT gates.
- Discover truth tables and how to use them.
- Use a sample ladder logic program and a given truth table to answer questions.

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Typical 30-assignment activities include (continued):

- Load the programme again and, in the student workbook, complete a truth table.
- Discover how to 'latch' an output.
- Create and extend a simple program to show understanding.
- Use CAI to learn about the Work-Cell sensors.
- Using the Work-Cell Sensors, incorporate AND/OR instructions to complete a series of programs.
- Use both logic statements and sensors to complete a program to control a ScanCan production line.
- Understand how Reed switch sensors work.
- Edit an existing program and add steps to include the use of Reed switch and Work-Cell sensors.
- Create and complete a program to simulate a sorting line in a factory.
- Test the program.
- Repeat the testing process, using more complex criteria.
- Troubleshoot a series of programs.
- Discover step logic description.
- Explore auxiliary components.
- Discover basic flow charts and convert to ladder logic.
- Complete a programme to test pneumatic power supply.
- Use a text book to read about careers in the manufacturing industry.
- Identify characteristics of a ladder logic counter and complete a program using counters.
- Edit and test this program.
- See logic timers represented as a waveform.
- Create a program using a timer.
- Create a program to move a bobbin along the conveyor belt and into a storage bin.
- Using a design brief, design and create a program to control the conveyor belt with a timed sequence.
- Using a design brief, design and create a programme to control the Work-Cell pistons.
- Design and create a program to sort bobbins into batches of four.
- Make a program to measure the width of the Work-Cell bobbins.
- Troubleshoot, fault find and fix ladder logic programs.
- Complete a program to sort bobbins into separate storage bins.
- Sort three bobbins of differing widths into storage bins.

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
- Computer Aided Instruction Software
- Book: 'Manufacturing Technology, Today and Tomorrow'
- Industrial Control Technology Work-Cell
- Industrial Control Work-Cell 'Machine Cover'
- Hand Pump Compressor
- Manufacturing Systems Kit
- Relay Actuator output/opto-isolated input card

Additional items required:

- Computer

Module Facts

For Technology Program, order as: ST290/40 Industrial Control Technology

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



LJ Technical Systems
Web site: www.ljgroup.com