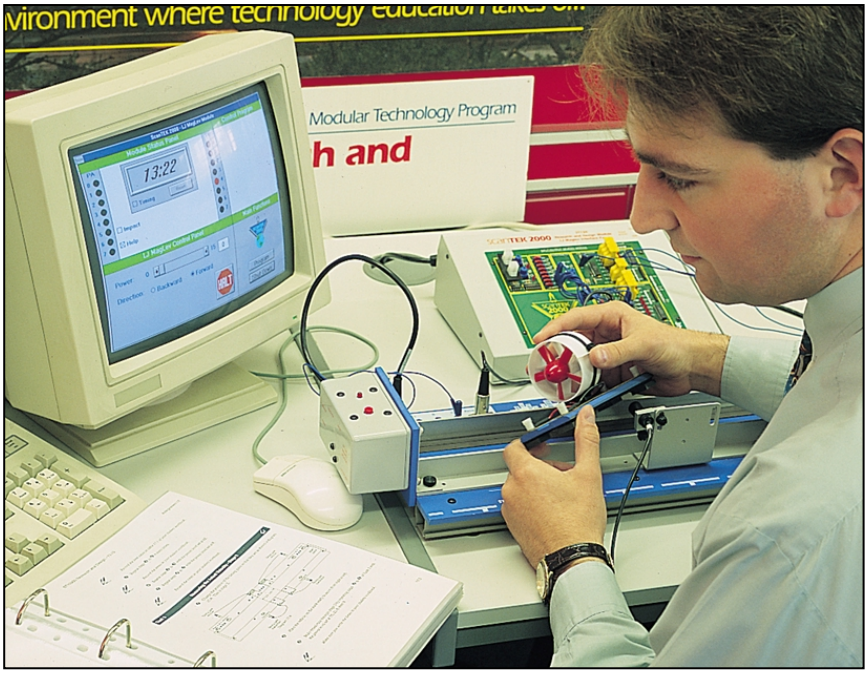
Research and Design (40-assignment)



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:

- Magnetic attraction and repulsion
- Construction of a model levitation vehicle
- Problem solving/design process
- Speed and velocity and time
- Using light gates to measure vehicle speed
- Acceleration and deceleration forces
- Power level versus time graphs
- Impact sensor to detect vehicle impact
- Prototypes

Typical 10-assignment activities include:

- Compare the principles of magnetic attraction and repulsion and explore how a magnetic levitation vehicle works.
- State the components of a transport system.
- Look at the principles of design and learn how to connect the equipment and to build and operate the LJ Maglev vehicle.
- Construct the model levitation vehicle.
- Learn the different types of energy and the forms they take.
- Operate the LJ Maglev control software to time events.
- Identify the problem and interpret the design brief.
- Discover the difference between speed and velocity.
- Time the vehicle travelling between the two light gates and calculate the speed (velocity) of the vehicle.
- Research the sources of energy used in transportation systems.
- To learn how to write a test program for automatic control of the vehicle.
- Use graphs to portray the input to a system.
- Investigate and assess the suitability of various acceleration and deceleration methods for controlling a passenger vehicle.
- Use an impact sensor to detect vehicle impact.

Typical 10-assignment activities include (continued):

- Develop the solution to achieve controlled acceleration and deceleration.
- Build and test prototype of chosen solution by performing test runs.
- Test, evaluate and refine the chosen solution.

Typical 30-assignment topic areas include:

- The technological age, systems and system outputs
- Impacts of science and technology
- Timing gates, sound, light and push button sensors for transport system control
- Design briefs
- Flowcharts
- Continuous and on-demand transport systems
- Vehicle impact sensing
- Vehicle propulsion systems
- Design and problem solving in technology
- Program control of transport systems
- Design evaluation
- Performance testing
- Passenger protection
- The Get command
- International system of units
- Propulsion systems
- Testing passenger protection systems
- Password protection

Typical 30-assignment activities include:

- Explore how the Maglev system is set up and controlled. Examine the relationship between science and technology.
- Use the Maglev system to make a timed run. Investigate the impact of technology on society today.
- Research the growth of the automobile and the problems this has caused in our towns and cities. Investigate possible solutions.
- Develop a design brief and specification for a Rapid Transit System.
- Use flowcharts as an aid to writing control system programs.
- Research transportation systems and their mode of operation.
- Write a control program to simulate a Rapid Transit System running in 'continuous' mode.
- Examine transportation support systems. Set up an interactive control system for the Maglev system.
- Investigate analog sensors and how they can be used to provide automatic control for a Rapid Transit System.
- Write a program that can be used to tell the control system whether it is day or night.
- Write a control program to simulate a Rapid Transit System running in 'on-demand' mode.
- Develop tests suitable for checking the performance of the Maglev control system.

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Typical 30-assignment activities include (continued):

- Write a full control system program utilizing 'continuous' and 'on-demand' operation modes.
- Write a program that checks the Maglev control system and associated sensors.
- Evaluate the performance of the finished control system.
- Investigate how the performance of a transportation system could be tested and evaluated using a model system.
- Perform a range of test procedures on a model transportation system.
- Analyze the data collected in the previous assignment to determine the performance of a model transport system.
- Investigate forces, and apply the results of model testing to a real transportation system.
- Investigate the problem of how to protect passengers during collisions and crashes of transport systems. Research momentum.
- Research buffers as one solution method of passenger protection, and examine vehicle structures.
- Test, evaluate and refine a design of a passenger protection system.
- Examine how computer programs can be made to interact with a user. Write an interactive control program for the Maglev system.
- Follow the program development process to design an interactive control program for testing the Maglev system after service or maintenance.
- Examine the energy conversions that take place in transportation systems and carry out an energy analysis of the Maglev system.
- Investigate vehicle propulsion systems and how they convert energy and transform motion from one form to another.
- Problem solving task to improve the overall performance of a vehicle propulsion system.
- Examine interactive control programming further and write a number of control programs using ASCII coding.
- Investigate how to recognize and fix errors in control programs.
- Write an interactive password protection program to restrict access to the Maglev control 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
- Computer Aided Instruction Software
- Book: 'Exploring Transportation'
- Book: 'Design and Problem Solving in Technology'
- Magnetic Levitation Track (Maglev track)
- Interface Panel
- Impact Sensor
- Propulsion Unit
- System Control Panel

Additional items required:

- Computer

Module Facts

For Technology Program, order as:
ST150/40 Research and Design

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

LJ Technical Systems
Web site: www.ljgroup.com

Ref No. P5009-E