Lab-Volt

MISSION

TECHNOLOGY TRAINING

SOLUTION

LAB-VOLT TRAINING SYSTEMS

HIGH-TECH TRAINING:
The Global Military Objective

Today's military forces are on constant alert for fast, efficient, and effective methods to train their personnel in state-of-the-art technical applications. Whether the need is for electronics technicians who can maintain and operate high-tech communications systems at a moment's notice, or those skilled in the development and long-term deployment of complex star-wars technologies, military installations around the world must depend on personnel who are well-trained across a spectrum of technologies.

LAB-VOLT'S AWARD-WINNING
TRAINING SYSTEMS: The Global Solution

To assist military training establishment to train personnel in leading-edge technologies, Lab-Volt Systems, Inc. has developed an extensive series of computer-based and simulation training programs in basic, intermediate and advanced technical applications. Lab-Volt training hardware and software installed at military training centers around the world include:

√ Telecommunications Systems

√ Electricity and Electronics (FACET®)

√ Fluid Power Systems

√ Electric Power and Controls

√ Software Simulation

√ Radar, including Radar Active Target

Real-Time Analog & Digital Radar Training

Real-Time PPI Display
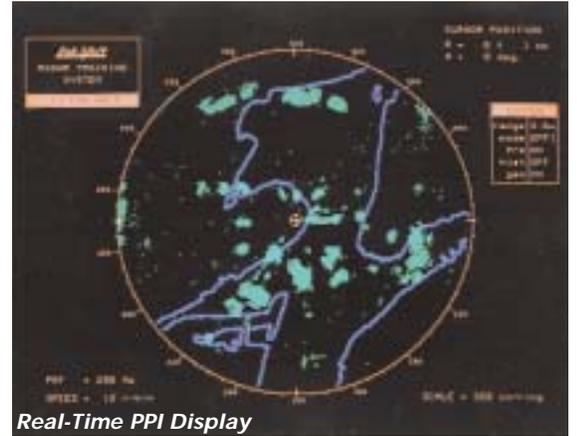
The Award-Winning FACET Electronic Telecommunications Training Program

State-of-the-Art Fluid Power Systems for Hydraulic and Pneumatic Applications

Electromechanical Simulation Training (LVSIM®-EMS)
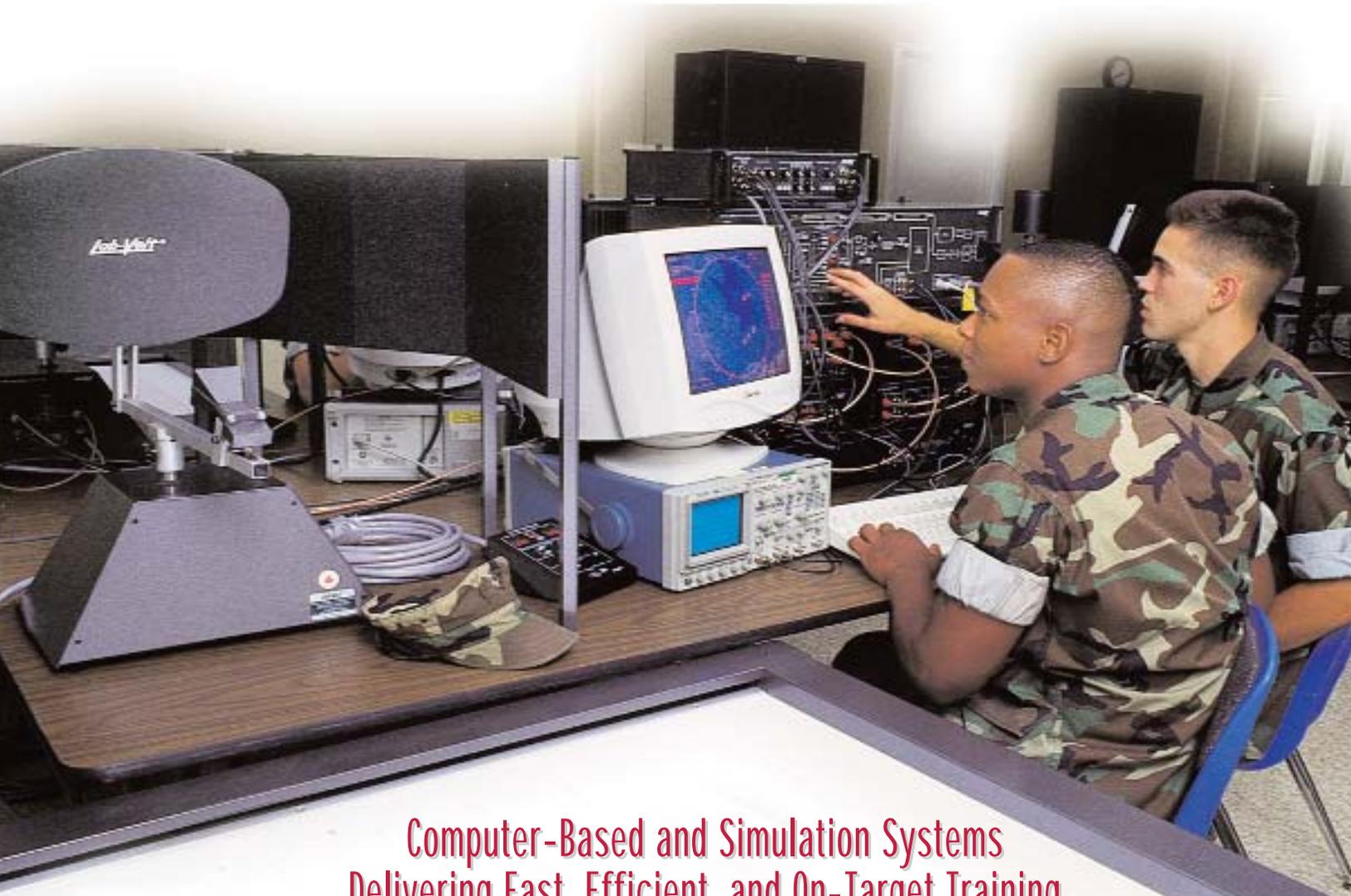
**Computer-Based and Simulation Systems
Delivering Fast, Efficient, and On-Target Training
for Today's High-Tech Military Forces**

Antenna Training and Measuring System
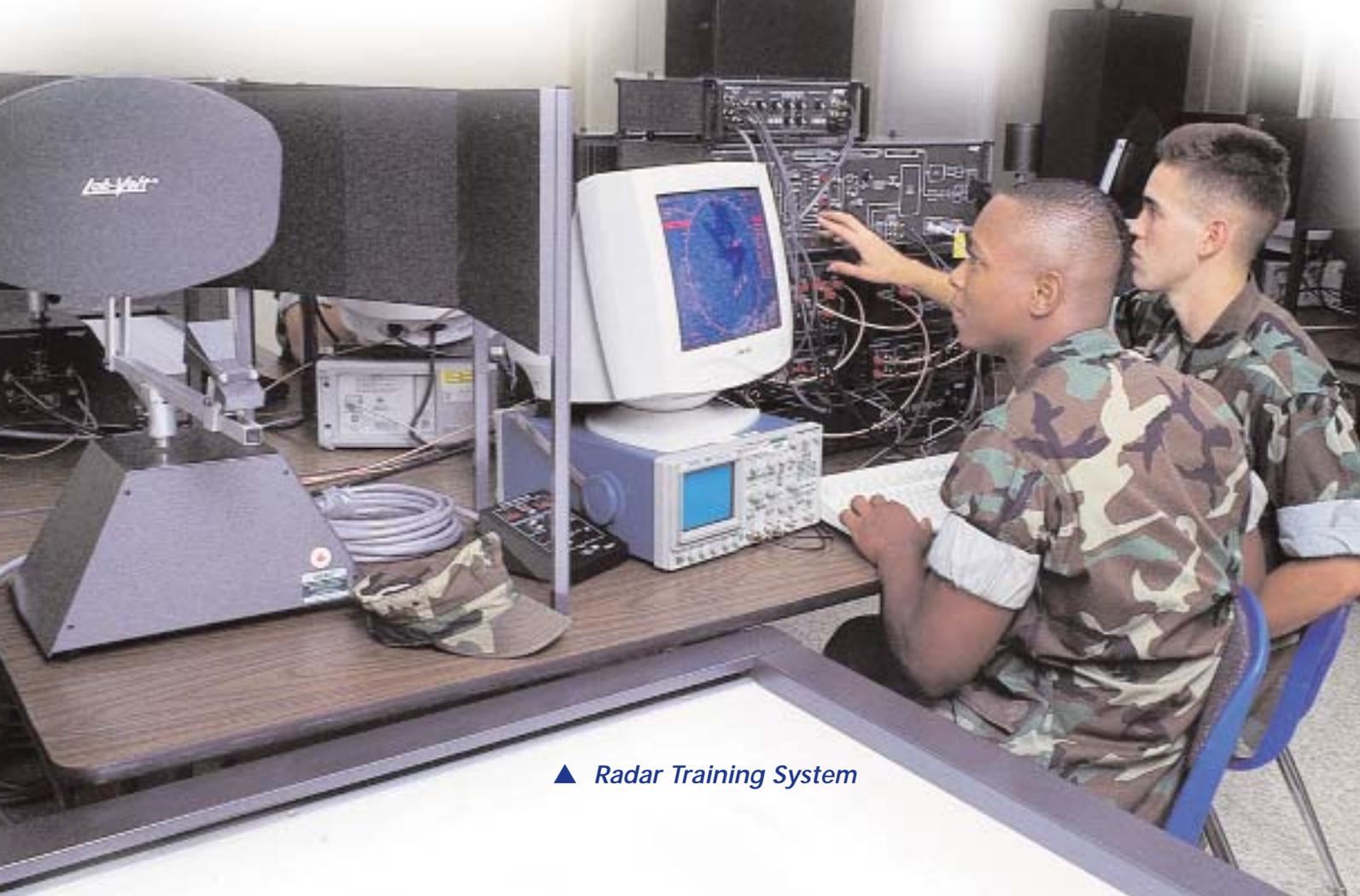
LAB-VOLT TELECOMMUNICATIONS SYSTEMS: State-of-the-Art Training in Leading-Edge Technology

Lab-Volt's Telecommunications training systems incorporate hands-on experience with the principles and operations of electronic telecommunications systems. Through computer-assisted curriculum or simulation software, trainees are able to progress from intermediate to advanced levels of study in the following critical telecommunications technologies:

√ Radar Active Target Scenarios
√ Radar Technology and Radar Target Tracking
√ Antenna Measurement
√ Digital Communications
√ Analog and Digital Communications (FACET)
√ Microwave Technology
√ Fiber Optics (FACET)
√ Digital Signal Processing (FACET)
√ Transmission Lines (FACET)

Simulation Training Software LVSIM®-ACOM and LVSIM®-DCOM

Computer-based simulation is a valuable step in the technical training process. The use of simulation software to demonstrate the principles and applications of specific technical areas allows students to practice and test their skills before they apply what they have learned to actual equipment.
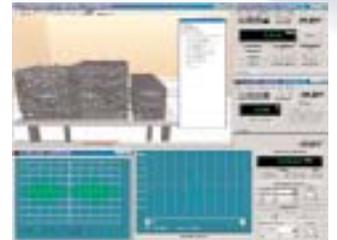
This "virtual" training experience has inspired Lab-Volt to incorporate simulation software into selected courses. LVSIM-ACOM is specifically for analog communications, and LVSIM-DCOM is for digital communications. Both software programs enable students to set up the same equipment required for the Lab-Volt Analog Communications (Model 8080) or Digital Communications (Model 8085) Training System. Using the mouse, students manipulate realistic images of Lab-Volt equipment on the computer screen and make connections by dragging icons of virtual leads.

LVSIM-ACOM and LVSIM-DCOM are bundled with the Lab-Volt Data Acquisition and Management System for telecommunications (LVDAM-COM), Model 9407 to further enable trainees to observe and accurately measure voltage, frequency, and RF power. LVDAM-COM also enables trainees to plot graphs and analyze waveforms and frequency spectra.

Analog Communications

The Lab-Volt Analog Communications Training System (Model 8080) consists of six instructional modules supported by six instrumentation modules and courseware that provides hands-on exercises in the generation, transmission and reception of amplitude, double sideband, single sideband, frequency, and phase modulated signals (AM, DSB, SSB, FM and PM).

Digital Communications

The Lab-Volt Digital Communications Training System (Model 8085-1) incorporates the latest IC technology with state-of-the-art signal modulators and demodulators to provide instruction and troubleshooting skills in digital communications. A variety of modules can be added to the Digital Communications Training System to teach advanced digital communications techniques. Available modules include the Baseband Channel/Brickwall Filter, Time-Division Multiplexer, Time-Division Demultiplexer, T1/CEPT PCM Transceiver, Clock Recovery, Line Coder and Line Decoder.

Real-Time Radar & Target Tracking

The Lab-Volt Radar Training System provides hands-on experience in the use of radar to detect and track passive targets at very short range in the presence of noise and clutter, and places real-time, safe and unclassified radar-tracking demonstrations into the hands of students. The complete system consists of the following six sub-systems:

√ Analog Radar Training System (Model 8095-10): covers pulsed, continuous-wave, and frequency-modulated continuous-wave analog radar

√ Digital Radar Training System (Model 8095-20): modeled after the ASR-9 (MK9) air surveillance radar system; introduces trainees to modern radar operations that use digital technology to perform moving target detection and track-while-scan target tracking

√ Radar Tracking Training System (Model 8095-30): covers continuous radar tracking of a passive target in both range and angle

√ Radar Active Target (RAT) Training System (Model 8095-40): connects with both the analog and radar tracking systems to provide training in the principles and scenarios of radar tracking

√ RCS and ISAR Measurement Training System (Model 8095-50): creates a computer-based, pulse-mode system for measuring RCS of targets; specifically designed for operation with small targets at short range.

√ Radar Phased-Array Antenna Trainer (Model 8095-60): fully compatible with the Lab-Volt analog and digital (PPI mode) radar training systems; includes a beam-steering control module.
(See picture of Radar Training System at far left.)

Microwave Technology

Microwave Technology Model 8090, employs rugged, high-quality components to instruct trainees in power measurements, the Gunn oscillator, calibration of the variable attenuator, detection of microwave signals, attenuation measurements, standing waves, the directional coupler, reflection coefficient measurement, SWR measurements, impedance measurements, reactive impedances, impedance matching, antennas and propagation, and microwave optics.
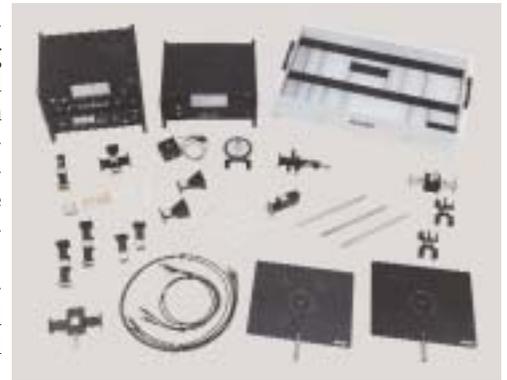
Antenna Measurement [1-GHz and 10-GHz]

The Antenna Measurement and Training System (Model 8092) offers an extensive list of antennas in the 1-GHz and 10-GHz bands, combined with an RF generator and receiving system, with a rotating antenna positioner linked to a data acquisition interface, operation under the Microsoft Windows environment. Antennas include (1-GHz) Dipoles (l/2, l, 3l/2), Folded Dipole, Monopole l/4, Loops, and Yagi; (10-GHz) Open Waveguide, Horns, Aperture Array, Serial Patch, Parallel Patch and Helicals.

Lab-Volt's Computer-Based Training for Electronic Systems (FACET)

Integrated Training at All Levels – from Basic Electronics to Advanced Telecommunications

The award-winning FACET electronics training system is used in military installations around the world to provide personnel with effective computer-based, interactive instruction and troubleshooting skills in basic to advanced principles and applications of electronics. A manual system also is available.

The Basic Electricity and Electronics FACET program consists of a wide range of courses, including:

√ DC Fundamentals
√ DC Network Theorems
√ Magnetism & Electromagnetism
√ AC 1 Fundamentals
√ AC 2 Fundamentals
√ Semiconductor Fundamentals
√ Transistor Amplifier Circuits
√ Transistor Power Circuits
√ Transistor Feedback Circuits
√ Power Supply Regulation Circuits
√ FET Fundamentals
√ Thyristor and Power Control Circuits
√ Operational Amplifier Fundamentals
√ Operational Amplifier Applications
√ Digital Logic Fundamentals
√ Digital Circuit Fundamentals 1
√ Digital Circuit Fundamentals 2
√ 32-Bit Microprocessor
√ Transducer Fundamentals
√ Motors, Generators and Controls
√ Power Transistors and GTO Thyristors

Conforming to the highest measure of educational quality, FACET courseware is designed to facilitate and reinforce progressive mastery of the course material. Delivered by means of training manuals or FACET software, the courseware provides an extensive array of instructional benefits, including:

√ An outline of the principles and concepts covered in each course helps to clarify course content and focus.
√ General and specific objectives stated in each unit help define learning outcomes and expectations for the trainees.
√ Topic discussions help foster comprehension.
√ Hands-on activities provide dynamic and retentive learning.
√ Emphasis on and definition of new words and phrases throughout the text help trainees develop comfort and familiarity with highly technical terms.
√ Equipment lists support trainees' efforts to efficiently organize time and materials.
√ Troubleshooting skills are facilitated through 12 instructor- or computer-activated fault switches and 20 circuit-modification switches.

The computer-based system provides these additional benefits:
√ Automatic screen prompts every three to five screens regularly reinforce learning.
√ Trainees receive constant feedback with a review test and competency ratings with each exercise, comprehensive unit tests and additional questions on new material.
√ Online data collection of exercise results, quizzes and unit tests facilitates instant feedback to trainees.

Several Lab-Volt Telecommunications training modules derive from the FACET electronics training program. These include:

√ Analog Communications
√ Digital Communications 1
√ Digital Communications 2
√ Fiber Optics
√ Digital Signal Processor
√ Transmission Lines

Analog Communications

Featuring instruction and troubleshooting in the functions of oscillators, filters, amplifiers, LC networks, modulators, limiters, mixers and detectors in communication circuits.

Fiber Optics

Featuring instruction and troubleshooting in Scattering and Absorption Losses, Connectors and Polishing, Numerical Aperture and Core Area, Bending Loss and Modal Dispersion, Light Source, Driver Circuit, Source-to-Fiber Connection, Light Detector, Output Circuit, Fiber Optic Test Equipment, Optical Power Budgets, Analog Communications and Digital Communications.

Digital Communications 1

Featuring instruction and troubleshooting in the Sampler, Sample/Hold, Adder, Ramp Generator, Comparator, Limiter, Filter, CODEC, PLL, Compressor, Expander, Integrator, Differentiator, Latched Comparator, Speaker Amplifier and Channel Simulator.
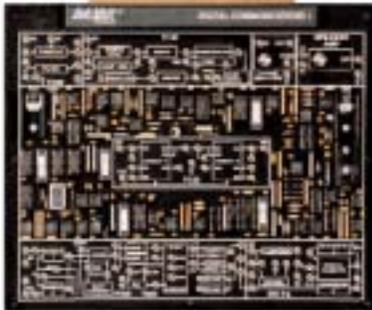
Digital Signal Processor

Featuring instruction and troubleshooting in the Assembler and the Debugger, Numerical Formats, Arithmetic in a DSP, Memory Structure, Address Generation Unit, Program Control, Pipelining, Peripherals and Signal Processing: The FIR Filter.
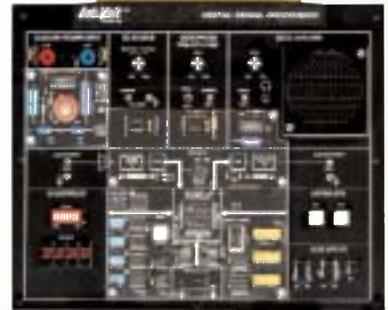
Digital Communications 2

Featuring instruction and troubleshooting in NRZ, RZ, Manchester Encoding and Decoding, Clock Synchronizer, Frequency-Shift Keying (FSK) Generation, FSK Asynchronous and Synchronous Detection, Phase-Shift Keying (PSK) Generation, PSK Synchronous Detection, Amplitude-Shift Keying (ASK) Generation, ASK Asynchronous and Synchronous Detection, Channel Effects, and FSK/DPSK (Differential Phase-Shift Keying) Modem.
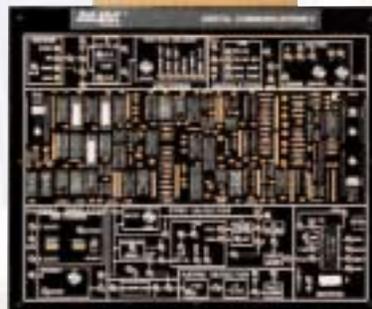
Transmission Lines

Featuring instruction and troubleshooting in Measurement Skills, Transient and Sinusoidal Steady-State Conditions, Time-domain Reflectometry (TDR), Reflection Coefficients, Line Attenuation and Insertion Losses, Resonant Lines and Impedance Transmission.

Lab-Volt's Electric Power and Controls Training Systems
Preparing Military Personnel for Electric Power Applications

Training in electromechanical systems, and specifically synchro-servo systems, is essential for military personnel charged with the task of controlling and maintaining electrically and electronically powered equipment, such as motors, generators, and weapons control and guidance systems.

The Lab-Volt Electromechanical Training System, available as a computer-based learning system (Model 8006) or as a simulated training program (LVSIM-EMS, Model 8970), provides comprehensive instruction and troubleshooting in the principles and applications of electric power and energy. Combined with the Lab-Volt Synchro-Servo Training System (Model 8060), these programs train personnel to perform the critical tasks needed for safe and efficient operation of systems.

The simulation features of LVSIM-EMS (above) and the modern and versatile instruments of LVDAM-EMS give trainees a virtual hands-on experience before using the actual equipment, saving lab time and equipment costs while enhancing learning.

Safe, High-Tech Training in Electric Power

The Lab-Volt low-power (0.2 kW) Electromechanical Training System (Model 8006 or LVSIM Model 8970) provides new opportunities for laboratory observations in the study of electric power technology. Presented in a basic subsystem and special applications format, the program incorporates various techniques used to generate and apply electrical energy.

Topics covered in this 150-hour program include Fundamentals of Electrical Power Technology, Alternating Current, Capacitors in AC Circuits, Inductors in AC Circuits, Power Phasors and Impedance in AC Circuits, Three-Phase Circuits, Single-Phase Transformers, Special Transformer Connections, Three-Phase Transformers, Fundamentals of Rotating Machines, DC Motors and Generators, Special Characteristics of DC Motors, AC Induction Motors, Synchronous AC Motors, and Three-Phase Synchronous Generators (Alternators).

The advanced add-on modules cover less common machines and equipment such as the Ward-Leonard System, the Two-Speed Constant Torque Motor, Synchronous Reluctance Motor, Two-Value Capacitor Motor, the High-Leakage Reactance Motor, Repulsion-Start Induction-Run Motor and Schrage Motor.

LVDAM-EMS

Used with the actual hardware of Model 8001, Model 8006 Computer-Assisted EMS training systems, or LVSIM-EMS, the Lab-Volt Data Acquisition and Management software (LVDAM-EMS) provides an interface that replaces standard desktop equipment with virtual instruments that include voltmeters, ammeters, power meters, four-channel oscilloscope, phasor analyzer, data table and graphing facility, and 15 configurable meters for measuring voltage, current, torque, speed and electrical/mechanical power.
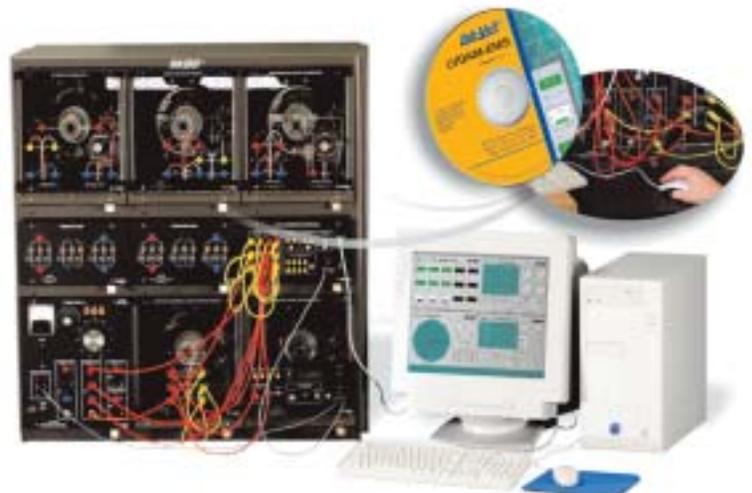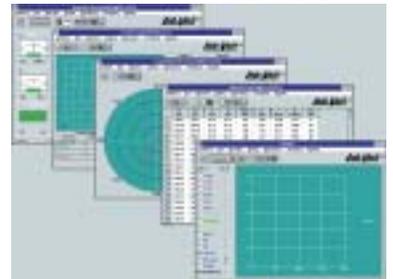
Computer-Assisted 0.2 kW Electromechanical Training System

Safe, Low-Voltage Synchro-Servo Systems

The Lab-Volt Synchro-Servo Training System (Model 8060) is portable and self-contained to enable trainees to observe and analyze the fundamental components of open- and closed-loop control systems and associated electronic circuits. With this modular system, trainees can build synchro-servo systems of their own by interconnecting components, thus reinforcing their knowledge of components and circuitry and reinforcing their comprehension of block diagrams.

Topics covered in this program include Position Control of a DC Motor, Position Control of a DC Motor with DC Tachometer Compensation, Position Control of a DC Motor Using Synchro Feedback, Speed Control of a DC Motor, Position Control of an AC Motor using AC or DC Reference, Position Control of an AC Motor with AC Tachometer Compensation, Position Control of an AC Motor with Synchro Feedback, and Position Control using only Synchro Motors.

LAB-VOLT SIMULATION (LVSIM) TRAINING SOFTWARE: Safe and Effective Instruction in Half the Time, at Lower Cost

Although Lab-Volt has been known for over 40 years primarily as a manufacturer of high-quality training hardware and comprehensive curriculum, we have always been on the cutting edge of learning technologies that speed and enhance the training process. With the introduction first of computer-based instruction, and more recently simulation-based instruction, Lab-Volt is able to offer even higher quality training systems at lower cost.

Lab-Volt's simulation training programs in Analog and Digital Communications (LVSIM-ACOM and LVSIM-DCOM), Electromechanical Systems (LVSIM-EMS), and Fluid Power (LVSIM-HYD and LVSIM-PNEU) cover the same topics as the standard systems while providing the added advantage of interactive learning. Using LVSIM software, trainees are able to set up a virtual work-station on the computer, thereby creating a desktop laboratory where they can perform the same experiments that are possible on the actual equipment, thus reducing lab time and costs while increasing trainee learning. Through this innovative and effective approach, training centers are able to schedule more trainees into a program without the added expense for additional laboratory equipment.

Simulation training is also available for FACET courses through EWB MultiSIM simulation software and the Lab-Volt Virtual Instrument Package (Model 1250). EWB MultiSIM works with the FACET computer-based curriculum to provide trainees with a quick and efficient means of forming and testing complex electronic circuits. The Lab-Volt Virtual Instrument Package replaces standard desktop test equipment with powerful, simulated instrumentation that includes a digital storage oscilloscope, multimeter, function generator, spectrum analyzer and transient recorder. All programs are based in a Microsoft® Windows® platform.

Virtual Instrumentation for Use with LVSIM-EMS and LVSIM-COM

The Lab-Volt Data Acquisition and Management interface provides computer-based instrumentation for measuring, observing and analyzing data in Lab-Volt technical training systems.

LVDAM software consists of a complete set of instruments that runs on an IBM®-compatible personal computer under the Microsoft Windows platform. Each instrument appears as a window on the computer screen, replacing the Lab-Volt conventional instruments used in the standard curriculum.

LVDAM-COM *includes a dual-channel oscilloscope, spectrum analyzer, true-RMS voltmeter and frequency counter.*

PC-Based Virtual Instrument for FACET

The Lab-Volt Virtual Instrument Package includes a desktop unit along with all necessary software, cables, a user manual, two oscilloscope probes (switchable 1:1-1:10) and a data acquisition feature that can be connected to the parallel printer port of a personal computer.

The trainee uses the keyboard, mouse and screen on his computer to control and display the five measuring instruments. The Windows software menu and tool task bars allow the inexperienced trainee to carry out measurements easily. Measured data can be printed out or stored on a floppy disk or network.

Lab-Volt Virtual Instrument Package *includes digital storage oscilloscope, multimeter, signal generator, spectrum analyzer and transient recorder*
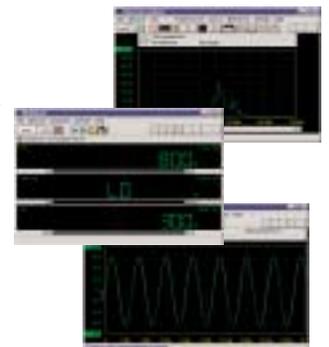
Fluid Power Training Systems for Military Applications

Military field operations, from construction to transportation, are dependent on the energy derived from hydraulic and pneumatic devices such as lifts, cranes, drills, pumps, and control of weapons and radar systems.

Lab-Volt's comprehensive and flexible fluid power training systems consist of two programs: the Hydraulics Training System (Model 6080) and the Pneumatics Training System (Model 6081). Both are innovative, modular systems that use state-of-the-art hardware, courseware and optional simulation software (LVSIM-HYD and LVSIM-PNEU) to deliver high-level skills in the control, troubleshooting and testing of fluid power systems, components, circuits and applications.

Engineered for extreme ease of use, the Lab-Volt Hydraulics and Pneumatics Training Systems are mobile and extremely flexible for classroom use. The basic Lab-Volt Hydraulics Training System consists of a power unit, work surface assembly, industrial-grade components, hoses, hose rack, metering instruments, and related courseware. The basic Pneumatics Training System consists of a work surface assembly, pneumatic components, measuring instruments, and necessary pneumatic accessories to perform experiments. All components in both systems exceed industrial safety standards and are equipped with male-check valve quick-disconnect fittings. Optional equipment includes a mobile support bench with expandable storage shelves, dress panels and additional expansion panels.

Pneumatics

Hydraulics

Operating on a standard electrical supply, the Hydraulics system requires no special wiring. The pump (3.72 l/min, 0.8 U.S. gal/min) delivers flow to components at a rate that allows observation while remaining powerful enough to provide pressures in excess of 4000 kPa or 600 psi.

Powerful e-Learning Programs Anytime, Anyplace
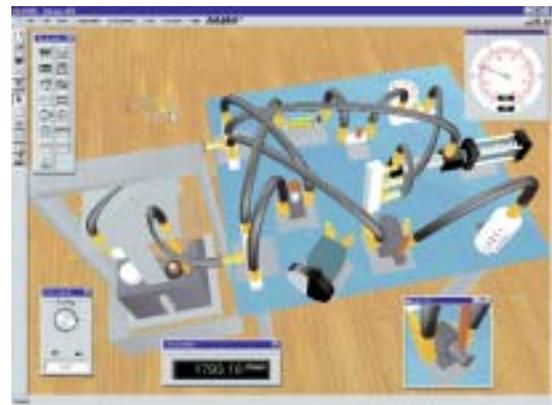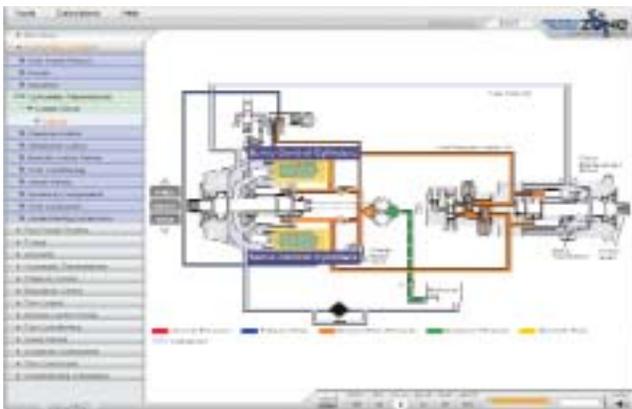
LVSIM-Hydraulics

Lab-Volt's e-learning courses in Fluid Power include all of the benefits of online training:

√ Anytime, Anyplace, and Any Pace Training
√ Consistent Delivery
√ Enhanced Training Administration
√ Easy to Update and Standardize
√ Implement Custom Training
√ Keep Costs Low

Other Product Literature Available from Lab-Volt:

Lab-Volt Product Catalog on CD-ROM

Descriptions and demonstrations of Lab-Volt training systems and software. Includes FACET®, EMS, and other award-winning training systems.

Computer-Based Electronics Training System (FACET®) Product Guide

Forty-eight-page catalog of Lab-Volt training systems in Fundamental Electronics; Analog, Digital and Fiber Optic Communications; Semiconductors, Transistors, Thyristors, FET and Amplifiers.
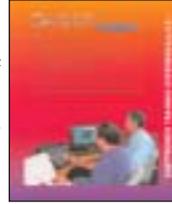
HVAC Brochure Refrigeration/Air Conditioning/Heating/Ventilation

Twenty-page color brochure describes indus-trial-standard training equipment and curriculum for refrigeration, air han-dling, energy management, heat pumps and air-condi-tioning systems.
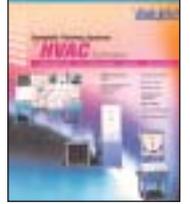
Manufacturing/Mechatronics Product Guide

Sixty-four page catalog of Lab-Volt training programs in Automation, Robotics, Fluid Power, Instrumentation and Process Control.

Telecommunications Product Guide

Thirty-six page catalog of Lab-Volt telecommunica-tions modules that cover analog and digital commu-nications, microwave, telephony, fiber optics, antenna and radar tech-nologies.

Tech-World®: Applications in Information Technology Brochure

Twelve-page, four-color brochure describes this multimedia curriculum that prepares students for certifications, entry-level employment, advanced education and careers in Information Technology or any other IT-dependent industry.

Graymark Information Technology Brochure

Eight-page brochure of Graymark's quality IT train-ing products, including PC familiarization, trou-bleshooting and repair; cable installation; monitor and printer repair; GPS tech-nology; and network technol-ogy programs.

Electric Power/Controls Product Guide

Forty-four page catalog of Lab-Volt's vast offering of training modules in Electro-mechanical systems, PLCs, Power Electronics, and corresponding CBT and sim-ulation software programs.

Industrial Maintenance Brochure

Twelve-page color brochure showcasing Lab-Volt's comprehen-sive industrial training sytems, including indus-trial pumps, mechanical systems, industrial wiring, rigging, and more.

Tech-World®: Manufacturing Brochure

Twelve-page color brochure describes this multimedia and hands-on curriculum for engineering and manufac-turing; presents competen-cies students achieve and related career opportunities.

Tech-Design® Technology Education Catalog

Seventy-four-page catalog with detailed descriptions of 43 Tech-Design modules and course objectives, including skills-at-a-glance charts showing competencies asso-ciated with each module.

Tech-World®: Manufacturing Demo CD-ROM

Highly graphical CD demonstrates this pre-engineering/manufac-turing curriculum that provides realistic, hands-on training with indus-try-standard equipment and advanced software.

Easy Ways to Order Additional Product Literature:

√ Send e-mail to: us@labvolt.com (USA)
                                       ca@labvolt.com (Canada)

√ Call us at 1-800-LAB-VOLT (USA AND CANADA)
    or 1-732-938-2000 (outside of the USA and Canada)

√ Visit our website at www.labvolt.com

√ Circle the requested items above and fax it: 1-732-774-8573

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Country: _____ Postal Code: _____

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