



Training Systems
for HV Vehicles
and ADAS, covering
ASE L3 and ASE L4





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Real Experience Learning: Intelligent training solutions of the future

Lucas-Nuelle's training systems combine theoretical knowledge with practical experience: Tangible, realistic learning systems with real equipment offer learners the chance to grasp and understand complex relationships. Because only when we experience things, do them ourselves, celebrate small successes and thus experience emotions, does what we have learned enter our long-term memory - and thus become permanently anchored in our minds. Our training systems combine user-friendly e-learning software with the corresponding courses and real tools and systems. In this way, they pave the way for sound practical knowledge.

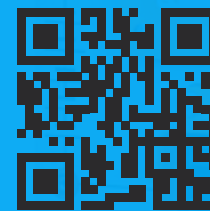
Thanks to Real Experience Learning with Lucas-Nuelle, learners are immersed in a new world of learning and acquire not only knowledge but also the necessary skills.



CarTrain Diagnosis and Repair of HV Vehicles, ASE L3 Trainer

The CarTrain "Diagnosis and Repair of HV Vehicles" combines hardware with a digital learning environment and offers the ideal introduction to high voltage technology. It fully meets the requirements of the ASE L3 Light Duty Hybrid/Electric Vehicle Specialist Test and other internationally recognized qualifications.

This system gives your trainees not only a comprehensive system understanding in order to carry out diagnosis but allows them to also carry out the repair and develop their skills. Around 30 real world projects are included in the brand new RXLea platform.



How it revolutionizes
HV Training!

Order no. AEV21CT



Training contents

- Real components - from real vehicles
- 400V high voltage - with integrated protection
- HV system deactivation - all common shut-down procedures
- Replaceable main relays modules - 3 variants of precharge
- Practice oriented - complete workshop procedures
- Virtual cockpit - integrated diagnostic scan tool
- Different drive configurations - based on real vehicle data
- Potential equalization - measurements on real metal components
- Realistic energy flows - all hybrid or EV manufacturers
- HVIL for all relevant components
- Three phase motor - types, structure and function
- Charging socket - methods of charging a HV vehicle
- Integrated fault simulation - activated via touchscreen
- Curriculum and projects - complete coverage of the ASE L3 test
- Acoustic feedback - warning of hazardous actions
- Safe and secure working environment - student proof

EXPERIENCE THE REVOLUTION IN PRACTICAL TRAINING FOR HIGHVOLTAGE VEHICLES



**Project Case with
Faulty and Spare
Components**



Charging Station

CarTrain is an innovative training system designed to equip automotive professionals with cutting-edge skills. With five drive configurations and real HV measurement capabilities, it seamlessly combines innovation and safety into one intuitive platform.

- Hands-On Learning, Maximum Safety**
 The touchscreen interface clarifies HV drive modes and energy flows, while fault simulation builds real-world diagnostic skills in a secure environment.
- Real Workshop Training**
 Train for the full repair process using integrated defective components that mirror actual workshop conditions.
- Smart Diagnostics Made Simple**
 A built-in scan tool allows seamless fault code reading, live data monitoring, and HV isolation—without extra tools.
- Confidence in HV Measurements**
 With HV measuring adapters and an integrated unit, trainees gain hands-on experience with real highvoltage measurements.
- Advanced Troubleshooting Capabilities**
 CarTrain uniquely supports magnetic interference troubleshooting for HV shielding noise, enhancing diagnostic expertise.
- Future-Proof and Versatile**
 Compatible with hybrids, EVs, and fuel cells, CarTrain supports all three precharge variants, ensuring comprehensive and adaptable training.

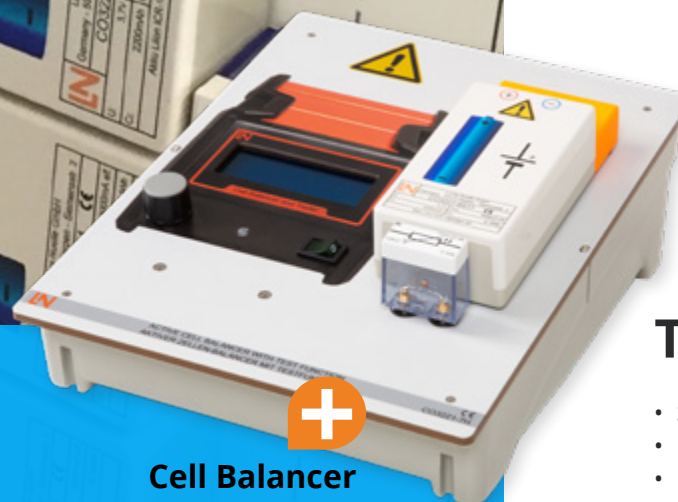


CarTrain HV Battery Trainer with Cell Balancer

Order no. CO3221-6S

More and more manufacturers carry out repairs on high voltage batteries. This is a new challenge for technicians and requires a special understanding of the systems involved. This training system makes it possible to work directly with a real high voltage battery. Trainees can carry out measurements inside the battery, work at cell level and even change actual cells.

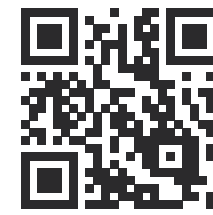
An extensive system which is nevertheless easy to use. Fault simulation capability enables study of many potential problems. While trainees work out the right ways to carry out diagnostics, they also gain practical skills for the latest workshop challenges.



Cell Balancer

Order no. CO3221-7H

Hands-on training on a new level: Find the faulty cell in the HV battery – precondition the new cell with the cell balancer and replace it.



How to diagnose and repair a high-voltage battery!



Training contents

- Structure and analysis of a real high voltage battery
- Diagnostic work on HV battery via fault simulation activation
- Disconnection (isolation) via service/maintenance plug
- Extra training for first responders (fire service, police)
- Various measurements including high voltage and temperature sensors
- Charging connectors (AC, CCS DC)
- HV Isolation as carried out in practice using high voltage diagnostic tester
- Dealing with damaged HV batteries
- Classification of HV batteries according to potential hazards



CarTrain

First Responder Trainer for Electric Vehicles

Order no. CO3223-6Z7

The growing number of electric vehicles on the road presents a new challenge, especially for emergency and rescue services.

Lucas-Nuelle has developed a unique training concept for first responders. This makes it possible to carry out the new tasks with seasoned professionalism and assurance. Integrated accident scenarios perfectly round out this training package.



Thermal camera
Order no. LM83158



The unique training concept!



Incl. accident scenarios:

- Welded-shut HV relays
- Thermal runaway of the HV battery
- Submerged vehicle
- Burning vehicle
- Trapped driver

Training contents

- Hands on training for first responders
- Immobilizing of the vehicle
- Using rescue cards
- All HV isolation procedures
- Accident scenarios like submerged vehicles
- Getting to know special risks

Table-top Panels

MEASUREMENT AND DIAGNOSIS ON THE ELECTRIC DRIVE



+ Practical Insulation and Resistance Measurement



Because real electric motors are often large and heavy, they can be challenging to use in a classroom setting. This tabletop solution offers students hands-on experience in electric motor testing in a convenient and accessible format. The system includes eight units, each presenting different readings and scenarios, including faults, enabling trainees to interpret and diagnose various electrical conditions.

The trainee can carry out a practical insulation measurement or check the resistances of the stator. The modules also offer the possibility to analyse the differences between a star or delta connection of a motor. In addition to these possibilities, further measurements can be carried out on the various modules, which further improve the understanding of the subject and the trainee's own diagnostic skills.

Training contents

- Structure of an electrical machine
- Differences between synchronous and asynchronous motors
- Differences between Star (Y) and Delta (Δ) circuits
- Insulation measurement on electrical machines
- Resistance measurement on electrical machines
- Inductance measurement of the coils

Order no. CO3223-7G

UniTrain

PREPARING FOR HV - UNDERSTANDING THE FUNDAMENTALS OF ELECTRICS AND ELECTRONICS



Welcome to the exciting world of electronics in vehicles! Our comprehensive training system provides an excellent introduction to this fascinating field. With pre-fabricated circuits, getting started is as easy as plugging in a few jumpers.

We understand the importance of using and handling measuring instruments in conjunction with customer vehicles, and special attention has been paid to ensure that our training system addresses these concerns. With our emphasis on practical application and hands-on experience, you'll be well-equipped to tackle the challenges of working with electronics in vehicles.

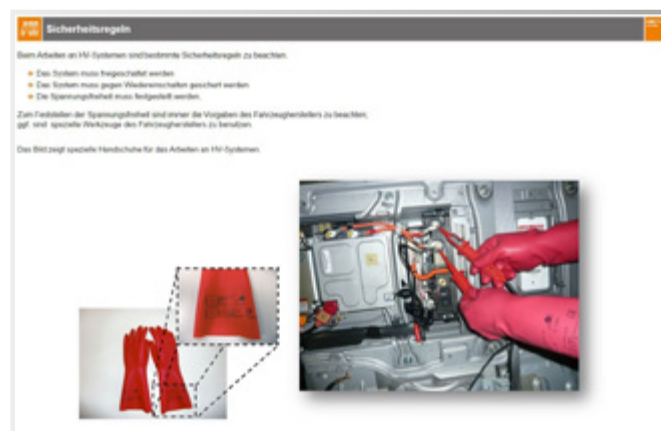
Training contents

- Hands on measurement of voltage, current and resistance
- Fuses in circuits
- Different circuits with symbols ready to use
- Understanding electrical principles
- Developing diagnostic skills

Order no. CO4205-1D

UniTrain

ELECTRIC DRIVES IN CARS, TRUCKS AND TWO-WHEELERS



With the UniTrain training system for electric drives, trainees get the perfect and safe HV drive systems and learn the three key components of the key components "electric motor", "inverter" and, in particular the "HV battery" with its numerous safety functions.

In practical exercises and various diagnostic tasks with fault simulation, they acquire practical knowledge and essential diagnostic skills.

Training contents

- Smart HV battery relays with self diagnosis function
- Extensive HV fault simulations
- Synchronous and asynchronous motor testing
- Function of the inverter to convert DC to AC
- Safety systems such as HV relays and HVIL

Order no. CO4204-6N

UniTrain

SAFE HANDLING OF HV SYSTEMS



Learning content

- Fundamentals of safety when working with high voltage vehicles
- Effects of faults encountered in practice
- Using a model to measure the current passing through a human body
- Diagnostic functions
- Investigation by means of measurements

Order no. CO4205-1M

UniTrain

HV BATTERY WITH SMART RELAYS



Learning content

- Design and function of battery disconnection unit
- Fault finding
- Perform the isolation procedure
- Measuring the HV start up and shutdown sequence
- Difference between conventional and smart HV relays

Order no. CO4205-1Z

UniTrain STEP-UP/STEP-DOWN CONVERTERS

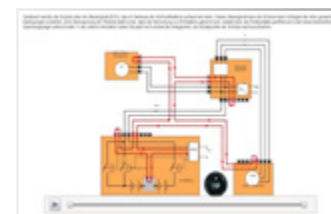


Learning content

- 1 course on step-up conversion (from lower voltage to higher)
- 1 course on step-down conversion (from higher voltage to lower)
- Safe handling thanks to safety low voltage
- Practical experience of voltage conversion
- Function and design of DC-DC converters
- Measurement of input and output voltages

Order no. CO4205-1K/CO4205-1L

UniTrain ELECTRICAL INTERLOCKS IN ELECTRIC AND HYBRID VEHICLES

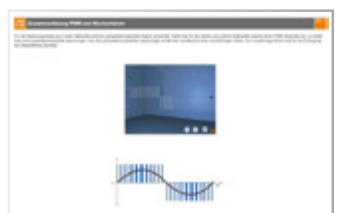


Learning content

- Electrical circuitry for interlocks
- Interlock signals
- Investigation of an interlock by measurement
- Simulation of faults commonly encountered in practice

Order no. CO4205-1H

UniTrain DC/AC CONVERSION



Learning content

- Electrical induction
- Current and voltage ratio
- Generation of a pulse-wide modulated voltage
- Conversion of direct voltage into alternating voltage

Order no. CO4204-6L

UniTrain FUEL CELLS



Learning content

- Fuel cell application in motor vehicles
- Function of a fuel cell
- Design of a fuel cell
- Fundamentals of the chemical process
- Properties of fuel cells
- Recording characteristics
- Efficiency of a fuel cell

Order no. CO4204-6M

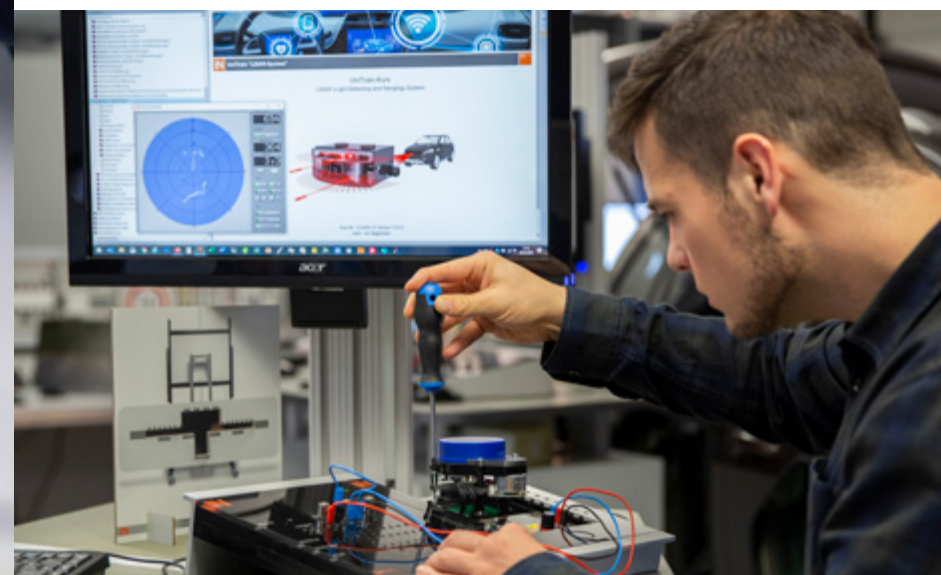


Qualification for ADAS, ASE L4

The ADAS Specialist Test (L4) is an advanced ASE certification for technicians who diagnose, repair, and calibrate driver assistance systems in modern vehicles. To take the test, candidates must have passed either the A6 (Electrical/Electronic Systems) or B5 (Mechanical and Electrical Components) certification.

The L4 test consists of 40 scored multiple-choice questions and 10 unscored questions (initially, 80 total questions). Half of the questions require the ADAS Composite Vehicle Reference, which will be clearly indicated in the test. Passing the L4 test, along with three years of relevant hands-on experience (or equivalent training), grants ASE Advanced Level Specialist certification.

UniTrain LIDAR (LIGHT DETECTION AND RANGING)



Learning content

- Fundamentals of driver assistance systems
- Significance for self-driving vehicles
- Physical principles of light and lasers
- Safety regulations when handling and operating lasers
- Design and function of LIDAR systems in vehicles
- Calibration of a LIDAR system by means of a calibration board
- Diagnostics for CAN bus, power supply and actuators
- Measuring techniques and reflection properties
- Signal processing and detection of surroundings
- Networked driver assistance systems and system architecture

Order no. CO4205-1E

UniTrain RADAR - ADAPTIVE CRUISE CONTROL



Learning content

- Calibrate and operate a real radar sensor
- Calibration by laser
- Adjustment of the sensor by the trainee
- Control strategy of the ACC system
- Networking and setup of the ACC system
- Basics of radar technology

Order no. CO4205-1V

UniTrain

FRONT FACING CAMERA - LANE KEEPING ASSIST AND DEPARTURE WARNING



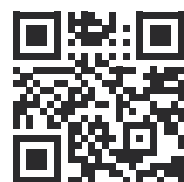
Learning content

- Overview of current driver assistance systems
- Stages of autonomous driving
- Operation of the active lane assistant
- Virtual lane
- Control behavior
- Performance limits of the active lane assistant
- Electrical components of the active lane assistant
- Networking in the vehicle
- Diagnosis including 4 workshop orders
- Calibration

Order no. CO4205-1W

UniTrain

ULTRASONIC PARK ASSIST WITH REAR VIEW CAMERA



Learning content

- Design and operation of the driver assistance system
- Integration of the camera in the overall system
- Functionality of the ultrasonic sensors
- Role of the driver assistance system
- Learning about the diagnostic functions
- Familiarisation with the system limits

Order no. CO4205-1C

UniTrain

CAN BUS



Learning content

- Use of bus systems in vehicles
- CAN bus: topology & components
- Comparison: low-speed vs. high-speed CAN
- Electrical properties of the CAN bus
- Data rate, identifiers & arbitration
- Structure of a CAN message
- Analysis of CAN messages
- Editing & transmitting CAN messages
- Troubleshooting & diagnostics

Order no. CO4205-1C

UniTrain

ETHERNET - SAFE DATA TRANSFER FOR HIGH SPEED APPLICATIONS



Learning content

- Setting up an Ethernet network for a vehicle
- Areas of application
- Real-time transmission of data
- Ethernet system components
- Difference between Ethernet and CAN buses
- Comparison of standard Ethernet and Ethernet for vehicles
- Software updates for in-vehicle systems via Ethernet
- Use of OBDII interfaces via Ethernet
- Benefits and risks

Order no. CO4205-1A

UniTrain VEHICLE STABILIZATION SYSTEMS - ABS, ESC AND TCS



Learning content

- Basic physics of driving
- Oversteer and understeer
- Sensors: Function and design
- ABS: Function and design (slip, ABS control loop)
- ESC: Function and design (controlling situations)
- TCS: Function and design (operating principle)



Order no. CO4204-6W



SkillsUSA COMPETITION



MobileTrain

EV CHARGING STATION TRAINER, WALLBOX LEVEL 2

A charging station, also known as a charge point or electric vehicle supply equipment (EVSE), is a piece of equipment that supplies electrical power for charging plug-in electric vehicles (including electric cars, electric trucks, electric buses, neighborhood electric vehicles, and plug-in hybrids). These charging stations can be conveniently installed at different locations, including public areas, private residences, and parking lots. As the popularity of electric vehicles continues to rise due to their cost-effectiveness and eco-friendliness, electric vehicle supply equipment (EVSE)

have become an essential component of the electric vehicle infrastructure. There are different types of EVSE, such as Level 1, Level 2, and Level 3 charging stations, with varying charging speeds and power levels that are dependent on the power available.

Necessary code regulations to perform installation and safety tests independently. The Lucas-Nuelle training system provides students all the essential knowledge regarding installation and safety testing.

Order no. CO5127-4Q57



Test and measuring equipment accessories

Training contents

- Understanding the structure and function of charging infrastructure systems
- Identifying the various types of charging columns and connection cables
- Determining the energy and power requirements for charging systems
- Learning about load management and assessing the energy and power requirements at the site
- Understanding the technical and legal requirements for installation
- Learning about the technical standards for connecting charging stations
- Testing communication signals (CP) in mode A, B, C, and E
- Understanding the protective equipment of charging stations
- Learning about testing and maintenance according to national regulations
- Start/stop charging w/RFID Card, or NFC enabled smart watch/phone
- Troubleshooting potential issues



Case lid can be removed



Rolling case



EMPOWER THE NEXT LEVEL

"We are proud to be a part of SkillsUSA: our goal is to provide modern and professional training systems to the future automotive workforce. We have over 15 years of experience in training systems for EV (Electric Vehicles) and ADAS (Advanced Driver Assistance Systems). Our training systems are developed and fully aligned with the ASE-L3 and ASE-L4 certification tests. For over a decade, our office in Williamsburg, Virginia has been supporting the needs of our customers throughout North America. We are committed to providing students with the best state-of-the-art training systems, ensuring they are well-prepared for their future careers."

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