LUCAS-NUELLE

SkillsUSA

LUCAS-NUELLE PRESENTS

Hands on Training Systems for ASE L3 and L4

2nd Edition

CHECK OUT OUR NEW VIRTUAL SHOW ROOM!

TRAINING SYSTEMS FOR ELECTRIC AND HYBRID VEHICLES

FACTS AND FIGURES

- Training is based on ASE L3
- Real high voltage systems
- Inculding all existing isolation procedures
- Complete training solution for HEV/EV

CARTRAIN
ASE L3 TRAINER | OFFICIAL SkillsUSA TRAINER

CARTRAIN
SYSTEM

The way that CarTrain unites in a single system five different drive configurations, including all the relevant measuring points for a high-voltage installation, is unique in the world. This renowned training system has been improved still further to meet levels 1 and 2 of the recommendations from the German insurers' organisation DGUV. Trainees can easily grasp the various drive modes and energy flows with the help of the new touchscreen.

Thanks to the fault simulation capability which allows various HV faults to be activated, they can learn vital diagnostic skills on a training system which has been specifically designed for safety.

Training contents

- Drive concepts in HV vehicles
- Energy flows in high-voltage systems
- On-board power supply for high-voltage vehicles
- Measurement of equipotential bonding and screening
- Charging sockets for vehicles
- Structure and function of electrical machines
- Preparations for inductive charging
- Diagnostics on HV systems similar to authentic practice, including use of fault codes
- Tester-based disconnection
- Manual (emergency) disconnection
- CAN communication in HV systems
- Genuine interlock systems
- Emulation of pre-load phase using testers

Five vehicles in one trainer:

Series Parallel Hybrid

Parallel Hybrid

Electric Vehicle

Serial Hybrid

Fuel Cell Vehicle

Order no. CO3221-6X8 (CarTrain)

Order no. CO3221-6Q8 (Wallbox)

Watch our video!

CARTRAIN
HV BATTERY TRAINER WITH CELL BALANCER

Includes troubleshooting

• Completely student safe HV battery
• Hands on faults within the HV battery

CARTRAIN
SYSTEM

More and more manufacturers carry out repairs on highvoltage batteries. This is a new challenge for mechanics 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.

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 infrastructure (AC, CCS DC)
- Disconnection as carried out in practice using high-voltage diagnostic tester
- Dealing with damaged HV batteries (accident-damaged vehicles)
- Classification of HV batteries according to potential hazards

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.

Cell Balancer

Order no. CO3221-6S (CarTrain)

Order no. CO3221-7H (Cell Balancer)

Watch our video!

CARTRAIN
FIRST RESPONDER TRAINER FOR ELECTRIC VEHICLES

CARTRAIN
SYSTEM

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.

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

Order no. CO3223-6Z7 (CarTrain)

Order no. LM83158 (Thermal camera)

Watch our video!

MEASUREMENT AND DIAGNOSIS ON THE ELECTRIC DRIVE

The electric motor is one of the central elements of an HV system. Due to the high currents flowing through the electric motor, it is exposed to high thermal stress and various malfunctions or defects can occur. The HV specialist must therefore be able to detect and eliminate these possible malfunctions.

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

ELECTRIC DRIVES IN CARS, TRUCKS AND TWO-WHEELERS

UNITRAIN
SYSTEM

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. safety functions.

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

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. CO4204-6N

UNITRAIN PREPARING FOR HV - UNDERSTANDING THE FUNDAMENTALS OF ELECTRICS AND ELECTRONICS

UNITRAIN
SYSTEM

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

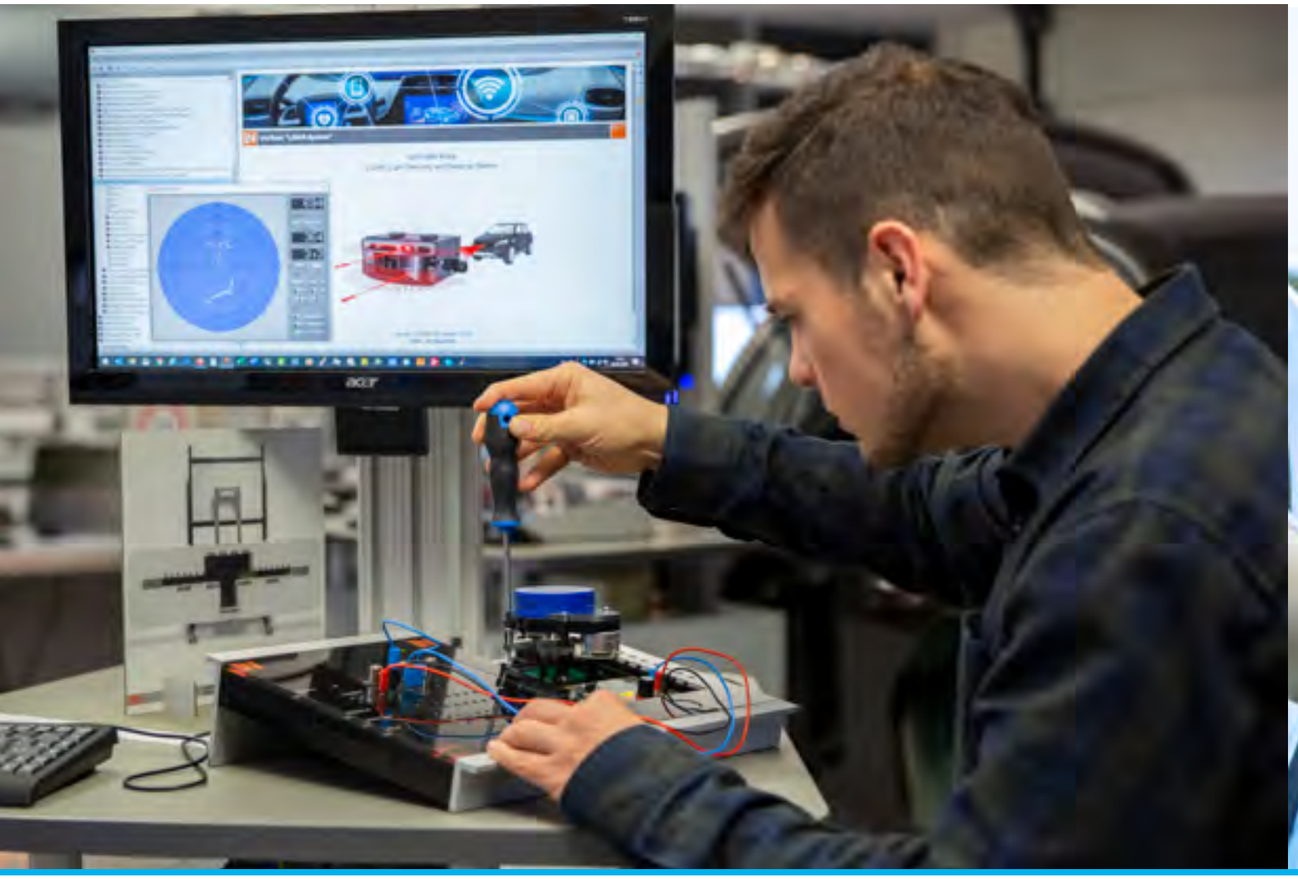
EV CHARGING STATION TRAINER

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 Charging Stations (EVCS) have become an essential component of the electric vehicle infrastructure. There are different types of EVCS, 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. It is also designed to easily integrate into an existing smart building energy system.

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

Order no. CO5127-4Q57

PERFECT BLEND OF THEORY AND PRACTICE FOR COMPLETE SYSTEM UNDERSTANDING



The challenges of training ADAS with real equipment:

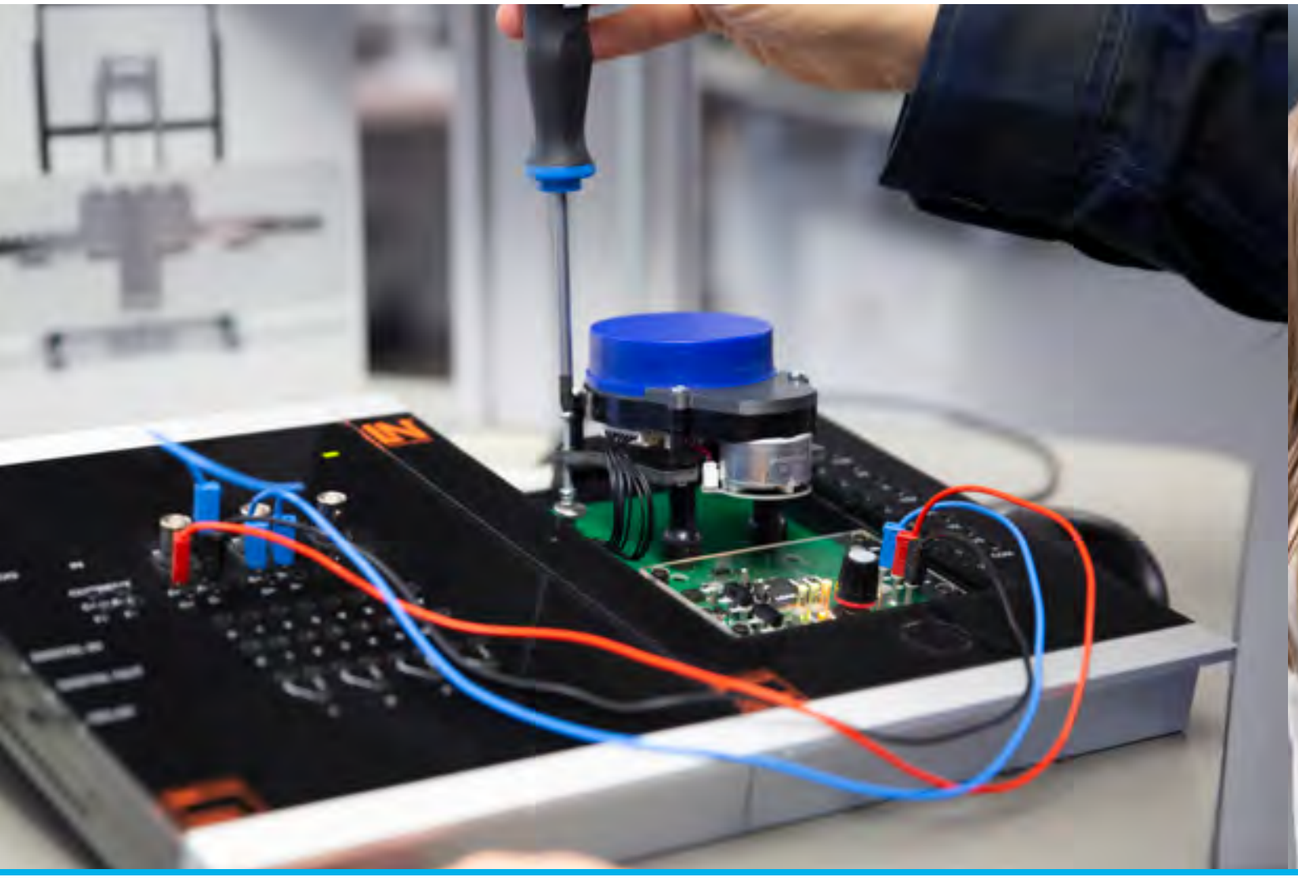
- High cost factor and space requirements, if trainees are to work practically in parallel, several modern vehicles, testers and calibration equipment are needed.
- Very difficult to communicate the functionality - the various elements of the ADAS system are usually hidden and furthermore, the ADAS functions cannot be used when the vehicle is stationary, only when it is moving.
- Every trainee should be able to practice the different static calibration procedures, however, this may be difficult due to cost and space constraints.
- The lack of training materials that explains the use of automotive radar, lidar and cameras in a clear way.

Allow your students to build employable skills by working on state-of-the-art real-world systems that teach the procedures required to work safely on today's vehicles.

QUALIFICATION FOR ADAS

The Advanced Driver Assistance Systems (ADAS) Specialist Test (L4) is an advanced level certification from ASE. It is geared toward technicians who diagnose, repair, and calibrate advanced driver assistance systems in modern automobiles and light trucks. To register to take the L4 certification test, you must have passed either the Automobile: Electrical/Electronic Systems (A6) certification test or the Collision: Mechanical and Electrical Components (B5) certification test. The L4 test consists of 40 scored multiple choice questions and 10 unscored questions. (Upon initial release, it will consist of 80 total questions.) Half of the questions require the use of the ADAS Composite Vehicle Reference; these questions will be clearly identified on the test. If you pass the L4 test and have at least three years of appropriate hands-on working experience (relevant training may substitute for some of the experience), you will be certified as an ASE Advanced Level Specialist.

LIDAR - ON THE ROAD TO AUTONOMOUS DRIVING



A direct introduction to the topic of LIDAR (Light Detection and Ranging): Use this training system to teach industry level diagnostic skills that include optical distance and speed measurement. The hardware of this driver assistance teaching system is based on a real, industry standard LIDAR module, giving trainees valuable insights into how the system works on a real vehicle.

When combined with our e-learning course, the system not only teaches how the system functions but also, how to demonstrate trouble shooting techniques quickly and effectively. Trainees can easily activate various fault scenarios from inside of the e-learning course. With the aid of the included calibration board, you can also show how to adjust a LIDAR system right in the classroom.

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

RADAR - ADAPTIVE CRUISE CONTROL

This UniTrain course introduces the trainee to the fundamentals of adaptive cruise control (ACC) including the emergency brake assistant. In addition to setting up and networking the system, all the individual components that make up the driver assistance system are discussed in detail. A major focus is placed on the calibration of the radar sensor. This is carried out using a hands on calibration target. The module can then be optimally aligned using the adjustment points on the ACC module.

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

FRONT FACING CAMERA - LANE KEEPING ASSIST AND DEPARTURE WARNING

This training system demonstrates how the active and passive lane change assistant systems function. Our hardware system includes front camera and calibration target, this allows that driver assistance system can be put into operation and calibrated the same as a real vehicle. Calibration is carried out using special diagnostic software and does not require any mechanical adjustments to the camera itself. The lane assistant can be tested in different situations on different sections of the route and evaluated in detail using the analysis tools of the diagnostic software. The necessary course content is made available in the associated e-learning course and includes integrated fault scenarios and numerous videos and animations to explain topics and procedures.

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

PARK ASSIST WITH REAR VIEW CAMERA

UNITRAIN
SYSTEM

Another driver assistance system that's important in assisting large SUVs or sedans in narrow parking spaces. Our UniTrain course includes a complete backup system for a vehicle using several ultrasonic sensors and a reversing camera. Trainees gain real world practical skills into the handling and diagnosis of the system. This enables them to learn about the physical limitations of the assistance system along with ways to troubleshoot different malfunctions.

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
- Familiarization with the limits of the system

Order no. CO4205-1C

ETHERNET - SAFE DATA TRANSFER FOR HIGH SPEED APPLICATIONS

UNITRAIN
SYSTEM

This training system enables trainees to set up an authentic Ethernet network and put it into operation. The focus is on implementing communication with the outside world via an existing EOBD connection exactly as it would be in a real vehicle. There is a specific purpose built into one of the three modules. The other two modules form an „infotainment“ network involving communication via Ethernet. The prime purpose here is the transmission of real-time data. The individual control units can be configured separately with the help of the supplied firmware dongle. This allows one module to be set up as a media server and the other as a controller for the sound system. Any audio files can be played using this network (using USB).

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

CAN BUS

UNITRAIN
SYSTEM

Modern vehicles feature many electronic control units which can constantly communicate with one another via a digital bus system. CAN bus systems are commonly used in construction, agricultural machinery and private or commercial road vehicles. The training system teaches this key topic in a way which closely resembles real world practice. Trainees start by learning the fundamentals of communication procedures before advancing to diagnostics using simulated faults.

Learning content

- Reasons for using bus systems in vehicles
- Topology and components of CAN bus systems as used in vehicles
- Differences between low-speed and high-speed CAN
- Electrical properties of a CAN bus
- Data rate, identifiers, addressing and arbitration (low-speed and high-speed CAN)
- Structure of a message frame in a CAN message
- Analysis of CAN messages using CAN monitor and an oscilloscope
- Editing and transmitting CAN messages from a PC
- Troubleshooting

Order no. CO4204-7K

VEHICLE STABILIZATION SYSTEMS - ABS, ESC AND TCS

UNITRAIN
SYSTEM

Today’s brake systems are becoming increasingly complex. Electronic aids such as ABS, ESC and TCS are now standard features on current systems. They are designed to help keep the vehicle physically stable during braking while protecting drivers. Each individual system is mutually connected and in part uses the same sensor signals. With this training system, the trainee learns practical skills and understanding or how the various systems interact and function together.

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

Contact Persons

Senior Vice President

Gerald Schex

gerald.schex@lucas-nuelle.com

Marketing and Sales

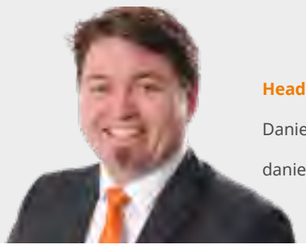
Stephen Westbury

steve.westbury@lucas-nuelle.com

Marketing and Sales - Backoffice

Nolan Opperman

nolan.opperman@lucas-nuelle.com



Head of Automotive

Daniel Brown

daniel.brown@lucas-nuelle.com

Head of LN Academy

Chris Klingler

christian.klingler@lucas-nuelle.com

Lucas-Nuelle, Inc. in Williamsburg Virginia

LUCAS-NUELLE

LUCAS-NUELLE, INC.
3909 MIDLANDS ROAD, SUITE A
WILLIAMSBURG, VA 23188
PHONE: 757 808 5696
WWW.LUCAS-NUELLE.COM
SALES@LUCAS-NUELLE.COM

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