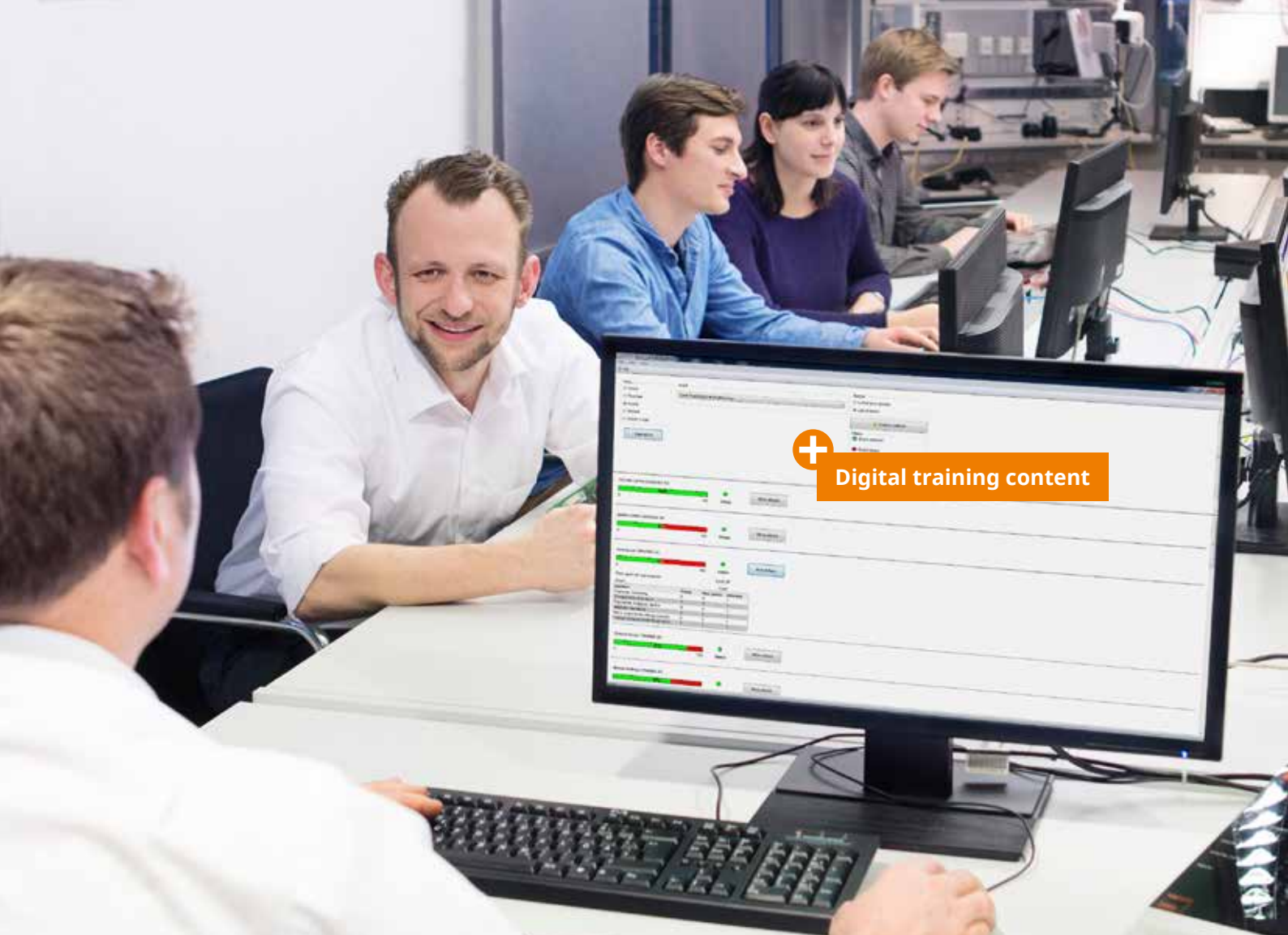




NETWORKED SYSTEMS

The digital innovation in training
of vehicle mechanics



+ Digital training content

LABSOFT – DIGITAL LEARNING AND CONTROL OF HARDWARE

Smart presentation of complex content

Labsoft provides users with a simple navigation concept to access all the content. The intelligent software also controls the UniTrain Interface and all the Lucas-Nülle hardware. Labsoft also stores all the measurements made by each user separately, making it the ideal tool for monitoring progress of students.

Benefits

- Direct access to complete course content
- Control of Lucas-Nülle hardware via virtual instruments
- User-specific storage of measurement results
- The system can operate locally, on a network or in combination with learning management systems
- Available in a wide variety of languages: All languages supported by HTML

MORE THAN A LABORATORY

Vivid presentation of complex educational content by means of modern training media

Complete solution for modern engine management systems, brakes, air conditioning and airbag systems



Training panel systems
Individual experiment set-ups

UniTrain
Individualised basic and advanced training in class groups

CarTrain
Training carried out on real components

Student Measurement Stations

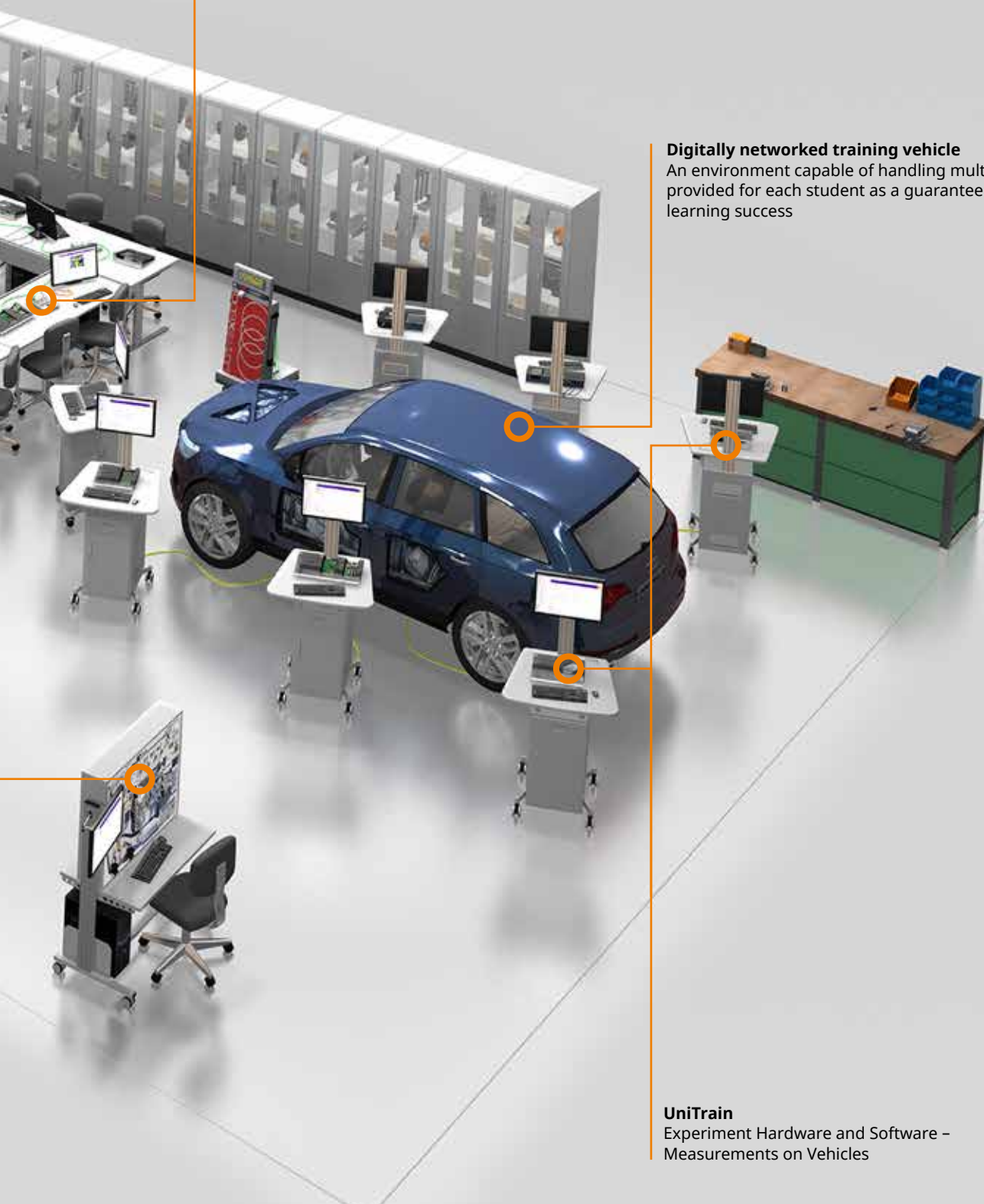
An environment capable of handling multiple signals is provided for each student as a guarantee for optimum learning success

Digitally networked training vehicle

An environment capable of handling multiple signals is provided for each student as a guarantee for optimum learning success

UniTrain

Experiment Hardware and Software –
Measurements on Vehicles



UNITRAIN



CAN

Modern vehicles feature many electronic control units which can constantly communicate with one another via digital bus systems. CAN bus systems are as common in construction and agricultural machinery as they are in private or commercial road vehicles.

The training system teaches this key topic in a way which closely resembles authentic practice. Trainees start by learning the fundamentals of communication procedures before using simulated faults for an introduction to diagnostics.

Training contents

- 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



CAN-FD

From small private cars to the biggest commercial trucks, CAN bus systems dominate the market. However, ever-greater “networking” has driven this universal aid to the limits of its capabilities. The consequent development of CAN-FD into CAN-FD (flexible data rate) has been essential and is already breaking through into series production.

This UniTrain course explains the features introduced by this innovation in an easily understood fashion. Trainees learn efficient methods for diagnostics by means of numerous experiments. They can put their own CAN-FD networks into operation and carry out all kinds of measurements as well as diagnostic work on them.

Training contents

- Features of CAN-FD bus systems
- Diagnostics as performed in practice at real workshops
- Measurements on a genuine CAN-FD network
- Diagnostic software for read-outs from the CAN-FD bus
- Select from various pre-set data rates
- Edit and transmit CAN messages via PC
- Troubleshooting

Order no. CO4205-1S



LIN buses

Another type of bus is used in addition to CAN buses. LIN buses are mainly used for non-safety-relevant comfort systems. With our training system, trainees can learn how and where such buses can be used and what their limitations are. They also carry out investigations of the bus protocol and targeted fault finding on the system.

Training contents

- Development of bus systems in vehicles
- Topology and components of a LIN bus system
- Electrical properties of a LIN bus
- Addressing in a LIN bus
- Master-slave principle
- Investigation of data fields by measurement
- Structure of message frames
- Analysis of LIN messages
- Editing and transmission of LIN messages
- Troubleshooting

Order no. SO4204-7E



Optical fibres (MOST buses)

Currently, optical bus systems are primarily used for multi-media systems using high data rates in the most expensive luxury vehicles. However, in view of the increasing data processing required in vehicles, their implementation is expanding rapidly.

Today's trainees will therefore be encountering this topic often during the course of their careers. Our training system focuses on the physical fundamentals and teaches the kind of diagnostic techniques used in practice.

Training contents

- Data networks in vehicles
- Reasons for use of fibre optics in vehicles
- Fundamentals of MOST buses
- MOST protocol and control units
- Ring-break diagnostics
- Structure of optical fibres in vehicles
- Optical bus systems in vehicles
- Fundamentals of ray optics (refraction, reflection)
- Attenuation in optical fibres
- Data transfer and optical measurements

Order no. CO4204-7H

UNITRAIN



FlexRay

The fact of there being more and more electronics in motor vehicles is accompanied by there being ever more complex networks. This now includes sensors, actuators and control units as well as entertainment and navigation systems.

FlexRay is the most widespread communications platform utilised in by-wire systems. The demands on such systems primarily include faster data rates, deterministic communication and a major need for systems to be both fail-safe and flexible. This UniTrain course teaches students about FlexRay in a manner closely aligned to authentic practice.

Training contents

- Bus systems in vehicles
- How a FlexRay bus works
- Communication between components via FlexRay
- Data exchange in FlexRay networks
- Practical application of the FlexRay protocol
- Identifying typical faults and how to trace them by measurement
- Functions of steer-by-wire technology and how it works
- Troubleshooting

Order no. SO4204-6Y



Workshop communication using RFID

In one way, communication with actual customers and the drafting of customer job orders forms the basis for all of a mechanic's business. On the other hand, though, technical communication with the actual vehicle via a PC is now an essential way of gaining vital information. Nowadays, vehicle data can be stored on the vehicle's key by means of RFID (radio-frequency identification) and can then be read out from there afterwards.

This course gives an insight into the principle of how this works and how it is used in vehicles. Trainees investigate aspects of energy and data transfer in the reader and transponder system.

Training contents

- Communication with internal and external clients
- Planning and preparation of working procedures
- Procedure of acceptance for servicing
- Compiling a work order
- Use of vehicle keys as instruments of communication
- Description of a key including data
- Reading data from a vehicle's key
- RFID applications in general and those specific to vehicles
- Understanding the essential components for data transfer
- Range of RFID transponders and antennae
- Physical relationships and standards

Order no. CO4205-1N



Comfort systems and keyless entry

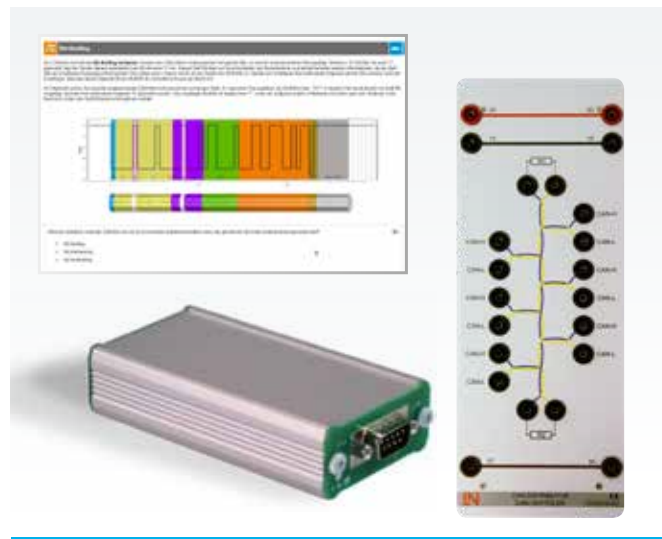
Comfort systems in vehicles make a major contribution to enhancing active safety and security. Innovative operating systems are now breaking into the marketplace and setting new standards.

Keyless entry, comfort systems, safety and security technology and door locking mechanisms, this UniTrain course offers a deep insight into all these systems. This means that trainees gain skills in essential parts of their training, such as testing, diagnostics, repairs and configuring parameters to customers' own needs and desires.

Training contents

- Comfort settings in vehicles
- Active safety
- Door-locking systems
- Central locking
- Radio remote control
- Keyless access to vehicles
- Capacitive pushbuttons
- Fundamentals of antenna technology
- How central locking works via a CAN bus and how such a system can be expanded to implement keyless systems

Order no. CO4204-6G



Use of CAN buses in cars, lorries and agricultural equipment

Here is a chance to gain an even greater understanding of CAN buses. This course helps trainees build up their own CAN network. A CAN distribution point can be used to put even a complex network into operation in rapid time.

Subsequent control of the individual CAN nodes can then be carried out by a whole group, since the educational concept provides full support for group working. The system can also be supplemented with components for a lighting installation.

Training contents

- Structure of a CAN network
- Setting up a system with the aid of a CAN distribution point
- Control of CAN nodes
- Transmitting and receiving messages
- Group work (with up to four teams)

Order no. ATS 2

UNITRAIN



Reversing camera with parking assistance

A complete system for the rear of a vehicle, composed of multiple ultrasonic sensors and a camera. This UniTrain course gives trainees a practical insight into the handling of a reversing camera with parking assistance, as well as diagnosis of the system.

The training system encompasses the technical features of the whole installation, as well as showing how the individual components operate. Trainees can therefore find out about the physical limitations of the assistant and learn diagnostic techniques for various possible malfunctions.

Training contents

- Design and function of driver assistance system
- Incorporating the camera into the overall system
- How ultrasonic sensors work
- Purpose of driver assistance system
- Learning diagnostic techniques
- Finding out limitations

Order no. CO4205-1C



Recognition of road signs and accompanying speed control

Modern driver assistance systems incorporate advanced speed control which works in conjunction with road sign recognition capability. They also provide a basis for autonomous, self-driving vehicles. The core of the system is a camera which focuses on the area ahead of the vehicle. The driver is shown all the road signs picked up on the camera. In the case of active speed control, the vehicle will even limit its speed accordingly all by itself.

Build this complex system into your classroom with the aid of a UniTrain course to get something which closely matches authentic practice. Trainees will then put a full-scale ADAS system into operation and carry out various practical exercises. Last but not least, they will also gain the necessary diagnostic skills.

Training contents

- Design and function of driver assistance system
- Incorporating the camera into the overall system
- Purpose of driver assistance system
- Learning diagnostic techniques
- Finding out limitations
- Physical relationships and standards
- Function and importance of optical filters

Order no. CO4205-1B

CAN/LIN DASHBOARD MODEL



including troubleshooting



Experiments closely aligned to authentic practice using original components from a VW Golf 7, already based on Volkswagen's modular component matrix MQB. This networked systems training model focuses on an actual CAN gateway as well as the complete steering column electronics and encompasses a fully operable front door complete with comfort control system.

The model allows for more than 20 simulated faults to be activated as situations require. An OBD connection enables full diagnostics. All the key electrical signals can be tapped directly via 4-mm sockets.

Benefits

- Original vehicle manufacturer's components
- Digital network concept (CAN/LIN bus)
- 20 different faults can be activated
- Break-out box with 4-mm measurement terminals
- OBD diagnostics
- Optional: Dynamic cornering lights and MOST bus

Order no. S03240-1R

DIAGNOSTICS ON TRAINING VEHICLES – CONCEIVED FOR THE NEEDS OF MODERN TRAINING.



Tested vehicles



We provide a choice of six different training vehicles. These not only include models with conventional drive trains using petrol or diesel engines but also vehicles with hybrid or purely electric traction. We provide a choice of six different training vehicles. These not only include models with conventional drive trains using petrol or diesel engines but also vehicles with hybrid or purely electric traction.

Features of vehicles

- Fully tested high-quality vehicles
- Recent vehicles
- Enhanced trim
- Visually perfect condition
- Choice of drive train
- European versions

All these vehicles are specially adapted and modified for optimum usefulness in education and training. Apart from visualisation of the most important systems in vehicles, various break-out boxes are included, as well as more than 30 fault simulation switches. Every vehicle is also supplied with its original circuit diagrams, allowing diagnostics to be carried out under authentic practice conditions.

Choose from the following vehicles:

Conventional drive train

- Audi Q5 petrol model (LM8293)
- Audi Q5 diesel model (LM8294)

Electric drive train

- VW e-Golf (LM8295)
- BMW i3 (LM8298)

Hybrid drive train

- VW Golf GTE (LM8296)
- Toyota Prius (LM8297)

Order no. LM8293-98



Digitisation package – digital diagnostics on real vehicles

In order to bring out the full potential of our training vehicles, we recommend installing the digitisation package. This set equips a vehicle with a WiFi-capable measurement and diagnostic interface, allowing simulated faults to be activated and measurements to be saved to the learning environment. All the measuring instruments (4-channel oscilloscope, multimeters, current probe etc.) are already built in and can be comfortably started from the learning environment, thus saving space.

Benefits

- Digitally networked learning environment
- Interactive diagnostic course
- WiFi-capable measurement interface
- Includes current probe
- WiFi-capable diagnostic interface
- OBD II break-out box

Order no. CO3223-7E



Measurement enhancement package – Parallel working for any number of trainees

The measurement enhancement package makes it possible for multiple students to carry out measurements and diagnostics simultaneously on the same vehicle.

By means of the signal interface in the vehicle itself, up to six different signals can be fed in and then made available to the student workstations. The number of workstations which can be added is limitless. This makes it possible for a whole group to work on just one vehicle.

Benefits

- Built-in signal interface
- Includes 6 external student workstations
- Parallel transmission of signals
- Extensible to custom level
- Capable of combination with learning environment
- Built-in CAN interface

Order no. CO3223-7F

CALIBRATION OF DRIVER ASSISTANCE SYSTEMS (FRONT CAMERA)



A perfectly optimised complete solution for calibration of driver assistance systems:

This training system focuses on calibration of a front camera. At the same time it offers many options to expand the scope of the training and calibrate other system components. By means of this course, you can teach essential skills for servicing and repair of modern driver assistance systems in vehicles of any price range. After all, improved manufacturing procedures already mean that such things as radar and camera systems are no longer confined to the most expensive luxury cars.

Such systems offer drivers clear benefits with regard to safety and comfort. However, they do need to be perfectly calibrated to achieve this, otherwise detection could go wrong or systems may fail entirely. Ensuring that all systems

still operate properly after any repair work is the job of vehicle mechatronics engineers. For example, if a windscreen is replaced or modifications made to a chassis, it would be essential to recalibrate all the driver assistance systems.

This training package has been developed in conjunction with Hella-Gutmann and exclusively features high-quality components which are optimised to work well together.

- Portable calibration tool
- Calibration panels included for Volkswagen Audi Group and Toyota
- Mega Macs 77 diagnostic tester
- Wheel sensors
- Special measuring tape with holder (2x)

Order no. CO3223-7Q

**Recommended**

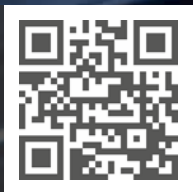
This package provides the perfect supplement to one of our digitally integrated training vehicles (LM8293/LM8294/LM8295/LM8296/LM8297).

Note

Before purchasing this package in conjunction with a digitally integrated training vehicle, you must ensure that the vehicle is equipped with a front camera system.

Note

Vehicles manufactured by BMW have a built-in calibration function, meaning that they carry out calibration automatically during a reference drive.



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