LITO-Didakt didaktické pomôcky

Automobilové mechatronické výukové systémy

- LD-EMB elektrotechnický a diagnostický merací panel
- Vstrekovanie benzínu s EOBD funkciami
- Snímač hmotnosti nasávaného vzduchu – výukový panel
- Snímače otáčok – výukový panel
- Common-Rail diesel vstrekovací systém
- CAN-BUS-Multiplex – výukový panel
- Digitálna automatická klimatizácia / + CAN /
- Svetelná technika / LIN-BUS /
- ABS výukový panel (osobné voz., softvérovo riadený)
- Pneumatický brzdový systém nákladných voz. – KNORR
- Výukové motory (Otto-OBD a Diesel-CR)
- Alternatívne pohony /Fuel-Cell/
- Nástenné výukové tabule

LD-EMB

ELEKTROTECHNICKÝ MERACÍ PANEL

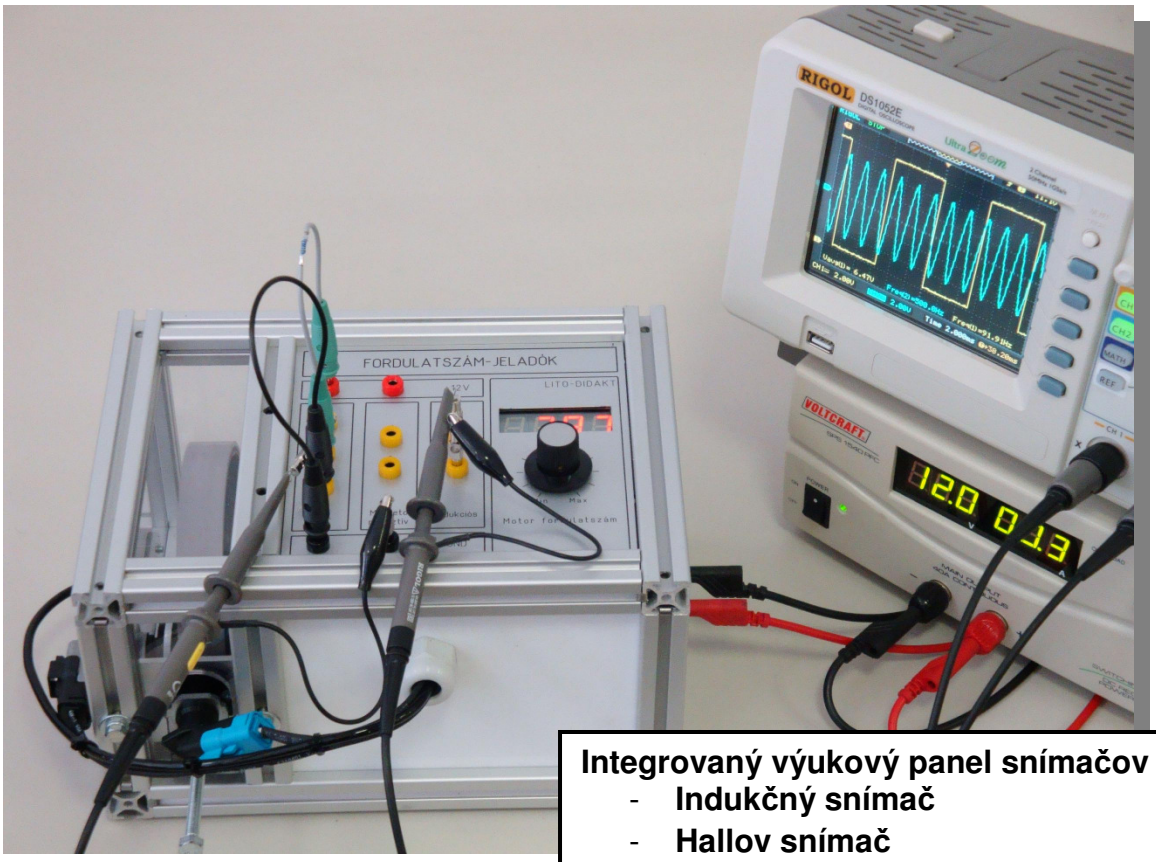
Auto elektrika – auto elektronika – mechatronika

Snímače, akčné členy, výkonová elektronika, zapojenia, logické obvody, dátový prenos, výpočty, ...

ZBIERKA ÚLOH A MERANÍ

LD-RPM snímač otáčok

názorný ukážkový výukový panel



Integrovaný výukový panel snímačov otáčok
- **Indukčný snímač**
- **Hallov snímač**
- **Magneto-rezistívny snímač - AMR**

- U: 12 – 20V extern
- n: 1500 – 4000/min

Vývoj a výroba: **LITO-Technik Kft.**
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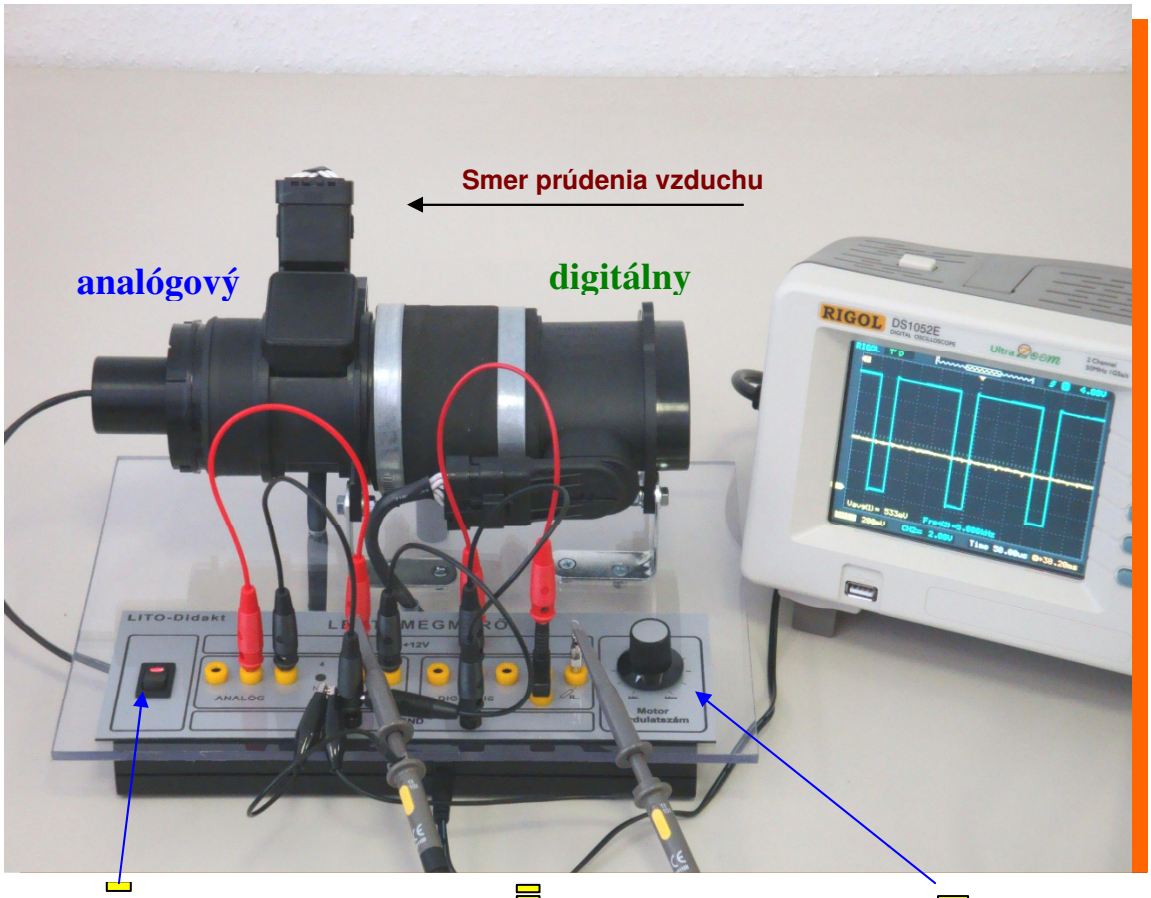
LITO-Didakt

Snímač hmotnosti vzduchu – A/D = 2 in 1

Názorný ukážkový výukový panel



Analógový a Digitálny
snímač hmotnosti nasávaného vzduchu.

Možnosti merania: multimeter, osciloskop

12 V stabilizovaný zdroj

Plynule regulovateľné otáčky
vstavaného elektromotora

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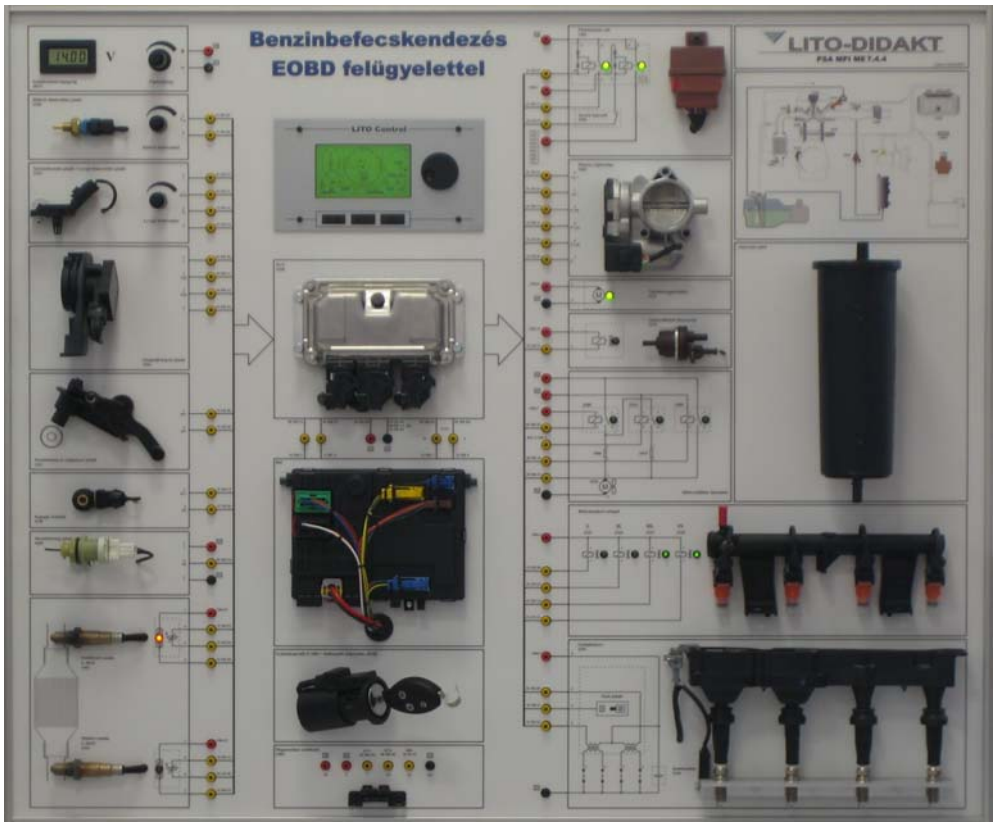
ELECTRONIC FUEL INJECTION SYSTEM
WITH EOBD

Demonstration equipment



Features:

- Original components of Citroën fuel injection system
- Solid state ignition
- Sequential fuel injection with “BOSCH E-Gas” electronic accelerator system
- Two oxygen sensors
- Catalyst efficiency checking
- Advanced immobiliser system with CAN BUS
- Operating in the same way as in the car, but no emission, no noise…
- Adjustable operating parameters
- Continuously adjustable engine speed by gas pedal position
- Monitoring of operating parameters
- Fault generating
- Electric measuring with DMM or Oscilloscope
- EOBD diagnostic link for tester (for example Gutmann Mega Macs 55)
- ECU, BSI and Immobiliser unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel.

Technical description:

This movable function demonstration stand is equipped with the original components of an ELECTRONIC FUEL INJECTION SYSTEM WITH EOBD function. It can be deployed for teacher or trainee experiments during instruction in the laboratory or in practice. It provides practical examples of operation, functions and maintenance.

For better comprehension, the original electronic components of a Citroën fuel injection system are assembled on an aluminium case with plastic board. A screen-printed and labelled front board of cabinet represents the operating block diagram of the sequential fuel injection system.

Engine temperature, intake air temperature, accelerator pedal position with throttle position sensor, engine speed, manifold pressure, heating and operating of oxygen sensors are read off LITO control LCD display units. The accelerator pedal position is continuously adjustable.
All control unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel. For practical purposes, they are arranged according to the respective components with control pin designations.

Demonstration options

The follow faults can be generated by LITO Control:

- Coolant temperature sensor
- Intake air temperature sensor
- Gas pedal position sensor
- Engine speed sensor (crankshaft sensor)
- Control oxygen sensor heating
- Monitor oxygen sensor heating
- ECU power supply
- CAN H
- CAN L
- Starter relay 1
- Starter relay 2
- Throttle position sensor control
- Throttle position sensor signal
- Electric fuel pump
- EVAP
- Electric cooling fan control
- 1. Injector
- Ignition control

Diagnostics

- Electric measuring with DMM or Oscilloscope
- Intelligent diagnostic with read-out device (for example Gutmann MM55)
  - Reading out and delete of fault code
  - Parameter measurement
  - Actuator test

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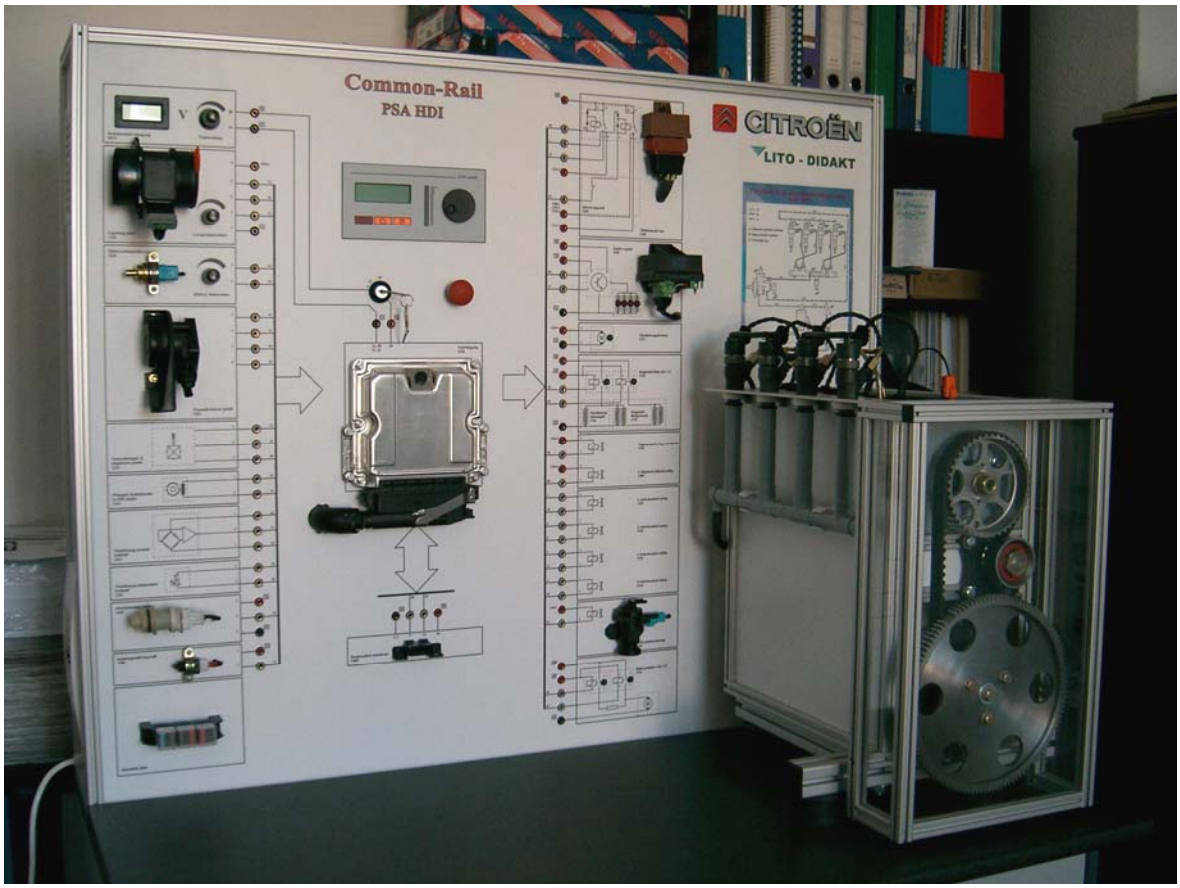
COMMON-RAIL DIESEL
PSA HDI RHY

Demonstration system



Features:

- Original components of a Citroën Berlingo HDI 2.0
- Operating in the same way as in the car, but no emission
- Continuously adjustable engine speed by gas pedal position
- Adjustable operating parameters
- Monitoring of temperatures and rail pressure
- Digital monitoring of engine rotational speed
- Diagnosis connector for tester (for example Gutmann Mega Macs 55)
- All control unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel.

Technical description:

Common-Rail is a high-pressure injection system for Diesel engines with direct injection. In structure and method of functioning, it significantly differs from conventional systems. The central part of the system is a shared high-pressure storage pipe (CommonRail). Unlike in systems having directly driven block or individual pumps, the pressure generation and fuel injection control are decoupled in the Common-Rail fuel injection system. The injection pressure is generated independently of the speed and can be freely selected within a broad range. The injection control by means of quick-action solenoid valves permits multiple injections, which leads to a significant reduction of pollutant emissions and noise development.

This movable function demonstration stand is equipped with original components of a Common-Rail Diesel injection system. It can be used for teacher's tests as well as for student's tests during laboratory and practise instruction.

For better comprehension, the Common-Rail original components of a Citroën Diesel engine are assembled on an aluminium case with plastic board. A screen-printed and labelled front board of cabinet represents the operating block diagram of the HDI Common-Rail diesel injection system.

Continuously adjustable electric motor drives the flywheel with the reference mark sensor, the camshaft trigger wheel and the jetting pump mechanically.

Engine temperature, intake air temperature, Engine speed and Rail pressure are read on LITO control LCD display unit. The gas pedal position is continuously adjustable.
All control unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel. For practical purposes, they are arranged according to the respective components with control pin designations.

Features:

- Original components of a Citroën Berlingo HDI 2.0
- Operating in the same way as in the car, but no emission
- Continuously adjustable engine speed by gas pedal position
- Adjustable operating parameters
- Monitoring of temperatures and rail pressure
- Digital monitoring of engine rotational speed
- Diagnosis connector for tester (for example Gutmann Mega Macs 55)
- All control unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel.

Building:

Inputs
- Temperature sensor intake air
- Air flow meter
- Coolant temperature sensor
- Gas pedal position sensor
- Position hall generator camshaft
- Engine speed sensor crankshaft
- Rail pressure sensor
- Pressure transducer
- Gas oil temperature sensor
- Speed hall generator
- Clutch pedal switch

Processing
- LITO control unit
- HDI control unit (input options, microprocessor and memory, Output options)
- Diagnostic link for original tester

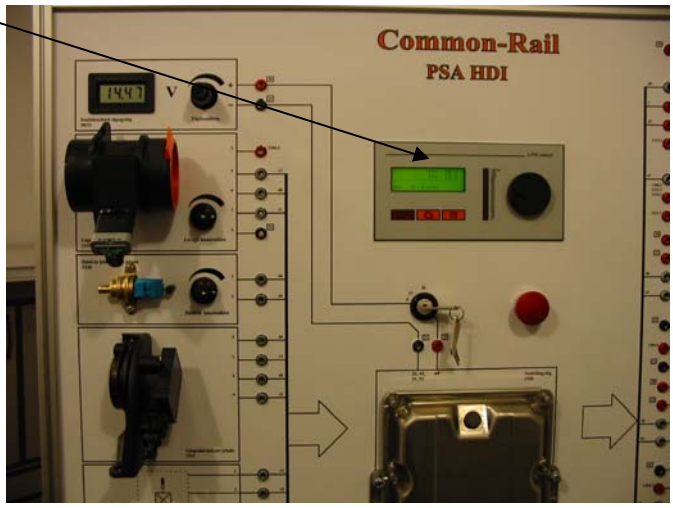
Output
- Starter relay
- Glow system control
- Electric gas oil pump
- Add-on heater relay
- 3rd.piston switch off valve
- Rail pressure control valve
- Fuel injection valves
- AGR valve
- Coolant ventilator relay 1.
- Coolant ventilator relay 2.

The following parameters are displayed on the LITO Control LCD display unit:
- Battery-charging indicator
- Check engine lamp
- Glow indicator
- Adjustable engine temperature
- Adjustable intake air temperature
- Adjustable engine rotational speed

Demonstration options

The follow faults can be generated by LITO Control:

- Intake air temperature sensor
- Air flow meter
- Coolant temperature sensor
- Gas pedal position sensor
- Position hall generator (camshaft sensor)
- Engine speed sensor (crankshaft sensor)
- Rail pressure sensor
- Gas oil temperature sensor
- Starter relay (86)
- Starter relay (87)
- Glow system control
- AGR valve
- 3rd.piston switch off valve
- Rail pressure control valve
- Electric gas oil pump



Diagnostics

- Electric measuring with DMM or Oscilloscope
- Intelligent diagnostic with read-out device (for example Actia, Gutmann mm55)
    - Reading out and delete of fault code
    - Parameter measurement
    - Actuator test

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HDI, ABS, AC, Komfort

CAN BUS MULTIPLEX

Demonstration System

Features:

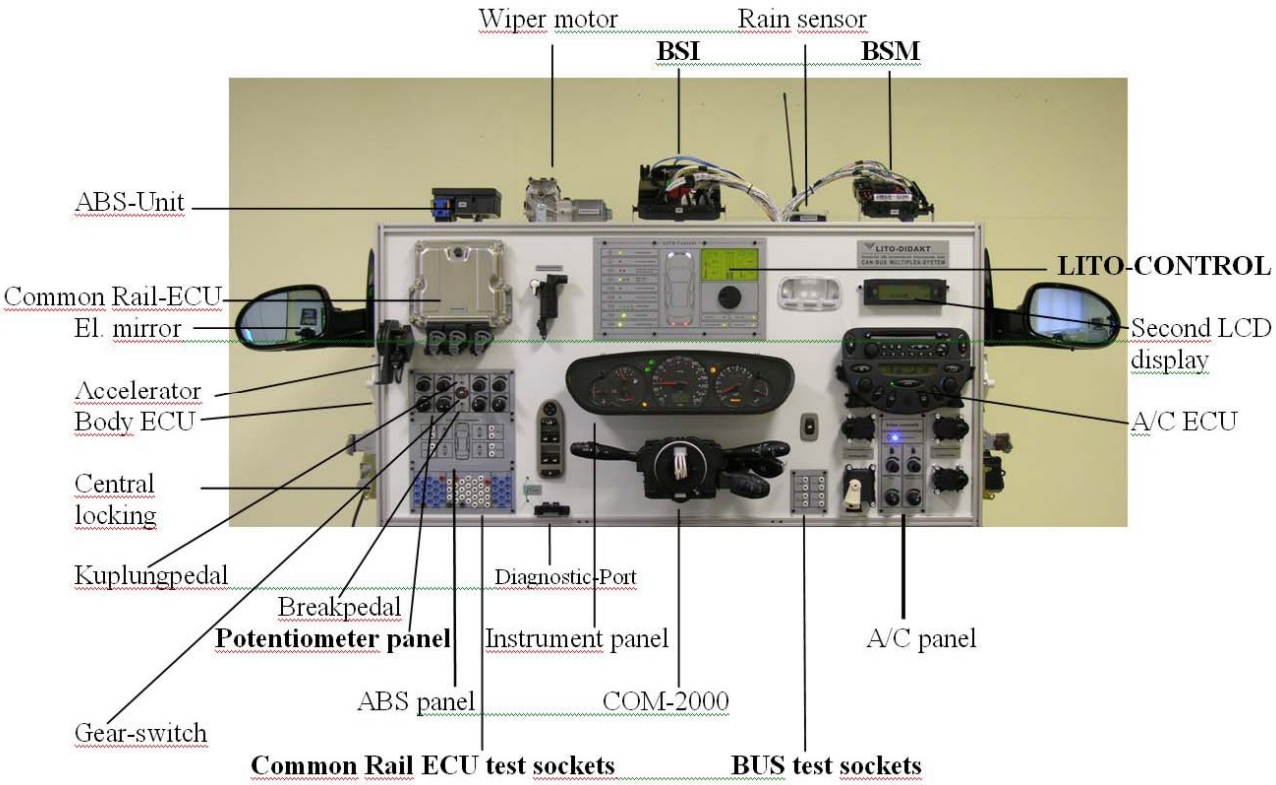
- Original components of a Citroën C5
- CAN BUS MULTIPLEX electrical system with four different buses
- Operating in the same way as in the car, but no emission, no noise…
- Adjustable operating parameters
- Continuously adjustable engine speed
- Break, accelerator, clutch and clutch rod, “acceleration and breaking”
- Monitoring of operating parameters
- Fault generating (CR ECU, ABS, BUS system)
- Electric measuring with DMM or Oscilloscope
- EOBD diagnostic link for tester
- Common-Rail ECU, ABS control unit and CAN BUS PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel.

Technical description:

This transportable function demonstration stand is equipped with the original components of an CAN BUS MULTIPLEX electrical system. It can be deployed for teacher or trainee experiments during instruction in the laboratory or in practice. It provides practical examples of operation, functions and maintenance.

Building:

Aluminium items with polystyrene panels build the equipment. The simulator demonstrates the electric network of a car with MULTIPLEX CAN/VAN BUS system. The central control unit of bus system is the BSI. The BSI combines the subsystems. BSI controls the controlling of electric network. The control units communicate by the double-wire circuit, asynchrony and serial communication system.



1. **CAN BUS system „Controller Area Network"** 250 kb/s
   - BSI Multiplex control unit
   - **Diesel injection control unit (HDI 2.0 Bosch EDC 15C2, motorcode: RHZ)**
     Suitable for full diagnostic function test of common rail diesel injection system. All components - PINs are connected in parallel to 4 mm test sockets and guided through the front panel.
   - **ABS (TEVES MK60)**
     The latest ABS system with simulation of skidding.

2. **VAN CAR 1 system „ Vehicle Area Network"** 62,5 kb/s
   - BSI Multiplex control unit
   - BSM (intelligent fuse box in engine space)
   - COM2000 steering column switch with electronic transponder antenna

3. **VAN CAR 2 system „ Vehicle Area Network”** 62,5 kb/s
   - BSI Multiplex control unit
   - Left side body electronic (in car-door)
   - Right side body electronic (in car-door)

4. **VAN comfort system „ Vehicle Area Network”** 125 kb/s
   - BSI Multiplex control unit
   - Instrument panel
   - Second LCD display
   - RDS Radio / CD player steering mounted controls
   - Automatic digital air conditioning control unit

Demonstration options

Adjustable operating parameters on the “poti” panel:

- Engine temperature (-15…+120°C)
- Intake air temperature (-15…+50°C)
- Power supply voltage (8…15V)
- Motoroil temperature (-15…+120°C)
- Outside temperature (-15…+50°C)
- Fuel temperature (-15…+120°C)
- Fuel level (not suddenly)
- Motoroil level

Adjustable operating parameters on the A/C panel:

Refrigerating agent pressure

Evaporator temperature

Air outlet temperature

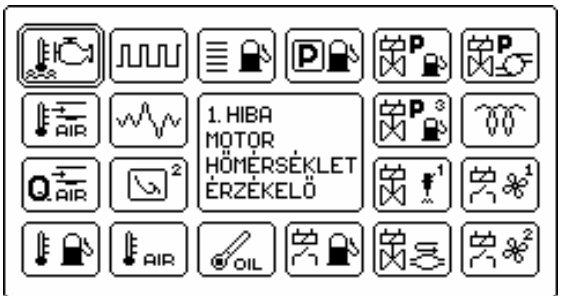
Foot space temperature

Compressor operated is signalled by LED

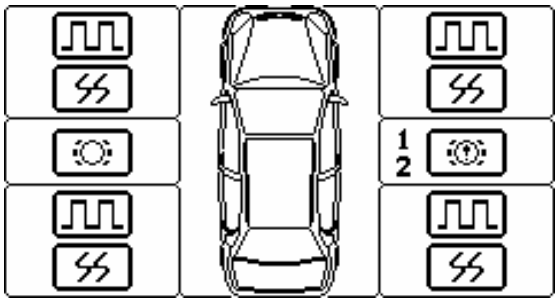
The LITO Control MCU informs to the settings, operating of BUS systems, lamps and Common-Rail-ECU.

Some fault can be generated by LITO Control MCU:

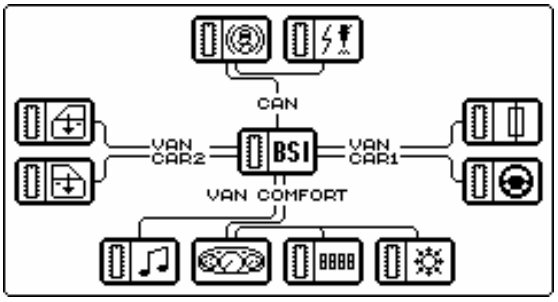
- Simulation of common rail diesel injection system faults



- Simulation of ABS system faults or skidding



- Simulation of BUS system faults (for example different open circuit)



Diagnostics

- Measurement of pressure and temperature in low and high pressure coolant circuit
- Electric measuring with DMM or oscilloscope (for example CAN signals with oscilloscope)
- Intelligent diagnostic with read-out device (for example Gutmann mega macs 55, Actia,)
    - Reading out and delete of fault code
    - Parameter measurement
    - Actuator test

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CAN BUS MULTIPLEX
DIGITAL AIR CONDITIONER
Demonstration System

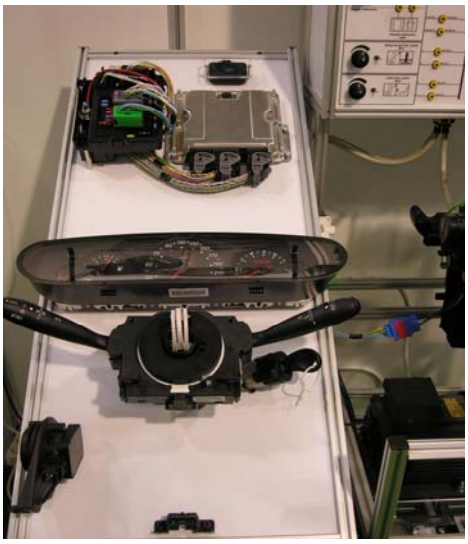
Features:

- Original components of a Citroën C5
- CAN BUS MULTIPLEX electrical system with dual zone automatic digital air conditioning system
- Actuation, maintenance and repairing in the same way as in the car
- Continuously adjustable engine speed
- High and low Pressure gauges are built in
- Monitoring of temperatures
- Digital monitoring of engine rotational speed
- Diagnosis connector for tester (for example Gutmann mega macs 55, Actia)

Air conditioning system unit PINs are connected in parallel to 4 mm test sockets and conducted out at the front panel.

Technical description:

This transportable function demonstration stand is equipped with the original components of an electronically controlled air conditioning system. It can be deployed for teacher or trainee experiments during instruction in the laboratory or in practice. It provides practical examples of operation, functions and maintenance.



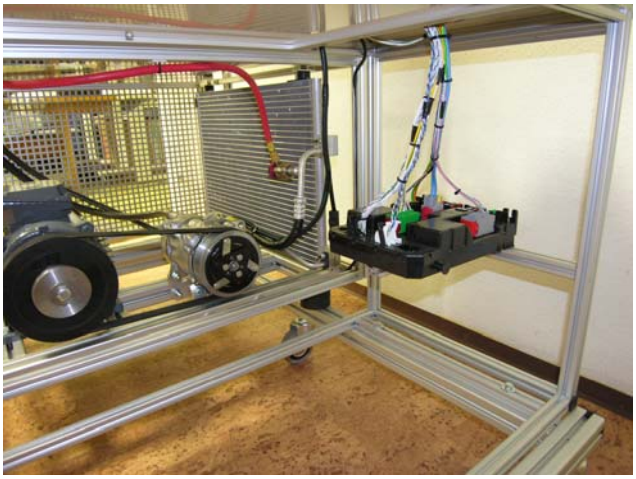
Building:

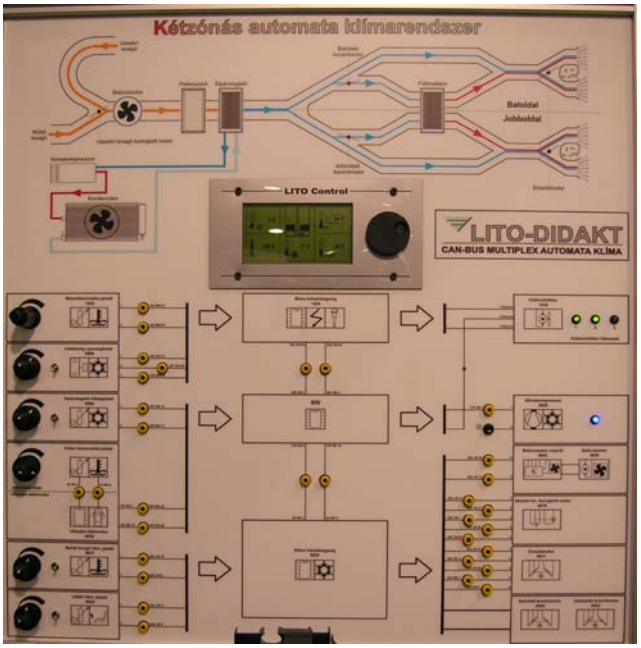
The head control units of CAN bus system are installed on the left side of the equipment.

The multiplex control unit (BSI) is built in under the box. The Common-Rail ECU is mounted on the top of the base. The intelligent fuse box (BSM) is located beside ECU, while the COM2000 steering column switch with transponder immobiliser and the instrument panel are installed in the middle.

The 3,2kW electric motor (3x380V), the cold compressor and the capacitor with ventilator and liquid container are built into the right-side lower cupboard.
The air distribution housing with air intake shaft, ventilator motor, servomotor and the three stepping
motors for the operation of the flaps, sensors and evaporator units are installed above the right-side lower cupboard.

The maintenance connections are original and, therefore, available for the filling station





A screen-printed and labelled front board of cabinet represents the operating block diagram of the digital air conditioning system with CAN BUS.

The corresponding potentiometers, switches, LEDs and the LITO Control MCU with graphic display are mounted on the front panel.

All component - PINs are connected in parallel to 4 mm test sockets and guided through the front panel. The coolant circuit is also schematically represented on the front panel.

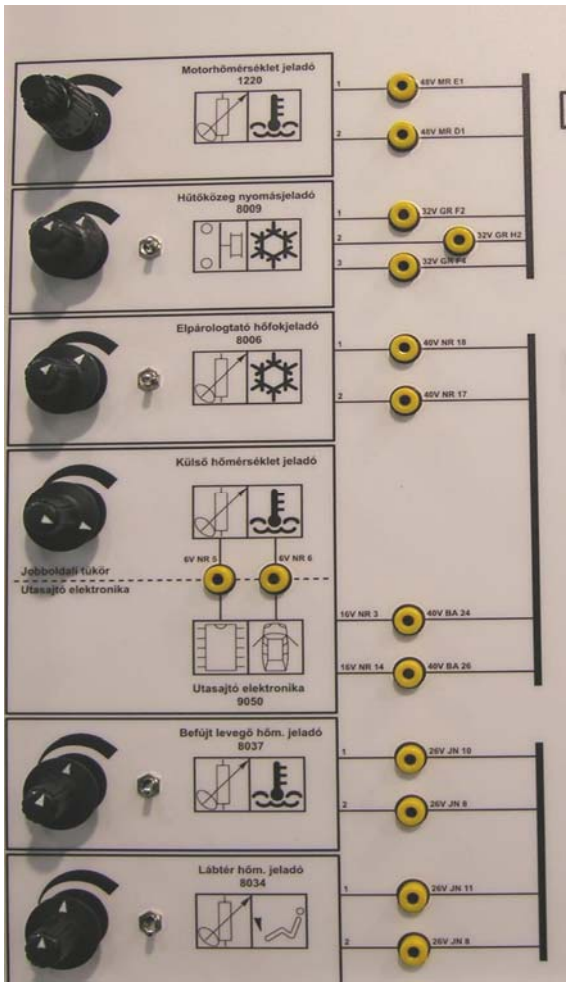
The air conditioning is switched on via the ignition start switch.

The individual operating conditions are adjusted.

The pressures in the capacitor are displayed on manometers.

The following parameters are displayed on the LITO Control graphic LCD display unit:

- Adjustable engine temperature
- Adjustable or original refrigerating agent pressure*
- Adjustable or original evaporator temperature*
- Adjustable outside temperature
- Adjustable or original air outlet temperature*
- Adjustable or original footspace temperature*



Demonstration options

Some fault can be generated by LITO Control MCU.

- Simulation of BUS system faults (for example different open circuit)
- Simulation of A/C system faults (15 different faults, for example sensors, compressor, servo and stepping motor…)

Diagnostics

- Measurement of pressure and temperature in low and high pressure coolant circuit
- Electric measuring with DMM or Oscilloscope
- Intelligent diagnostic with read-out device (for example Actia, Gutmann MM55)
    - Reading out and delete of fault code
    - Parameter measurement
    - Actuator test

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ABS

Demonstration System

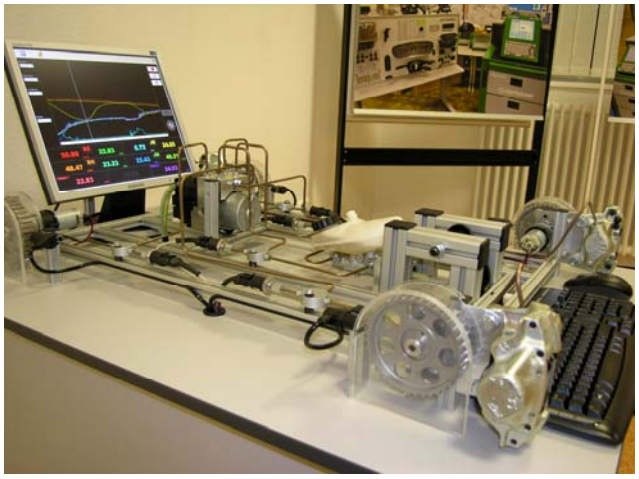
Technical description

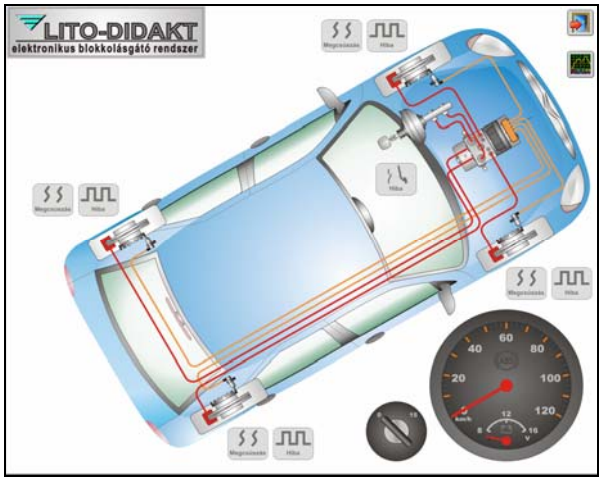
The movable function demonstration stand is equipped with original Citroën components of a BOSCH 5.3 antilock braking system. The parts are mounted on an aluminium chassis.

By means of the function demonstration stand, the braking process with ABS can be easily demonstrated.

The four wheels are driven by electric motors with continuously adjustable rotational speed. In this manner, the driving speed of 0 - 70 km/h can be simulated. The rotational speed of each wheel can be adjusted independently in order to simulate the ABS breaking control function. Pressure sensing units are built in the brake pipes at wheels and main brake-cylinder.

The driving speed and the individual rotational speeds of the wheels and brake pressures are shown on large displays.





Features:

- Original components of a Citroën
- Continuously adjustable driving speed
- Monitoring of rotational speed of the wheels
- Monitoring of brake torques at different wheels
- Monitoring of brake torques at main brake-cylinder
- Diagnosis connector for intelligent-tester

Demonstration options

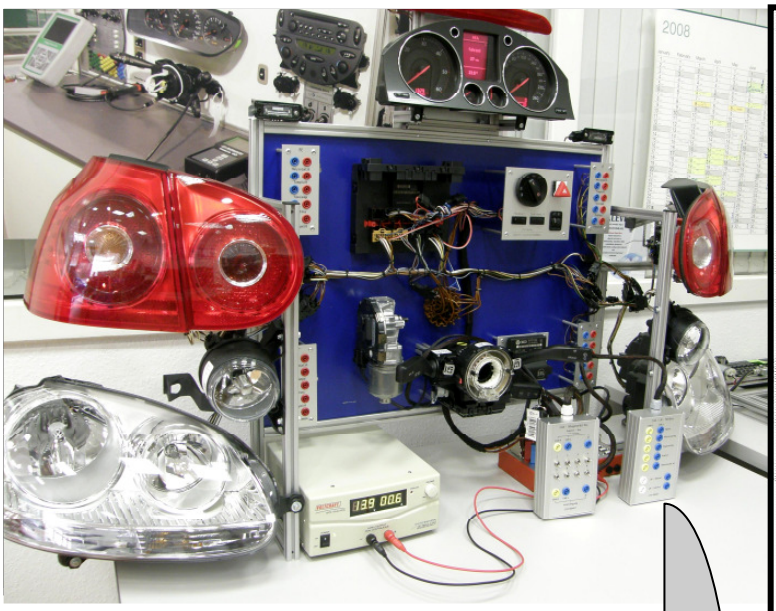
- Simulation of ABS faults (for example different open circuit)
- Simulation of skidding

Diagnostics

- Electric measuring with DMM or Oscilloscope
- Intelligent diagnostic with read-out device
  - Reading out and delete of fault code
  - Parameter measurement
  - Actuator test

LITO-DIDAKT výukové systémy

CAN-BUS multiplex svetelná technika - výukový panel



Výukový panel predstavuje jednu podskupinu celkového elektrického a elektronického systému vozidla, konkrétne s CAN-systémom podporovanú svetelnú techniku. Panel je vyrobený z originálnych komponentov a montážnych celkov známeho a vo veľkom množstve vyrobeného vozidla - **VW Golf 5**.

Systém obsahuje nasledovné komponenty:

- Predný kombinovaný svetlomet
- Zadné kombinované svietidlo
- Predné hmlové svetlo
- Zadné hmlové svetlo
- Panel prístrojov
- 3. brzdové svetlo a cúvacie svetlo
- Osvetlenie evidenč. čísiel a vnútor. priestoru
- Výstražné svetlá
- Motor stieračov
- Ovládacie prvky svetiel
- Smerovky (int. v predných a zadných svietidlách)
- Elektronika volantu (s ovl. klaksonu)
- RJ centrálnej elktroniky
- RJ Gateway
- CAN-ovládací Box

Zvláštne charakteristiky výukového panela:

CAN-ovládací Box je centrálnou jednotkou osvetlovacieho systému. Cez to sú napájané všetky komponenty, a umožňuje ďalšie rozšírenie a pripojenie diagnostického prístroja.
Vhodným diagnostickým prístrojom je možné prečítať chybové hlásenia a informácie, ktoré sa do iných RJ (napr. motor) neuložia.

BUS-Merací box:

Merací box možno pripojiť cez 25-pólovú zásuvku na CAN-ovládací box, a tak sa umožní znázornenie CAN-High a CAN-Low, všetkých CAN-, LIN-komfort a LIN-palubných elektronických systémov. K-linka je dostupná cez 3,5mm-ovú zásuvku. Na takto pripravenej hardverovej strane sa dajú vykonať všetky merania osciloskopom a multimetrom bez nutnosti vyhľadania meracích bodov na schéme zapojenia.

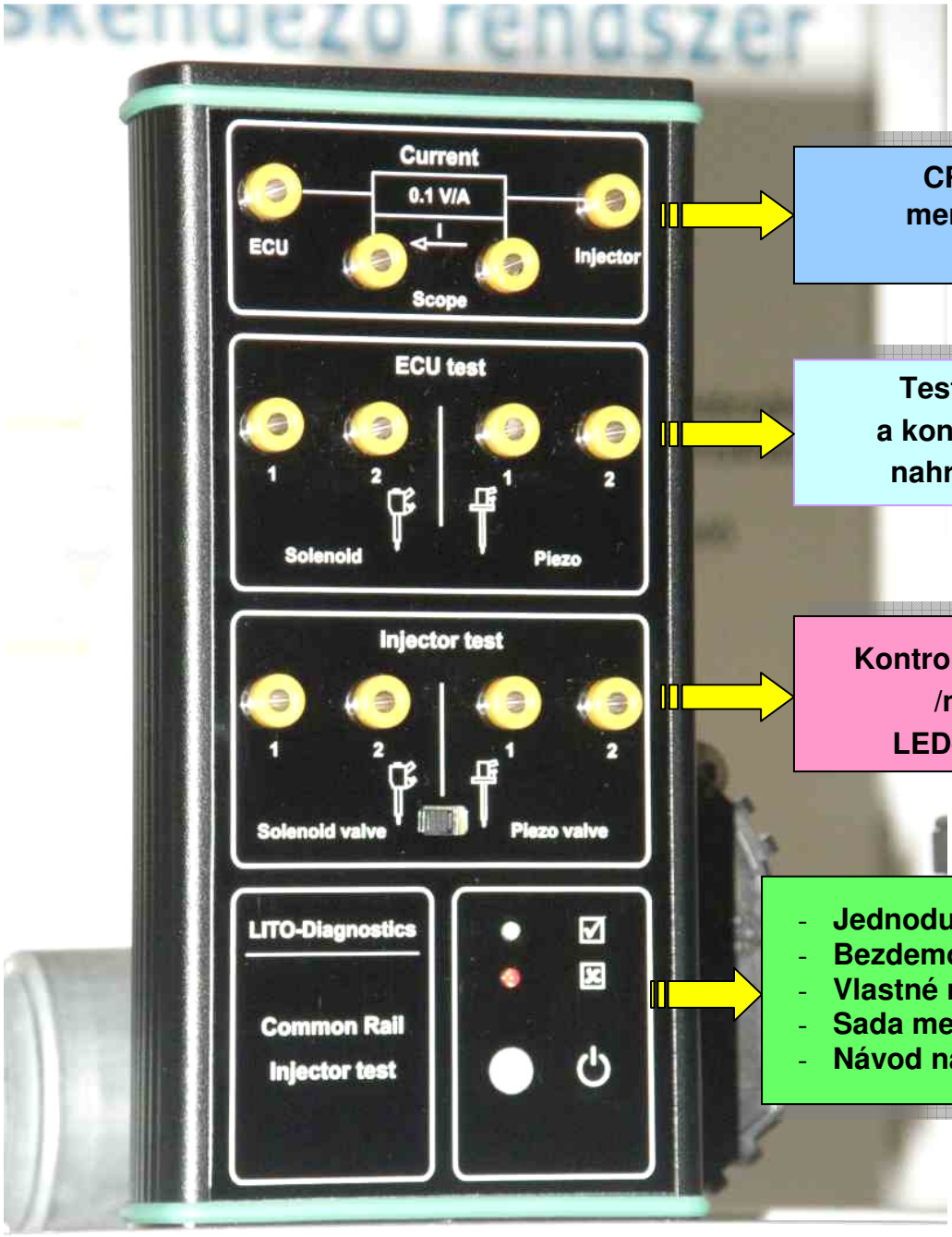
CAN-Generátor chýb:

V CAN-BUS-systéme výukového panela svetelnej techniky je možné vygenerovať 8 chýb pomocou tlačítok očíslovaných od 1 až 8. Žiaci by mali vedieť simulovaný chybný priebeh signálu namerať osciloskopom a porovnať so vzorovým priebehom, a tak určiť typ chyby. Tých 8 chýb na CAN H/L vodičoch je typu skrat alebo prerušenie na +/- strane, ktoré napr. keď sa vyskytnú len na jednom vodiči CAN-systému, prenos signálu zostane zabezpečený, ale jednovodičový systém bude citlivý na elektromagnetické rušenie…

Tester vstrek. ventilov Common-Rail

/pre kontrolu elektrických charakteristík/

INDUKČNÉ(Bosch+Delphi) a PIEZZO(Siemens) vstrekovacie ventily



CR- vstrekovací ventil
meranie napätia a prúdu
osciloskopom

Test koncového člena RJ
a kontrola káblového zväzku
nahradením vstrek. ventila

Kontrola vstrekovacieho ventila
/meranie reaktancie/
LED-signalizácia výsledku

- Jednoduchá obsluha,
- Bezdemontážny test!
- Vlastné napájanie /9V/
- Sada meracích káblov v príslušenstve
- Návod na obsluhu a diagnotiku.

Vývoj a výroba: **LITO-Technik Kft.**
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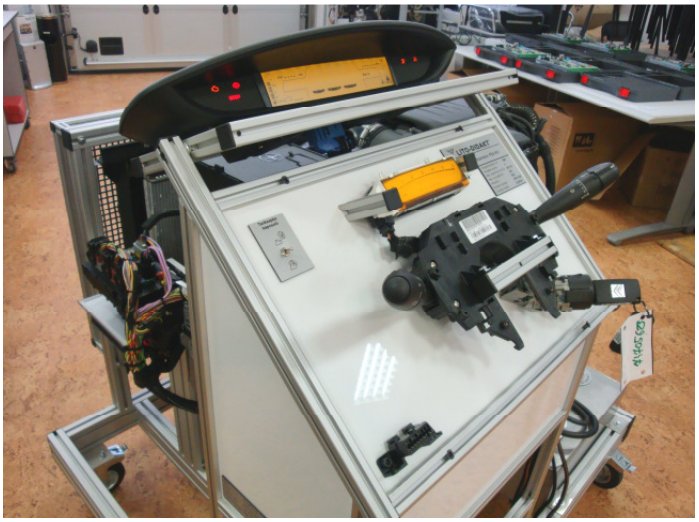
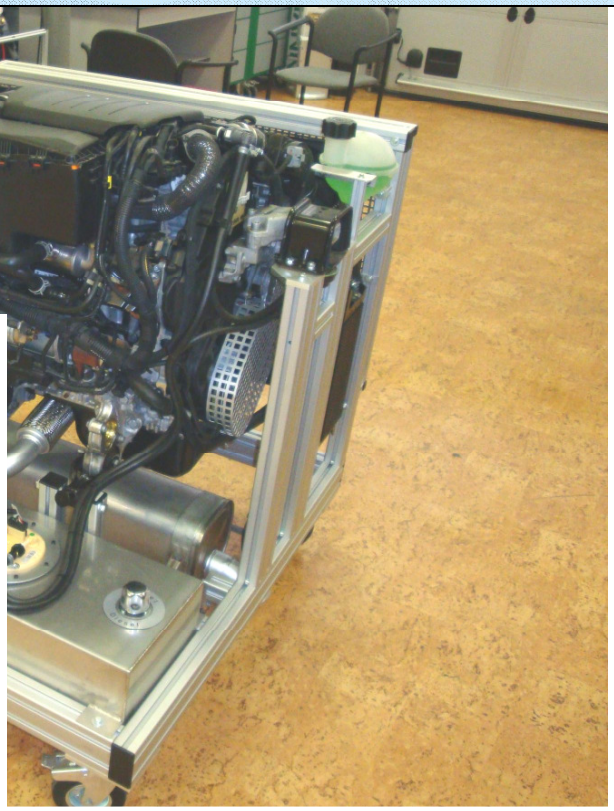
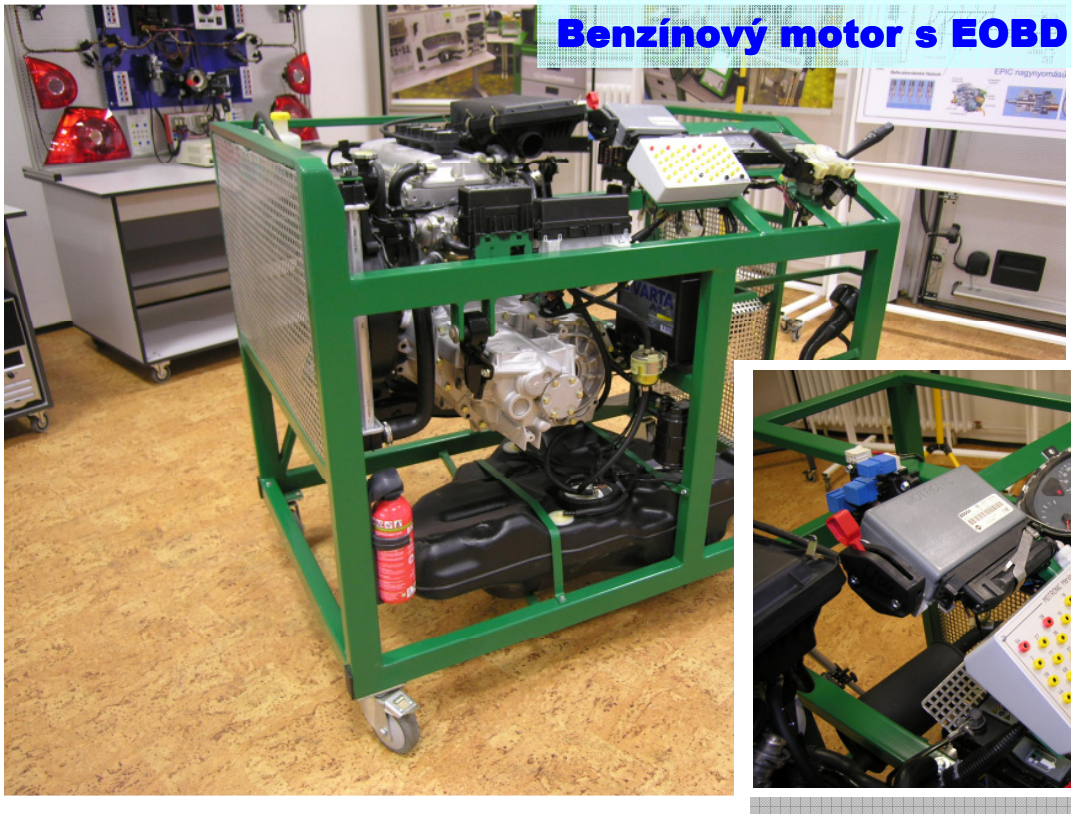
LD – výukové motory a vozidlá

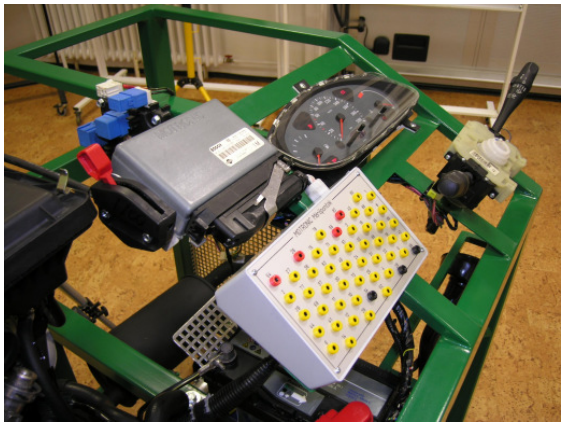
Common Rail dieselový motor + EOBD





Benzínový motor s EOBD





Ponuka LD-výukových motorov: Diesel CR a Benzin EOBD

1.) LD – výukové motory:
- Nový motor (0 km) + diagnostická zásuvka
- Nový motor (0 km) + diagnostická zásuvka + úprava periférií/breakout-box = BB
- Nový motor (0 km) + diagnostická zásuvka + úprava periférií/BB + generátor chýb
- Nový motor (0 km) + diagnostická zásuvka + úprava periférií/BB + LITO-Controll
- Vyššie uvedené varianty sú dostupné aj pre jazdené motory.

2.) LD – výkové vozidlá:
- Nové vozidlo (0 km) + úprava periférií / podľa stupňa vybavenosti systému
- Nové vozidlo (0 km) + úprava periférií + generátor chýb
- Nové vozidlo (0 km) + úprava periférií + LITO-Controll
- Vyššie uvedené varianty sú dostupné aj pre jazdené vozidlá, ako aj možnosť upraviť vozidlo dodané zákazníkom.
- U nového aj jazdeného vozidla je možné vymontovať a upraviť motor a potom to spojiť s ostatnými časťami vozidla. To ale niekedy vyžaduje duplicitu niektorých prvkov.

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