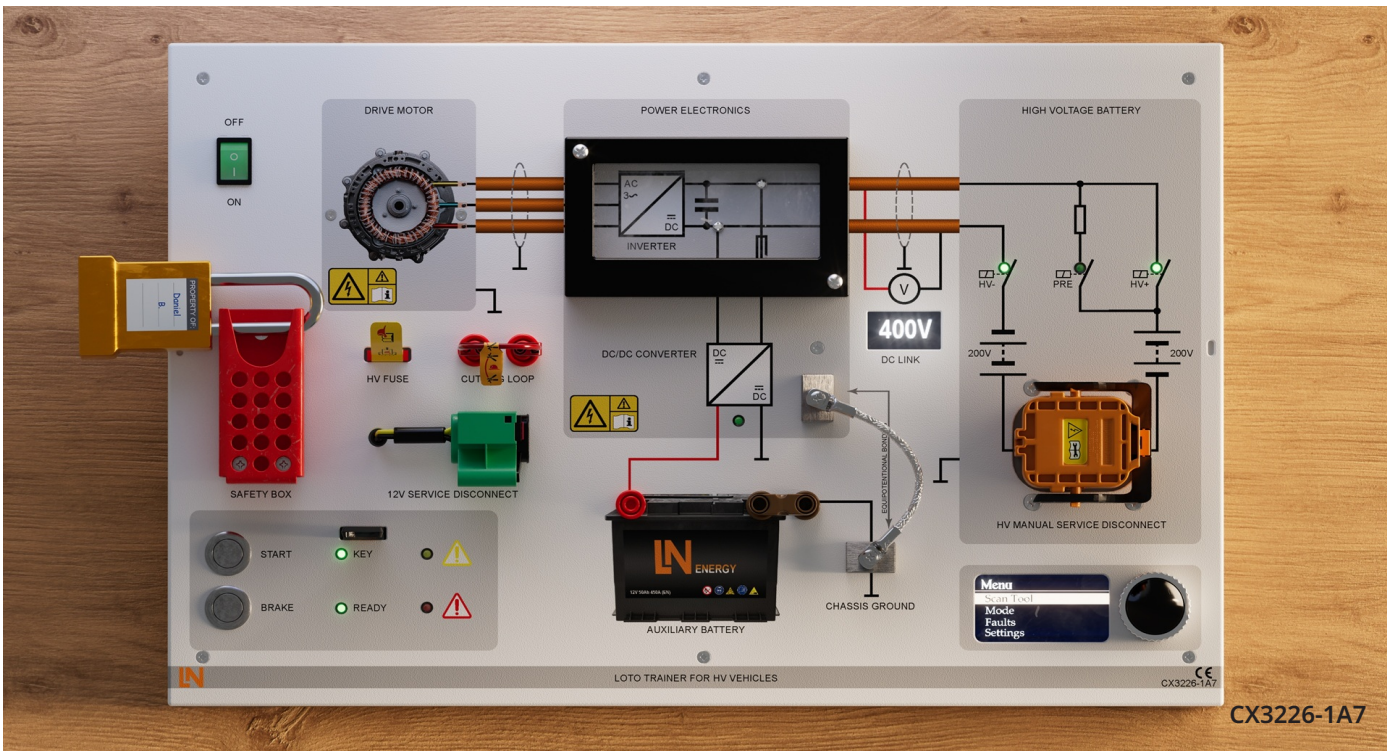
LOTO Trainer for HV Vehicles (Fault Simulator included)

High Voltage Isolation and Lockout/Tagout Training System



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OVERVIEW

Practical training system for safe high voltage isolation procedures on battery electric, plug-in hybrid, and hybrid electric vehicles. Students identify hazards, select the correct isolation strategy, verify safe system status, and recommission the vehicle after service.

DESIGNED FOR

- Vocational schools and community colleges
- OEM, fleet, and workforce training centers
- High school automotive programs

CORE LEARNING OUTCOMES

- Recognize EV high voltage hazards
- Become proficient with methods of vehicle isolation
- Investigate faults and system status
- Reinitialize and recommission vehicle safely

KEY SYSTEM FEATURES

Scan Tool Simulation

Integrated user interface for fault insertion and scan tool with DTCs and live data

Multiple HV Isolation Types

Live - Dead - Live measurements, MSD, 12V disconnect, cutting loop, HV fuse, smart key storage, scan tool shutdown and audible warning for incorrect operation

Simulated HV Circuit

HV Battery, contactor operation, HVIL, Drive motor, DC/DC Converter and bonding circuit

Guided Learning

Guided learning modes and included assessment activities

Use Real Workshop Tools

Practice all safety procedures using the same equipment that will be used in the workshop on real vehicles

Original Components

Authentic automotive components and procedures in a safe and repeatable high voltage work environment

Training Topics and Applied Scenarios

Detailed training content and scenario-based learning

TRAINING TOPICS

1 High Voltage Awareness

- Identify HV components
- Recognize EV safety hazards
- Interpret warning indicators

2 HV Isolation Methods

- Manual service disconnect (MSD)
- 12V service disconnect
- Perform Live - Dead - Live measurements
- Scan tool isolation

3 Lockout/Tagout Procedures

- Apply LOTO devices
- Prevent unintended energization
- Prepare vehicles for service

4 Safe Work Condition Verification

- Verify system shutdown
- Check residual voltage
- Confirm contactor status
- Verify equipotential bonding integrity

5 DTC & Fault Investigation

- Retrieve and interpret DTCs
- Navigate the integrated scan tool
- Diagnose interlock faults
- Diagnose bonding faults

6 Safety Decision Making

- Assess safe-to-work conditions
- Recognize unsafe states
- Select the correct isolation method
- Identify when fault conditions exceed authorization level

PROCEDURAL SCENARIOS

Vehicle Isolation Procedure	Complete high voltage shutdown and lockout/tagout procedure before service work begins.
Scan Tool Shutdown Required	Interpret system data and use the scan tool to safely disable the high voltage system.
Incorrect Isolation Procedure	Identify procedural errors, restore safe conditions, and recommission the vehicle.
Procedure Validation Failure	Investigate an incorrect shutdown sequence, identify the cause, and restore to a safe state.
Recommissioning Verification	Reinitialize the vehicle following service procedures and verify correct system operation.

DECISION-BASED SCENARIOS

Interlock Fault Investigation	Diagnose an interlock fault and determine whether the vehicle can be safely serviced.
Equipotential Bonding Fault	Investigate a failed bonding circuit and verify safe working conditions.
Residual Voltage Present	Conduct Live-Dead-Live test after isolation, but determine the system still has voltage.
High Voltage System Fault	Interpret safety fault information and decide whether isolation can proceed.
Insulation Fault Active	Isolate vehicle and perform insulation test.
Unknown Contactor Status	Evaluate system status and determine whether the vehicle is safe to work on.
Collision-Damaged Vehicle	Assess a compromised high voltage system and apply additional safety procedures.
Authorization Limit Reached	Recognize when a fault exceeds the technician's training level and act accordingly.
Unsafe Work Condition	Identify conditions preventing safe servicing and determine when work must not proceed.

EQUIPMENT REQUIRED (MAY REQUIRE SEPARATE DEVICES)

Bonding Tester
4-wire Kelvin milliohmmeter:

- Test current ≥ 200 mA (1 A rec.)
- Resolution ≤ 1 mΩ
- Pass threshold < 0.1Ω

Insulation and Voltage Tester
Megohmmeter:

- DC voltages: 500 V & 1000 V
- Range ≥ 200 MΩ
- Rating: CAT III or IV 1000