



**NEW TO THE SCHEDULE!**

## **J1939 Network Single-Day Class**

**Factory or On-Site Availability**

# **HELP YOUR TECHNICIANS TAKE THEIR ELECTRICAL SKILLS TO THE NEXT LEVEL!**

J1939 is the standard protocol for electronic communication in heavy-duty vehicles, built on CAN (Controller Area Network) technology. Heil units use J1939 to connect and coordinate ECUs (Electronic Control Units) like the main controller, display, sensors, and actuators.

This single-day course is designed to equip truck technicians with the essential knowledge and hands-on skills needed to safely and effectively service refuse equipment using J1939 CAN network technology. The training covers foundational safety practices, electrical theory, and advanced troubleshooting techniques for modern refuse trucks, with a focus on Heil products and related Environmental Solutions (ES) equipment.

### **In this class, students will explore:**

- The fundamentals of J1939 communication and how CAN networks move information throughout a vehicle
- The structure and function of ECUs, including how controllers, sensors, and displays share data
- Key electrical concepts such as voltage, current, resistance, duty cycles, and PWM signal behavior
- Network design standards, including backbone layout, stub lengths, addressing, and termination
- Testing and troubleshooting methods that help technicians identify opens, shorts, interference, and failed components

Through a combination of classroom instruction and diagnostic exercises, participants will learn how to service, verify, and maintain CAN based systems on Heil and ES equipment with accuracy and increased confidence.



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# J1939 Networks & Communications Course Summary

## Course Objectives

After completing this course, the student will be able to:

### Demonstrate Safe Measurement Practices

- Identify the correct procedures for testing resistance in electrical circuits, including ensuring all power is disconnected before testing.

### Understand Key Terminology and Acronyms

- Define PWM (Pulse Width Modulation) and explain its significance in network communication.
- Explain the meaning of CAN and its role in vehicle and industrial networks.

### Interpret Network Signals and Measurements

- Describe what a duty cycle is and how it relates to PWM signals.
- Recognize the expected resistance values in a healthy CAN network and interpret resistance readings to diagnose network health.

### Apply Network Design Standards

- State the maximum allowable lengths for network backbones and cable stubs in a J1939 network.
- Understand the importance of network address assignment for communication between components.

### Diagnose and Troubleshoot Network Issues

- Analyze resistance measurements to identify open circuits, shorts, or failed ECUs in a CAN network.
- Evaluate bus load percentages and recognize recommended operational limits for network reliability.

### Follow Best Practices for Network Maintenance

- Assess the appropriateness of making wiring repairs within a network harness.
- Understand the function and placement of termination resistors in a network.

### Recognize and Mitigate Interference

- Identify sources and effects of electromagnetic and radio frequency interference in networked systems.

## Course Outline

### 1. J1939 Networks & Communication

- Objectives: CAN (Controller Area Network) networks, PWM (Pulse Width Modulation), communications, inputs/outputs
- Information Center (In-Sight Display) for operators and technicians

### 2. Electrical Theory & Ohm's Law

- Voltage, current, resistance definitions
- Circuit operation and troubleshooting basics
- Duty cycle and PWM explanation
- History and adoption of J1939
- CAN bus as the nervous system of the vehicle
- ECUs and network layers

### 3. Network Communication & Physical Layer

- Addressing, backbone, cable stubs, ECU connections
- Testing network resistance and troubleshooting tips

### 4. CAN Bus Networks in Heil Equipment

- Examples from Half/Pack with Odyssey Hydraulic Controls
- Network maps and connection points

### 5. Repairing CAN/Network Harness

- Recommended procedures for wire repair
- Avoiding damage, maintaining integrity, EMI/RFI precautions

### 6. 3rd Eye Camera Addition

- Proper connection to J1939 backbone
- Importance of following protocols

### 7. J1939 Connection Process

- Using PCAN-Diag scan tool for bitrate and resistance
- Bus load checks, message verification, adapter installation

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