

# Diesel Engine Simulators

Educational Training Equipment for the 21st Century

Bulletin 191-200C

## H-CD-46-RC Four-Cycle, Six Cylinder Digital Diesel Engine Simulator

### Purpose

The Hampden **Model H-CD-46-RC** Four-Cycle, Six-Cylinder Digital Diesel Engine Simulator provides hands-on training on a computer-controlled simulated diesel engine.

### Description

The trainer is mounted in a steel housing, 24½" high by 36" wide by 16" deep, finished in instrument tan texture enamel. A carrying handle is located on each side.

The front panel is mounted vertically with an 8° slope and contains switches, indicators, controls, and student display. The graphics are of the various systems as later tabulated.

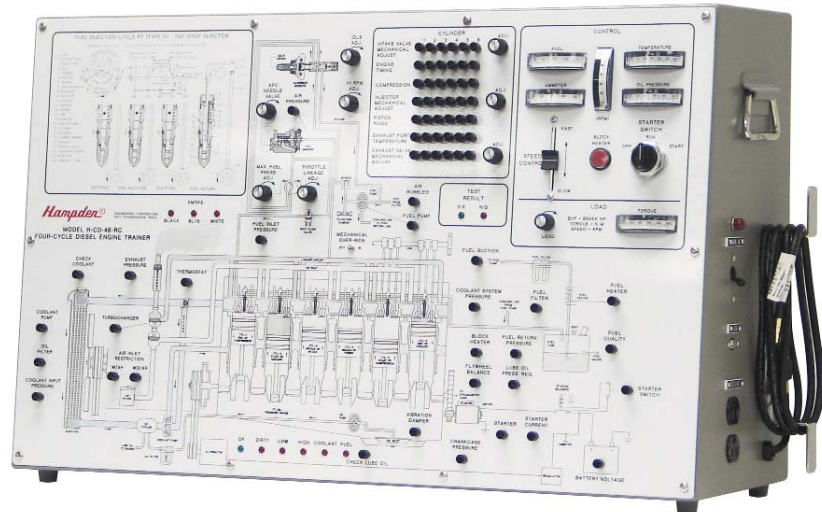
A USB Connection is provided for the instructor's use to start procedures, introduce faults and malfunctions into the simulation, select engine type, hot or cold start, test components, and monitor student performance.

The simulator acts as a Cummins NC-855 four cycle, six-cylinder engine.

Selection of the engine operational mode is made by the instructor from the instructor's menu. All graphics representations of the engine, fuel, air and other systems are intended to denote the levels of operation possible in the actual use of this engine.

### Student Logging

Student actions are recorded during operation, recording the time the malfunction was inserted, the actions the student performed (tests, etc.) as well as the time the actions were completed, and how many and what corrective actions were chosen by the student.



**MODEL H-CD-46-RC Four-Cycle, Six Cylinder  
Digital Diesel Engine Simulator**  
Shipping Weight: 250 lbs.

### Procedures

The Simulator is capable of performing and/or demonstrating the following procedures:

- Start up as hot or cold start-up
  - Automotive/industrial/generator
- Variable speed (2800 RPM)
  - Automotive Engine
- Variable speed (2800 RPM)
  - Industrial motor
- Fixed speed (1800 RPM)
  - Procedural testing in a logical progression is required.

### Malfunctions

The simulator has the capability of 40 malfunctions. Once in a malfunctioning state, the complaints window informs the student of the problems.

The student analyses the state of the trainer by pressing an appropriate test button. The student next selects the best corrective action and tests to see the trainer working correctly. Once the student has confirmed that the corrective action has fixed the malfunction, it is declared working by the student.

All Hampden units are available for operation at any voltage or frequency

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## Systems

The Simulator includes instrumentation, indication and controls to operate the unit both manually and on automatic control.

The systems included are:

- Engine
  - Cylinder Block      – Cylinder Head
  - Pistons                – Crankshaft
- Fuel System
  - Injectors              – Pump
  - Governor             – Control
- Air Intake System
  - Blower                – Turbocharger
- Lubrication System
  - Oil Pump             – Filter
  - Cooler                – Pressure Regulator
- Cooling System
  - Radiator             – Water Pump
  - Thermostat
- Exhaust System
  - Manifold             – Turbocharger
- Electrical System
  - Battery                – Generator
  - Starter                – Control

## Data for Simulated Diesel Engine

### Engine Specifications

Number of Strokes/Cycle	4
Number of Cylinders	6
Bore	5.5"
Stroke	6"
Displacement	855 cu. in.
Compression Ratio	14.1:1
Firing Order (RH Rotation)	1-5-3-6-4-2
Idle Speed	600 rpm
Maximum Speed	2100 rpm (FL)
Governor	Limiting speed - mechanical
Fuel Injector	Pressure Timed
Injection Timing	203 th BTDC
Compression @ 600 rpm	550 psi

### Engine Operating Conditions (@ 2100 RPM)

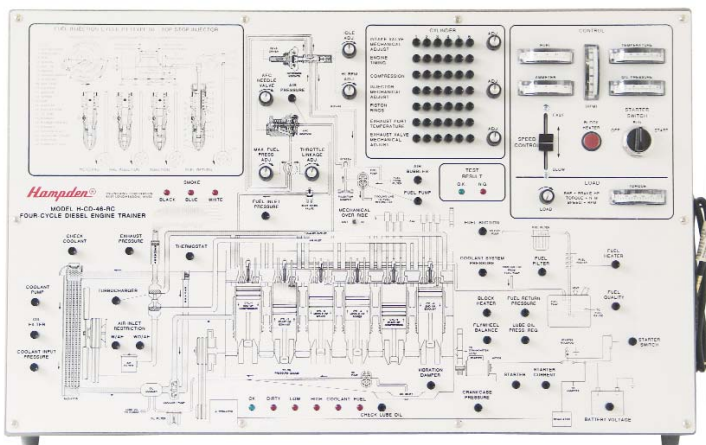
Generator	@ 1800 RPM
Lubrication Oil Pressure	50-70 psi
Lubricating Oil Temperature	200-235°F
Air Box Pressure	20-30" Hg
Air Inlet Restriction	3-20" H <sub>2</sub> O
Crankcase Pressure (max.)	12" H <sub>2</sub> O
Exhaust Back Pressure	3.0" Hg (max.)
Fuel Pressure	80-138 psi
Fuel Back Press. (min.) NL	4" Hg
Fuel Pump Suction (max.)	8" Hg
Coolant Temperature (normal)	175-195°F

## Diagnostics

Diagnostic procedures are provided in the program for testing the lamps, switches, meters and potentiometers. These routines are accessed through the keyboard on the computer.

## Input Voltage

120/240V AC-1Ø-50/60Hz



**MODEL H-CD-46-RC**  
Digital Diesel Simulator shown with  
H-LTCS Laptop Computer

All Hampden units are available for operation at any voltage or frequency

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