

# Diesel Engine Simulators

Educational Training Equipment for the 21st Century

Bulletin 191-100C

## H-DD-24-RC

### Two Cycle, Four-Cylinder Digital Diesel Engine Simulator

#### Purpose

The Hampden **Model H-DD-24-RC** Two-Cycle, Four-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, student display and graphics of the various systems.

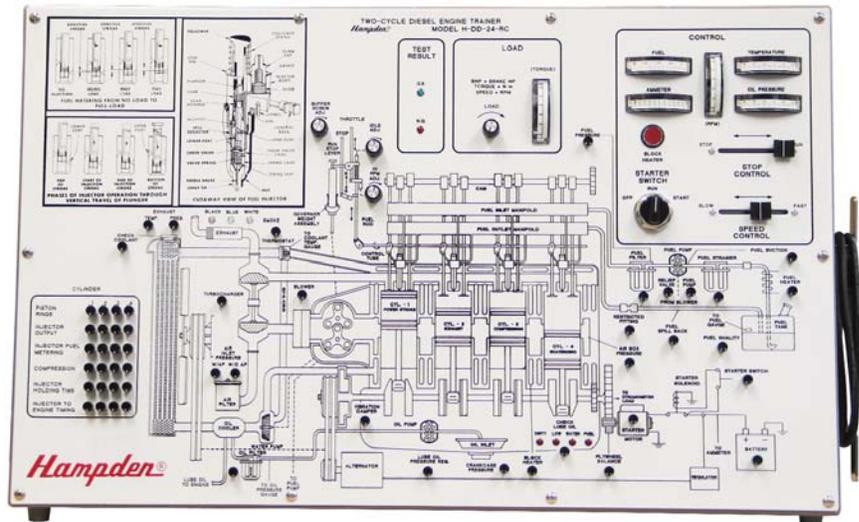
A USB connection is provided for the instructor's use to start procedures, introduce faults and malfunctions into the simulation, select engine type, test components, and monitor student performance.

The simulator acts as a Detroit-Allison two-cycle four-cylinder engine.

Selection of the engine type is made by the instructor from the instructor's terminal. All graphic 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

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



**MODEL H-DD-24-RC** Digital Diesel Engine Simulator  
Shipping Weight: 250 lbs.

#### Procedures

The Simulator is able to perform and/or demonstrate the following procedures:

- Variable speed, cold start-up
  - Truck/Auto
  - Industrial (pumps, etc.)
- Variable speed, hot re-start
  - Truck/Auto
  - Industrial (pumps, etc.)
- Fixed speed (1800 RPM), cold start-up
  - Generator/Alternator
- Fixed speed (1800 RPM), hot re-start
  - Generator/Alternator

#### Malfunctions

The simulator has the capability of 40 malfunctions which can be inserted singly or in multiples. They may be inserted before their "permissive" has been reached; that is, a battery or starter failure may be selected while the engine is running. However, it will not signal a problem until the engine is turned off and an attempt is made to restart.

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
- Air Intake System
  - Blower — Turbocharger
- Fuel System
  - Injectors — Pump
  - Governor — Control
- Lubrication System
  - Oil Pump — Filter
  - Cooler — Pressure Reg.
- 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	2
Number of Cylinders	4
Bore	4.25"
Stroke	5
Displacement	284 cu. in.
Compression Ratio	17:1
Firing Order (RH Rotation)	1-3 4-2
Idle Speed	500-600 rpm
Maximum Speed	2100 rpm
Governor	(FL) Variable speed mechanical
Fuel Injector	Needle valve
Injection Timing	1.460"
Compression @ 600 rpm	475 psi

### Engine Operating Conditions (@ 2100 RPM)

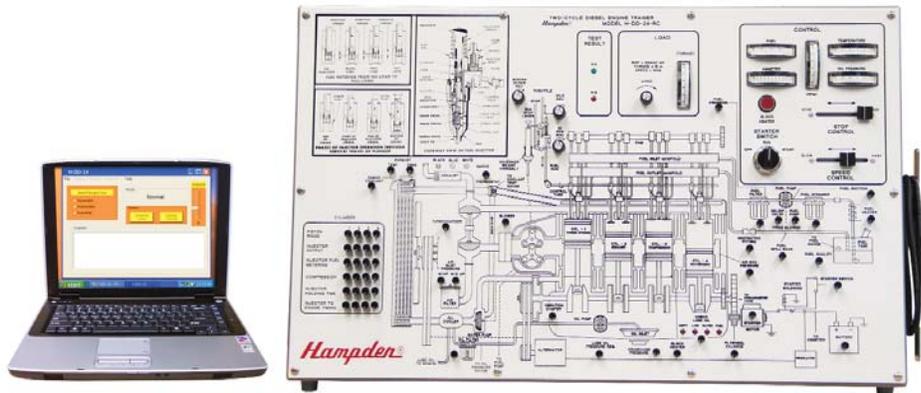
Lubrication Oil Pressure	45-65 psi
Lubricating Oil Temperature	200-235°F
Air Box Pressure	36.7-38.9" Hg
Air Inlet Restriction	12-20" H <sub>2</sub> O
Crankcase Pressure (max.)	1.9" H <sub>2</sub> O
Exhaust Back Pressure (max.)	3.0" Hg
Fuel Pressure	50-70 psi
Fuel Spill (min.) NL	0.9 GPM
Fuel Pump Suction (max.)	6-12" Hg
Coolant Temperature (normal)	160-185°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-DD-24-RC Digital Diesel Engine Simulator  
shown with H-LTCS Laptop Computer

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