

H-6740

Air Ventilation System Trainer

Purpose

The Hampden **Model H-6740** Air Ventilation System Trainer permits the operational study of residential, commercial, and industrial air ventilation systems. The unit can be operated as a stand-alone device or as an integral part of a complete environmental control system. The student will be able to investigate the fundamental principles of air flow measurement, air distribution systems, and the operating characteristics of fans.

Description

This unit comes equipped with a fan, air flow development section, and an instrument console all contained on a mobile bench.

The air flow is generated by a centrifugal-type fan with a 1/2-hp motor. The motor speed is controlled by a variable speed drive and is protected by a 15-amp circuit breaker. The centrifugal fan shaft can mount one of three fan blade assemblies:

- backward-inclined
- forward-curved
- airfoil type

The fan blade assemblies are designed for easy removal, permitting quick substitution of one style by another. The air intake is covered with a steel safety screen which swings out to allow access to the fan shaft. The screen has a built-in safety feature which interlocks it with the fan power. This prevents fan operation while the screen door is open. The outlet of the fan is fitted with a plenum section which leads into the air flow development section.

The air flow development section consists of an air straightener, pressure take-offs and fittings, and a flow control valve. The air straightener ensures a smooth air flow through the measuring section. This is important for accurate sensing of the static, velocity and total pressures in

the duct. The true mean static pressure in the duct can be monitored with a triple-T piezometer ring. Two fittings (located 90° apart) are available for insertion of a pitot-static tube to measure the total and velocity pressures inside the duct. With the pitot-tube positioner included in the optional **Model H-6740-10** package, accurate velocity profiles in the duct can be taken. Downstream of these fittings is the flow control valve.

There is a butterfly-type damper with an integral positioner and scale. Provisions for monitoring the static pressure drop across the damper are included. This will enable the student to generate plots of the damper static pressure drop versus air flow rate and damper position.

The instrument console is located on the rear of the bench. All of the instruments are mounted such that none are obstructed by the equipment mounted on the bench.



MODEL H-6740 w/Centrifugal Fan
Dimensions: 72"H x 72"W x 30"D
Weight: 1500 lbs

Located in the instrument console are:

- on/off switch with pilot light
- ammeter
- voltmeter
- tachometer
- three pressure gauges (one each for indication of static, velocity and total pressure)
- variable speed drive for fan
- tubing connections for the pressure gauges

The pressure gauges can be specified as having scales calibrated in inches WC or millimeters WC.

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

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Experiment Capabilities

The Hampden **Model H-6740** Air Ventilation Trainer is a versatile unit which allows augmentation of the basic equipment with additional ductwork, diffusers, register boxes, etc. The experiments contained in the technical manual provide a starting point for the study of air distribution. The students will be given a basic understanding of the principles of air flow measurement; fan technology, operation, testing and balancing of duct systems. This will allow the student to venture further into the field of air distribution.

The experimental capabilities of the trainer are:

Air Flow Measurement

- static pressure measurement
- velocity pressure measurement
- total pressure measurement
- calculate air velocity
- calculate volume flow rate (CFM)
- determine velocity profile in duct

Fan Performance

- determine the volume flow rate and static pressure relationship with fan power at different fan speeds.
- determine the static pressure relationship with fan power at different volume flow rates.
- fan efficiency
- plot fan performance curves
- evaluate different fan blade configurations

With the inclusion of the **Duct Fitting Package**, the experimental capabilities can be extended to:

Air Duct Data

- measure friction losses in duct work, tees, damper, reducers, elbows, expansions
- design, test, and evaluate ventilation systems

Diffusers

- determine performance of ceiling, side-wall, and linear diffusers; pressure loss, diffuser flow patterns; volume air flow rate relationship with pressure loss
- how to balance diffusers (to get the desired volume flow rate)

System Performance (with an air conditioner)

- design, test, and evaluate residential air conditioning system for variations in air temperature, air density, and volume flow rate

With the addition of the **High Velocity Experiments Package**, the student will also be able to investigate:

High Velocity Duct System Performance

- determine pressure loss of system components
- design, test, and evaluate duct systems with variations in air velocity and volume flow rate
- balance high velocity duct systems
- control high velocity duct systems with terminal unit

Accessories

The **Duct Fittings Package** includes the following:

- 2 x Adjustable support stand
- 6 x Duct section - 8"D by 60"L
- 3 x Duct section - 4"D by 60"L
- 6 x Slip joint - 8"
- 2 x Slip joint - 4"
- 2 x Radius elbow - 8" by 45°
- 1 x Radius elbow - 8" by 90°
- 1 x Radius elbow - 4" by 90°
- 1 x Tee - 8" by 8" by 4"
- 1 x Damper - 4"
- 1 x Reducer - 8" to 4"
- 1 x Expansion - 4" to 8"
- 1 x Diffuser with box - 8" by 8"
- 1 x Diffuser with box - 10" by 10"
- 1 x Diffuser with box - 12" by 12"
- 1 x Diffuser with box - 10" by 6"
- 1 x Diffuser, linear - 6" by 24"



MODEL H-6740 Show with
MODEL H-6740-10 High Velocity Experiment
Package (Axial Fan)

Options

Computer Data Logging

The addition of National Instruments analog I/O modules terminating to a RS-232 jack allows the measurements to be logged via a Windows based computer (not supplied). Templates for LabVIEW® control software are included.

Specify **MODEL H-6740-CDL**.

High Velocity Experiments Package includes the following:

- 1 - Airfoil type fan
- 1 - Volume control terminal unit
- 1 - Pitot-tube positioner

Specify **MODEL H-6740-10**

Power Required

208V AC-3 ϕ -60Hz

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

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