

# WATER HYDRAULICS



**Hampden**<sup>®</sup>  
ENGINEERING CORPORATION



# WATER HYDRAULICS

## Learning Fluid Behavior in the Classroom

### Model H-6540 Water Hydraulic System

consists of a Mobile Hydraulics Bench **Model H-6540-10** and a complete line of basic to advanced demonstration and experimentation equipment.

Each unit has been designed to fully demonstrate specific working properties of hydraulic theory.

### Model H-6540-10 Water Hydraulic Bench

includes the following:

- ▶ Motor
- ▶ Self-priming centrifugal pump
- ▶ Dump valve
- ▶ Drain valve
- ▶ Needle valve
- ▶ Stepped volumetric tank
- ▶ Sump tank
- ▶ Supply outlet
- ▶ Remote pressure gauge
- ▶ Sight glass w/ scale
- ▶ Calibrated measuring cylinder

### Model H-6540-11 Dead Weight Pressure Gauge Module

consists of a precision-machined piston and cylinder, base mounted, with leveling feet, spirit level and weight set.



### Model H-6540-12 Hydrostatic Pressure Module

consists of a clear Lexan tank with base, leveling feet, spirit level, fill port and drain cock. A quadrant with balance beam, pivot, adjustable counter balance weight, beam level indicator and weight balance hanger. (calibrated weights not included)



### Model H-6540-13 Weir Set

consists of two stainless steel weir plates, one vee notch and one rectangular notch.



### Model H-6540-14 Metacentric Height Module

consists of a plastic floating pontoon with mast, adjustable mast weight, plumb bob, lateral adjustable weight, and scale bar.

### Model H-6540-15 Bernoulli's Theorem Demonstration Apparatus

consists of a base with leveling feet, venturi with pressure taps, head tube traverse tap, and a needle valve. An eight tube manometer is provided with hand pump.

The **Model H-6540-15** Bernoulli's Theorem Demonstration Apparatus demonstrates the circumstances to which Bernoulli's Theorem may be applied and why, in other circumstances, the theorem gives an inadequate description of the fluid behavior.

The following demonstrations can be conducted with the **Model H-6540-15**:

- Demonstrate Bernoulli's Theorem and its limitations
- Directly measure the static and total head distribution along a Venturi tube
- Determine the meter coefficient at various flow rates

The test section consists of a Venturi machined in clear acrylic. A series of wall tapings allow measurement of the static pressure distribution along the converging duct, while a total head tube is provided to traverse along the center line of the test section. The tapings are connected to the manometer bank incorporating a manifold with air bleed valve.

The hand pump is used to pressurize the manometers. The test section is arranged so that the characteristics of flow through both a converging and diverging section can be studied. Water is fed through a hose connector and is controlled by a flow regulator valve at the outlet of the test section.

The Venturi can be demonstrated as a means of flow measurement and the discharge coefficient can be determined.

### Model H-6540-16 Impact of a Jet Module

consists of a clear plastic cylinder with leveling feet and spirit level. Included is a nozzle, target plate with stem and counterbalanced compression spring, weight paw and scale. (weights not included)



### Model H-6540-17 Orifice Calibration Apparatus

consists of a base with leveling feet, spirit level, clear plastic tank with inlet pipe, adjustable overflow pipe, orifice fixture with "O" ring, backboard assembly with paper clips, needle support with eight adjustable needles, two orifice plates and a tank level scale. The orifice diameters are 3.0 mm and 6.0 mm.



### Model H-6540-17a

is the same as **H-6540-17** with five (5) additional orifice plates.

### Model H-6540-18 Energy Loss in Pipes

consists of a base with leveling feet, spirit level, constant head tank, test pipe with two pressure taps, needle valve, water manometer, air pump and measuring cylinder.



### Model H-6540-19 Laminar Flow Visualization Channel

consists of a base with inlet tank, adjustable feet, clear plastic channel, undershot weir, overshot weir, and dye injection system. The unit comes with broad crested weir, narrow crested weir, two aerofoils, and two cylinders.



### Model H-6540-20 Reynold's Demonstration Apparatus

consists of a base with adjustable feet, spirit level, head tank with supports and overflow, needle valve, bellmouth entry, and dye injection system.

### Model H-6540-21 Flowmeter Demonstration Module

introduces students to three basic types of flowmeters.

The following demonstrations can be conducted with the **Model H-6540-21**:

- Directly compare flow measurement using a Venturi meter, variable area meter and orifice plate
- Calibrating each flowmeter using the volumetric measuring tank of the bench, **Model H-6540-10**
- Comparing pressure drops across each device

**Model H-6540-21** Flowmeter Demonstration Module consists of:

- Base with Leveler Feet
- Venturi
- Flowmeter
- Orifice Plate
- Needle Valve
- Eight Tube Manometer installed in a series configuration to permit direct comparison.

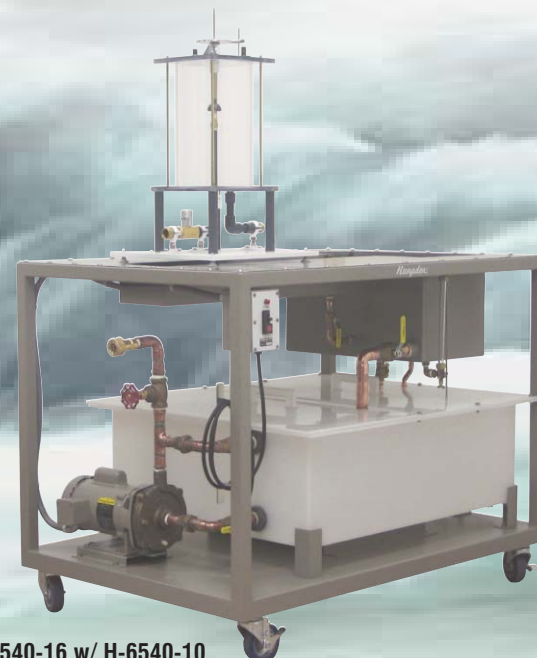
A flow control valve permits variation of the flow rate through the circuit. Pressure tapings are incorporated so that the head loss characteristics of each flowmeter may be measured. These tapings are connected to the eight tube manometer bank incorporating a manifold with air bleed valve. The hand pump is used to pressurize the manometers. The circuit and manometer are attached to a support framework which stands on the working top of the hydraulics bench. The bench is used as the source of water supply and for calibrating volumetrically each flowmeter.



H-6540-10 Water Hydraulics Bench



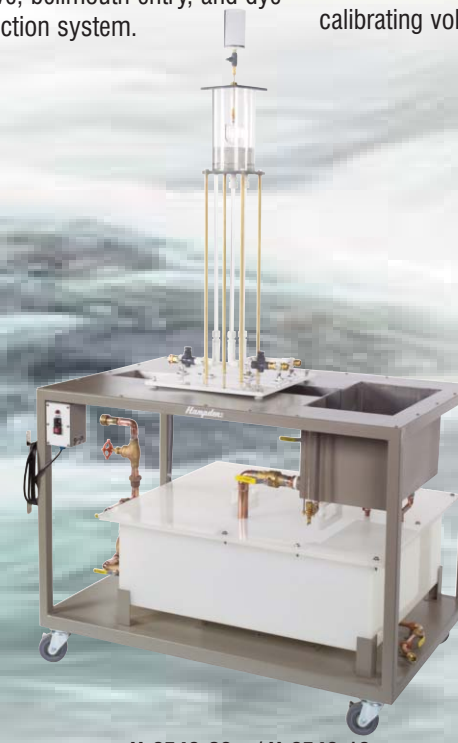
H-6540-11



H-6540-15 w/ H-6540-10



H-6540-16



H-6540-19 w/ H-6540-10



H-6540-21 w/ H-6540-10

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# WATER HYDRAULICS

## Model H-6540-22 Losses in Bends Apparatus

consists of a metal frame with inlet, sweep bend, expansion-contraction section, short bend, 90° elbow, pressure gauge, gate valve, miter bend, needle valve, and one twelve tube manometer.

This unit includes twelve pressure taps.

## Model H-6540-23 Free and Forced Vortices Apparatus

consists of a base with leveler feet, models for test and hydro-gen bubble flow generator.



## Model H-6540-24 Hydraulic Ram Apparatus

for determining flow pressure characteristics and efficiency.

## Model H-6540-25 Pelton Turbine Demonstrator

consists of a base channel, pelton turbine, friction dynamometer and spear valve with pressure gauge. Turbine speed is measured using **HT-100K** Tachometer, (purchased separately).

## Model H-6540-26 Series-Parallel Pump

consists of one centrifugal pump with 1/4 HP motor, pressure gauges and associated hardware and piping. It is used in conjunction with the H-6540-10 bench pump.



## Model H-6540-27 Centrifugal Pump

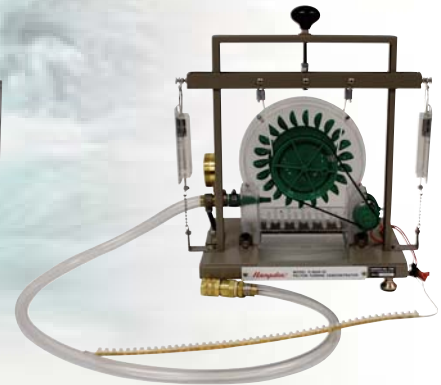
consists of one centrifugal pump with 1/4 HP motor, pressure gauges, associated hardware and variable speed motor drive.



H-6540-22



H-6540-19



H-6540-22



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