

# Fluid Power Learning Systems

Educational Training Equipment for the 21st Century

Bulletin 220G

## Purpose

The Fluid Power Learning System acquaints students with the principles and practices of power transfer through the media of liquid and air. Fluid power systems are used in industry to perform hundreds of important tasks. As factories became more automated, that is, placed under computer control, fluid power played an increasingly important role. The reasons are simplicity and versatility. Valves, levers, and pushbuttons are all that are required to start, stop or control fluid power systems. No other medium provides the same degree of accuracy and flexibility while maintaining the ability to transmit maximum power utilizing minimum bulk and weight.

## Description

Hampden Fluid Power Learning Center, **MODEL H-FP/H-6032**, shown with hydraulic reservoir and pump, air compressor and control panels, but without the experimental hardware package that is furnished with the Learning Center. The pump, reservoir, and hydraulic panel are furnished with the Basic Hydraulics segment; the pneumatic panel with the Basic Pneumatics segment; and the electrical panel with the Electrohydraulics segment. For the compressor, specify **MODEL H-FP/PPS**.



The Hampden Fluid Power Learning System consists of the following segments:

**H-FP/BH Basic Hydraulics.** In this segment, students learn the basic principles of hydraulic circuits. Components include valves (flow, check, relief, two-way, four-way, etc.), cylinders, motors and pumps. Furnished complete with hydraulic hoses having quick-disconnect couplings.

**H-FP/AH Advanced Hydraulics.** The Advanced Hydraulics segment gives students the opportunity of designing, connecting, and operating more complex circuits, such as sequencing, counterbalance, unloading and braking. The additional components of this segment are used in conjunction with the Basic Hydraulics segment of the Fluid Power Learning System.

**H-FP/EH Electrohydraulics.** Students learn the basic concept of electricity and how pilot devices, relays and solenoids are used to control the operation of hydraulic systems. When the electrohydraulic segment is included, the Fluid Power Learning Center con-

**Model H-FP/H-6032**, shown with optional accessories **Model H-FP/BH, H-FP/AH, H-FP/EH, H-FP/BP, H-FP/PPS**

Dimensions: 35"H x 80"W x 30"D  
Shipping Weight: 1300 lbs.

tains an electromagnetic control panel. For a more advanced study of automation, the **MODEL H-FP/ES**, Servo Trainer, or the **MODEL H-FP/PLC**, Programmable Logic Controller, may be added. Also available is the **MODEL H-FP/EES**, interface panel, for analog PLC control of the servo system.

**H-FP/BP Basic Pneumatics.** The laws governing the behavior of air are covered in this segment, along with the components of pneumatic power transmission systems. When Basic Pneumatics is included, the Fluid Power Learning Center contains the pneumatic control panel complete with pneumatic hoses having quick-disconnect couplings. An air compressor may be added, if required.

**H-FP/FL Fluidics.** This segment provides students with a comprehensive exploration of nonmoving part air logic. In fluidics, air serves as both the power medium and the control medium. The Fluidics segment utilizes the Control Panel used in the Basic Pneumatics segment. Furnished complete with pneumatic tubing having quick-disconnect fittings.

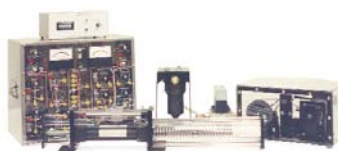
## Hampden H-FP/ES Electrohydraulic Servo Trainer

### Purpose

The **MODEL H-FP/ES** Electrohydraulic Servo Trainer provides a comprehensive study of electronic analog control of hydraulic systems. Subjects include: angular and linear position transducers, rotary and linear hydraulic actuators, summing and signal amplifiers, current limiting, dither control, servo valves and drivers, and automatic control theory.

The **MODEL H-FP/ES** is furnished complete with interconnecting cords and hydraulic hoses, and is fully compatible with the Hampden Fluid Power Learning Center.

**MODEL H-FP/ES** training system consists of: (1) modularized panel, (2) pilot-operated 4-way



**MODEL H-FP/ES**

Shipping Weight: 150 lbs.

servo valves, (3) linear actuator (hydraulic cylinder) having Linear Variable Differential Transformer (LVDT) to produce a position feedback signal, loading device, and an optional load cell, (4) rotary actuator (hydraulic motor) having a tachometer-generator to produce a speed feedback signal, a loading device and potentiometric transducer to produce an angular position feedback signal.

The Servo Hydraulic Control Panel contains modules for the following:

- DC power supply
- Dual set-point potentiometric control
- Error detection with dual summing amplifiers
- Signal control amplifier with derivative (rate)
- Cut-out switch
- Servo valve driver including current limit and dither adjustments
- Servo valve interface
- Multi-range diode-protected ammeter and voltmeter
- Angular position/velocity interface for LVDT, potentiometric, tachometer and load cell signals

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

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## H-FP Modular Fluid Power Technology Program

### Purpose

The Hampden Modular Fluid Power Technology Program consists of hydraulic/ pneumatic equipment in modular form available for purchase in combinations needed to meet various teaching objectives.

### Description

- **H-FP/BHS** Basic Hydraulics System consists of an Instrumentation Module, a Valve and Actuator Module (pictured right).
- **H-FP/IHS** Intermediate Hydraulics System consists of a Valve Module.
- **H-FP/EHS** Electrohydraulics System consists of a Control Module and a Component Module. This system is to be used in conjunction with the **H-FP/BHS**.



MODEL H-FP/IHS Intermediate Hydraulics



MODEL H-FP/BHS Basic Hydraulics



- **H-FP/BPS** Basic Pneumatics System consists of an Instrumentation Module, a Pneumatic Actuator/Valve Module (pictured below), and a Hose and Component Package.
- **H-FP/IPS** Intermediate Pneumatics System consists of a Pneumatic Module.
- **H-FP/EPS** Electro-Pneumatics System consists of an Electro-Pneumatic Module.
- **H-FP/ESS** Electronic Sensor System consists of a Magnetic Reed Sensor, Proximity Sensor, Hall Effect Sensor, Fiber Optic Sensor, Target Set and a Base Assembly with protractor. All of the above modules are designed for interface with the **H-FP/EHS** Electrohydraulic and **H-FP/EPS** Electro-Pneumatic Systems.
- **H-FP/MTS** Basic Mechanisms System consists of a steel work base, carrying case for the mechanical components including gears, belts, pulleys and bearings.

- **H-FP/HPS** Mobile Hydraulic Supply supports up to 3 hydraulic systems.
- **H-FP/PAC** Portable Air Compressor with 8' hose.
- **H-FP/H-6032** consists of a mobile (2 fixed and 2 locking swivel casters) hydraulic bench for mounting the modular systems for experimentation. It has two sliding doors, provided with a key lock for security. The bench has a recessed top surface that sloped from all sides toward a drain and is capable of housing a hydraulic power supply (included) and an air compressor.
- **H-FP/PPS** Pneumatics Air Supply is designed for mounting within the **H-FP/H-6032** bench, completely factory assembled.



MODEL H-FP/IPS Intermediate Pneumatics



MODEL H-FP/BPS Basic Pneumatics



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

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