

H-6320 Structures Test System

Purpose

Literally thousands of investigations into the effects of statically or dynamically loading mechanical structures can be made with this one unit. Costs are so low that tests may be carried to destruction by individual students.

Description

The Structures Test System is a bench-top sized "learning laboratory" system designed to test and indicate the effects of static and dynamic mechanical loading on models of various engineering components and structures such as beams ("I"-beams, "T"-beams, rectangular and round beams, etc.), simple and complex bridge trusses, cantilever beams and trusses, crane trusses and the like.

The system consists of:

1. a heavy-duty, formed-steel test fixture assembly adaptable to a variety of test set-ups and configurations
2. a hydraulic hand pump with high- and low-range pressure gauges and necessary hoses with quick couplings
3. a double-acting hydraulic ram with a 1-in stroke
4. micrometer with micrometer-mounting bars for measuring load deflections
5. dial indicator with mounting bars for measuring load deflections
6. illustrated operating instruction manual
7. student experiment manual

Models for tests may be student or instructor devised. Stock test models (described on reverse side) may be ordered from Hampden. Hampden can provide special models or sections to order.



MODEL H-6320-CDL Base shown with optional CDL package & optional Computer

Structural model under test is set upon or secured to the test fixture assembly—supported at one end or at both ends. Model is then subjected to the mechanical loading pressures by means of hydraulic pump and ram, with deflections measurable in thousandths of an inch by means of a micrometer. System also demonstrates strain photoelastically when used with a polariscope.

Two hydraulic pressure gauges are supplied:

1. 0 to 2000 psi, for reading under relatively light-loading conditions, and
2. 0 to 10,000 psi for heavy-loading conditions.

Test models are normally stressed to a point below failure, but may be stressed up to and beyond failure. Some damaged model members and specimens may be repaired, others may be replaced at nominal cost.

As with all Hampden Systems, the Structures Test System is designed to induce maximum individual student involvement in the learning process - to provide more students with the direct access to the experimental equipment and to encourage individual study by each student.

Specifications

The system is a self-contained, bench-top sized laboratory device for mechanically loading structural components and members up to and beyond the point of failure - with provision for measuring loads and deflections.

Model H-6320 Structures Test system consists of the following components:

Test fixture assembly

A frame of sufficient strength to support structural models or members under 3700 lbs stress with negligible distortion to itself; test fixture has sufficient versatility in design to provide for a wide variety of mechanical loading tests on pinned, fixed, crane, bridge and cantilever model structures.

Hydraulic hand pump

capable of generating hydraulic pressures of up to 10,000 psi.

Fittings

including clevises, male and female; and pins for assembling test models and attaching them to test fixture.

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

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Hydraulic pressure gauges (2) capable of measuring hydraulic pressures of up to 2000 psi full-scale and 10,000 psi full-scale respectively; gauges have a "maximum pressure indicator hand" which travels with pointer as pressure increases, but which remains at highest pressure attained until it is manually reset to start a new test. Dial readings for tension and compression in lbs. and psi.

Double-acting hydraulic ram w/1-in stroke capable of applying up to 7850+ lbs compression loading, 3440+ lbs tension loading, at maximum hydraulic pressure of 10,000 psi.

Precision micrometer and rigid micrometer mounting bar and adapter for measurement of structural deflections of models under varying load conditions; micrometer system provides a measurement to ± 0.0001 in.

Services Required

Normal pump and cylinder maintenance.

Computer Data Logging

The Hampden **MODEL H-6320** can be supplied with the necessary accessory equipment to permit acquisition of appropriate signals/values. This includes the following equipment: ten strain gauges, two precision linear potentiometers with cable, Data Translations data acquisition board and signal conditioning unit, complete with Data Translation LabTech software, for IBM compatible computer (computer not included). Capabilities include recording and simultaneous display of eight channels.

Specify **MODEL H-6320-CDL**

Experiment Capabilities

(Partial List)

- Tension loading to 2200+ lbs
- Compression loading to 3700+ lbs
- Combined tension and compression beam
- Vector-loading, symmetrical and non-symmetrical
- Force analysis from observed deformations
- Static and/or dynamic loading
- Bridge-Truss design load limits
- Cantilever and crane truss and beam design load limits
- Metal fatigue
- Beam-loading comparisons (i.e. "I"- vs. "T"-beam, solid vs. hollow, etc.)
- Metal and plastic stress-loading comparisons using beams of similar cross-sections
- Structural design and analysis
- Failure-point determinations for various truss designs
- Failure-point determinations for various materials of similar configuration
- Moment determination and analysis
- Reinforced concrete beam load determinations

Optional Experiment Packages

MODEL H-6320-10 Plastic Truss: determination of deflections with center and off center, normal and vector loading; photoelastic observation of stress patterns and values with a polariscope.

MODEL H-6320-20 Wing-beam with whiffle tree: determination of deflections and stresses of point or distributed loads in cantilevered beam.

MODEL H-6320-30 Determinate bridge truss: determination of deflections at all critical points in model, failure predictions based on materials properties. Includes clevis and attachments arranged for center loading of bottom middle spacer.

MODEL H-6320-40 Indeterminate bridge truss:

determination of effects of loading statically indeterminate structure designs. Includes clevis and attachments arranged for center loading of bottom middle spacer.

MODEL H-6320-50 Horizontal truss:

determination of structural characteristics, derivation of theory, observation of stress patterns, evaluation of stresses. For use with 4 photoelastic diagonals - arranged with 2 short and 2 long photoelastic diagonals to demonstrate redundancy and stress patterns with polariscope.

MODEL H-6320-60 Crane beam:

determination of vector effects, stress distribution, deflections, composite force effects. Includes clevis and attachments arranged with anchored end, and with capability for applying load near center of truss.

MODEL H-6320-70 Vertical extension channel:

is firmly attachable to vertical member of test fixture assembly and capable of increasing height of vertical member.

MODEL H-6320-71 Flat Beam Assembly

MODEL H-6320-100 Option Package: Consists of H-6320-10 thru H-6320-70 options.

Replacement Kits

MODEL H-6320-30RK

Replacement Truss Rods for **Model H-6320-30** Option

MODEL H-6320-40RK

Replacement Truss Rods for **MODEL H-6320-40** Option

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

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