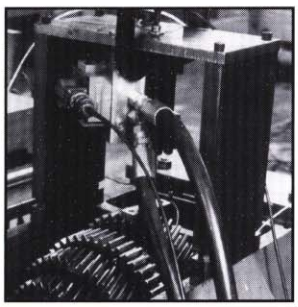
XCITE SYSTEMS CORPORATION

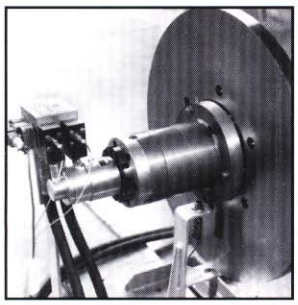
# High Force Modal Excitation Systems for the 21st Century

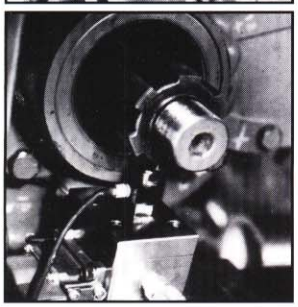
# Advantages of Hydraulic Excitation for Measuring the Frequency Response of Structures

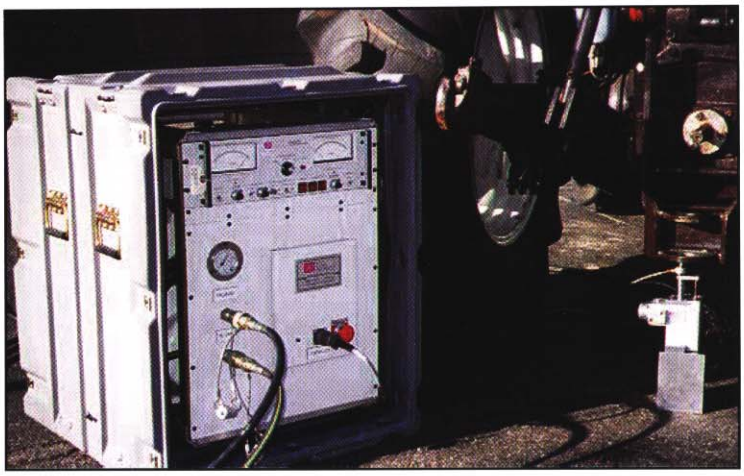
The FFT analyzer has rapidly gained popularity for making frequency response measurements on mechanical systems. One reason for this popularity is the ability of these analyzers to quickly and easily measure frequency response functions using impulsive excitation generated by an impact hammer. For lightly damped, linear structures, this low energy excitation technique provides good results, which accurately predict the dynamic behavior of the structure under higher level inputs.

However, many real-life structures exhibit a considerable degree of non-linearity and/or high damping. For example, bolted or riveted joints produce frictional damping and "gap" discontinuities; elastomeric isolation mounts are often highly non-linear. In such cases, the frequency response function can change dramatically depending on the amplitude of the input, and so a useful measurement requires higher energy excitation techniques which approximate the dynamic levels actually observed in the operating environment.









These techniques involve the use of an exciter which is able to reproduce a desired force waveform, usually either random or sinusoidal nature.

A properly designed hydraulic exciter system provides an excellent general purpose tool for high energy structural excitation. Some of the key features which may be important for a successful frequency response are:

### High Force Capability

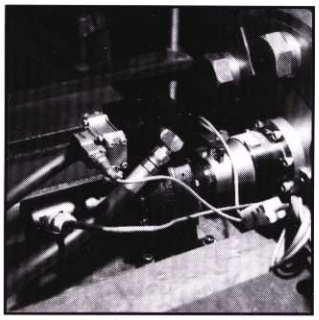
Hydraulic exciters are available with peak force ratings from 1,000 lbs. to 20,000 lbs. or more. High force is essential for testing smaller structures which are highly damped, and for testing non-linear structures at a variety of input levels. It allows the use of broadband random excitation for faster results than would be possible using swept-sine testing with a lower force exciter.

### Ease of Fixturing

A hydraulic exciter provides an extremely compact point source of force which can normally be applied directly to the structure under test. This eliminates the need for complicated fixturing and the attendant distortion and resonance problems.

### High Frequency Response

With hydraulic excitation there is no loss of performance at low frequency, and with a suitable design, excellent response can be achieved in excess of 1,000 Hz. This frequency range covers the vast majority of all structural analysis applications.

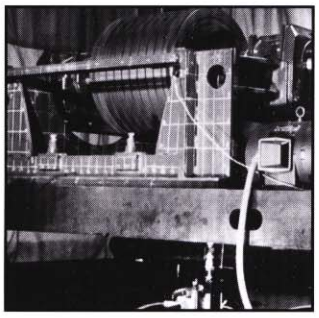


### Preload Capability

Many structures require an accurately controlled static "preload" force in order to take up the slack in bearings, gears, or joints. Hydraulics provide a high preload capability, which is easily adjusted for studying the effects of variations in static loading.

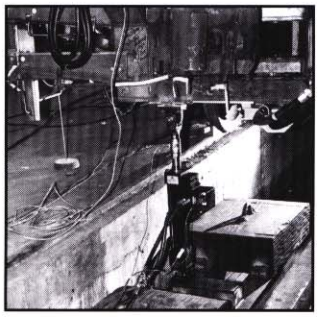
### Independent Static and Dynamic Control

This feature allows independent control of separate static and dynamic feedback variables. For example, in testing compliant or freely-suspended structures, it is often necessary to control the dynamic input force while maintaining static displacement control. This helps to keep the exciter from drifting to the end of its stroke.



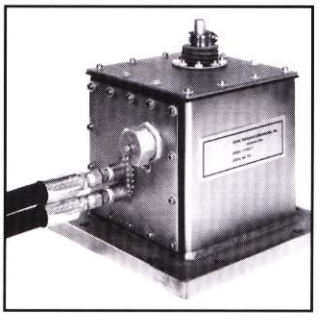
### Automatic Gain Compensation

This feature maintains a constant level of force (or some other dynamic feedback variable) during a sine sweep, in order to automatically compensate for variation in the dynamic stiffness of the structure being tested.



### Long Stroke

Hydraulics can provide up to several inches of stroke for testing vehicle suspensions, exciting total vehicle or similar applications.



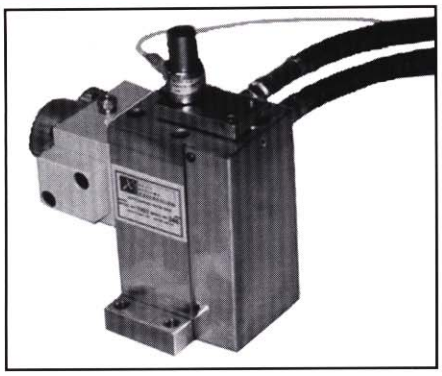
### Variety of Exciter Models

In addition to the full range of linear and torsional exciters, inertial mass exciters are available in linear and torsional models for applications in which backup fixturing is difficult, such as exciting buildings, turbine rotors, automotive drivelines, or shipborne structures.

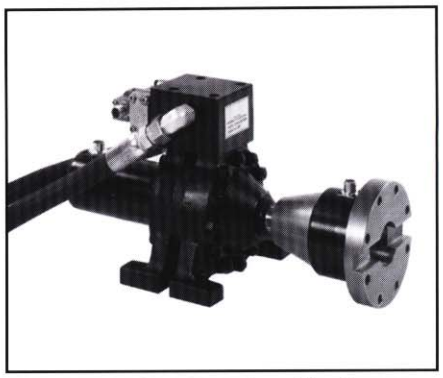
# Expanded Frequency Response Through Xcite's Unique Dual Loop Control

The Xcite line of standard force generation systems includes a broad range of built-in features, as well as all the electronic and hydraulic equipment options for complete application versatility. These Xcite system's were the first to be totally engineered for high frequency mechanical impedance testing with minimal operational training required. The end user is assured ease of use with little knowledge of electrohydraulic systems due to the systems flexibility of operation in numerous applications. All Xcite systems consist of three basic components: The Exciter Head, Master Controller, and Hydraulic Power Supply.

## Exciter Head

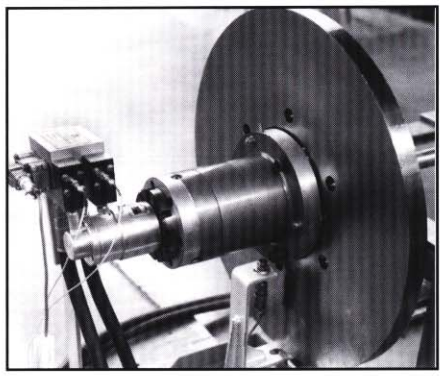


**Linear Exciter Head**



**Torsional Exciter Head**

**Linear Inertial Exciter Head**



**Continuous Rotating Torsional Exciter Head**

The Exciter Head, with its force and displacement transducers, generates and measures the force or torque to the structure being tested and provides feedback signals for control of the test variables.

Exciter heads are designed for maximum problem-solving flexibility in applications, fixtures and operation. Available in a broad range of force/ torque capabilities in linear, torsional, and inertial mass models, the exciter heads provide controlled static and dynamic force for a wide range of structural testing applications.

**Unique Features**

- Miniature strain gauge load cell for both static and dynamic force feedback and output
- Small size
- Tandem mounted displacement kit
- High frequency servovalve
- Easy to fixture
- Bronze impregnated TFE piston rings for low stiction
- Long life rod seals
- Precision ground piston rods
- Low maintenance

# Dual Loop Master Controller

The Xcite System Master Controller provides all dual loop functions needed for accurate closed loop control and display of the static and dynamic test variables, while producing the highest electro-hydraulic frequency response.

At the heart of each Xcite System is the Master Controller, a compact electronic control package which provides all of the controls and displays necessary to operate a controlled force or torque exciter system. The Xcite Master Controller is unique in that it provides excitation over a broad frequency range, unprecedented by any previous electro-hydraulic excitation system. It achieves its great frequency range through the use of sophisticated circuitry, high voltage inputs to the servovalve, and compression control of the dynamic feedback variable in addition to the conventional servo control of the static loop. Static parameters such as force or displacement may be matched with dynamic control variables such as force, displacement, velocity, acceleration or strain for maximum test flexibility.

**Unique Features**

- Independent static and dynamic control loops
- Compression control of the dynamic loop
- Direct power amp input for use with random shaker control system
- Adaptable to other exciter heads by swapping one printed circuit card
- LVDT and strain gauge signal conditioning
- Hydraulic power supply control
- Large, easy to read, meter indications of static and dynamic controller variable levels
- Factory preset control loop circuitry tailored to each model exciter head

# Hydraulic Power Supply

**Laboratory Hydraulic Power Supply**

The Hydraulic Power Supply furnishes the Exciter Head with its hydraulic pressure, flow and filtration requirements. Xcite Hydraulic Power Supplies present a unique approach to meeting the fluid power requirements of the exciter heads. Each unit is transportable and self-contained to permit use at virtually any test site, yet its low noise characteristics make it equally suited for laboratory use. Power supply control is located on the Master Controller for ease of use. All Xcite power supplies furnish 3000 psi of pressure and are available in models ranging from 1 GPM to 75 GPM.

**Field Test Hydraulic Power Supply**

**Unique Features**

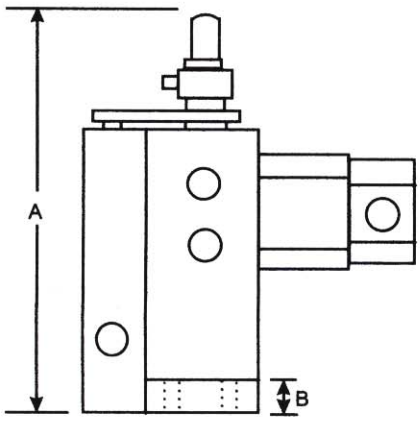
- Transportability
- Quiet operation
- Pressure compensation and variable volume; provides energy consumption because it supplies only the flow demanded by the exciter head
- Housed in rugged, wheeled cabinet
- Low Maintenance
- Operation features: 3-phase power sequence indicator, temperature and filtration warning lights
- Automatic shutdown on over-temperature & clogged filter
- 3 micron filtration
- Polarized quick disconnects
- Available in air or water cooled models
- Available in 110V & 220V, 380V or 440V 3-phase models

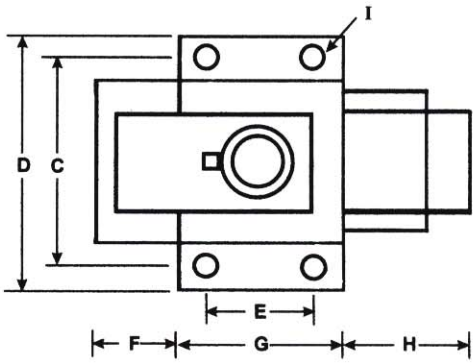
# Xcite 1100 Field Test Series

The Xcite 1100 Field Test Series uses the same Exciter Heads and Master Controller as the 1100 Laboratory Series but replaces the 5 GPM 3-phase Hydraulic Power Supply with a field portable 1.2 GPM single phase Power Supply. While providing the same 3000 PSI pressure, the field test unit is switch selectable from 110 V (20 A) to 220 V (10 A) single phase power.

This simplified power requirement along with the packaging of the unit in a roto-molded shipping case provide for ease of modal testing in remote areas of your facility and allows air shipment to off site test destinations. The 1100 Field Test Series is used in the power and natural gas distribution industries as well as on shipboard structure borne noise path identification.

| | **Xcite 1100-4-FT System** | **Xcite 1100-6-FT System** | **Xcite 1100-7-FT System** |
|---|---|---|---|
| **Hydraulic Power Supply** | **1001P 1.2 GPM (5 l/m)** | **1001P 1.2 GPM (5 l/m)** | **1001P 1.2 GPM (5 l/m)** |
| **Master Controller** | **1104-Mod4** | **1104-Mod4** | **1104-Mod4** |
| **Exciter Head** | **1106-4-T/C** | **1107-4-T/C** | **1114-4-T/C** |
| Static Force | 1,000 lb (4,450 N) | 1,000 lb (4,450 N) | Total Static & Dynamic |
| Dynamic Force | 1,000 lb (4,450 N) | 1,000 lb (4,450 N) | Force = 1,000 lb (4,450 N) |
| Stroke | 1.0 in (25 mm) | 2.0 in (50 mm) | 1.0 in (25 m) |
| Rod | .75 in (18 mm) | .75 in (18 mm) | .75 in (18 mm) |
| Bore | 1.0 in (25 mm) | 1.0 in (25 mm) | 1.0 in (25 mm) |
| Thread | .38 - 24 | .38-24 | .38-24 |
| Load Cell | 2,500 lb (11,125 N) | 2,500 lb (11,125 N) | 2,500 lb (11,125 N) |
| LVDT | 1.0 in (25 mm) | 2.0 in (50 mm) | 1.0 in (25 mm) |
| Exciter Design | Single Ended | Single Ended | Double Ended |

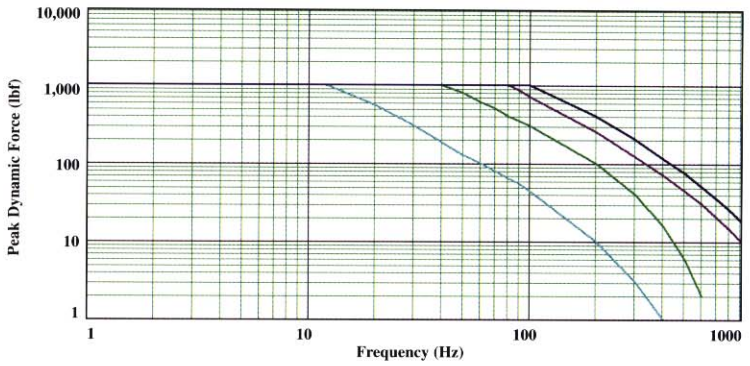


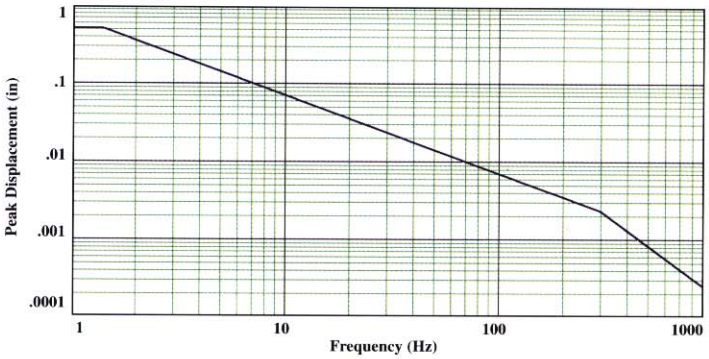

| Exciter Head | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in(dia) | mm(dia) | in(dia) | mm(dia) |
| 1106-4-T/C | 6.12 | 53 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |
| 1107-4-T/C | 7.12 | 178 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |
| 1114-4-T/C | 6.78 | 170 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |

# Xcite 1100-4 Field Test System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency

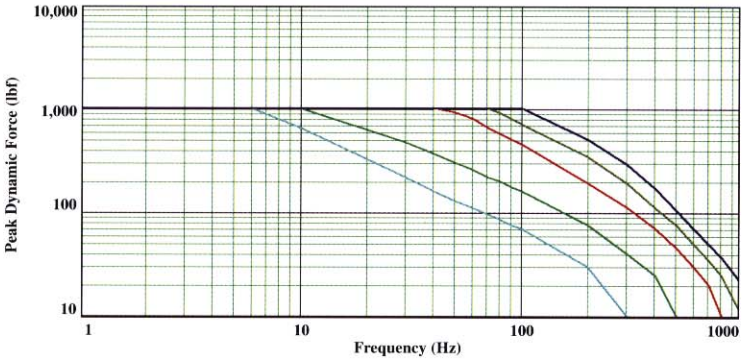



**Structure Stiffness:**

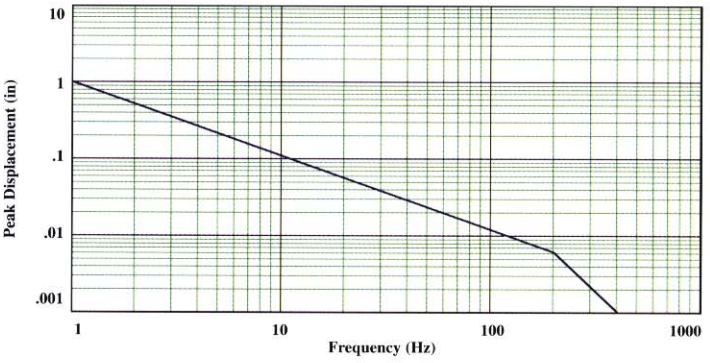
K=2E4 lb/in
K=1E5 lb/in
K=5E5 lb/in
K=infinite

# Xcite 1100-6 Field Test System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency

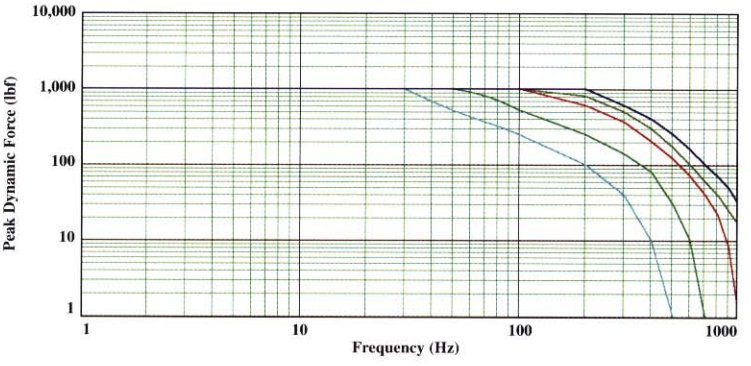



**Structure Stiffness:**

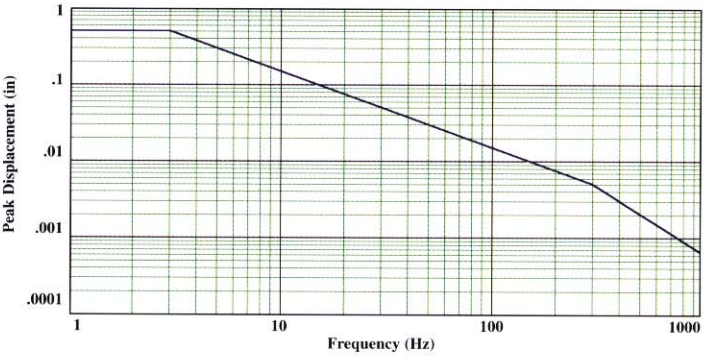
K=2E4 lb/in
K=5E4 lb/in
K=2E5 lb/in
K=5E5 lb/in
K=infinite

# Xcite 1100-7 Field Test System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency




**Structure Stiffness:**

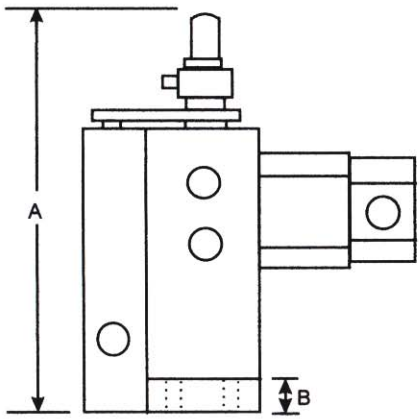
K=2E4 lb/in
K=5E4 lb/in
K=2E5 lb/in
K=5E5 lb/in
K=infinite

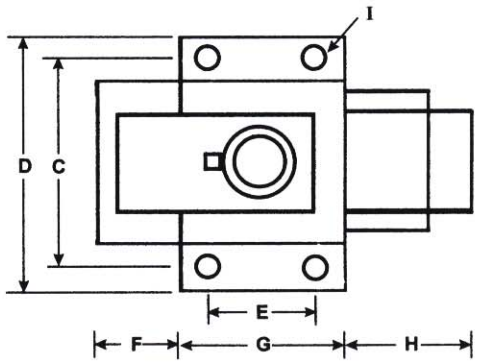
# Xcite 1100 Laboratory Series

The Xcite 1100 Laboratory Series is the most popular of the Xcite product line because of its large force capacity and broad frequency range compared to its extremely compact size. The 5 GPM 3-phase hydraulic power supply used in the system provides a high level of low frequency displacement response for testing system subassemblies and non-linear structures such as suspensions and elastomeric dampers. The small piston area of the exciter and the high performance servovalve combine to provide excitation to over 1000 Hz allowing structure borne noise path evaluations.

The systems are used for applications ranging from machine tools to jet engine bearing studies. The small package allows fixturing in small spaces such as under vehicles and inside gearboxes and drive trains of earthmovers, trains and trucks. The compact package is especially well suited for engine mount structural tests in automobiles and jet engine mounting pod evaluations.

| | Xcite 1100-4 System | Xcite 1100-6 System | Xcite 1100-7 System |
|---|---|---|---|
| **Hydraulic Power Supply** | **1201B 5 GPM (20 l/m)** | **1201B 5 GPM (20 l/m)** | **1201B 5 GPM (20 l/m)** |
| **Master Controller** | **1104-Mod4** | **1104-Mod4** | **1104-Mod4** |
| **Exciter Head** | **1106-4-T/C** | **1107-4-T/C** | **1114-4-T/C** |
| Static Force | 1,000 lb (4,450 N) | 1,000 lb (4,450 N) | Total Static & Dynamic |
| Dynamic Force | 1,000 lb (4,450 N) | 1,000 lb (4,450 N) | Force = 1,000 lb (4,450 N) |
| Stroke | 1.0 in (25 mm) | 2.0 in (50 mm) | 1.0 in (25 m) |
| Rod | .75 in (18 mm) | .75 in (18 mm) | .75 in (18 mm) |
| Bore | 1.0 in (25 mm) | 1.0 in (25 mm) | 1.0 in (25 mm) |
| Thread | .38 - 24 | .38-24 | .38-24 |
| Load Cell | 2,500 lb (11,125 N) | 2,500 lb (11,125 N) | 2,500 lb (11,125 N) |
| LVDT | 1.0 in (25 mm) | 2.0 in (50 mm) | 1.0 in (25 mm) |
| Exciter Design | Single Ended | Single Ended | Double Ended |

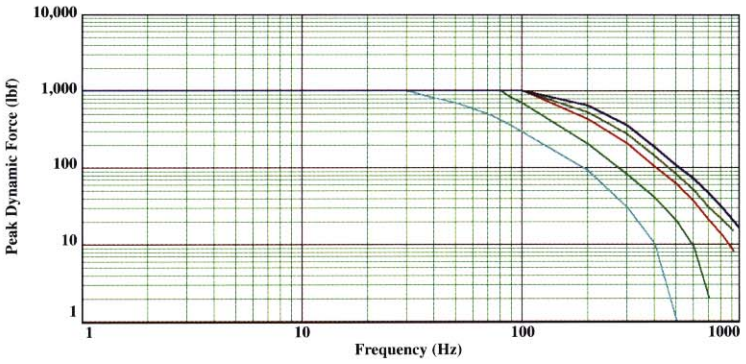



| Exciter Head | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in(dia) | mm(dia) | in(dia) | mm(dia) |
| 1106-4-T/C | 6.12 | 153 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |
| 1107-4-T/C | 7.12 | 178 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |
| 1114-4-T/C | 6.78 | 170 | 0.60 | 15 | 3.12 | 78 | 3.75 | 94 | 1.38 | 35 | 1.12 | 28 | 2.00 | 50 | 2.75 | 69 | 0.28 | 7 |

# Xcite 1100-4 Laboratory System

### Peak Dynamic Force vs. Frequency

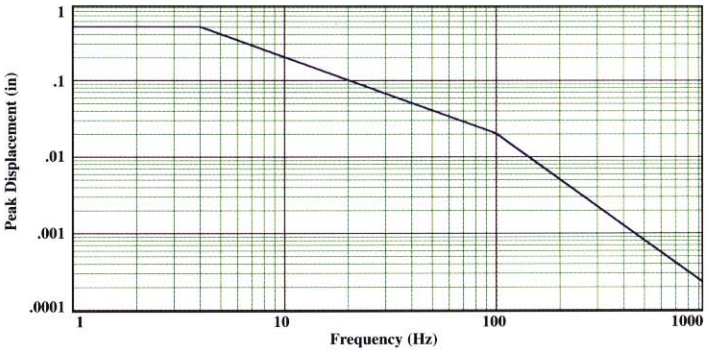



**Structure Stiffness:**

K=2E4 lb/in — K=5E4 lb/in — K=2E5 lb/in

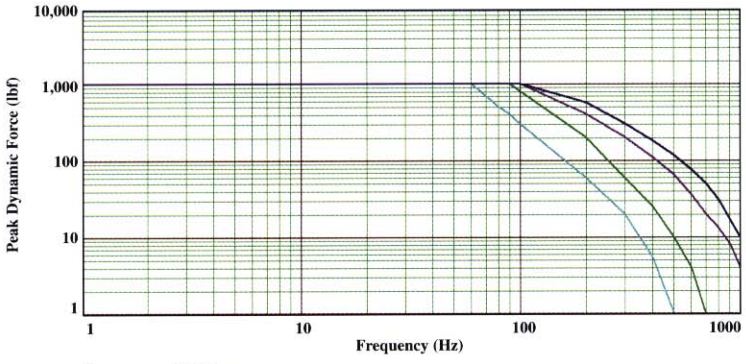
K=5E5 lb/in — K=infinite

### Peak Displacement vs. Frequency




# Xcite 1100-6 Laboratory System

### Peak Dynamic Force vs. Frequency

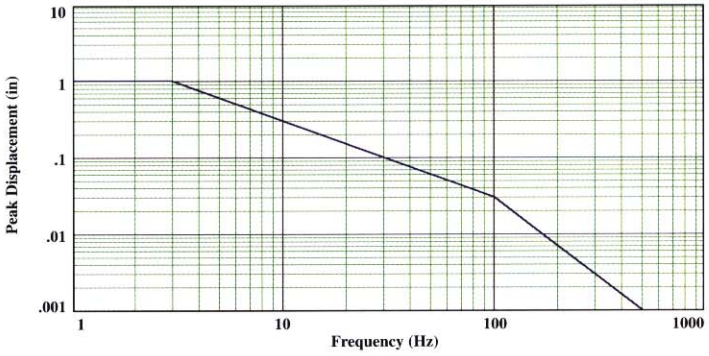



**Structure Stiffness:**

K=2E4 lb/in — K=1E5 lb/in

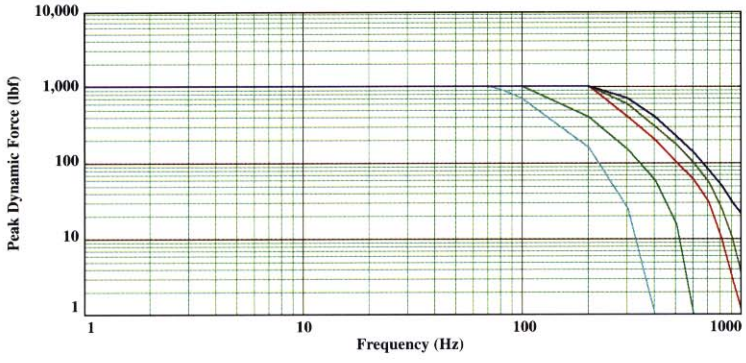
K=5E5 lb/in — K=infinite

### Peak Displacement vs. Frequency




# Xcite 1100-7 Laboratory System

### Peak Dynamic Force vs. Frequency

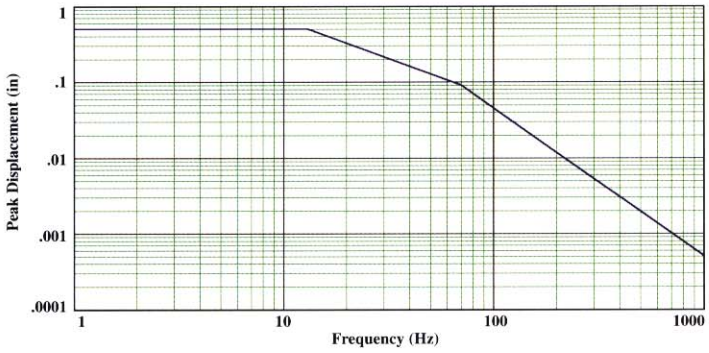



**Structure Stiffness:**

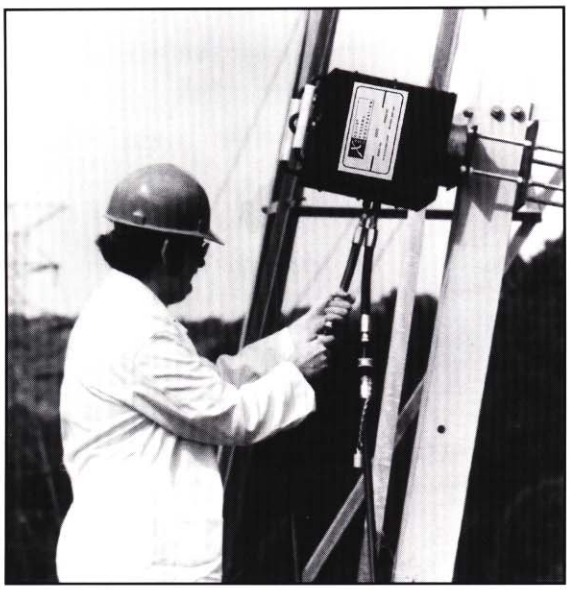
K=2E4 lb/in — K=5E4 lb/in — K=2E5 lb/in

K=5E5 lb/in — K=infinite

### Peak Displacement vs. Frequency



# Xcite 1100-5 Inertial Mass System

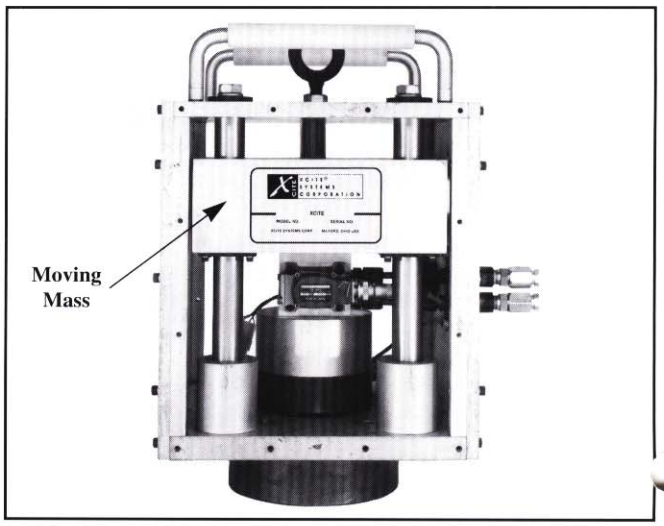


Xcite 1100-5 System used to test a utility tower

The 1100-5 Inertial Mass Modal Excitation system allows the testing of structures where backup fixturing is not available or possible. Accelerating an internal mass with the closed loop hydraulic excitation system generates the inertial forces. The compression control of the Xcite Master Controller maintains a constant force over a frequency sweep by continuously altering the drive signal to maintain the required dynamic force level.

The 1100-5 Exciter System is used in testing electrical transmission towers, turbine rotors, stators and bearing housings, generator armatures, stators and windings, diesel engines and motor-generator sets. The fixturing versatility of the system allows for testing ship bulkheads, prop shafts and propellers as well as structure borne noise isolation systems in submarines.

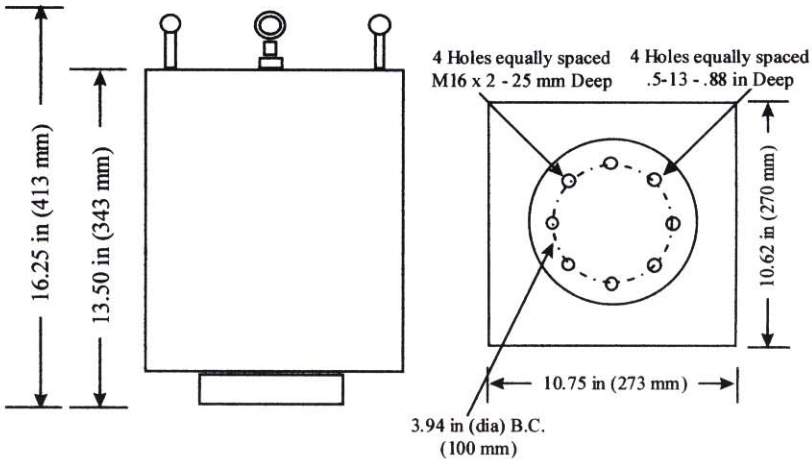
ES-301-2 Inertial Mass Exciter



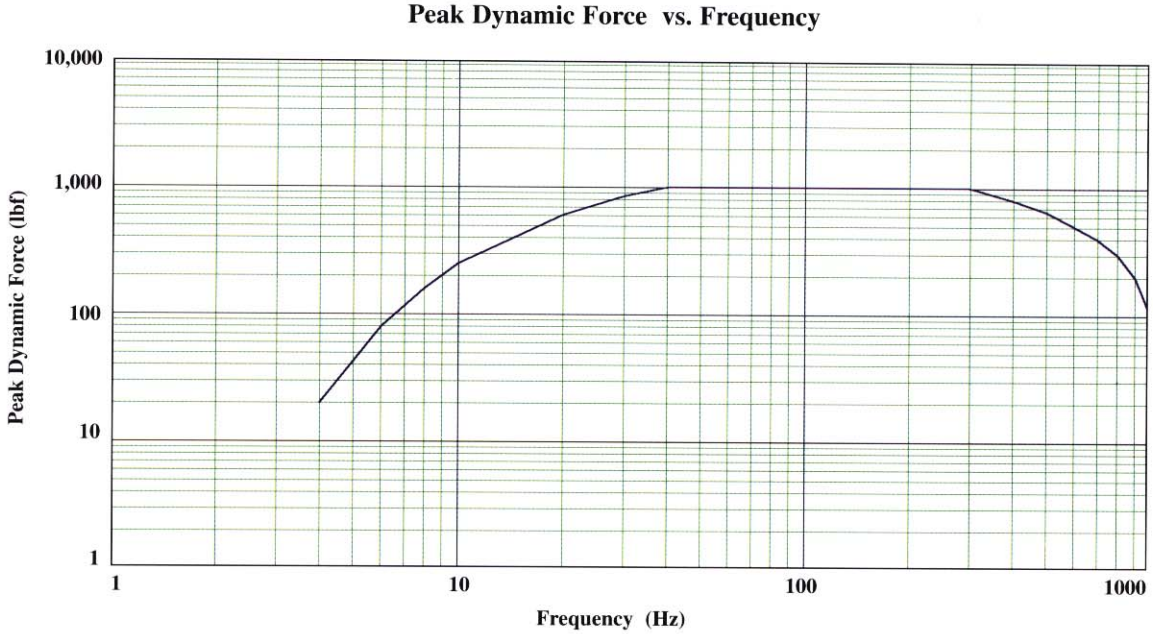

Interior View of the ES-301-2 Inertial Mass Exciter

**ES-301-2 Inertial Mass Exciter Head**

| | |
|---|---|
| Dynamic Force | 1,000 lb (4,450 N) |
| Stroke | 1.0 in (25 mm) |
| Rod | .75 in (18 mm) |
| Bore | 1.0 in (25 mm) |
| Moving Mass | 55 lb (25 kg) |
| Load Cell | 2,500 lb (11,125 N) |
| LVDT | 1.0 in (25 mm) |
| Exciter Design | Double Ended |
| Weight | 135 lb (61 kg) |

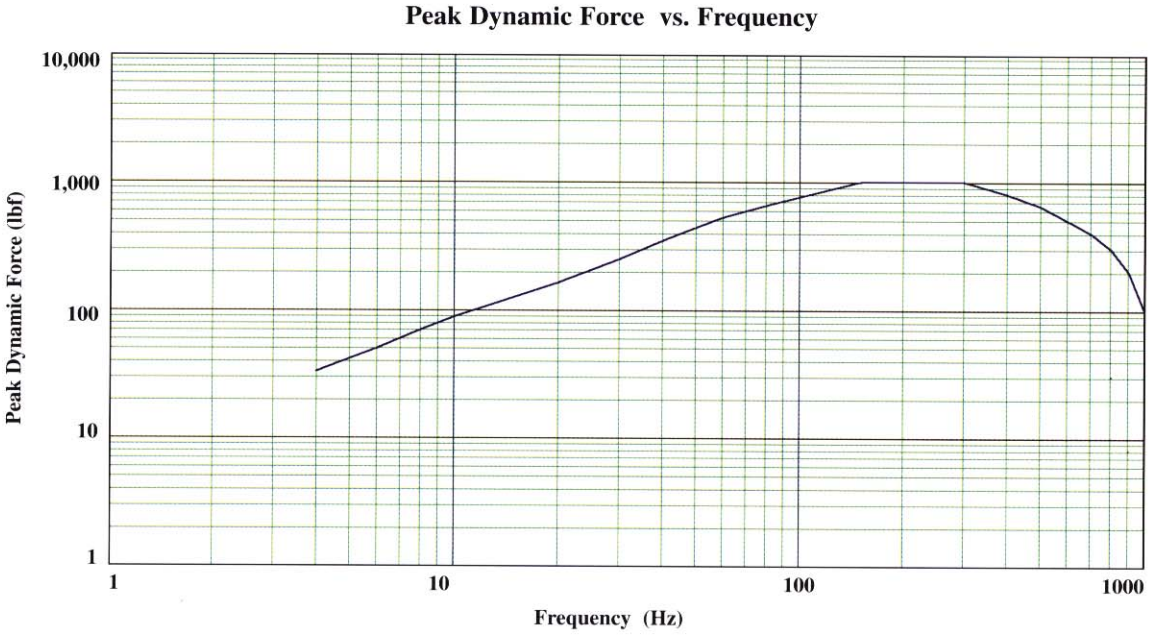


## Xcite 1100-5 Laboratory System




| | |
|---|---|
| **Hydraulic Power Supply** | 1201B 5GPM (20 l/m) |
| **Master Controller** | 1104-Mod2 |
| **Exciter Head** | ES-301-2 |

## Xcite 1100-5 Field Test System



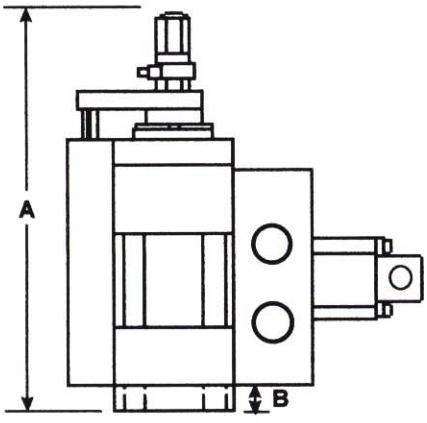

| | |
|---|---|
| **Hydraulic Power Supply** | 1101P 1.2GPM (5 l/m) |
| **Master Controller** | 1104-Mod2 |
| **Exciter Head** | ES-301-2 |

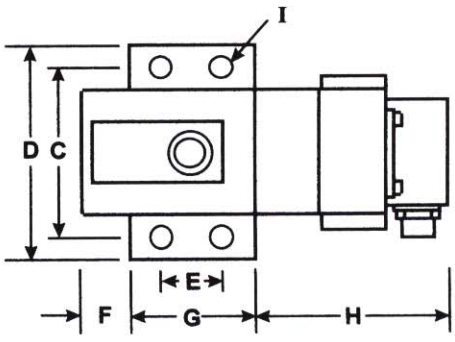
# Xcite 1200 Laboratory Series

The Xcite 1200 Series provides medium levels of force for testing vehicles such as trucks, locomotives, off road construction equipment and power generation equipment such as turbines and generator rotors, stators and bearings. The larger force capability is still coupled with a frequency response in the 500 Hz to 1000 Hz range for modal studies of highly damped and non-linear structures.

The 1200 Series systems are used extensively in the automotive industries for component and system sub-assembly modal testing for correlation of damping and non-linear characteristics with simulation models.

| | Xcite 1200-1 System | Xcite 1200-3 System | Xcite 1200-6 System |
|---|---|---|---|
| **Hydraulic Power Supply** | **1201B 5 GPM (20 l/m)** | **1201B 5 GPM (20 l/m)** | **1201B 5 GPM (20 l/m)** |
| **Master Controller** | **1204-Mod4** | **1204-Mod4** | **1204-Mod4** |
| **Exciter Head** | **1206-8-T/C** | **1215-8-T/C** | **1207-8-T/C** |
| Static Force | 2,000 lb (4,900 N) | Total Static & Dynamic | 2,000 lb (4,900 N) |
| Dynamic Force | 2,000 lb (4,900 N) | Force = 2,000 lb (4,900 N) | 2,000 lb (4,900 N) |
| Stroke | 1.0 in (25 mm) | 2.0 in (50 mm) | 2.0 in (50 mm) |
| Rod | 1.0 in (25 mm) | 1.0 in (25 mm) | 1.0 in (25 mm) |
| Bore | 1.5 in (37 mm) | 1.5 in (37 mm) | 1.5 in (37 mm) |
| Thread | .50 - 20 | .50 - 20 | .50 - 20 |
| Load Cell | 5,000 lb (22,250 N) | 5,000 lb (22,250 N) | 5,000 lb (22,250 N) |
| LVDT | 1.0 in (25 mm) | 2.0 in (50 mm) | 2.0 in (50 mm) |
| Exciter Design | Single Ended | Double Ended | Single Ended |

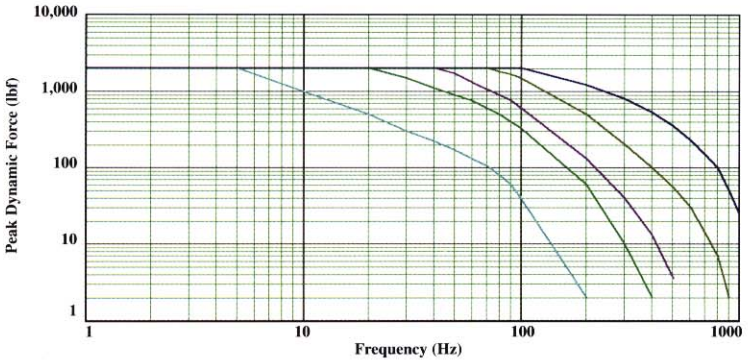


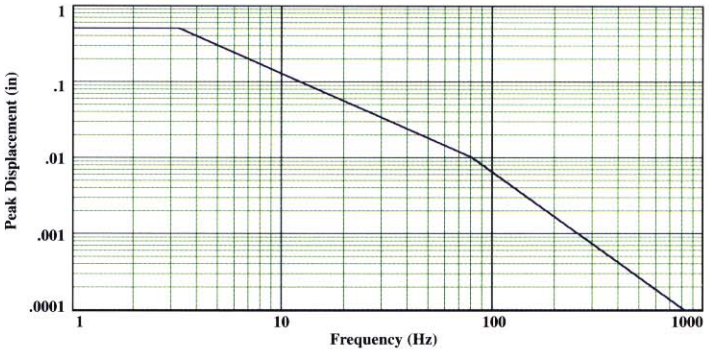

| Exciter Head | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in(dia) | mm(dia) | in(dia) | mm(dia) |
| 1206-8-T/C | 9.75 | 244 | 0.60 | 15 | 3.50 | 88 | 4.18 | 105 | 1.62 | 41 | 1.12 | 28 | 2.50 | 63 | 4.25 | 106 | 0.48 | 12 |
| 1215-8-T/C | 12.50 | 313 | 0.60 | 15 | 3.50 | 88 | 4.18 | 105 | 1.62 | 41 | 1.12 | 28 | 2.50 | 63 | 4.25 | 106 | 0.48 | 12 |
| 1207-8-T/C | 10.75 | 269 | 0.60 | 15 | 3.50 | 88 | 4.18 | 105 | 1.62 | 41 | 1.12 | 28 | 2.50 | 63 | 4.25 | 106 | 0.48 | 12 |

## Xcite 1200-1 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency

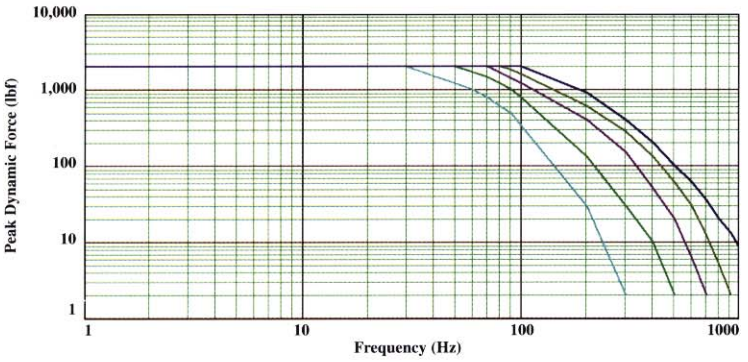



**Structure Stiffness:**

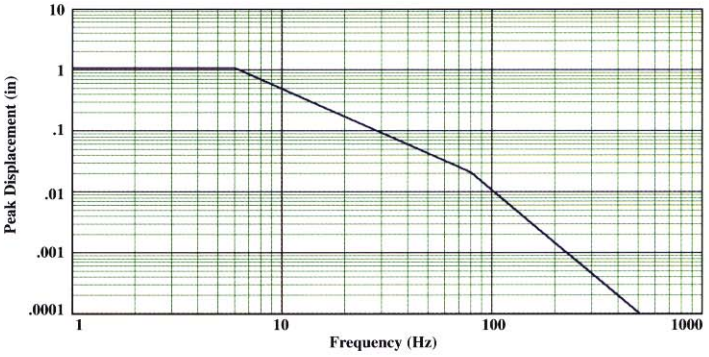
K=1E4 lb/in  K=5E4 lb/in  K=1E5 lb/in
K=5E5 lb/in  K=infinite

## Xcite 1200-3 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency

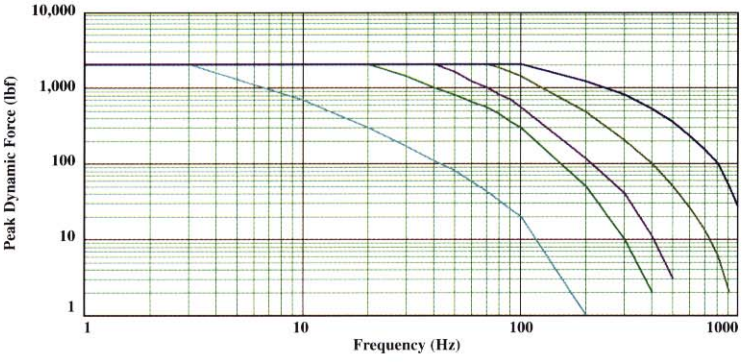



**Structure Stiffness:**

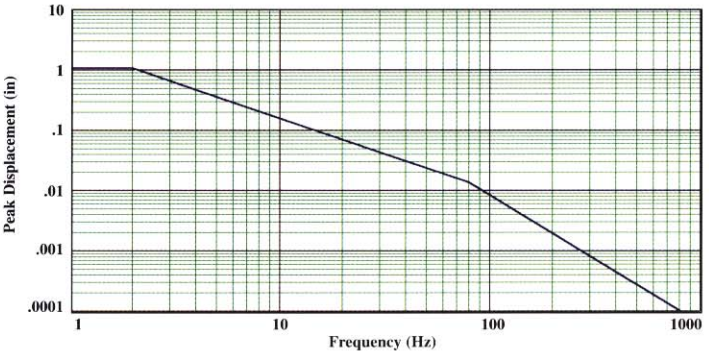
K=2E4 lb/in  K=5E4 lb/in  K=2E5 lb/in
K=5E5 lb/in  K=infinite

## Xcite 1200-6 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency




**Structure Stiffness:**

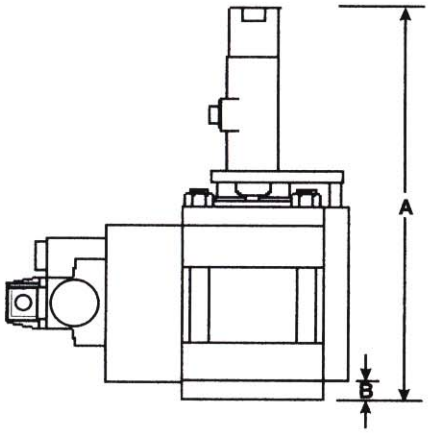
K=2E4 lb/in  K=5E4 lb/in  K=2E5 lb/in
K=5E5 lb/in  K=infinite

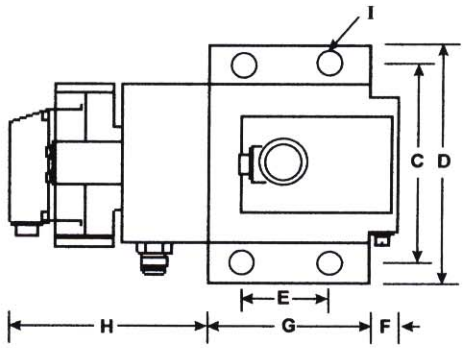
# Xcite 1300 Laboratory Series

The Xcite 1300 Laboratory Series is used in applications where longer stroke and extremely high forces are required to determine the modal characteristics of flexible structures such as truck suspensions and engine mounts, transit vehicles, locomotives, drag lines, backhoes, cranes and large electrical generating apparatus. The 15 GPM Hydraulic Power Supply of these systems allows frequency responses in the 100 Hz to 500 Hz range while the larger exciters generate forces to 20,000 lbf.

This series is used primarily in heavy industrial applications such as nuclear power generating plants and foundries for foundation and bearing pedestal dynamic testing. The 1300 Series has also been used in shipboard applications for testing of major propulsion equipment foundations, mounts, drive shafts and propellers.

| | **Xcite 1300-1 System** | **Xcite 1300-2 System** | **Xcite 1300-3 System** |
|---|---|---|---|
| **Hydraulic Power Supply** | **1301B 15 GPM (60 l/m)** | **1301B 15 GPM (60 l/m)** | **1301B 15 GPM (60 l/m)** |
| **Master Controller** | **1304-Mod4** | **1304-Mod4** | **1304-Mod4** |
| **Exciter Head** | **1306-15-T/C** | **1352-15-T/C** | **1310-15-T/C** |
| Static Force | 20,000 lb (89,000 N) | 5,000 lb (22,200 N) | Total Static & Dynamic |
| Dynamic Force | 20,000 lb (89,000 N) | 5,000 lb (22,200 N) | Force = 10,000 lb (44,500 N) |
| Stroke | 1.0 in (25 mm) | 3.0 in (75 mm) | 2.0 in (50 mm) |
| Rod | 1.75 in (44 mm) | 3.5 in (87 mm) | 2.0 in (50 mm) |
| Bore | 2.5 in (62 mm) | 5.0 in (125 mm) | 3.0 in (75 mm) |
| Thread | 1.5 - 12 | 1.25 - 12 | 1.25 - 12 |
| Load Cell | 50,000 lb (222,000 N) | 15,000 lb (66,750 N) | 10,000 lb (44,500 N) |
| LVDT | 1.0 in (25 mm) | 3.0 in (75 mm) | 2.0 in (50 mm) |
| Exciter Design | Single Ended | Single Ended | Double Ended |

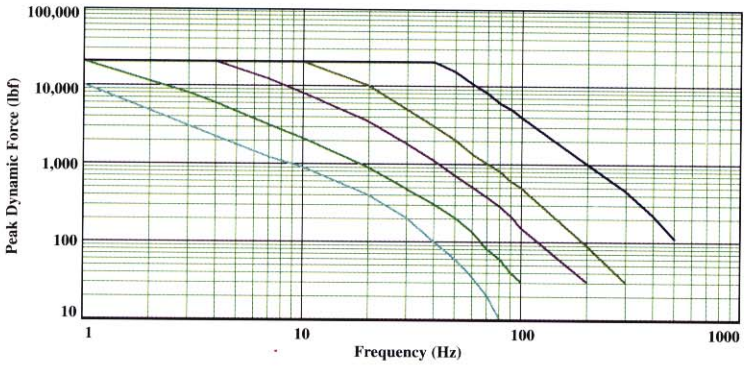


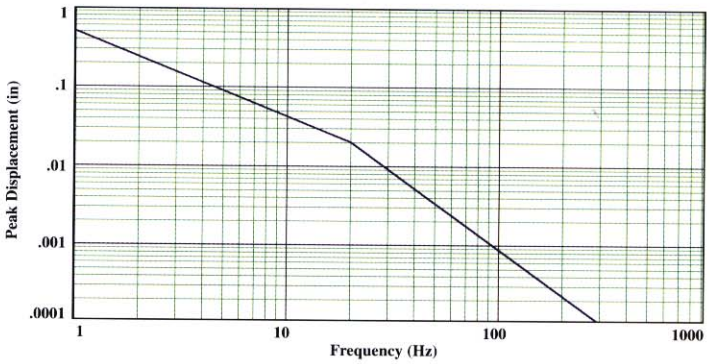

| Exciter Head | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in(dia) | mm(dia) | in(dia) | mm(dia) |
| 1306-15-T/C | 20.12 | 503 | 0.75 | 19 | 8.18 | 205 | 9.75 | 244 | 4.96 | 124 | 1.12 | 28 | 8.18 | 205 | 2.75 | 69 | 0.94 | 24 |
| 1352-15-T/C | 18.56 | 464 | 0.62 | 16 | 4.62 | 116 | 5.62 | 141 | 2.55 | 64 | 1.12 | 28 | 3.50 | 88 | 5.17 | 129 | 0.56 | 14 |
| 1310-15-T/C | 23.56 | 589 | 0.75 | 19 | 8.00 | 200 | 11.00 | 275 | 8.00 | 200 | dna | dna | 11.00 | 275 | 4.31 | 108 | 1.00 | 25 |

# Xcite 1300-1 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency



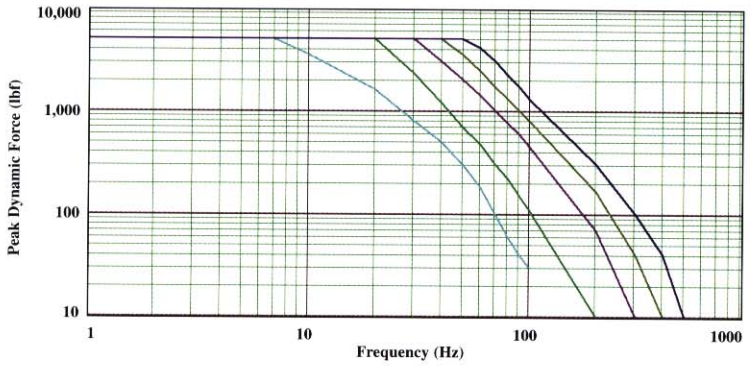

**Structure Stiffness:**

K=2E4 lb/in — K=5E4 lb/in — K=2E5 lb/in

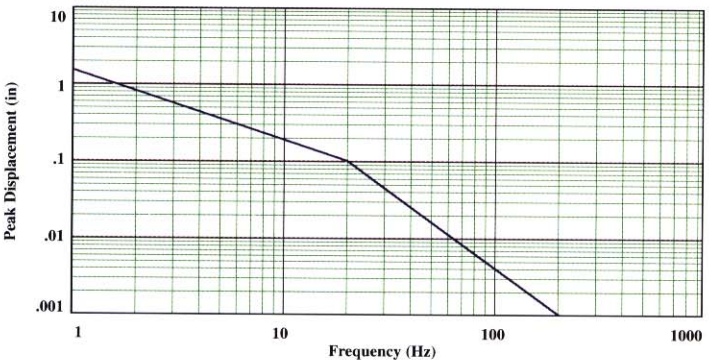
K=5E5 lb/in — K=infinite

# Xcite 1300-2 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency



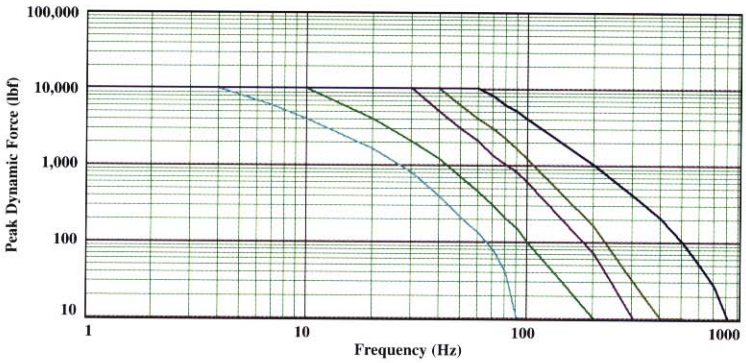

**Structure Stiffness:**

K=2E4 lb/in — K=5E4 lb/in — K=2E5 lb/in

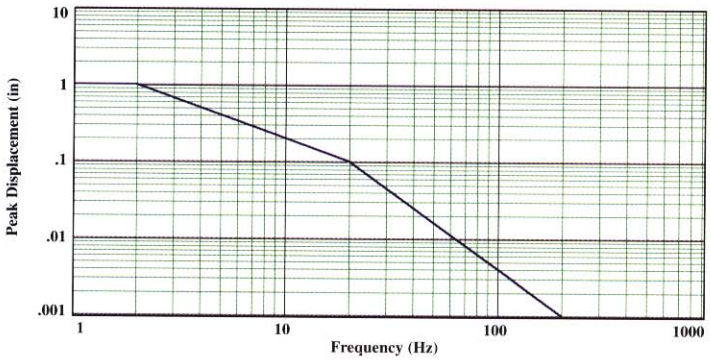
K=5E5 lb/in — K=infinite

# Xcite 1300-3 Laboratory System

### Peak Dynamic Force vs. Frequency




### Peak Displacement vs. Frequency

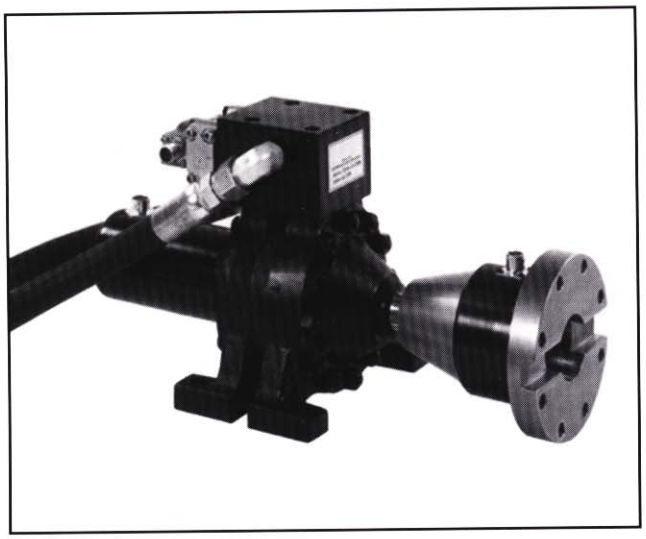



**Structure Stiffness:**

K=2E4 lb/in — K=5E4 lb/in — K=2E5 lb/in

K=5E5 lb/in — K=infinite

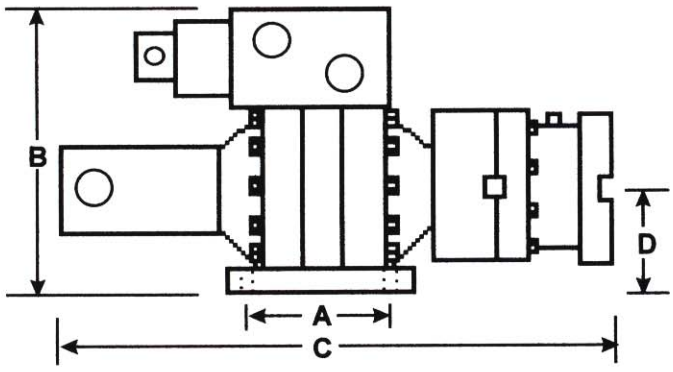
# Xcite 1300T Torsional Series

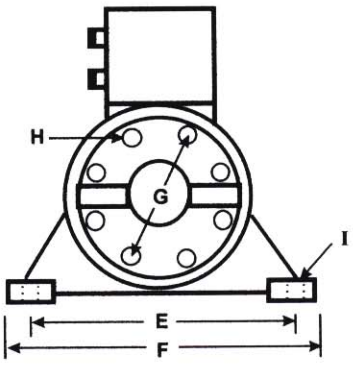


The Xcite 1300T Torsional Series of modal exciters provides pure torque input into structures for modal parameter estimation without the bending mode coupling effects present when linear excitation is applied through moment arms. These systems are used in structure borne noise tests of structures such as automotive and truck transmissions, prop shafts, axles, differentials, and torsional engine dampers.

Additional applications of the 1300T Torsional Series are found in power generation where steam turbine rotor torsional resonances and their modal coupling with blade bending frequencies can be easily identified because of the pure torque excitation.

| | Xcite 1300T-1 System | Xcite 1300T-2 System | Xcite 1300T-3 System |
|---|---|---|---|
| **Hydraulic Power Supply** | **1301B 15 GPM (60 l/m)** | **1301B 15 GPM (60 l/m)** | **1301B 15 GPM (60 l/m)** |
| **Master Controller** | **1304-Mod4** | **1304-Mod4** | **1304-Mod4** |
| **Exciter Head** | **1307-15-Tor** | **1314-15-Tor** | **1318-15-Tor** |
| Static Torque | 20,000 in-lb (2,225 N-m) | 2,000 in-lb (222 N-m) | 6,000 in-lb (666 N-m) |
| Dynamic Torque | 20,000 in-lb (2,225 N-m) | 2,000 in-lb (222 N-m) | 6,000 in-lb (666 N-m) |
| Stroke | 100 deg (1.75 rad) | 100 deg (1.75 rad) | 100 deg (1.75 rad) |
| Torque Cell | 50,000 in-lb (5,550 N-m) | 10,000 in-lb (1,110 N-m) | 15,000 in-lb (1,660 N-m) |
| RVDT | 100 deg (1.75 rad) | 100 deg (1.75 rad) | 100 deg (1.75 rad) |
| Exciter Design | 2 Vane Torsional | 2 Vane Torsional | 2 Vane Torsional |

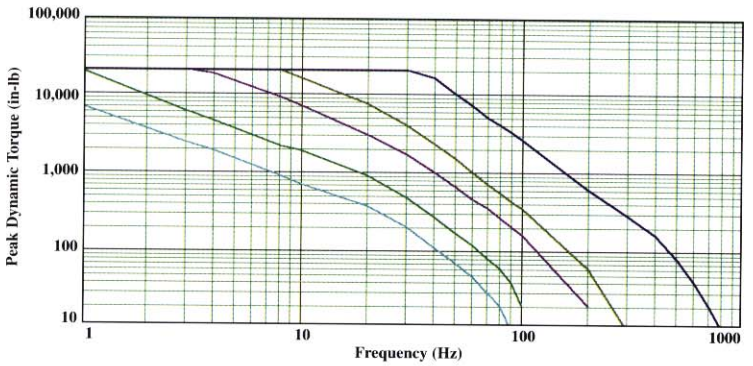


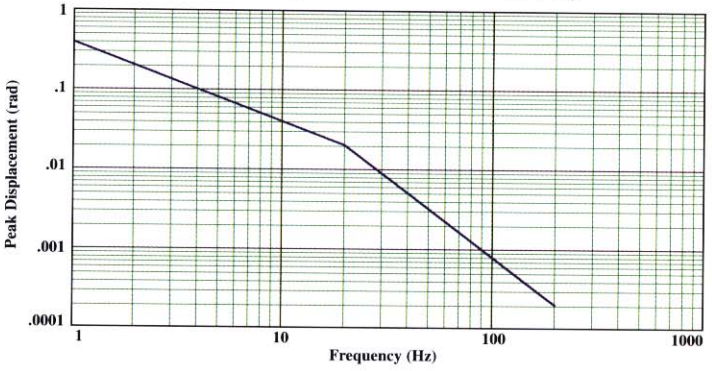

| Exciter Head | A | | B | | C | | D | | E | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in(dia) | mm(dia) | in(dia) | mm(dia) |
| 1307-15-Tor | 6.12 | 153 | 12.19 | 305 | 23.19 | 580 | 4.62 | 116 | 10.12 | 253 | 11.88 | 297 | 5.75 | 144 | 0.39 | 10 | 0.78 | 20 |
| 1314-15-Tor | 3.25 | 81 | 7.44 | 186 | 15.25 | 381 | 2.50 | 63 | 5.50 | 138 | 6.50 | 163 | 3.75 | 94 | 0.34 | 9 | 0.41 | 10 |
| 1318-15-Tor | 4.62 | 116 | 9.69 | 242 | 15.81 | 395 | 3.38 | 85 | 7.50 | 188 | 9.00 | 225 | 4.81 | 120 | 0.34 | 9 | 0.53 | 13 |

## Xcite 1300T-1 Torsional System

### Peak Dynamic Torque vs. Frequency




### Peak Displacement vs. Frequency



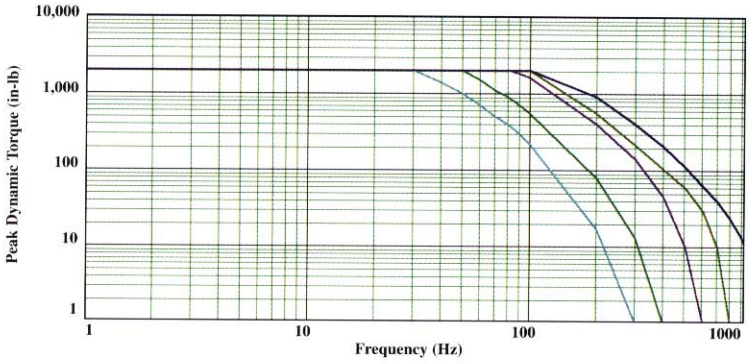

**Structure Stiffness:**

K=2E4 in-lb/rad — K=5E4 in-lb/rad — K=2E4 in-lb/rad

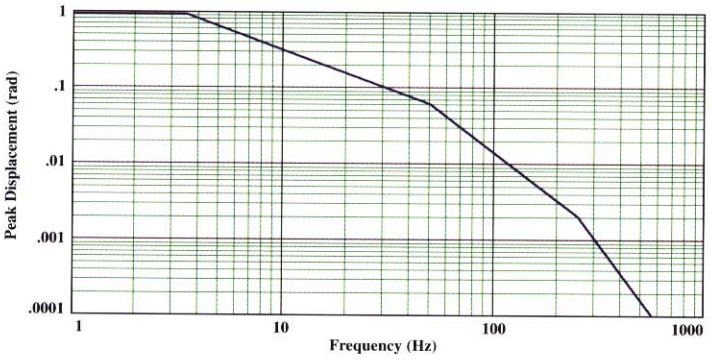
K=5E5 in-lb/rad — K=infinite

## Xcite 1300T-2 Torsional System

### Peak Dynamic Torque vs. Frequency




### Peak Displacement vs. Frequency



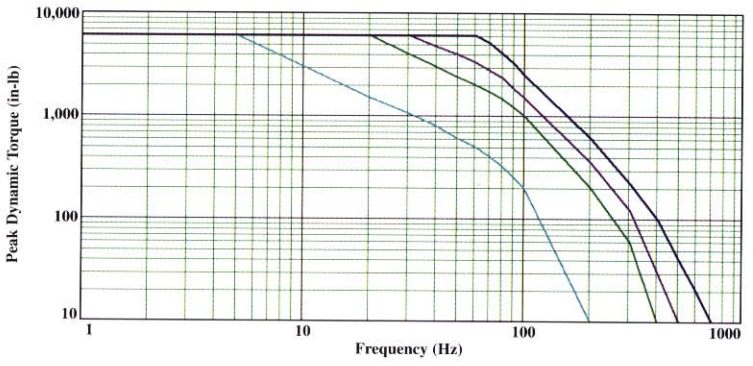

**Structure Stiffness:**

K=2E4 in-lb/rad — K=5E4 in-lb/rad — K=2E4 in-lb/rad

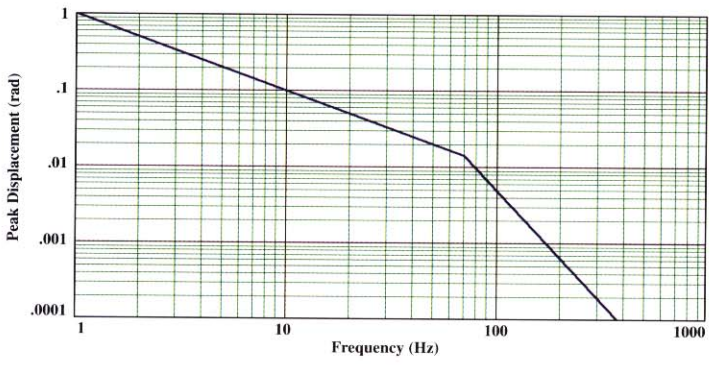
K=5E5 in-lb/rad — K=infinite

## Xcite 1300T-3 Torsional System

### Peak Dynamic Torque vs. Frequency




### Peak Displacement vs. Frequency




**Structure Stiffness:**

K=1E5 in-lb/rad — K=5E5 in-lb/rad

K=1E6 in-lb/rad — K=infinite

# Xcite Dual Loop Master Controller

**Xcite Systems 1104 Mod 4 / 1204 Mod 4 / 1304 Mod 4**
**Dual Loop Master Controller**

The dual control loop design of the Xcite Master Controller affords three major advantages to the structural dynamist. First, the compression control of the dynamic loop changes the amplitude of the system drive signal dynamically to adjust the displacement output of the exciter to maintain a constant sine force even as the compliance of the structure changes during frequency sweeps.

This allows the study of non-linear structures by developing a family of data curves with varying levels of constant static and dynamic forces.

Second, the dual loop philosophy allows the mixture of feedback signals such as static displacement and dynamic force when testing compliant structures such as an automotive suspension or engine mounting subsystem. The static control may be force or displacement, while the dynamic control may be force, displacement, velocity or acceleration.

Third, a user selectable power amplifier input allows the dynamist to use either an external digital shaker control system or FFT analyzer DAC to drive the system with random, shaped random, white noise, chirp, pulse or user-generated waveforms. Master Controllers are rack-mountable and may be located hundreds of feet from the exciter head and power supply.

**Displays**
Static Variable — Force or Displacement
Dynamic Variable — Force or Displacement

**Excitation Modes** — Standby / Static / Static + Dynamic

**Control Variables**
Static — Force / Displacement / Ext. Transducer
Dynamic — Force / Displacement / Ext.Transducer

**Set Point Control** — Static and Dynamic Setpoints

**Static Loop Gain** — Fixed or Variable - Switch Selectable

**Frequency Modes**
Low Frequency — Static Control Variable
High Frequency — Static Control Variable + Compression Control of Dynamic Control Variable

**Load Cell** — Signal Conditioning and Calibration

**LVDT** — Signal Conditioning and Calibration

**Pump Control** — On / Off

**Interlock** — Interlock Connector for Ext. Signals

**Dither Control** — 400 Hz On / Off

**Inputs**
Program Input for Constant Amplitude Sine Testing
External Power Amp Input for Random, Burst & Chirp

**Standby Level**
User Adjustable Standby Force or Displacement Levels

**External Control Variable Calibration**
User Adjustable Calibration for Static & Dynamic Variables

**Outputs**
Force or Torque
Displacement
Dynamic Loop Compression Level

**Static Preload**
Switch Selectable Tension or Compression

**Power Requirements**
115 VAC / 3 A
220 VAC / 1.5 A

**Dimensions**
Width — 19 in (489 mm) Rack Mountable
Depth — 13 in (330 mm)
Height — 5.25 in (133 mm)
Weight — 20 lb (9 kg)

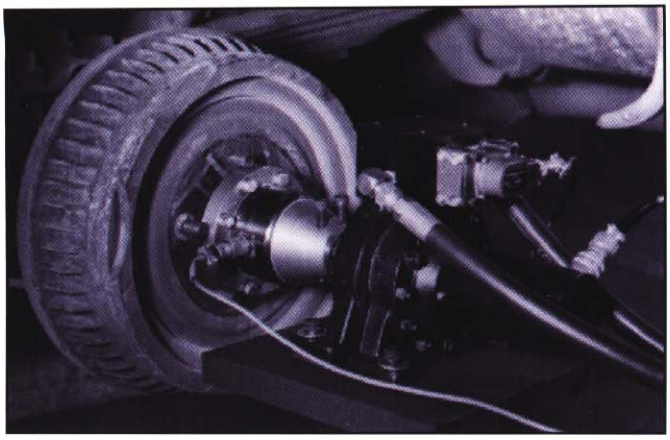
# Xcite Hydraulic Power Supplies

**Xcite 1001P Field Test Hydraulic Power Supply**

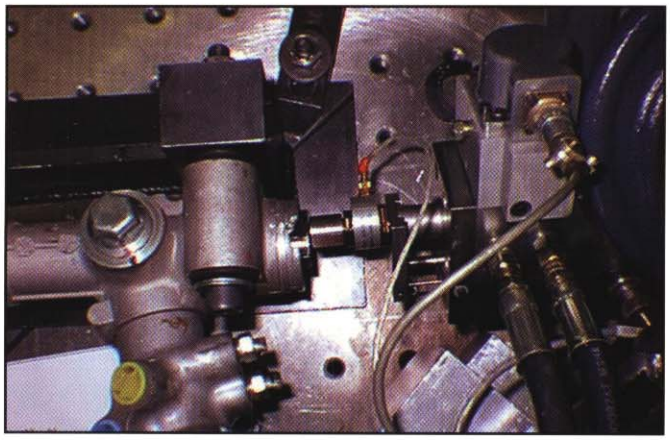
**Xcite 1201B/ 1301B/ 1302B Laboratory Hydraulic Power Supply**

| Model Number | 1001P | 1201B | 1301B | 1302B |
|---|---|---|---|---|
| Flow | 1.2 GPM (5 l/m) | 5 GPM (20 l/m) | 15 GPM (60 l/m) | 15 GPM (60 l/m) |
| Pressure | 3000 PSI (206 Bar) | 3000 PSI (206 Bar) | 3000 PSI (206 Bar) | 3000 PSI (206 Bar) |
| Pump Type | Constant Displacement | Var. Vol / Press. Comp. | Var. Vol / Press. Comp. | Var. Vol / Press. Comp. |
| Motor | 3 HP | 10 HP | 30 HP | 30 HP |
| Voltage | 110/220 Switch Selectable | 220/380/440 Specify | 220/380/440 Specify | 220/380/440 Specify |
| Current | 20/10 Single Phase | 30/17/15 A Three Phase | 72/42/36 A Three Phase | 72/42/36 A Three Phase |
| Reservoir Capacity | 5 Gal (20 l) | 15 Gal (60 l) | 30 Gal (160 l) | 30 Gal (160 l) |
| Reservoir Fill/Empty Pump | Yes | No | No | No |
| Cooling | Air/Oil | Air/Oil | Air/Oil | Water/Oil |
| Oil Filtration | 3 Micron Absolute | 3 Micron Absolute | 3 Micron Absolute | 3 Micron Absolute |
| Polarized Quick Disconnects | Yes | Yes | Yes | Yes |
| Max Ambient Temp | 104 F (40 C) | 104 F (40 C) | 104 F (40 C) | 130 F (55 C) |
| Cabinet | Roto-molded Plastic | Metal | Metal | Metal |
| Wheels | No | Yes | Yes | Yes |
| Shut Down on: | | | | |
| Low Oil | Yes | Yes | Yes | Yes |
| Over Temp | Yes | Yes | Yes | Yes |
| Dirty Filter | Yes | Yes | Yes | Yes |
| Alarm Light on: | | | | |
| Low Oil | No | Yes | Yes | Yes |
| Over Temp | No | Yes | Yes | Yes |
| Dirty Filter | No | Yes | Yes | Yes |
| Incorrect Phase | DNA | Yes | Yes | Yes |
| Emergency Stop | Yes | Yes | Yes | Yes |
| Pressure Gage | Yes | Yes | Yes | Yes |
| Temperature Gage | Yes | Yes | Yes | Yes |
| Oil Level Gage | Yes | Yes | Yes | Yes |
| Oil Required | Mobil DTE 24 or Equal | Mobil DTE 24 or Equal | Mobil DTE 24 or Equal | Mobil DTE 24 or Equal |
| Dimensions: | | | | |
| Width | 30 in (750 mm) | 30 in (750 mm) | 30 in (750 mm) | 30 in (750 mm) |
| Length | 30 in (750 mm) | 37 in (950 mm) | 40 in (1000 mm) | 40 in (1000 mm) |
| Height | 36 in (900 mm) | 53 in (1350 mm) | 53 in (1350 mm) | 53 in (1350 mm) |
| Weight w/o Oil | 265 lb. (120 kg) | 860 lb (390 kg) | 1610 lb (730 kg) | 1650 lb (750 kg) |
| 20 Ft (3 m) Power Cord | Yes | Yes | Yes | Yes |

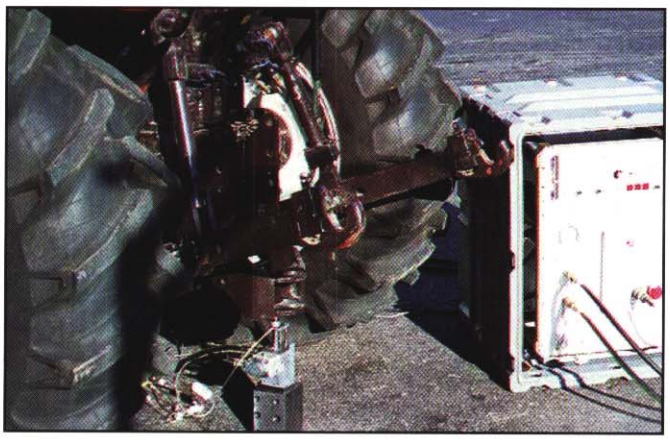
*All three phase power supplies require specification of mains voltage and frequency at time of order.*



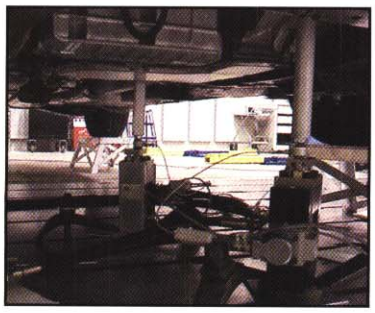
The Xcite Torsional Modal Excitation System allows the structural dynamist to apply pure moments in structures for the evaluation of torsional modal participation without the addition of side loads. (A problem which always accompanies the use of linear exciters and moment arms.) These torsional systems have been used in the development of diesel engine torsional dampers, anti-lock braking systems, automotive axles, half axles and turbine rotors.



The Xcite 1100 Series of Modal Exciters have found applications in component testing in addition to total vehicle or structure excitation. As shown in the photo, the Xcite 1100 is being used on a bench to simulate the wheel/ road induced forcing functions into a prototype electr steering assembly to simulate noise and vibration levels acquired on the test track. By allowing a bench simulation, the exciter system allows the engineers to evaluate fixes at a fraction of the time and cost of repetitive test track runs.



The Xcite 1100 Field Test System provides the mobility required by field test engineers who can efficiently air freight the hydraulic modal system to remote locations or move it across town to another manufacturing area. The Xcite 1001P Field Test Hydraulic Power Supply operates on 110/ 220 VAC single-phase power so the excitation system can be used in any country or on shipboard. This application shows the modal system being used to evaluate the dynamic forcing functions of a farm tractor caused by PTO side load



***Cover Photo***

The compact size and versatility of control options when using the Xcite 1200 Modal Excitation System allows NVH engineers to simulate the operational static torque loading on engine mounts. Simultaneously, the engineers apply road acquired or synthesized dynamic loading profiles to evaluate the vibration isolation of various mounting configurations without needing to move the vehicle to a road simulator. This application shows two Xcite systems holding opposing engine mounts under tension and compression loading while dynamically driving the engine mounts with opposing phase signals generated by an LMS system.

*Due to constant engineering improvements, all product specifications subject to change without notice.*

**NEW!!**
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