ET-132-2 & -203 *Electrodynamic Transducers*

GENERAL DESCRIPTION

The Labworks ET-132 Electrodynamic Transducers are truly portable (only 6 pounds) permanent magnet shakers. With their standard trunnion, they are ideally suited for the production screening of small components, or as displacement transducers for use in scholastic, biomedical or laboratory research.

ET-132 shakers incorporate a two layer copper drive coil with a single internally threaded load mounting insert. When directly coupled to a PA-138 or PA-119 linear power amplifier, the ET-132-2 is usable to 9 KHz and the ET-132-203 to 11 KHz.

Both models feature an extremely rugged suspension system with a positive, rubber-cushioned displacement stop. Carbon fiber composite leaf flexures and isolated linear bearings provide for low distortion and eliminate the need for reaction wrenches when mounting a load to the armature. All moving components are field replaceable without the need for demagnetization.

- **7 or 4.5 POUNDS PEAK SINE FORCE**
- **.50 or .20 INCH STROKE**
- **.50 INCH HEX MOUNTING SURFACE**
- **70 or 64g ACCELERATION, BARE TABLE**
- **STANDARD TRUNNION BASE**

Labworks Inc.

2950 airway ave. a-16
costa mesa, ca 92626
tel: (714) 549-1981
fax: (714) 549-8041
info@labworks-inc.com
www.labworks-inc.com

STANDARD FEATURES

- AIR COOLED
- PERMANENT MAGNET FIELD
- REPLACEABLE, HIGH LATERAL STIFFNESS ARMATURE SUSPENSION
- TRUNNION BASE

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ET-132 SPECIFICATIONS[1]

PERFORMANCE	ET-132-2	ET-132-203
Sine force		
Natural cooling	7.0 lbf pk	4.5 lbf pk
With blower	10.0 lbf pk	6.4 lbf pk
Random force		
Natural cooling	5.0 lbf rms	3.0 lbf rms
With blower	7.0 lbf rms	4.2 lbf rms
Shock force, 50 msec	21.0 lbf pk	13.5 lbf pk
Max displacement		
Continuous pk-pk	0.5 in	0.2 in
Between stops	0.55 in	0.55
Maximum velocity	82 ips pk	50 ips pk
Acceleration [1,2,3]		
Bare table	70 g pk	64 g pk
0.1 lb load	35 g pk	26 g pk
0.5 lb load	11 g pk	7.9 g pk
Maximum acceleration		
Resonant	120 g pk	120 g pk
Peak shock	150 g pk	150 g pk
PHYSICAL		
Armature weight	0.1 lb	0.07 lb
Suspension stiffness	15 lb/in	15 lb/in
Rated armature current		
Natural cooling	8.5 A rms	3.0 A rms
With blower	12 A rms	4.2 A rms
Frequency range [2]	DC-9 kHz	DC-11 kHz
Fundamental resonance [2]	≈ 8000 Hz	≈ 10,000 Hz
Stray magnetic field		
Measured 1" above table	<35 gauss	<35 gauss
Measured .5" from body	<20 gauss	<20 gauss
Blower Cooling	20 CFM @ 15 inch H_20	
Dimensions	5.25" H x 3.6" W x 3.5" D	
Shaker weight	6 lbs	6 lbs

OPTIONS

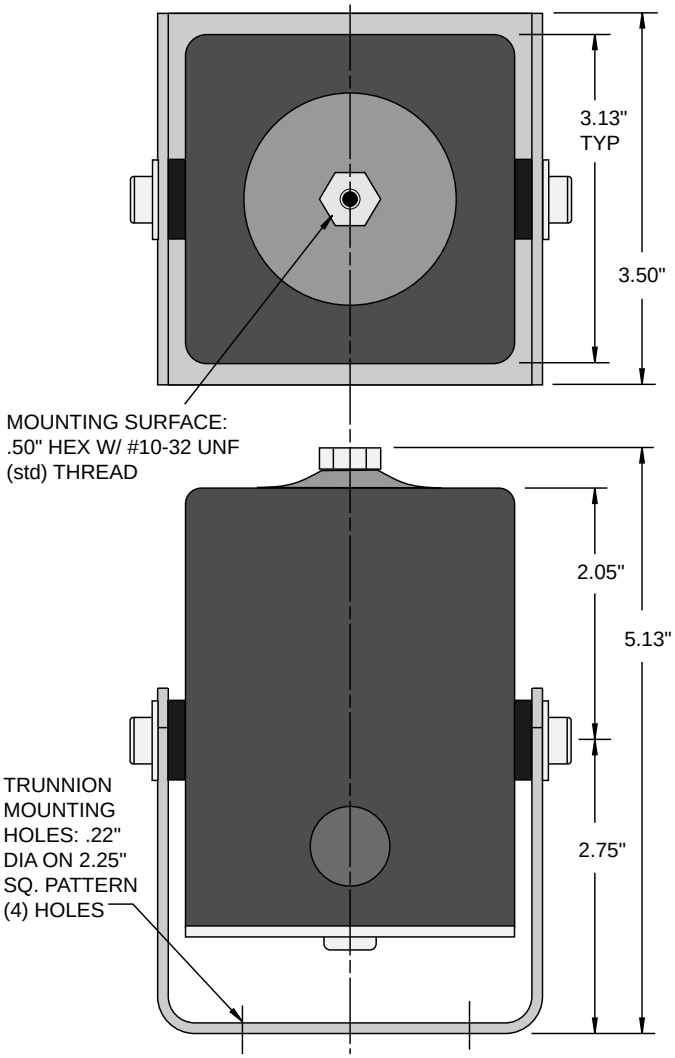
CB-132 Cooling Blower: Required for operation above 7 lbf. pk. (4.5 for ET-132-203). Recommended for continuous operation above 5 lbf. pk.(3 for -203).

Vibration isolation mounts.

Modal stinger kit.

[1] Please see systems ratings for additional specifications.
[2] Load dependent.
[3] Natural cooling

Specifications subject to change. Consult factory for latest specifications.



ET-126B *Electrodynamic Transducer*

GENERAL DESCRIPTION

The Labworks ET-126B Electrodynamic Transducer is a portable shaker that is ideally suited for all types of general vibration testing. Its small size and weight make it ideal for use in research and modal testing.

The shaker has a large 2.125 inch diameter table with multiple attachment points and up to 25 pounds force capability. The 0.75 inch stroke of the ET-126B, usually available only in larger shakers, facilitates modal testing of resonant structures. These features ease fixture requirements in production and unique test applications.

The rugged, damped dual flexure armature suspension system offers high axial compliance and lateral stiffness. This design allows testing of unsupported loads with minimal suspension related noise problems.

- **25 POUNDS PEAK SINE FORCE**
- **0.75 INCH STROKE**
- **2.125 INCH DIAMETER TABLE**
- **125g ACCELERATION, BARE TABLE**
- **TRUNNION BASE**

Labworks Inc.
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STANDARD FEATURES

- AIR COOLED
- PERMANENT MAGNET FIELD
- HIGH LATERAL STIFFNESS ARMATURE SUSPENSION
- TRUNNION BASE

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www.labworks-inc.com

ET-126B SPECIFICATIONS[1]

PERFORMANCE

Sine force	
Natural cooling	13 lbf pk
With blower	25 lbf pk
Random force	
Natural cooling	8 lbf rms
With blower	17.5 lbf rms
Shock force	53 lbf pk, 50 msec
Max displacement	
Continuous pk-pk	0.75 in
Between stops	0.75 in
Maximum velocity	120 ips pk
Acceleration [1,2]	
Bare table	125 g pk
0.5 lb load	36 g pk
2 lb load	11 g pk
Maximum acceleration	
Resonant	150 g pk
Peak shock	175 g pk

PHYSICAL

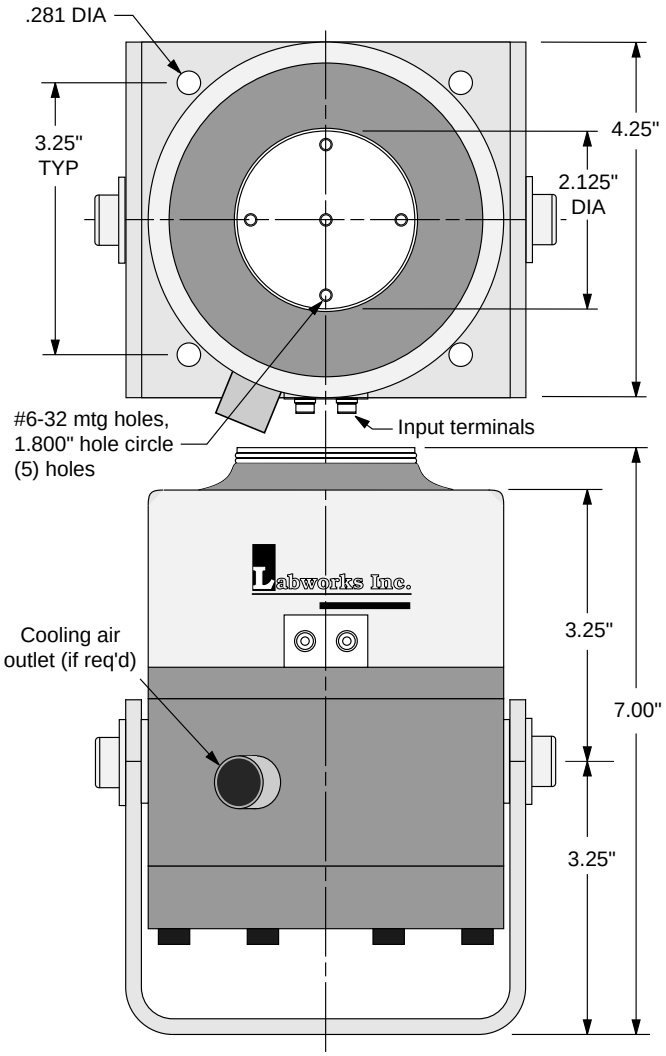
Armature weight	0.2 lb
Suspension stiffness	15 lb/in
Rated armature current	
Natural cooling	9 A rms
With blower	17 A rms
Frequency range [2]	DC-8,500 Hz
Fundamental resonance [2]	6,000-8,000 Hz
Stray magnetic field	
Measured 1.0” above table	<15 gauss
Measured 0.5” from body	<15 gauss
Cooling	80 CFM @ 22 inch H_20
Dimensions	6.5" H x 4.8" W x 4.25" D
Shaker weight	11 lbs

OPTIONS

Cooling blower: Required for operation above 13 lbf. pk. Recommended for continuous operation above 10 lbf. pk.
Vibration isolation mounts.
Modal stinger kit.

[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.



ET-126HF *Electrodynamic Transducer*

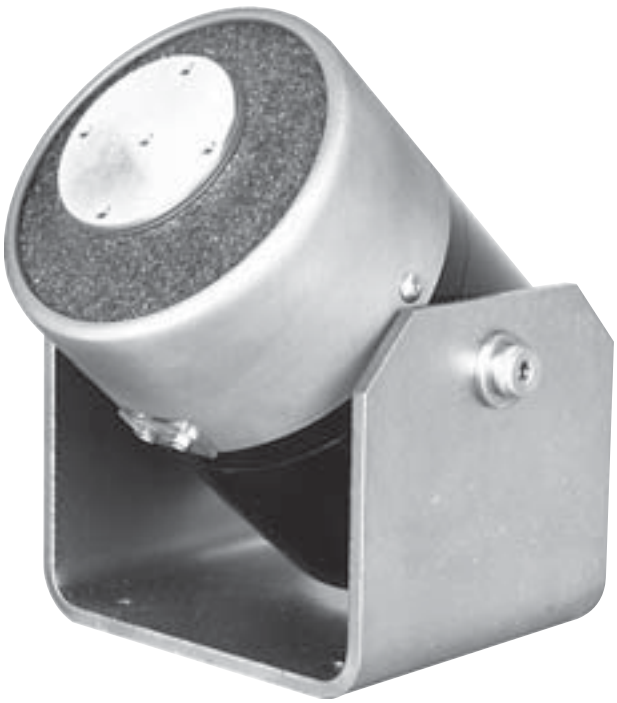
GENERAL DESCRIPTION

The Labworks ET-126HF Electrodynamic Transducer is a portable shaker that is ideally suited for all types of general vibration testing. Its small size and weight make it ideal for use in research and investigative testing. Specifically constructed for high frequency operation, the ET-126HF can operate up to 18 KHz with light loads

The shaker has a large 2.125 inch diameter table with multiple attachment points and up to 25 pounds force capability to ease fixture requirements in production as well as unique test applications. The 0.5 inch stroke of the ET-126HF, usually available only in larger shakers, facilitates modal testing of resonant structures.

The rugged, damped dual flexure armature suspension system offers the high axial compliance and lateral stiffness needed for testing unsupported test loads with minimum suspension related noise problems.

- **25 POUNDS PK SINE FORCE**
- **.50 INCH STROKE**
- **2.125 INCH DIAMETER TABLE**
- **70g ACCELERATION, BARE TABLE**
- **TRUNNION MOUNTING BASE**



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STANDARD FEATURES

- AIR COOLED
- PERMANENT MAGNET DESIGN
- HIGH FREQUENCY OPERATION

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ET-126HF SPECIFICATIONS[1]

PERFORMANCE

Sine force	
Natural cooling	13 lbf pk
With blower	25 lbf pk
Random force	
Natural cooling	8 lbf rms
With blower	17.5 lbf rms
Shock force	53 lbf pk, 50 msec
Max displacement	
Continuous pk-pk	.50 in
Between stops	.50 in
Maximum velocity	120 ips pk
Acceleration [1,2]	
Bare table	70 g pk
.5 lb load	30 g pk
2 lb load	11 g pk
Maximum acceleration	
Resonant	150 g pk
Peak shock	175 g pk

PHYSICAL

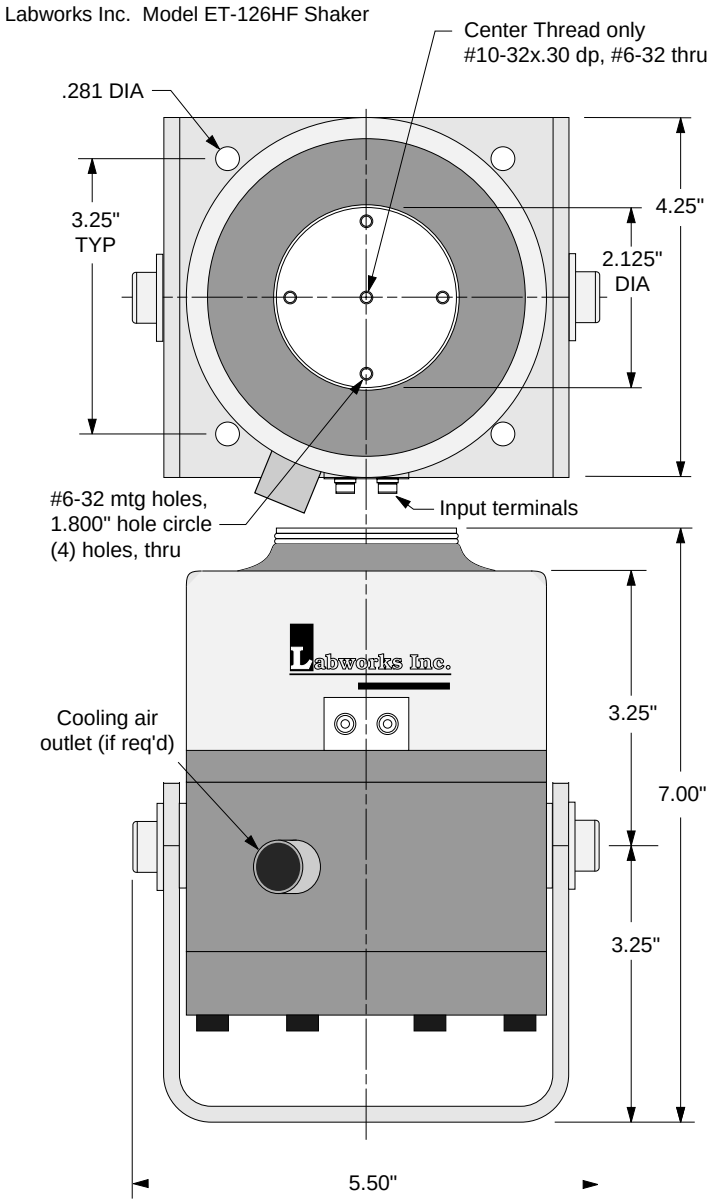
Armature weight	0.35 lb
Suspension stiffness	15 lb/in
Rated armature current	
Natural cooling	9 A rms
With blower	17 A rms
Frequency range [2]	DC-14,000 Hz (Usable to 20,000)
Fundamental resonance [2]	11,500-12,500 Hz
Stray magnetic field	
Measured 1.0” above table	<15 gauss
Measured .5” from body	<15 gauss
Cooling	80 CFM/22 in H_20
Dimensions	6.5" H x 4.8" W x 4.25" D
Shaker weight	11 lbs

OPTIONS

Cooling blower: Required for operation above 13 lbf. Recommended for continuous operation above 10 lbf pk.
Vibration isolation mounts.
Modal stingers and mounts.

[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.



ET-139 *Electrodynamic Transducer*

GENERAL DESCRIPTION

The ET-139 shaker's compact size, long stroke and lightweight armature make it equally well suited for modal as well as general vibration testing. The shaker has a large 3.25 inch diameter mounting surface and a rugged suspension system which minimizes test fixture requirements and related fixture guidance problems. The shaker trunnion allows the shaker to be operated in any axis from vertical to horizontal and is easily positioned for modal applications. It also facilitates bolting the shaker in place either with or without vibration isolation mounts.

Reliability is assured through the use of the latest composite materials in the unique, all flexure, armature suspension design. The design provides excellent axial compliance with high lateral stiffness and has no rolling or sliding components to wear out and/or produce unwanted noise and distortion. When combined with a Labworks linear power amplifier, the system is unmatched for reliability, performance, and cost.

- **75 POUNDS PK SINE FORCE**
- **1.0 INCH STROKE**
- **3.25 INCH DIAMETER TABLE**
- **75g ACCELERATION, BARE TABLE**
- **TRUNNION MOUNTING BASE**

Through-Hole Design for Modal Testing
(shown with optional Stinger Kit)

Labworks Inc.

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STANDARD FEATURES

- **AIR COOLED**
- **PERMANENT MAGNET DESIGN**
- **HIGH LATERAL STIFFNESS ARMATURE SUSPENSION**

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ET-139 SPECIFICATIONS[1]

PERFORMANCE

Sine force	
Natural cooling	35 lbf pk
With blower	75 lbf pk
Random force	
Natural cooling	25 lbf rms
With blower	50 lbf rms
Shock force	150 lbf pk, 50 msec
Max displacement	
Continuous pk-pk	1.0 in
Between stops	1.03 in
Maximum velocity	70 ips pk
Acceleration [1,2]	
Bare table	75 g pk
1 lb load	35 g pk
5 lb load	12 g pk
Maximum acceleration	
Resonant	120 g pk
Peak shock	150 g pk

PHYSICAL

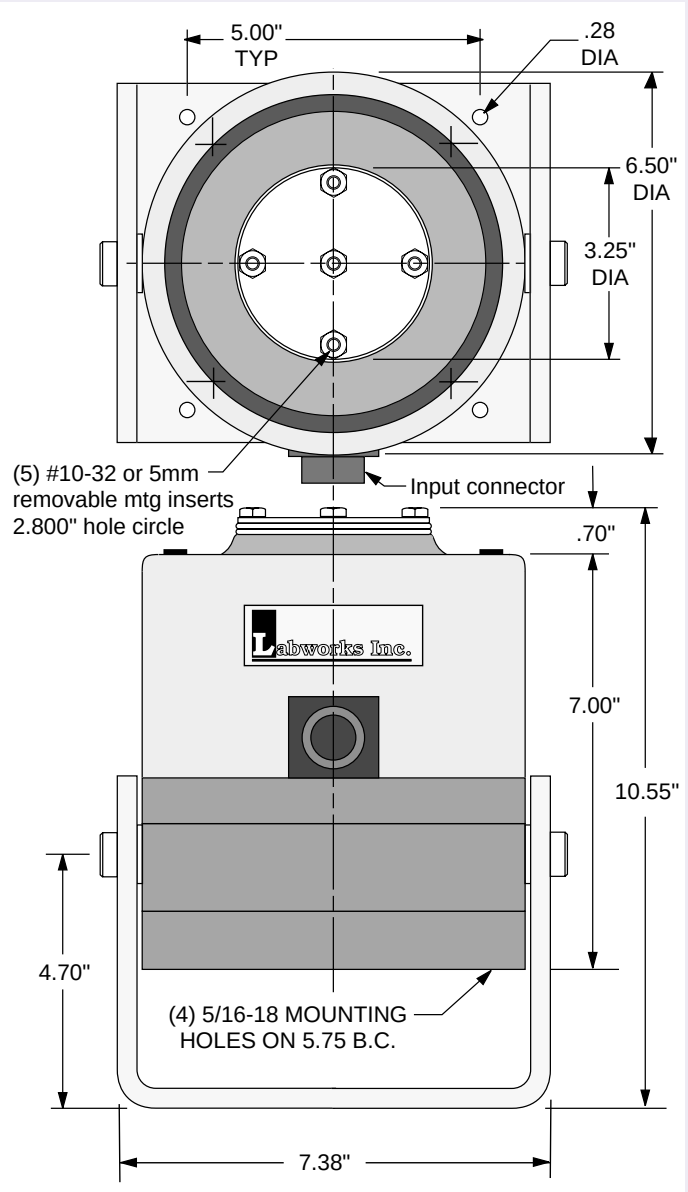
Armature weight	1.0 lb
Suspension stiffness	60 lb/in
Rated armature current	
Natural cooling	11 A rms
With blower	22 A rms
Frequency range [2]	DC-6,500 Hz
Fundamental resonance [2]	4,000-5,000 Hz
Stray magnetic field	
Measured 1.5” above table	<15 gauss
Measured 1.0” from body	<20 gauss
Cooling	100 CFM/15 in H_20
Dimensions	10.4" H x 7.4" W x 6.5" D
Shaker weight	28 lbs

OPTIONS

Cooling blower: Required for operation above 40 lbf. Recommended for continuous operation above 35 lbf pk.
Vibration isolation mounts.
Modal stingers and mounts.

[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.



ET-140 *Electrodynamic Transducer*

GENERAL DESCRIPTION

The ET-140 shaker's compact size, long stroke and lightweight armature make it equally well suited for modal as well as general vibration testing. The shaker has a large 3.25 inch diameter mounting surface and a rugged suspension system which minimizes test fixture requirements and related fixture guidance problems. The shaker trunnion allows the shaker to be operated in any axis from vertical to horizontal and is easily positioned for modal applications. It also facilitates bolting the shaker in place either with or without vibration isolation mounts.

Reliability is assured through the use of the latest composite materials in the unique, all flexure, armature suspension design. The design provides excellent axial compliance with high lateral stiffness and has no rolling or sliding components to wear out and/or produce unwanted noise and distortion. When combined with the correct Labworks linear power amplifier, the system is unmatched for reliability, performance and cost.

- **110 POUNDS PK SINE FORCE**
- **75 POUNDS PK RANDOM FORCE**
- **1.0 INCH STROKE**
- **3.25 INCH DIAMETER TABLE**
- **110g ACCELERATION, BARE TABLE**
- **TRUNNION MOUNTING BASE**

Labworks Inc.

2950 airway ave., a-16
costa mesa, ca 92626
tel (714) 549-1981
fax (714) 549-8041

STANDARD FEATURES

- AIR COOLED
- LOW STRAY MAGNETIC FIELD
- HIGH LATERAL STIFFNESS ARMATURE SUSPENSION

Labworks Inc.
2950 airway ave.
a-16, costa mesa, ca 92626 (714) 549-1981

ET-140 SPECIFICATIONS[1]

PERFORMANCE

Sine force	110 lbf pk
Random force	75 lbf rms
Shock force	225 lbf pk, 50 msec
Max displacement	
Continuous pk-pk	1.0 in
Between stops	1.03 in
Maximum velocity	70 ips pk
Acceleration [1,2]	
Bare table	110 g pk
1 lb load	55 g pk
5 lb load	18 g pk
Maximum acceleration	
Resonant	150 g pk
Peak shock	200 g pk

PHYSICAL

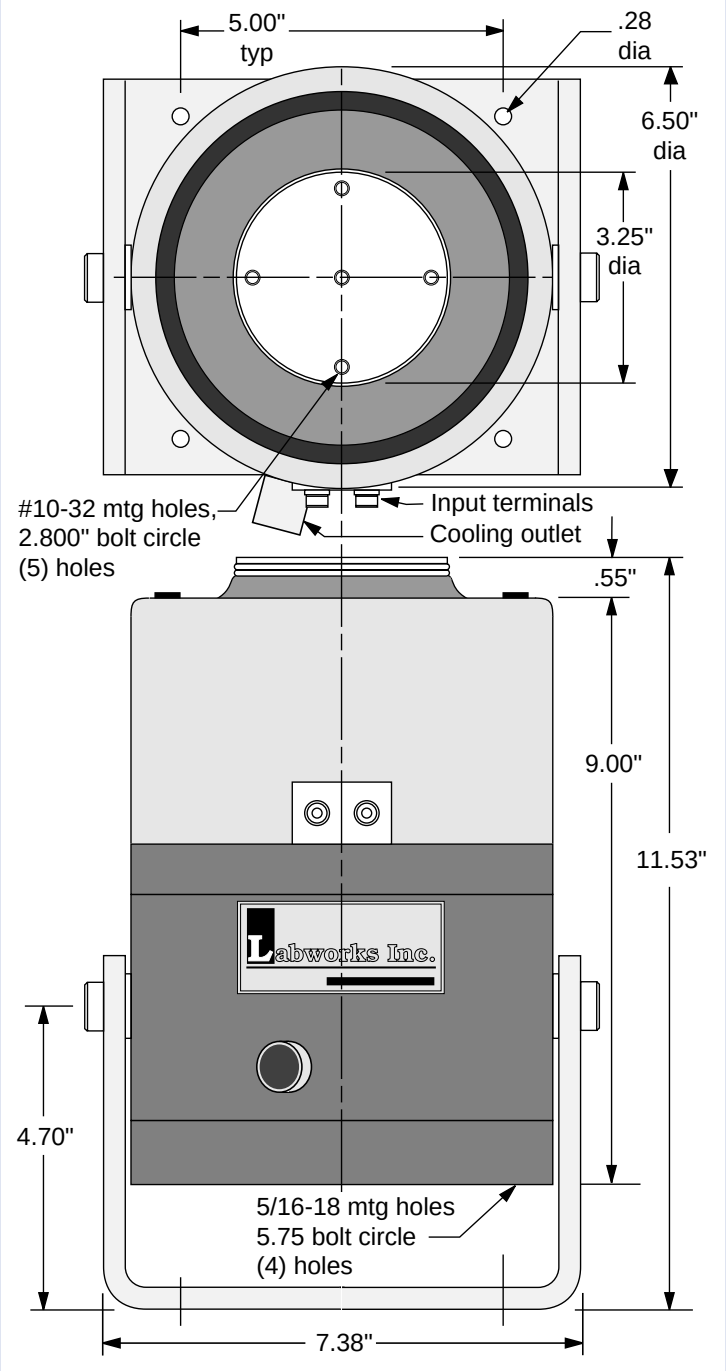
Armature weight	1.0 lb
Suspension stiffness	90 lb/in
Rated armature current	22 A rms
Frequency range [2]	DC-6,500 Hz
Fundamental resonance [2]	4,000-5,000 Hz
Stray magnetic field	
Measured 1.5” above table	<20 gauss
Measured 1.0” from body	<25 gauss
Field power	175W
Cooling	100 CFM/15 in H_20
Dimensions	11.5" H x 7.4" W x 6.5" D
Shaker weight	56 lbs

OPTIONS

Vibration isolation mounts.
Modal stingers and mounts.

[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.



ET-127 *Electrodynamic Transducer*

GENERAL DESCRIPTION

The Labworks ET-127 is a high performance general purpose Electrodynamic Transducer which is well suited for a wide variety of vibration testing. This shaker features a lightweight armature which allows smaller test articles to be subjected to high frequencies and accelerations. At the same time, the large table and rugged armature suspension easily accomodate larger loads, thus eliminating or reducing external fixture guidance and support requirements.

The unique “side load” restraint armature guidance system ensures that the suspension is axially compliant and radially rigid. Use of the latest high-tech composite materials provides reliable operation when large displacements are required, as in modal testing of large structures.

In order to adapt the shaker to specific test requirements a host of options are available, including pneumatic payload support, a unitized shaker and slip table base, custom fixtures and low frequency trunnion isolation.

- **500 POUNDS PEAK SINE FORCE**
- **1.0 INCH STROKE**
- **6.0 INCH DIAMETER TABLE**
- **100g ACCELERATION, BARE TABLE**
- **TRUNNION BASE**

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STANDARD FEATURES

- AIR COOLED
- LOW STRAY MAGNETIC FIELD
- HIGH LATERAL STIFFNESS ARMATURE SUSPENSION
- TRUNNION BASE

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ET-127 SPECIFICATIONS[1]

PERFORMANCE

Sine force	500 lbf pk
Random force	350 lbf rms
Shock force	1000 lbf pk, 50 msec
Max displacement	
Continuous pk-pk	1.0 in
Between stops	1.2 in
Maximum velocity	70 ips pk
Acceleration [1,2]	
Bare table	100 g pk
5 lb load	50 g pk
20 lb load	20 g pk
Maximum acceleration	
Resonant	120 g pk
Peak shock	150 g pk

PHYSICAL

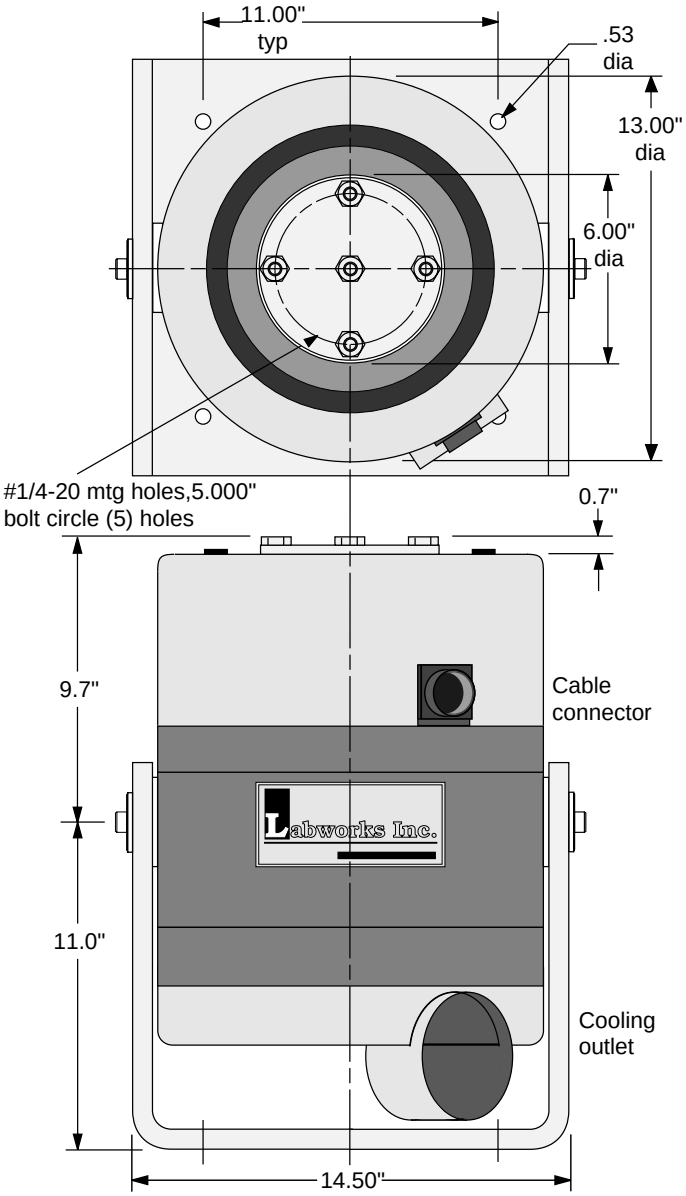
Armature weight	5.0 lb
Suspension stiffness	250 lb/in
Rated armature current	40 A rms
Frequency range [2]	DC-4,500 Hz
Fundamental resonance [2]	3,000-4,000 Hz
Stray magnetic field	
Measured 3.0” above table	<10 gauss
Measured 2.0” from body	<15 gauss
Cooling	300 CFM @ 1 inch H_20
Dimensions	21" H x 14.5" W x 14" D
Shaker weight	475 lbs

OPTIONS

DuoBase slip table assembly.
Vibration isolation mounts.
Pneumatic internal load support

[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.



FG-142 *Force Generator*

GENERAL DESCRIPTION

The FG-142 generator's compact size and lightweight construction make it equally well suited for modal as well as general vibration testing on larger and more compliant test articles. The generator has a single .141 inch diameter mounting hole and a rugged internal suspension system which eliminates test fixture requirements for most testing applications. The FG-142 can be operated in any position and is therefore easily positioned for modal applications above 20 Hz.

Reliability is assured through the use of the latest composite materials in the unique, integral, armature coil design. The generator's closed armature design eliminates alignment and lateral motion problems. When combined with a Labworks linear power amplifier, the system is unmatched for reliability, performance, and cost.

- **4 POUNDS PK SINE FORCE**
- **0.33 lb. DYNAMIC WEIGHT**
- **SINGLE .141 in. MOUNTING HOLE**
- **2.0 in. DIAMETER**
- **20 - 3000 Hz.**

Labworks Inc.

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STANDARD FEATURES

- AIR COOLED
- PERMANENT MAGNET DESIGN
- ANY POSITION MOUNTING

Labworks Inc.

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FG-142 SPECIFICATIONS [1]

PERFORMANCE

Sine force	
Natural cooling	2 lbf pk
Forced air cooling	4 lbf pk
Random force	
Natural cooling	1.4 lbf rms
Forced air cooling	2.8 lbf rms
Shock force	4.5 lbf pk, 20 msec
Low frequency force	.012 f^2 (.35-d) f=freq. Hz, d=disp. in. pk-pk
Max displacement	.35 in
Maximum velocity	20 ips pk
Acceleration, non-resonant[1,2]	
Bare table	6.0 g pk
1 lb load	1.5 g pk
5 lb load	.38 g pk
Maximum acceleration	
Resonant sine	100 g pk
Peak shock	13.5 g pk

PHYSICAL

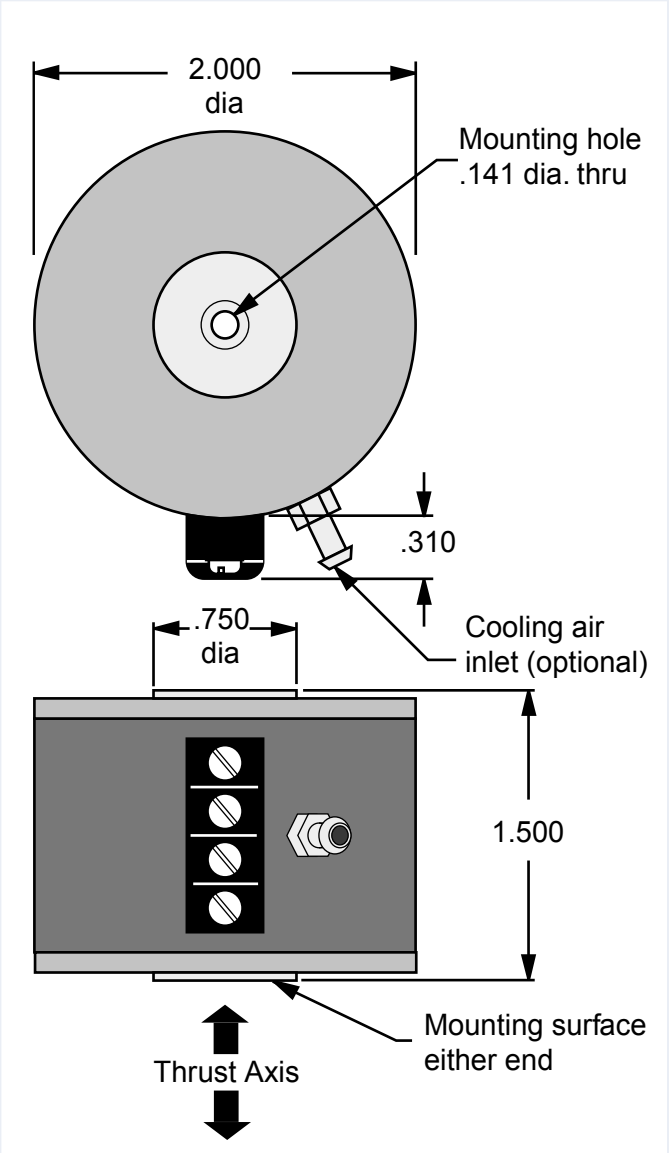
Dynamic weight	.33 lb
Total weight	.56 lb
Rated armature current	
Natural cooling	1.1 A rms
Forced air cooling	2.2 A rms
Frequency range	20 - 3000 Hz
Reaction mass resonance	10 Hz
Structural resonance [2]	3500 - 4500 Hz
Stray magnetic •eld	
Measured @ 1.0" distance	<10 gauss
Cooling (>1.0 lb force)	3.5 CFM/5 psi
Dimensions	2.0" dia x 1.5" long
Attachment hole	.141" dia x 1.5" long

OPTIONS

Cooling package: Required for operation above 2.0 lbf. Regulator, •lter, 10 ft. hose, etc. Requires 80 - 125 psi inlet air pressure @ 3.5 CFM dry air.

[1] Please see systems ratings for additional speci•cations.
[2] Load dependent.

Specifications subject to change. Consult factory for latest speci•cations.



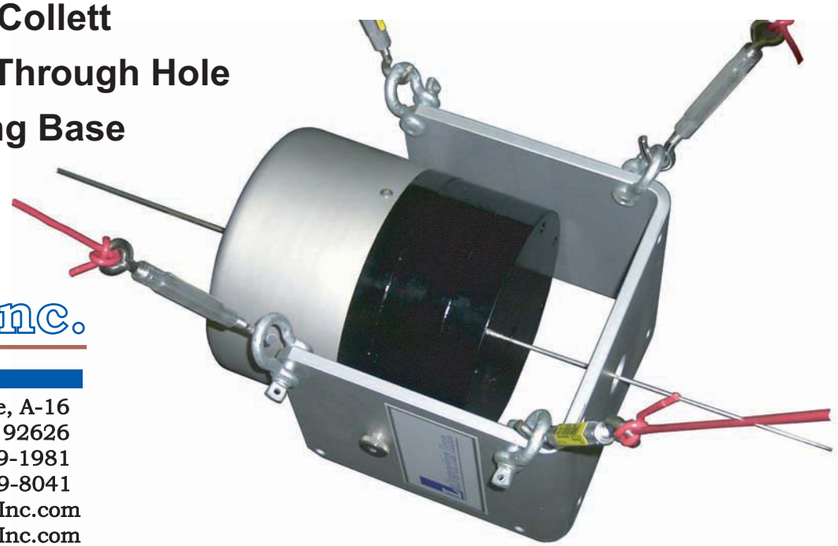
MT-160 *Modal Thruster*

GENERAL DESCRIPTION

The MT-160 thruster's compact size, long stroke and lightweight armature make it well suited for all types of modal testing. The trurster has a compression collett and features a central through-hole suitable for modal stinger and pre-tensioned wire testing applications. The standard shaker trunnion allows the shaker to be operated in any axis from vertical to horizontal as well as easily mounted in wire tensioning tripods. The trunnion base also facilitates bolting the shaker in place for rigid applications or the use of adjustable mounting feet.

Reliability is assured through the use of the latest composite materials in the unique, all flexure, armature suspension design. The design provides for low axial stiffness while retaining high lateral stiffness and has no rolling or sliding components to wrear pit and/or produce unwanted harmonics or distortion. When combined with the correct Labworks linear power amplifier, the system is unmatched for reliability, performance and cost.

- **60 lbf. pk Sine**
- **1.4 Inch Stroke**
- **.005 to .188" Dia. Collett**
- **Stinger and Wire Through Hole**
- **Trunnion Mounting Base**



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STANDARD FEATURES

- **Air Cooled**
- **Permanent Magnet Design**
- **High Lateral Stiffness Armature Suspension**
- **Universal Collett Stinger Attachment**
- **Multi Axis Trunnion**

Labworks Inc.

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MT-160 SPECIFICATIONS[1]

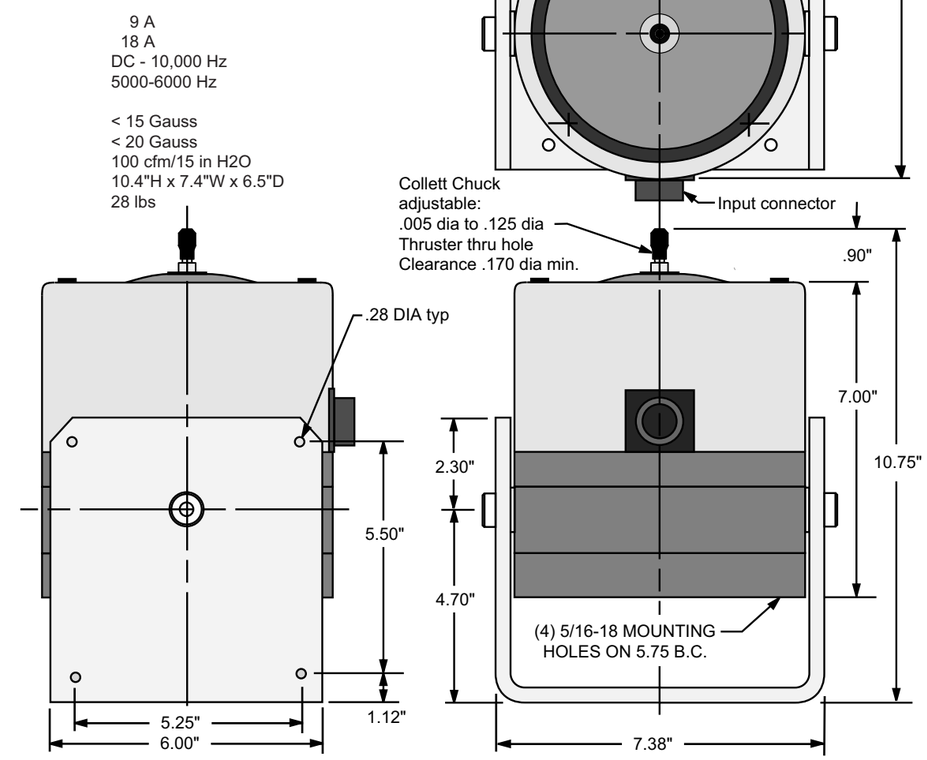
PERFORMANCE	
Sine Force	
Natural Cooling	30 lbf pk
With Cooling Vacuum	60 lbf pk
Max. Displacement	
Continuous pk-pk	1.4 in.
Between Stops	1.5 in.
Maximum Velocity	100 ips pk
Acceleration[1,2]	
Bare Table	120 g pk
1 lb load	40 g pk
5 lb load	11 g pk
Maximum Acceleration	
Resonant	200 g pk
PHYSICAL	
Armature Weight	0.5 lb
Suspension Stiffness	20 lb
Rated Drive Current	
Natural Cooling	9 A
With Cooling Vacuum	18 A
Frequency Range[2]	DC - 10,000 Hz
Fundamental Resonance[2]	5000-6000 Hz
Stray Magnetic	
1.5" above collett	< 15 Gauss
1.0" from body	< 20 Gauss
Cooling Air	100 cfm/15 in H2O
Dimensions	10.4"H x 7.4"W x 6.5"D
Shaker Weight	28 lbs

OPTIONS

C-146 Cooling Vacuum:
- Required for operation above 30 lbf.
- Recommended for continuous operation above 25 lbf.

SI-160 Vibration isolation mounts

MS-129-160 Modal Stinger Kit



1. Please see systems ratings for additional specifications.
2. Load dependent

Specifications subject to change without notice. Contact the Labworks Inc. for current information.

MT-161 *Modal Thruster*

GENERAL DESCRIPTION

The MT-161 thruster's compact size, long stroke and lightweight armature make it well suited for all types of modal testing. The thruster has a compression collett and features a central through-hole suitable for modal stinger and pre-tensioned wire testing applications. The standard shaker trunnion allows the shaker to be operated in any axis from vertical to horizontal. The trunnion base also facilitates bolting the shaker in place for rigid applications or the use of adjustable mounting feet.

Reliability is assured through the use of the latest composite materials in the unique, all flexure, armature suspension design. The design provides for low axial stiffness while retaining high lateral stiffness and has no rolling or sliding components to wear out and/or produce unwanted harmonics or distortion. When combined with the correct Labworks linear power amplifier, the system is unmatched for reliability, performance and cost.

- **25 POUNDS PK SINE FORCE**
- **.75 INCH STROKE**
- **.005 to .125" DIA. COLLETT**
- **STINGER AND WIRE THROUGH HOLE**
- **TRUNNION MOUNTING BASE**

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STANDARD FEATURES

- AIR COOLED
- PERMANENT MAGNET DESIGN
- HIGH LATERAL STIFFNESS ARMATURE SUSPENSION

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MT-161 SPECIFICATIONS[1]

PERFORMANCE

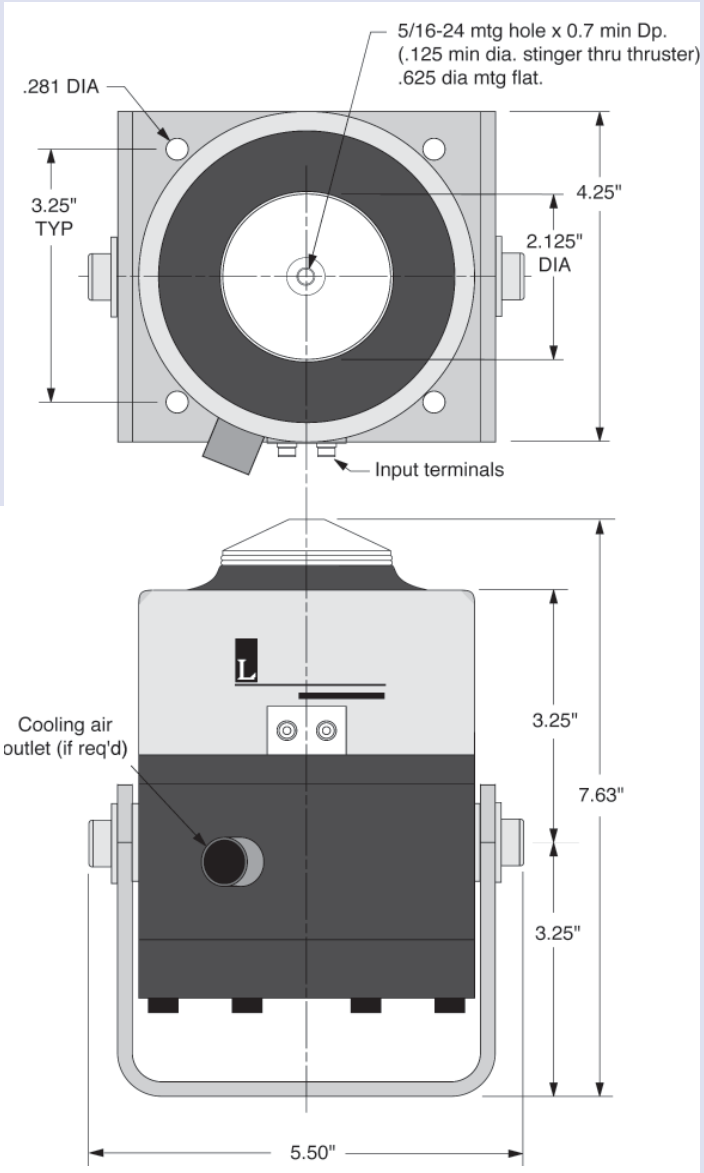
Sine force	
Natural cooling	13 lbf pk
With blower	25 lbf pk
Max displacement	
Continuous pk-pk	0.70 in
Mechanical Stop	0.75 in
Maximum velocity	120 ips pk
Acceleration [1,2]	
Bare table (w/collett)	71 g pk
0.5 lb load	63 g pk
2.5 lb load	9 g pk
Maximum acceleration	
Resonant	200 g pk

PHYSICAL

Armature weight	0.35 lb
Suspension stiffness	15 lb/in
Rated armature current	
Natural cooling	9 A rms
With blower	17 A rms
Frequency range [2]	DC-10,000 Hz
Fundamental resonance [2]	9,000-10,000 Hz
Stray magnetic field	
Measured 1.5" above collett	<10 gauss
Measured 0.5" from body	<15 gauss
Cooling	80 CFM/22 in H_20
Dimensions	7.13" H x 4.8" W x 4.25" D
Shaker weight	11 lbs

OPTIONS

Cooling blower: Required for operation above 13 bf. Recommended for continuous operation above 11 lbf pk.
Vibration isolation mounts.
Modal stingers and mounts.



[1] Please see systems ratings for additional specifications.
[2] Load dependent.

Specifications subject to change. Consult factory for latest specifications.

PA-151 *Linear Power Amplifier*

State of the art linear technology and features you won't find on any other commercially available small amplifier.

GENERAL DESCRIPTION

The Labworks PA-1519 Linear Power Amplifier is a high quality, air-cooled, direct-coupled audio amplifier primarily intended for use with small vibration systems.

To insure long term reliability, PA-151 Amplifiers come equipped with protection from both over current and over temperature. External interlock capabilities as well as voltage and current bar graphs to monitor output are also incorporated in the design. An oversized heat sink allows continuous operation at maximum output. Both DC and AC coupled signal inputs are provided as well as a signal output voltage proportional to output current

Although this amplifier has been designed to directly drive low impedance loads, it can be used in any application requiring continuous duty high quality audio power. PA-151 amplifiers are designed for stand-alone desktop mounting, optional 19 in. rack mount brackets are available. Selectable Voltage or Current Source output modes accomodates all types of vibration testing applications. The amplifier can operate on 100, 115, 200 or 230V, 48 to 60 Hz power

Switch selectable dual internal rail voltage allows this amplifier to be optimially matched to most low impedance loads. This feature reduces the heat dissipated with high current loads reducing heat sink temperatures and output stage dissapation for dependable operation.

FEATURES

- 180 VA, Linear Output
- Voltage or Current Source
- Convection Cooled, no Fan
- Direct coupled for DC operation
- DC-20,000 Hz Frequency Range
- V / I Signal Output
- Output Voltage and Current Meters
- External and Internal Interlock
- Dual Rail Voltage & Soft Start Circuitry

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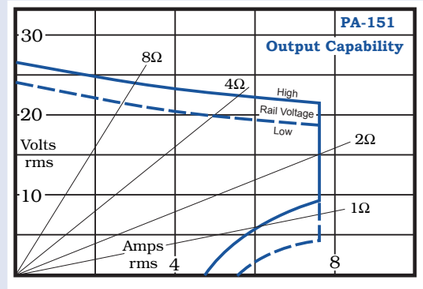
Labworks Inc.

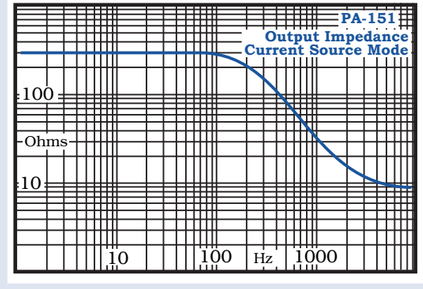
PA-151 SPECIFICATIONS*

Output voltage (continuous)	**High/Low rail voltage**
1.0 Hz to 20 KHz	
open circuit	26.4 / 23.0 V rms
4Ω load	22.5 / 19.5
2Ω load	14.5 / 14.5
1Ω load	6.0 / 7.5
DC to .10 Hz	
open circuit	31.5 / 28.5 Vdc/pk
4Ω load	30.0 / 27.0
2Ω load	21.0 / 21.0
1Ω load	5.4 / 6.4
Random voltage output	
2.5 sigma peak volts	
open circuit	14.8 / 13.4 V rms
4Ω load	13.7 / 12.0
2Ω load	12.2 / 9.2
1Ω load	6.9 / 6.6
3.0 sigma peak volts	
open circuit	12.4 / 11.2 V rms
4Ω load	11.4 / 10.4
2Ω load	10.2 / 7.6
1Ω load	5.8 / 5.5
Maximum continuous dissipation	
Ambient Temp =	40°C 180W
	50 90
	60 0
Frequency response (DC coupled input)	
DC to 10 KHz	-1.0 dB
DC to 20 KHz	-3.4
AC coupling @ 1.0 Hz	-0.5
Slew rate	1.5 V/µsec
Harmonic distortion	
(10V, 1000 Hz)	<1% @ 2 Ω
Signal/noise ratio	
(ref 15V out)	73 dB
Input impedance	
DC coupled	10K Ω
AC coupled	47 uF in series with 10k Ω
DC offset	6 mV max
Voltage gain	25 (28 dB) max
Voltage source regulation	<0.1 dB (∞- 2Ω load), 30 Hz/10 V rms
Front panel controls	Power switch, Gain adjust, V / I Source Mode Select
Front panel indicators	Internal power, interlock trip, Amplifier ready
Front panel metering	
Type	(2) 9 segment vertical bar graphs
Scale, non-enumerated	
Voltage	0-20 V peak
Current	0-8 A avg
Resolution	
Peak voltage	10% of full scale
Average current	10% of full scale
Accuracy (voltage & current)	±15% abolute
Interlock circuit	
Type	<1 Vdc= fault or switch
Response time	3 ms. max
Action	Output drives to ground
Reset	Gain pot full down
Indicator	Flashing Interlock light
Cooling	Natural convection
Self protection	Over current, over temp.
Line protection	Hi & Lo line on-board replaceable Line fuses
Input power	250 VA max
Voltage	100, 115, 200 or 230 V
Frequency	48 to 62 Hz
Dimensions	3.5" H x 17" W x 10" D
w/Optional rack mt. brackets	3.5" H x 19" W x 10" D
Weight	19 lbs

*Specifications subject to change.
Consult factory for latest specifications.

PERFORMANCE GRAPHS





PA-138 *Linear Power Amplifier*

State of the art linear technology brings quiet, direct coupled capability to vibration and acoustic test systems.

GENERAL DESCRIPTION

The Labworks PA-138 Linear Power Amplifier is a high quality, air-cooled, direct-coupled audio amplifier primarily intended for use with small vibration systems. Although this amplifier has been designed to directly drive low impedance loads, it can be used in any application requiring continuous duty high quality audio power.

PA-138 Amplifiers feature protection from both over current and over temperature insuring long term reliability. The amplifier has full interlock capabilities as well as peak voltage and RMS current bar graphs to monitor output.

Two operational modes are incorporated in the design. These amplifiers can be used as either a wide-band, highly damped voltage source, or as a high impedance current source. DC and AC coupled signal inputs are provided. PA-138 Amplifiers are designed for standard 19 in. rack mounted installation and require 100, 120, 220 or 240V, 48 to 60 Hz power.

FEATURES

- Linear output stage provides low noise and distortion.
- Automatic over temperature and over current protection.
- Direct coupled input and output allows DC operation.
- Two operational modes, voltage or current source.
- External interlock circuitry.

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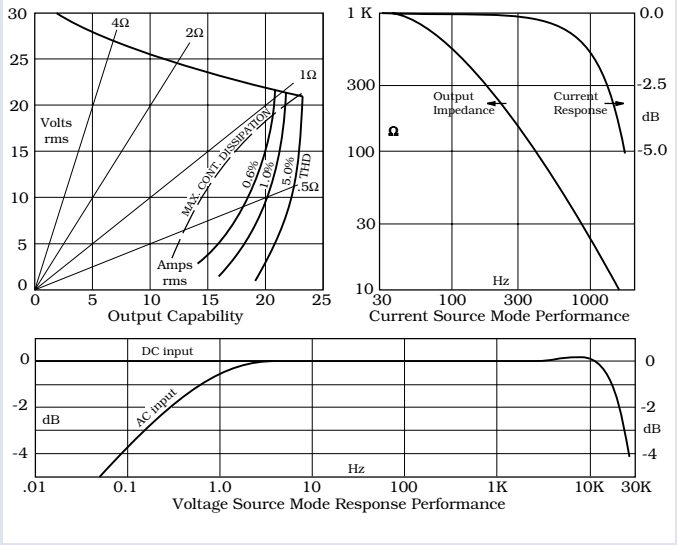
PA-138 SPECIFICATIONS*

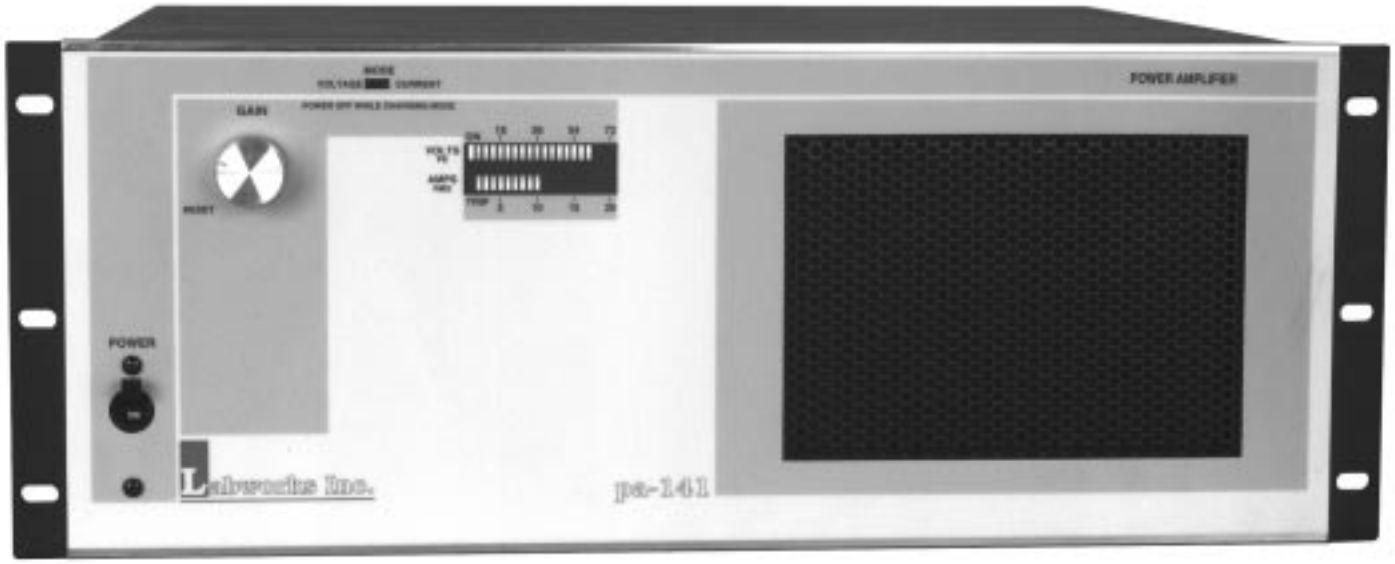
Output Voltage (continuous)		
10 Hz to 20 KHz		
open circuit	31.0 V rms	
4Ω load	26.0	
2Ω load	23.5	
1Ω load	20.0	
DC to .1 Hz		
open circuit	45.0 Vdc/pk	
4Ω load	36.5	
2Ω load	22.0	
1Ω load	11.0	
Random Voltage Output		
2.5 sigma peak volts		
open circuit	18.0 V rms	
4Ω load	16.0	
2Ω load	15.0	
1Ω load	14.0	
3.0 sigma peak volts		
open circuit	15.0 V rms	
4Ω load	13.0	
2Ω load	12.5	
1Ω load	11.5	
Maximum continuous dissipation		
Ambient Temp =	40°C	400W
	50	200
	60	0
Frequency response (DC coupled input)		
DC to 10 KHz	-0.6 dB	
DC to 20 KHz	-2.5	
AC coupling @ 1.0 Hz	-0.5	
Slew rate	2 V/µsec	
Harmonic distortion		
(10V, DC-10k)	<0.65% @ 1Ω	
Signal/noise ratio		
(ref 20V out)	100 dB minimum	
Input impedance		
DC coupled	10 kΩ	
AC coupled	47 uF in series with 10 kΩ	
DC offset	5 mV max	
Voltage mode gain	48 (34 dB) max	
Current mode gain	22 Amps/Volt max	
Voltage source regulation	<0.1 dB (∞- 1Ω load, 30 Hz/10 V rms)	
Current source regulation	<0.1 dB (0-2Ω load, 30 Hz/10 A rms)	
Front panel controls	Power, mode switches, gain adjust	
Front panel indicators	Internal power, interlock trip	
Front panel metering		
Type	(2) 19 seg. horiz. bar graphs	
Scale		
Voltage	0-40V pk	
Current	0-16 A rms	
Resolution		
Peak voltage	5% of full scale	
True rms current	5% of full scale	
Accuracy (voltage & current)	±5% abolute	
Interlock circuit		
Type	<1 Vdc= fault or N.C. switch	
Response time	3 ms. max	
Action	Output drives to ground	
Reset	Gain pot full down or > 1.5V @ RST	
Indicator	Flashing front panel "Trip" light	
Cooling	2-speed fans	
Noise level: low/high speed	<45 dB/<55 dB (switches @ approx. 1/2 diss.)	
Self protection	Over current, over temperature	
Line protection		
Dual line fuses	(10A @ 100, 120 Vac) (5A @ 220, 240 Vac)	
Input power	1,000 VA max	
Voltage	100, 120, 220 or 240 Vac	
Frequency	48 to 62 Hz	
Dimensions	3.5" H x 19" W x 13" D	
Weight	24 lbs	

*Specifications subject to change. Consult factory for latest specifications.

PERFORMANCE GRAPHS



PA-141 *Linear Power Amplifier*



High quality audio power for vibration test systems.

GENERAL DESCRIPTION

The Labworks PA-141 Linear Power Amplifier is a high quality, air-cooled, direct-coupled audio amplifier primarily intended for use with vibration systems. Although this amplifier has been designed to directly drive low impedance loads, it can be used in any application requiring continuous duty, high quality, audio power.

There are two operational modes. The amplifier can be used as either a wide-band, highly damped voltage source, or as a high impedance current source. DC and AC coupled signal inputs are provided.

In order to insure long term reliability, the PA-141 features protection from both over current and over temperature.

Full interlock circuitry is also included. Peak voltage and RMS current bar graphs monitor output conditions.

Optional, internal DC field power supplies are available for use in conjunction with Labworks Shakers. These options provide the convenience of a single chassis power source, as well as fully integrated power-up and cooling interlock circuitry with the power amplifier. Switched 115 Vac power is provided for shaker cooling blower and control instrument requirements.

The PA-141 is designed for standard 19 in. rack mounted installation and can be operated on 100, 120, 200, 220 or 240V, 48 to 62 Hz power.

FEATURES

- Linear output stage provides low noise and distortion.
- Automatic over temperature and over current protection.
- Direct coupled input and output allows DC operation.
- External interlock circuitry.
- Two operational modes, voltage or current source.
- Optional internal shaker field supplies.

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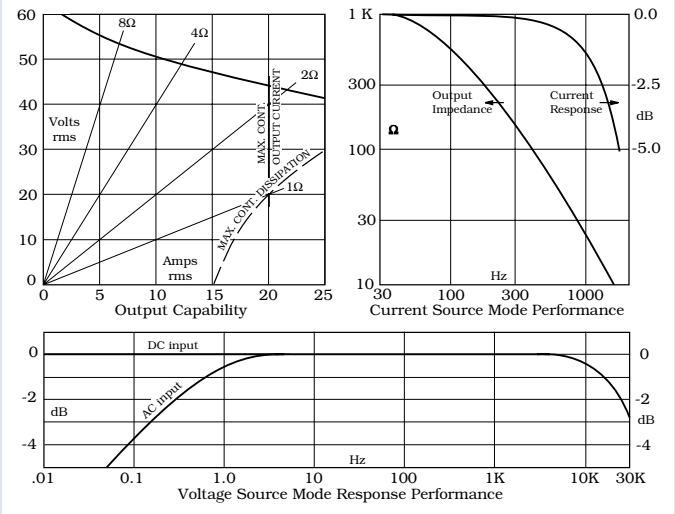
PA-141 SPECIFICATIONS*

Output Voltage (continuous)		
10 Hz to 20 KHz		
open circuit	62.0 V rms	
4Ω load	49.0	
2Ω load	40.0	
1Ω load	20.0	
DC to .1 Hz		
open circuit	87.5 Vdc/pk	
4Ω load	69.0	
2Ω load	56.5	
1Ω load	28.0	
Random Voltage Output		
2.5 sigma peak volts		
open circuit	36.0 V rms	
4Ω load	30.0	
2Ω load	28.0	
1Ω load	20.0	
3.0 sigma peak volts		
open circuit	30.0 V rms	
4Ω load	25.0	
2Ω load	23.0	
1Ω load	20.0	
Maximum continuous dissipation		
Ambient Temp =	40°C	900W
	50	450
	60	0
Frequency response (DC coupled input)		
DC to 10 KHz	-0.6 dB	
DC to 20 KHz	-2.5	
AC coupling @ 1.0 Hz	-0.5	
Slew rate	6.0 V/µsec	
Harmonic distortion		
(10V, DC-10k)	<0.65% @ 1Ω	
Signal/noise ratio		
(ref 50V out)	100 dB minimum	
Input impedance		
DC coupled	10 kΩ	
AC coupled	47 uF in series with 10 kΩ	
DC offset		
Voltage mode	5 mV max	
Current mode	3 mA max	
Voltage mode gain	96 (40 dB) max	
Current mode gain	22 Amps/Volt max	
Voltage source regulation	<0.1 dB (∞ - 2Ω load, 30 Hz/20 V rms)	
Current source regulation	<0.1 dB (0-2Ω load, 30 Hz/10 A rms)	
Front panel metering		
Type	(2) 19 seg. horiz. bar graphs	
Scale		
Voltage	0-72V pk	
Current	0-20 A rms	
Resolution		
Peak voltage	5% of full scale	
True rms current	5% of full scale	
Accuracy (voltage & current)	±5% absolute	

Front panel indicators	Internal power, interlock trip
Front panel controls	Power switch, mode switch, gain adjust
Interlock circuit	
Type	Logic <1 Vdc or switch open = fault
Response time	3 ms. max
Action	Output drives to nil
Reset	Gain pot full down or > 1.5V @ RST
Indicator	Flashing front panel "Trip" light
Cooling	2-speed fan
Noise level: low/high speed	<53 dB/<67 dB (switches @ approx. 1/2 diss.)
Self protection	Over current, over temperature
Line protection	
Dual circuit breaker	15A
115 Vac convenience output	Std. Duplex (USA)
PA-141	3A
PA-141-127	20A
PA-141-140	12A
Optional DC shaker field power supplies	
141-127	32V, 28A DC Nom.
141-140	12V, 12A DC Nom.
Input power	
PA-141	2,000 VA max
PA-141-127 or -140	3,000 VA max
Voltage	100, 120, 200, 220 or 240 Vac
Frequency	48 to 62 Hz
Dimensions	7.0" H x 19" W x 17" D
Weight	
PA-141 (PA-141-127 or-140)	48 lbs (73 lbs)

*Specifications subject to change. Consult factory for latest specifications.

PERFORMANCE GRAPHS



PA-123 *Series Linear Power Amplifers*

■ OUTPUT: 65V/130V. ■ 750 to 8000 VA.

PA-123 Power Amplifiers utilize state-of-the-art linear technology to bring quiet direct coupled capability to vibration or audio frequency systems. Flexible modular design enables tailoring of the amplifier to any application requiring from 1,000 to 8,000 VA. Individual 1,000 VA power modules are connected to a common PS-123 Power Supply and are wired in either single ended or bridged configurations.

Linear output stages insure minimum RF radiation to accompanying instrumentation and very low output impedance to maximize system damping. Oversize heat sinks dissipate internal energy with minimum air flow rates. Dual-speed cooling fans provide extra quiet operation during idle or normal dissipation conditions.

Power up soft start relays and line power sensing interlock circuitry eliminate accidental output transients during turn-on and turnoff. Complete self protection for over-temperature, over-current, and instantaneous dissipation, as well as normally open and normally closed external interlock loops are standard.

The CP-123 Control Panel is a compact, rack mounted instrument which provides convenient drive signal control. The CP-123 Control Panel provides gain control (pre-amplification), power amplifier output voltage and current metering, adjustable output current limiting for transducer protection, and full function system safety interlocks. The CP-123 may be used as a remote control panel, connected in master-slave configuration, if more than one control location is desirable. For multiple channel amplifiers, CP-123 Control Panels provide independent control for each channel. Power modules are simply connected into appropriate groups.

The CS-123 current source chassis is designed to interface transparently with the CP-123. Simply flip a front panel switch on the CS-123 and any PA-123 series amplifier is converted into a dependable, high impedance, current source amplifier.

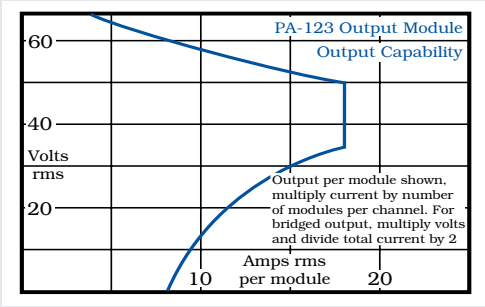
1 Channel, 8,000 VA

6 Channels, 1,000 VA / Channel

PA-123 GENERAL SPECIFICATIONS*

	Single end : Bridge**
Output voltage	65 V rms : 130 V rms
Output current per module	18 A rms : 9 A rms
Max. cont. dissipation	850 W/module
Frequency response	
DC input: DC to 10 KHz	-1 dB
AC input: 1.0 to 10 KHz	-1 dB
Max. voltage gain	40 dB : 46 dB
Cooling	2-speed fans, automatic
Input impedance	10 kΩ/channel
Meters	
Volts, pk	3 digit ± 1 lsd
Amps, rms/pk	3 digit ± 1 lsd
Interlock circuit	N.O./N.C. switch or TTL
Input power	1800 VA/module max. typ.
Voltage	208 or 230 Vac
Frequency	48 to 62 Hz

* Specifications subject to change. Call factory for latest specifications.
**Bridge amplifiers must contain even numbers of output modules.



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- **PA-123-3/2-500**
  OUTPUT: 65V/2600 VA.
- **PA-123-2/2-65 & PA-123-1/2-40**
  OUTPUT: 65V, 2000 VA or 40V, 750 VA.

PA-123-3/2-500

PA-123-2/2-65 & 1/2-40

The PA-123-3/2-500 houses a field and De-Gauss power supply specifically designed to drive the ET-127 shaker. It's a class AB, air-cooled unit with a power output of 2,600 VA. The modular design allows this amplifier to be configured for use with other shakers and the control panel can be mounted remotely if desired.

PA-123-X/2 amplifiers utilize standard PA-123 output modules and a CP-123 control panel/preamplifier. The number of output modules and power supply voltage is varied to match the load requirements.

The PA-123-2/2-65 uses two output modules and full supply voltage. The PA-123-1/2-40 uses one output module and reduced supply voltage to match low impedance loads. The 2/2-65 can be configured to supply up to 130 Volts/18 amps if required for high voltage loads.

PA-123-2/2-65 & PA-123-1/2-40 SPECIFICATIONS*

		2/2-65	1/2-40
Output Voltage (continuous)			
10 Hz to 20 KHz			
open circuit		70.0	45.0 V rms
4Ω load		60.0	40.0
2Ω load		52.0	35.0
1Ω load		35.0	22.0
DC to .1 Hz			
open circuit		100.0	63.0 Vdc/pk
4Ω load		40.0	40.0
2Ω load		20.0	20.0
1Ω load		10.0	10.0
Random Voltage Output			
2.5 sigma peak volts			
open circuit		40.0	25.0 V rms
4Ω load		38.0	23.0
2Ω load		36.0	21.0
1Ω load		28.0	18.0
3.0 sigma peak volts			
open circuit		33.0	21.0 V rms
4Ω load		31.0	19.0
2Ω load		30.0	17.5
1Ω load		28.0	15.0
Maximum continuous dissipation			
Ambient Temp =	40°C	1700	850 W
	50	850	425
	60	0	0
Frequency response (DC coupled input)			
DC to 10 KHz		-1 dB	
DC to 20 KHz		-3 dB	
AC coupling @ 1.0 Hz		-1 dB	
Slew rate		5 V/µsec	
Harmonic distortion			
(10V, 1k)		<.5 % @ 2Ω	
Signal/noise ratio			
(ref 20V out)		80 dB min.	
Input impedance			
DC coupled		7	10 kΩ
AC coupled		47 uF in series with 10 kΩ	
DC offset		10 mV max	

	2/2-65	1/2-40
Voltage mode gain	40 dB max	
Voltage source regulation	<0.2 dB (∞- 2Ω load, 30 Hz/10 V rms)	
Front panel controls	Power, damping, rms/pk, limit, gain adjust.	
Front panel indicators	Power, gain up, ready, fault, limit.	
Front panel metering		
Type	(2) digital meters	
Scale		
Voltage	0-100 V pk	
Current	0-50 A rms	
Accuracy		
Peak voltage	± 3% reading, ± 1 digit	
True rms current	± 3% reading, ± 1 digit	
Interlock circuit		
Type	N.O./N.C. switch or TTL	
Response time	3 ms. max	
Action	Output drives to ground	
Reset	Gain pot full down or > 1.5V @ RST	
Indicator	Fault light	
Cooling	2-speed fans	
Noise level: low/high speed	<52 dB/<65 dB (switches @ approx. 1/2 diss.)	
Self protection	Over current, over temperature	
Line protection		
Circuit breaker	15 A @ 208 - 230 Vac	
Input power	3,500	1,750 VA max
Voltage	208 or 230 Vac, 1ø	
Frequency	48 to 62 Hz	
Dimensions	10.5" H 21" W 20" D	10.5" H 21" W 20" D
Weight	85 lbs	70 lbs

*Specifications subject to change. Consult factory for latest specifications.

VibeLab™ VL-144x

DIGITAL SINE AND RANDOM VIBRATION CONTROLLER

- Straightforward Virtual Instrument operating under Windows™
- Automatic calculation of Acceleration, Velocity, and Displacement
- Programmed test requirements automatically compared to system capabilities and accelerometer sensitivity
- Online help for both novice and experienced users
- Password protection and extensive report generating capabilities
- Comes assembled with everything you need including computer, monitor, printer, keyboard, and accelerometer. Ready to Run, Not a Kit

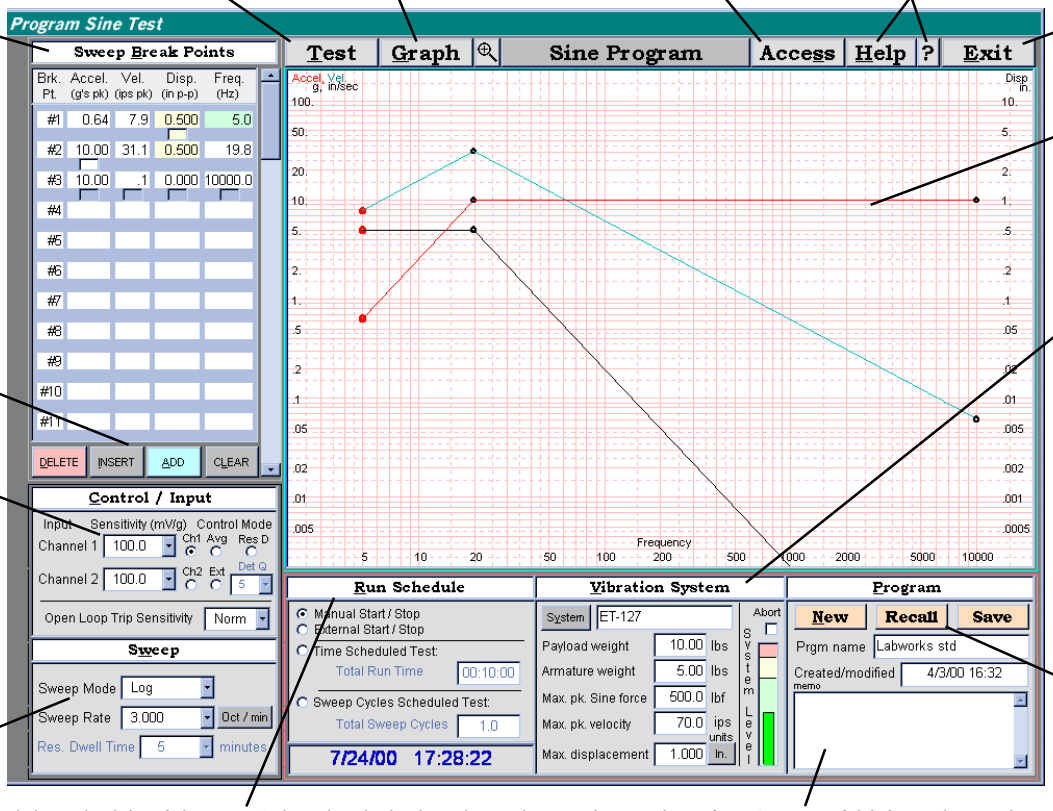
Complete Controller System Includes:

- Computer
- VibeLab™ and Windows™ software installed, ready to run
- Monitor, Keyboard, Mouse
- Printer
- VibeLab™ Shaker interface PC Board w/accelerometer power supply factory installed
- Accelerometer package: accelerometer, cable, stud, and mounting base

Labworks Inc.

2950 airway ave., a-16, costa mesa, ca 92626 • (714) 549-1981 • fax (714) 549-8041 • www.labworks-inc.com

Sine Program Screen



Go to the run test screen.

Scale the graph to best suit the test.

Access password protection.

Complete online and pointer help available.

Go back to the introduction screen.

Breakpoint entry field. The active breakpoint is highlighted. Click on the box below an acceleration, velocity, displacement or frequency value to copy it into the next breakpoint. When any two values for a breakpoint are entered, the other two are calculated.

The programmed acceleration, velocity, and displacement are shown graphically as they are programmed.

Easily add, insert, and delete break points.

Enter the vibration system limitations and payload information and the controller will alert the user to potential problems during the programming phase. Set the system abort to provide automatic system protection during the actual test.

Set the accelerometer sensitivity and turn channels on and off. Select the desired control mode; channel 1, channel 2, average, extremmel or resonance search and dwell.

Select the desired type of sweep; logarithmic, linear, resonance search and dwell, accelerometer calibration, etc.

Create new test programs or recall existing ones. Run, modify, rename, and save to the test library.

Control the schedule of the test. Select the desired total test time or the number of sweep cycles or allow the test to be externally or operator controlled.

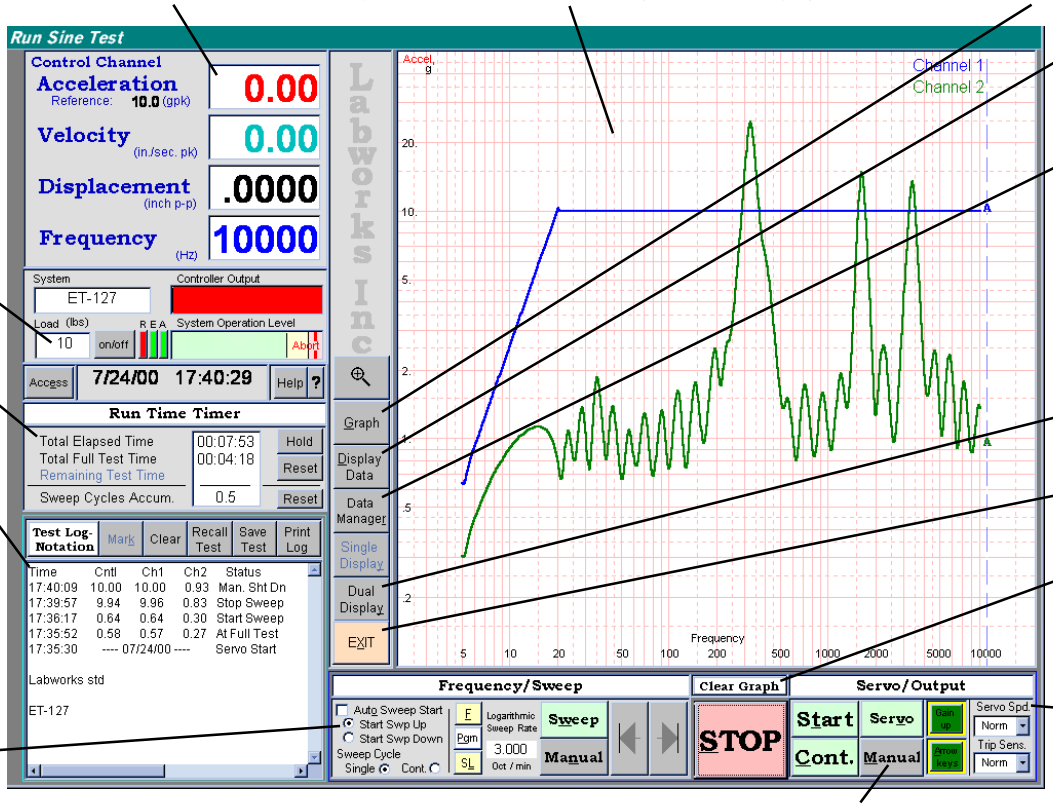
Save useful information to the disk along with the test profile.

Sine Run Test Screen

Clicking in this area toggles the display between the large control channel format shown and the more detailed format which displays channel one, two and control information simultaneously.

Graphic display of either run time or recalled test data. T–Square and cursor position displays (not shown) enable detailed inspection of the graphic data.

Scale the graph to suit the test spectrum.



One bar graph displays the current output level of the controller which allows the operator to adjust the system gain to best suite a specific test requirement. The other bar graph can be enabled to display the overall vibration system operating level.

Chose which data is graphically displayed at any given time.

Save up to ten complete sets of test data for post analysis. Return later and recall test data, reformat and either print or transfer to the clipboard for generating reports.

A controllable timer keeps track of the current test.

Select single or dual graph display

Go back to the program screen.

A continuous test log automatically keeps track of significant events. This log may be printed along with notations entered by the operator.

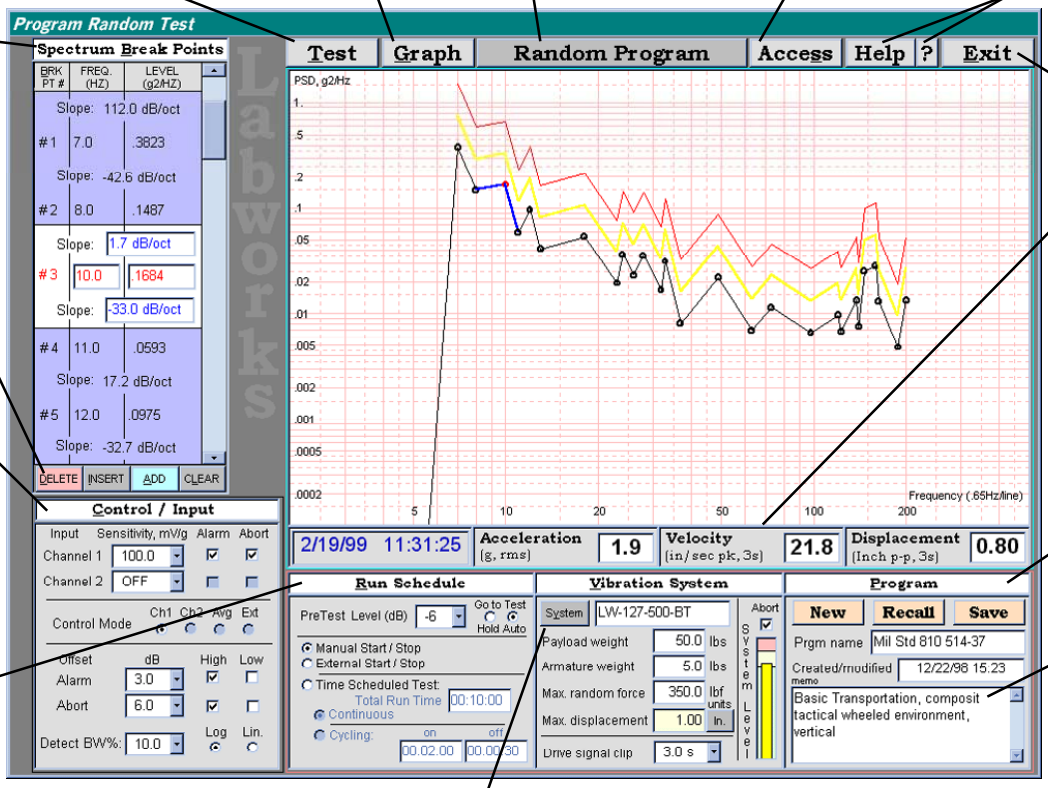
The data displayed can be cleared without stopping the test.

The servo speed and trip sensitivity can be adjusted to accommodate difficult to control test articles.

Select either manual or program control of the sweep. In the program mode the sweep rate and direction may be adjusted during the test. The sweep can be set to start automatically and sweep either up or down in frequency.

Select either servo or manual gain control. The test may be stopped and then continued under program control without losing the test data. Indicators warn the operator when the gain is up or the cursor keys are enabled.

Random Program Screen



Go to the run test screen.

Scale the graph to best suit the test.

Select Frequency Bandwidth.

Access password protection.

Complete online and pointer help available.

Spectrum entry field. Enter and edit data as break points or sloped line segments. The part of the spectrum in the active edit window is highlighted in blue on the graphic display.

Go back to the introduction screen.

Easily add, insert, and delete break points.

Acceleration, velocity and displacement requirements automatically calculated and displayed as the test is defined.

Turn channels on and off and control the sensitivity, alarms and aborts. Select the desired method of control. Select tolerances for the alarms and aborts.

Save new test profiles or recall existing ones. Run, modify, rename and save to the test library.

Control the schedule of the test. Program the desired elapsed time for the test, either continuous or cycled on and off, or allow the test to be operator controlled.

Save useful information to the disk along with the test profile.

Enter the vibration system limitations and payload information and the controller will alert the user to potential problems during the programming phase. Set the system abort to provide automatic system protection during the actual test.

Random Run Test Screen

Up and Down buttons allow the operator to change the control acceleration manually while under servo control.

Displays the current vibration acceleration, velocity, and displacement along with the programmed reference and the current control servo reference acceleration.

Graphic display of either run time or recalled test data. T–Square and cursor position displays (not shown) enable detailed inspection of the graphic data.

Start, Stop, Reset and Resume controls are located next to the controller signal output bar graph. The shaker system information and the status window, which provides the operator with information regarding the current tests progress, are also located here.

Scale the graph to suit the test spectrum.

Chose which data is graphically displayed at any given time.

Save up to ten complete sets of test data for post analysis. Return later and recall test data, reformat and either print or transfer to the clipboard for generating reports.

A control to enable and disable the previously programmed alarm and aborts is provided along with status indicators.

A controllable timer keeps track of the current test.

Control the averaging of the run time display data.

A continuous test log automatically keeps track of significant events. This log may be printed along with notations entered by the operator.

Go back to the program screen.

Select single or dual graph display

VibeLab™ VL-144x

Digital Sine and Random Vibration Controller

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General Description

The VibeLab Digital Sine and Random Vibration Controller is a pc-based vibration test controller. Running under the Windows operating system, the controller generates and runs user-defined vibration tests. The electrical output of the VibeLab controller is a real-time analog voltage signal suitable for use in driving most commercially available wide band vibration test systems. VibeLab utilizes vibration acceleration feedback from one or two accelerometers mounted on the shaker, fixture, and/or test article.

VibeLab's straight forward user interface allows creation and running of vibration tests with minimal learning time. All critical settings are software interlocked and cross checked to insure that only valid tests are generated. The virtual instrument approach to the controller user interface puts all of the user-required settings and parameters in view, with minimal hidden menu activity required when defining or running a vibration test.

While running a test, VibeLab can be configured to monitor the vibration system operating level and even abort its operation if system limits are exceeded. Most common Labworks vibration systems are included in the VibeLab system library or the user can easily define and store custom system parameters.

VibeLab's primary report output is graphical. Either a single large or two smaller graphs can be prepared and printed directly, or copied, to the clipboard, for inclusion on other Windows-based applications. Each graph carries its own notation field that prints automatically in the direct print mode. The test log header includes the name of the parent test program for reference. Any two data sets can be displayed on each graph with crosshairs provided for specific level or frequency identification, if required. The data files saved are spreadsheet compatible for custom report generation. The chronological test log is also available for incorporating into reports.

General Specifications

Frequency Range

Random	6 to 2,000 Hz or 2 to 500 Hz
Sine	2 to 10,000 Hz
Display Units	English or Metric units with automatic conversion

Reports

Graphical, Tabular, Current or Post Analysis

Signal Input

Number of Input Channels	2
Acceleration Range	Random: 0.2 to 100 grms Sine: 0.1 to 200 gpk
Acceleration Resolution	16 Bit
Maximum Input Voltage	5 V
Connectors	BNC
Dynamic Range	80 dB minimum

Vibration System Protection

System Checker	Automatic cross check of program with the vibration system force and displacement capabilities
Sensitivity Checker	Automatic cross check of program with accelerometer dynamic range and sensitivity
Run-Time and Output Level Monitors	Show the vibration system operating level and VibeLab signal output voltage level

Test Article Protection

Acceleration	Open loop/low gain + rate detection
Random	Over and/or under acceleration alarm and abort levels
Sine	System operation level, acceleration and displacement
Manual Abort	Red "STOP" key and external shutdown terminals
External Interlock	Normally open switch or Logic Low

Password Access/Training

Up to 3 levels plus demonstration/ learning mode

Operating Modes

Manual, Timed, Timed Cycle, Sweep Cycle, External Switch/TTL

Control

Random Modes	Single channel, average, or extremal technique
Sine Modes	Single channel, average, extremal, resonant search and dwell, calibration. All modes use a tracking harmonic comb filter

Program

Random Spectrum Entry	Break point or line segment slope, graphical display
Sine Sweep Profile Entry	Break point or constant level, graphical display of acceleration, velocity, displacement, and frequency
Other Parameters	Virtual intrument design, minimum hidden menus

Test

Save and Recall	All parameters, user named including all program parameters, data, and display setting
Last Test	The last test run is automatically saved and can be recalled and continued or analyzed

Run Time Display

Graphical Data	Single or dual graphs with up to 2 acceleration/data channels or output drive data sets/graph: Ch 1, Ch 2, Control, Drive, Transmissibility: Ch 1/2 and Ch 2/1 (ch1/drive, sine)
System Monitor	Vibration system operation level meter
Timers	Cycle timers and sweep cycle counter

Graph/Data Save and Print

Save a full data set to disk, print direct, or clipboard the Test Log or any Graph

Post Analysis

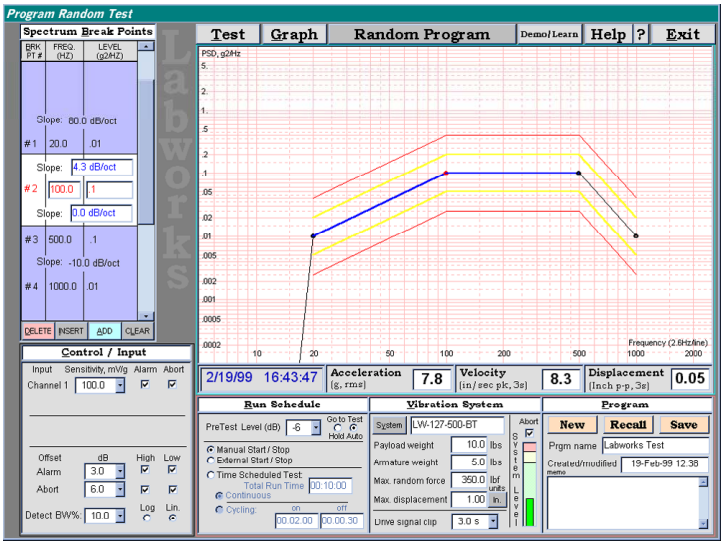
Any saved test can be recalled and the data re-configured for report printing or saving to the clipboard for incorporation into other Windows applications

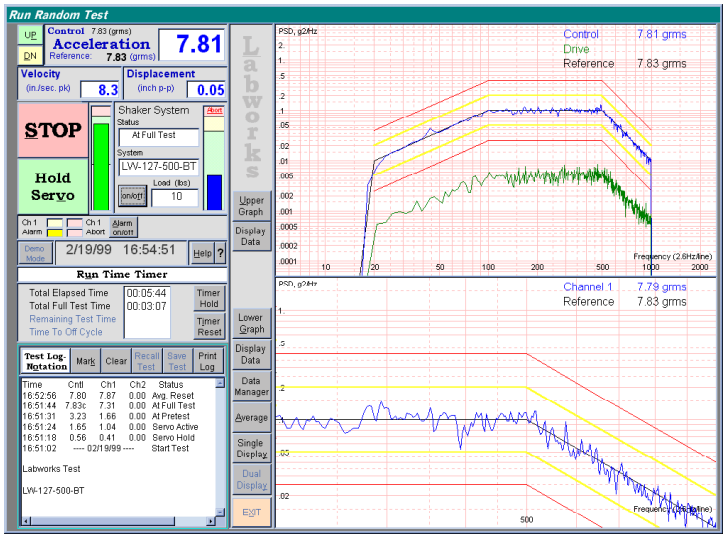
VibeLab™ VL-145 Series

DIGITAL VIBRATION CONTROLLERS

145x – Sine and Random
145s – Sine
145r – Random

- Straightforward Virtual Instrument operating under Windows™.
- Automatic spectral calculation of Acceleration, Velocity and Displacement.
- Programmed test requirements automatically compared to system capabilities.
- Online help for both novice and experienced users.
- Generate reports to use with your preferred software.
- Fully expandable to the top of the line VibeLab™ controller.
- Comes completely assembled with everything you need including computer, monitor, keyboard and accelerometer with built-in signal conditioning. Not a kit.





Complete Controller System Includes:

- Computer, Monitor, Keyboard, Mouse
- VibeLab™ and Windows™ software installed, ready to run
- Printer
- VibeLab™ Shaker interface PC Board w/accelerometer power supply, factory installed
- Accelerometer package: accelerometer, cable, stud, and mounting base

Labworks Inc.

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VibeLab™ VL-145 Series

Digital Vibration Controllers

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General Description

The VL-145 series VibeLab controllers are pc-based (WindowsTM) vibration test controllers. These controllers generate an analog output signal suitable for input to a vibration test system amplifier in response to specific user-defined test parameters. Vibration acceleration feedback from an accelerometer mounted on the shaker, fixture, and/or test article is compared with the desired test levels and the controllers internal servo adjusts its output to produce the corresponding vibration at the accelerometers location.

The VL-145 virtual instrument user interface layout, with its use of minimal hidden menus and straight forward terminology, is easy to use and the intuitive layout reduces the time required to learn, program, and run specific tests. Most critical system functions are automatically cross-checked during the program phase against the vibration system capabilities, accelerometer sensitivities, etc. to prevent erroneous or harmful tests. Previously defined test profiles can be recalled and saved at will as well as defined as the default start-up profile.

Three versions of the VL-145 single channel controller are available. The VL-145x single channel sine and random controller, VL-145s single channel sine only vibration and the VL-145r single channel random only vibration controller. The controller can be configured to monitor the operating level of the vibration test system and can be programmed to shut the system down if maximum operating levels are exceeded. The system parameters can be recalled from the complete Labworks system library or entered and saved to suit the your vibration system limitations.

VibeLab's primary report output is graphical. Either a single large or two smaller graphs can be prepared and printed or copied to the clipboard for use with other WindowsTM-based applications. Data files saved are spreadsheet compatible for custom report generation. The chronological test log is also available for direct printing or inclusion in custom reports.

General Specifications

Model Configuration*

VL-145x	Sine and random
VL-145s	Sine only
VL-145r	Random only

Frequency Range

Random*	6 to 2,000 Hz or 2 to 500 Hz
Sine*	2 to 10,000 Hz
Display Units	English or metric units with automatic conversion

Reports

Graphical, tabular, current, or post analysis

Signal Input

Number of Input Channels	1
Acceleration Range	Random: 0.2 to 100 grms* Sine: 0.1 to 200 gpk*
Acceleration Resolution	16 Bit
Maximum Input Voltage	5 V peak
Connectors	BNC
Dynamic Range	80 dB minimum

Vibration System Protection

System Checker	Automatic cross check of program with the vibration system force and displacement capabilities
Sensitivity Checker	Automatic cross check of program with accelerometer dynamic range and sensitivity
Run-Time and Output Level Monitors	Show the vibration system operating level and VibeLab signal output voltage level

Test Article Protection

Acceleration	Open loop/low gain + rate detection
Random*	Over and/or under acceleration alarm and abort levels
Sine*	System operation level, acceleration and displacement
Manual Abort	Red "STOP" key and external shutdown terminals
External Interlock	Normally open switch or Logic Low

Training

Demonstration/Learning mode

Run Modes

Random*	Manual, timed, timed cycle, external switch/TTL
Sine*	Manual, timed, sweep cycle, external switch/TTL

Program

Random Spectrum Entry*	Break point or line segment slope, graphical display
Sine Sweep Profile Entry*	Break point or constant level, graphical display of acceleration, velocity, displacement, and frequency
Other Parameters	Virtual intrument design, minimum hidden menus

Test

Save and Recall	All parameters, user named including all program parameters, data, and display settings
Last Test	The last test run is automatically saved and can be recalled and continued or analyzed

Run Time Display

Graphical Data	Single or dual graphs with acceleration or output drive data: Ch 1, Control, Drive
System Monitor	Vibration system operation level meter
Timers	Cycle timers* and sweep cycle counter*

Graph/Data Save and Print

Save a full data set to disk, print direct, or clipboard the Test Log or any Graph

Post Analysis

Any saved test can be recalled and the data re-configured for report printing or saving to the clipboard for incorporation into other Windows applications

*Sine specifications apply only to the VL-145x and VL-145s.
*Random specifications apply only to the VL-145x and VL-145r.

SC-121 *SINE SERVO CONTROLLER*

Vibration testing suddenly got a whole lot easier.

A remarkably convenient operator interface with performance found only in the best units available make the SC-121 ideal for controlling electrodynamic shakers in almost any test situation from research and calibration to production testing.

The SC-121 is unmatched in cost / performance value.

- Dual microprocessor design.
- Digital signal synthesis and filtering.
- Two-channel acceleration input and control.
- Flexible programming with non-volatile memory.
- Four independent meters display all control parameters.
- Analog data outputs interface easily to computer analog inputs and x-y recorders.

Labworks Inc.

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DESCRIPTION

The Labworks model SC-121 Sine Servo Controller incorporates the latest in microprocessor technology to provide an economical solution to modern sinusoidal vibration testing requirements with a remarkably convenient operator interface. It is designed for use with vibration test systems requiring sinusoidal vibration between 2 and 10,000 Hz with acceleration levels ranging from .5 to 99.9 g pk and displacement requirements from .02 to 2.5 inches pk-pk.

The servo provides an output that will give a constant displacement and or acceleration level during a swept or stationary sine test by means of an acceleration feedback signal.

Vibration displacement is generated internally by double integration of the channel 1 servo loop acceleration signal. A dual microprocessor design ensures that all commands bring immediate control response without degrading the performance of the control system.

Crystal controlled digital signal synthesis and filtering insures that the Labworks model SC-121 has performance specifications found only in the best controllers available.

The SC-121 has two acceleration input channels to facilitate tests requiring the comparison of two signals, such as calibration or transmissibility tests. The *difference* output makes transmissibility determination and calibration tests as easy as running a simple sine test.

Tests using large head shakers, slip tables or large fixtures

We packed the SC-121 with performance.

- Wide frequency range: 2.0-6,553 Hz or (4.0-10,000 Hz).
- High resolution: 0.1 Hz. or (0.2 Hz).
- Two independent input channels with built-in conditioning amplifiers.
- The built-in input amplifiers have a current source and adjustable sensitivity.
- Three separate digital meters monitor frequency, acceleration and displacement.
- Test cycle counter displayed on frequency meter upon demand.
- Control modes: channel 1 or average (channel 1 and channel 2).
- Output modes: Log channel 1 accel., Log channel 2 accel., Log average accel., linear difference ratio.
- Convenient user interface: requires little or no documentation to set up or run.
- Three program storage in internal non-volatile memory for easy recall of frequently used tests.
- Analog and TTL inputs and outputs allow the controller to function with either a PC or other test control or recording instruments.

are more precisely controlled by optionally using the *average* of the two channels for servo feedback.

The frequency generator and servo control sections are independent in order to allow either manual or automatic frequency control with the output under either manual or servo control.

In the manual frequency and output modes, the SC-121 functions as a high quality sine signal source with simultaneous control of frequency and amplitude. This mode is required for manual investigation of vibration response or general sine signal applications.

Flexible programming allows internal storage of up to three independent 2, or 4 level test profiles. Stored test profiles are easy to modify or replace and are maintained internally when the power is removed. This feature eliminates the need for external disks or memory cards and there are no batteries to wear down or replace.

Large displays indicate frequency, acceleration and displacement at all times without the need to manually switch the display function after a cross-over.

A programmable test cycle counter keeps track of the accumulated test time or can be set to terminate the test after a specific number of test sweep cycles.

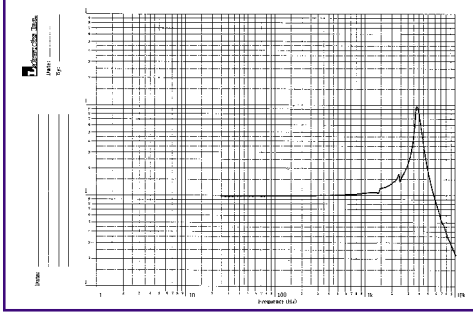
Digitally generated analog outputs for frequency and acceleration, facilitate plotting or recording test profiles, responses and transfer functions.

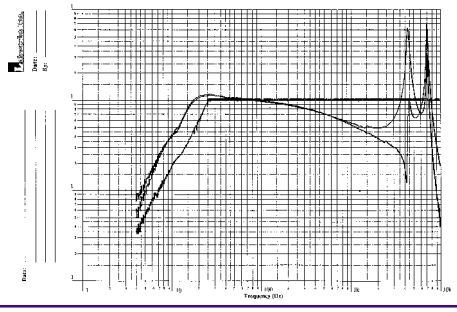
Analog outputs make recording or plotting test profiles easy.

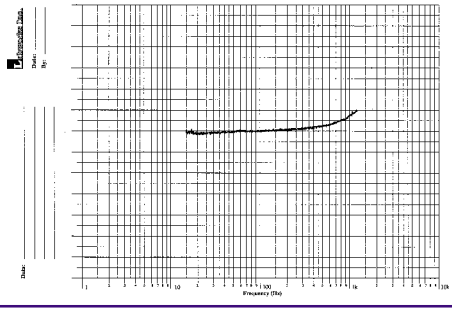
Transmissibility. Plotting transmissibility and acceleration response curves is a snap with the Labworks SC-121 sine servo controller. Simply place the control (channel 1) accelerometer on the input member, base or fixture and mount a response accelerometer (channel 2) on the active portion of the test load. Set the SC-121 to control on channel 1 and program for a constant acceleration output. Program the SC-121 for a frequency sweep over the band of interest and initiate a servo controlled frequency sweep. Switching the plotter output control to channel 2 allows recording or plotting the acceleration response on channel 2, producing a log transmissibility curve automatically.

2 Channel Average Control. When large test articles must be tested beyond their fundamental resonance frequency, an over test condition can occur where the control accelerometer is physically located at a resonance node. For this situation and others that would benefit from a sine test based on control of the average of two accelerations, the SC-121 has average control capability. Sine signals cannot be simply combined to form an average acceleration because of phase coherence. The detected scalar sine amplitudes must be used, but are not normally available from sine analysis instrumentation. The SC-121 solves this problem by providing for control on the average acceleration of both of its channels.

Calibration or Relative Acceleration. The analog data output can be switched to provide a linear DC voltage proportional to the ratio of the two acceleration inputs. A semi log formatted output is automatically presented to make acceleration transducer calibration or linear transmissibility curves easy to plot. This output voltage is normalized to 1.00 Vdc when the ratio of the two different accelerations is equal to 1. This allows the output to be read and interpreted by a common volt meter for inexpensive calibration or recorded or plotted by analog/digital conversion or analog recorder-plotters. The output ranges from 0 to 200% (0 to 2.00 Vdc) in the linear difference (ratio) plotter output mode.







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SC-121 SPECIFICATIONS

Frequency Generator

Range @ Resolution:	2. to 6553 Hz @ 0.1 Hz or 4 to 10,000 Hz @ 0.2 Hz [1]
Accuracy:	± .004%
Temp. stability:	± 100 ppm/°C
Display:	4 digit LED

Feedback Analysis

Acceleration:	
Range:	0 to 99.9 g pk
Accuracy:	0.2 dB ± 1 LSD / 5-7000 1.0 dB ± 1 LSD / 2-10,000
Display:	3 digit LED
Displacement:	
Range:	0 to 2.50 in. pk-pk or 0 to 50.0 mm pk-pk [1]
Accuracy:	0.2 dB ± 1 LSD / 5-7000 1.0 dB ± 1 LSD / 2-10,000
Display:	3 digit LED
Input channels / connector:	2 / BNC
Calibrated inputs:	10 or 100 mV/g
Variable inputs:	10 or 100 mV/g ± 20%
Accelerometer bias:	3 mA nom. (on-off)

Sweep, Logarithmic

Modes:	Manual, continuous or single sweep [2]
Rate:	0.5 to 8 octaves / min.
Sweep speed resolution:	0.5 octaves / min.
Sweep cycle counter:	-999 to 9999 sweep cycles [3]

Control Servo

Dynamic range:	70 dB min.
Control accuracy:	0.25 dB typical
Speed:	3 ranges, microprocessor optimized, frequency dependent.
Open loop monitor:	Adjustable, gain sensitive
Output level monitor:	10 segment bar graph

Outputs

Servo voltage @ impedance:	0 to 2.5 Vrms @ 50 Ω
Servo sine distortion (1.0 V out):	< .3% THD, 3rd harmonic: < -50 dB typical
Constant sine voltage @ impedance:	1.2 Vrms @ 10 KΩ
Normalized acceleration:	10 mV/g @ 50 Ω (both channels)
Data:	
Acceleration:	
Log ch 1,2 & avg.:	2 Vdc / decade
Difference, linear:	1.0 Vdc ± .01 Vdc / % difference
Impedance:	50 Ω
Frequency:	
Log:	2 Vdc / decade
Impedance:	50 Ω
Sweep/Pen lift logic:	TTL, low during sweep

Inputs

Reset, external:	TTL low or contact closure to ground
Shut down interlock:	TTL low or contact closure to ground

Program

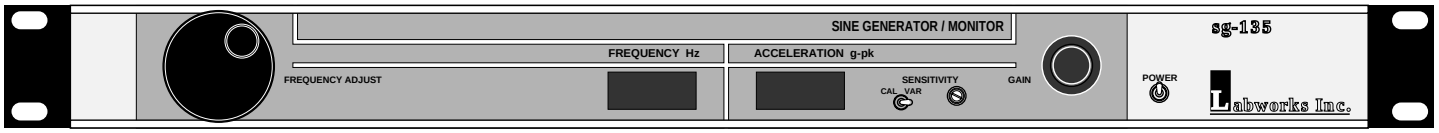
Levels per program:	2 to 4 (2 displacement, 2 acceleration)
Program memory:	
Non-volatile:	3 programs
Active:	1 program

Physical/environmental

Power:	110 ± 15 Vac or 220 ± 30 Vac, 50 / 60 Hz
Dimensions:	19 in. W x 12 in. D x 3.5 in. H
Weight:	5 lbs
Temperature:	
Operating:	± 60 to + 100° F
Storage:	± 40 to + 130° F
Humidity:	5 to 90% RH

[1] Internal switch selectable range.
[2] Sweep can start at any frequency within the programmed range, in either direction.
[3] The sweep cycle counter increments at each low frequency end point transition during continuous sweep mode and terminates the test when it increments from -1 to 0.

SG-135 *MANUAL SINE CONTROLLER*



Vibration testing just got more economical.

The SG-135 is a high quality sine signal source which provides simultaneous manual control of both frequency and amplitude. There are two digital readouts. One indicates the frequency of the output signal and the other displays acceleration in g's peak from a feedback accelerometer. It's an ideal choice for manual investigation of vibration response or control of electrodynamic shakers of all sizes.

Low cost control for the smaller shaker system.

- Digital meters for frequency and acceleration.
- Built in acceleration monitoring up to 100 g-pk.
- Small size 1.8" H x 19" W x 6" D (Rack Mount).
- Low cost unit with manual operation and control.
- Wide continuous frequency range: 1.0 to 10 kHz.
- Built in accelerometer power supply, 100 or 10 mV/g ± 30%.
- Fuzzy logic frequency control gives wide frequency range with maximum resolution.

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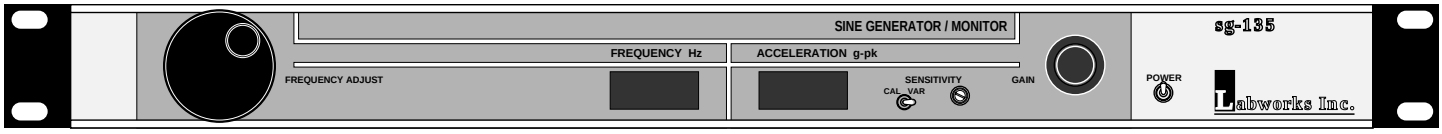
DESCRIPTION

The Labworks SG-135 Sine Generator/Monitor is a low cost, single-channel, manual sine controller that's adaptable to many test situations. It's perfect for controlling modal shaker systems, manual calibration stations, or for engineering evaluation and general sine testing applications requiring sinusoidal vibration between 1.0 and 10,000 Hz with acceleration levels ranging from 0.1 to 99.9 g peak.

An acceleration input channel is provided to facilitate tests that require testing to specific acceleration levels. Full manual control is enhanced by separate front panel frequency and signal gain controls. Frequency adjustment is logarithmic from 1.0 Hz to 10 kHz in one continuous range with an automatic linear fine adjustment mode. There is a locking 60+ dB output signal amplitude control. Two independent meters display both frequency and acceleration at all times allowing instantaneous assessment of the test status with just a glance. The four digit frequency meter shows output frequency with 0.2 Hz resolution below 1,000 Hz and 1.0 Hz resolution above 1,000 Hz..

The built in acceleration monitor accepts either voltage calibrated acceleration signals or integral electronics accelerometers directly and displays the monitored acceleration up to 100 g pk. Both meters are large and bright to allow reading at a distance from the instrument.



SG-135 SPECIFICATIONS

Frequency

Range @ Resolution:	1.0 to 10,000 Hz @ 0.2 Hz
Accuracy:	±0.004%
Temperature Stability:	±100 pm/ °C
Display:	4 digit LED

Acceleration Analysis

Range:	0 to 99.9 g pk
Frequency Range:	2.0 to 10,000 Hz
Accuracy:	0.2 dB ±1 LSD/5 to 7,000 Hz 1.0 dB ±1 LSD/2 to 10,000 Hz
Display:	3 digit LED
Input Connector:	BNC
Calibrated Input:	10 or 100 mV/g
Variable Input:	10 or 100 mV/g ±30%
Accelerometer Bias	3 mA nominal (on-off)

Outputs

Variable Out Voltage @ Impedance:	0 to 3.0 V rms @ 50Ω
Variable Out Sine Distortion (1.0 V Out):	<0.1% THD, 5 to 5,000 Hz <0.3% THD, 1 to 10,000 Hz 3rd harmonic <-50 dB typical
Constant Sine Voltage @ Impedance:	1.3 V rms @ 2 KΩ
Normalized Acceleration:	10 mV/g @ 50Ω

Physical/Environmental

Power:	110 ±15 VAC or 220 ±30 Vac, 50/60 Hz
Dimensions:	1.8" H x 19" W x 6" D (Rack Mount)
Weight:	5 lbs
Temperature:	
Operating:	±60 to +100° F
Storage:	±40 to +130° F
Humidity:	5 to 90% RH