L.A.B
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TECHLABSYSTEMS

SD SERIES™ SHOCK SYSTEMS

MECHANICAL SHOCK

SD-SERIES™ SHOCK MACHINE

In today's world, products and packaging are required to go through an extensive amount of testing before reaching the distribution environment. Often, many products are subjected to a specific test standard that requires the shock testing. L.A.B SD-Series™ Shock Systems are used to conduct such tests, due to their ability to produce drop impacts that are controlled, reproducible and accurate.

SHOCK WITH CONFIDENCE

The SD-Series™ of mechanical shock machines are used in the design of rugged products and cost effective protective shipping packages. The SD-Series™ produces half-sine, sawtooth, and square wave pulses meeting military (MIL-SPEC) and industrial (ASTM, ISO, JEDEC) specifications, as well as other specified test requirements.

SD-SERIES™ FEATURES

- High Performance Carriage: every SD-Series™ Shock Test System incorporates a highly engineered aluminum alloy carriage skilfully designed and machined to precision. This ensures that the carriage has no resonant frequencies within the machine's operating range. Consequently, the resulting shock pulses are clean and do not require over-filtering.
- Specimens are firmly anchored to the mounting surface, which is equipped with numerous tapped holes machined to close tolerances. Each hole is strengthened with steel inserts.
- Fail-safe rebound brakes are incorporated on every design, requiring no auxiliary air or electrical services. The brake arrests the carriage after rebound, prevents secondary impacts, and maintains the carriage in a fail-safe position during the hoisting cycle.
- Full safety guards are standard equipment on all SD-Series™ machines. These expanded sheet metal safety enclosures surround the hoist mechanism and the carriage falling zone. Opening the electrically interlocked enclosure door will interrupt hoist operation. Incorporating these enclosures as well as compliance with other features allow the SD-Series™ full CE Compliance
- No special foundation is needed. A solid steel reaction mass is isolated from the floor by heavy-duty springs and shock absorbers. This unique feature prevents transmission of shock waves created by the carriage impact, and is standard on all models.
- Automatic Cycle Counter allows multiple tests without operator intervention
- Complies with JEDEC, IEC, ASTM, ISO and other internationally recognized test standards.
- All SD-Series™ machines are manufactured in the USA using the finest materials available.

SD-Series™ Operation

Load sample and accelerometer to carriage. Easily set the desired drop height by adjusting the release mechanism on the scale. Ensure proper pulse pad. Close the safety enclosure and turn on the switch. The chain will lift the carriage until the release mechanism is reached and the carriage drops. That's it!

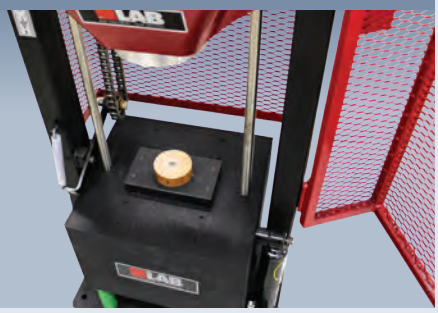
SD-SERIES™ OPTIONS

- Extended drop height as required by customer
- Half Sine Shock Programmers are calibrated to produce standard shock pulses
- Trapezoidal(square-wave) Pulse Cylinder pneumatically produces pulses and includes pressure regulation. A 13.8 Mpa (2000 psi) Nitrogen supply is required.
- Elastomer Half Sine Kit includes 9 elastomer modules, two mounting plates, and fasteners. This allows a wide variety of half sine/haver-sine pulses to be generated.
- Dual Mass Shock Amplifier produces short duration, high acceleration shock pulses on small items.
- Low Impulse Kit produces shock pulses with a velocity change of 1.5 m/s (5ft/sec) or less with a pneumatic cylinder that slows down the shock table prior to impact.
- Acceleration Kit for high energy pulse generation.
- Our Premium Data Analysis and Acquisition Systems;TLP (Test Lab Professional) and DAS105 accurately capture and analyze data from multiple tests, as well as provide quantitative results for real-time or post test evaluation.

CE COMPLIANT

SD-SERIES™ MODEL COMPARISON

SD-Series™



	METRIC	ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH
Machine Type	SD-10		SD-16		SD-24	
Size	254 x 254 mm	10 x 10 in	406 x 406 mm	16 x 16 in	610 x 610 mm	24 x 24 in
Test Load Rating	14 kg	30 lbs	91 kg	200 lbs	181 kg	400 lbs
Carriage Weight	20 kg	45 lbs	77kg	170 lbs	245 kg	540 lbs
Mounting Hole Pattern	M6x1 - 50 mm Grid		M8x1.25 - 75 mm Grid		M10x1.25 - 100 mm Grid	
Standard Carriage Fall	1067 mm	42 in	1524 mm	60 in	1524 mm	60 in
Optional Carriage Fall	*** Consult Factory ***					
Maximum Acceleration	3500 G		1500 G		1000 G	
Minimum Pulse Duration	0.3 ms		0.5 ms		1 ms	
Isolated Base Weight	228 kg	500 lbs	952 kg	2100 lbs	1497 kg	3300 lbs
Floor Space Required	305 x 635 mm	12 x 25 in	686 x 838 mm	27 x 33 in	1219 x 1219 mm	48 x 48 in
Machine Overall Height	Selected Carriage Fall		Selected Carriage Fall		Selected Carriage Fall	
	Plus 1321 mm	Plus 52 in	Plus 1549 mm	Plus 61 in	Plus1829 mm	Plus 72 in
Shipping Weight	431 kg	950 lbs	1588 kg	3500 lbs	2495 kg	5500 lbs
Standard Power Inputs	100-230VAC-1 PH-50 or 60Hz					

Please consult L.A.B. Equipment, Inc. for non-standard specifications.
Due to our continuous commitment to product development, the above specifications and features may be modified without notice.

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A Spectral Dynamics Company
SPECTRAL DYNAMICS

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L.A.B. Mass Shock Amplifiers

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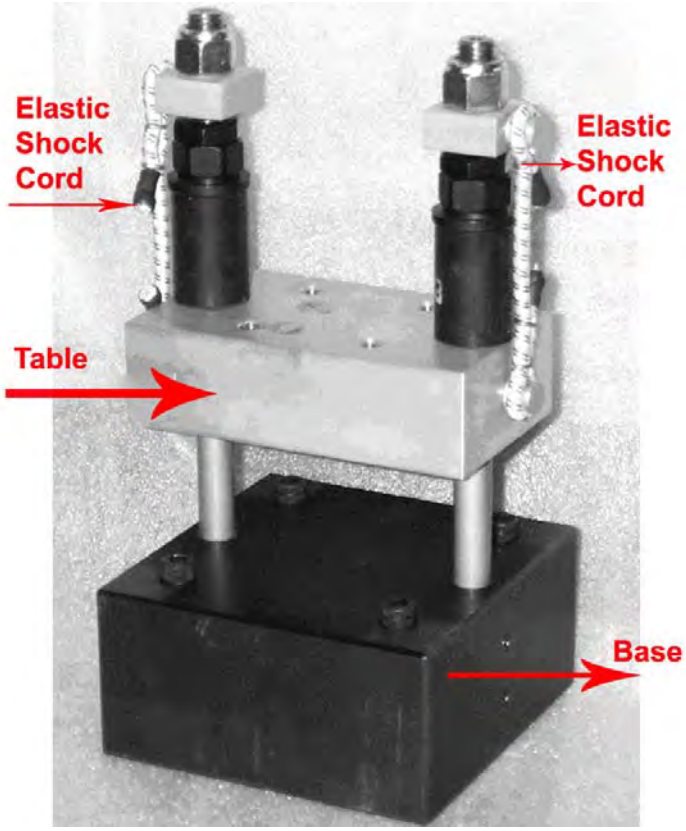
Mass Shock Amplifiers

For High Intensity Shock Testing

Introduction

Mass Shock Amplifiers (MSA) are use for testing relatively small specimens with very short duration, high acceleration pulses on shock machines which would not be capable of generating these pulses. There are two models: MSA-89x89 and MSA-305x305.

Both models can be used for generating the most test conditions specified in MIL-STD, ISTA, ASTM, ISO and other internationally and industry recognized standards. Depends on shock systems, the MSA-89x89 can generate accelerations as high as 100,000 g; and the MSA-305x305 can generate accelerations up to 10,000 g at pulse duration as short as 0.2 ms.



Specifications

	MSA-89x89	MSA-305x305
Specimen mounting surface	3.5” x 3.5” (89 x 89 mm)	12” x 12” (305 x 305 mm)
Maximum specimen weight	5 lbs (2 kg)	25 lbs (11 kg)
Maximum acceleration	100,000 g	10,000 g
Maximum pulse duration	1.0 ms	1.0 ms
Minimum pulse duration	.05 ms	.2 ms
Velocity amplification	10% minimum 30% maximum	10% minimum 30% maximum
Table weight	1.6 kg	21 kg
Base weight	15 kg	227 kg
Base dimensions	152 mm x 152 mm	305 mm x 457 mm

System Operation

The amplifiers consist of precisely guided secondary shock table and a massive base which is bolted to the top of the table of the primary shock machine. The specimen is mounted on top of the secondary shock table.

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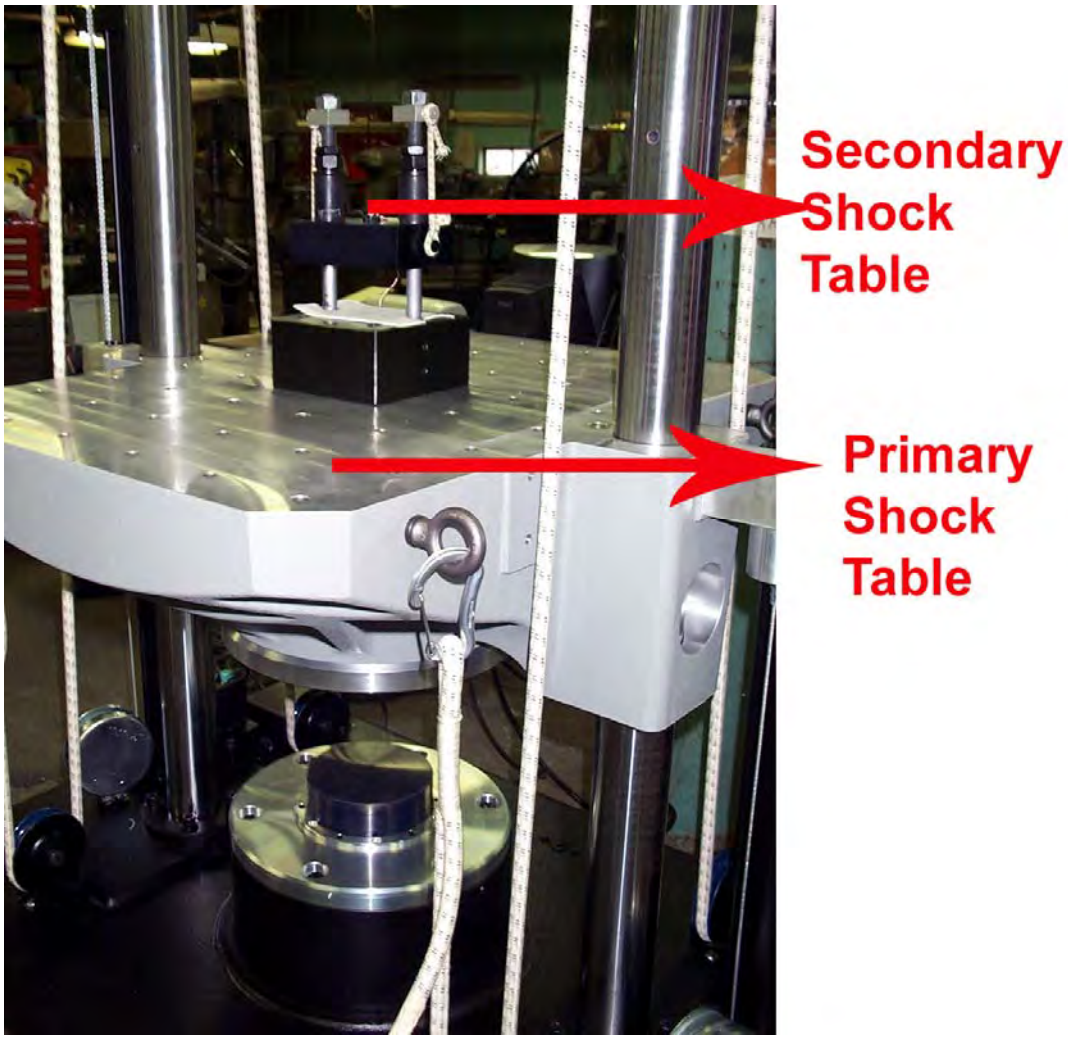
The secondary table is held up against high damping elastomer bumpers by elastic shock cords. A high density felt programmer is placed between the secondary table and its base. The thickness of the felt controls the duration of the pulse experienced by the secondary table and the specimen.

Any type of resilient programmer which will produce a pulse duration of about 6 ms or less is used between the primary table of the machine and its base.

While the primary shock table is falling, the secondary table is held approximately 64 mm above its base by the elastic shock cords. When the primary shock table impacts and rebounds from the programmer on the base of the machine, the secondary table continues downward stretching the shock cords. While the primary shock table is moving upward after rebound, the secondary table impacts on the felt programmer and then rebounds against the soft elastomer bumpers and is held against the bumpers by the shock cords. When used on a shock machine with rebound brakes, no secondary impact on the felt programmers occurs because of the high damping properties of the bumpers and the upward pull of the shock cords.



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Mass Ratio and Velocity Amplification

Because the weight of the secondary table and specimen is much less than the combined weight of the primary shock table and amplifier base which it is impacting against, the secondary table experiences a velocity change which is greater than that experienced by the primary shock table. This velocity amplification ranges from a minimum about 10% for machines with light shock tables to a maximum about 30% for machines with heavy shock tables. A "light" shock table is anything between 9 kg to 45 kg. A "heavy" shock table is anything between 45 kg to 227 kg.

To calculate the maximum performance of the shock amplifier on a particular shock machine, it is necessary to know the machine's maximum velocity change and the approximate weight of the primary shock table.

Secondary Table ΔV = Amplification x Machine Velocity Change

For example, the performance of both MSA-89x89 and MSA-305x305 would have the following performance on a shock machine capable of producing a velocity change of 9 m/sec and a shock table weighing 136 kg:

MSA-89x89 – the 136-kg table is in the "heavy" range, so the maximum amplification factor is used.

Secondary Table ΔV = 1.3 x 9 m/sec = 12 m/se

MSA-305x305 – the 136-kg table is between the "light" and "heavy" range, so an intermediate amplification factor is used.

Secondary Table ΔV = 1.2 x 9 m/sec = 11 m/sec

To determine what combination of peak accelerations and pulse durations can be generated on the shock amplifiers, the following formula can be used for half-sine pulses:

$$\Delta V = .02\ AT$$

Where ΔV = Velocity Change in ft/sec; A = Peak Acceleration in g's; T = Pulse Duration in millisecond

For example, the velocity change required to produce a 10,000 g / .2 ms pulse is

ΔV = (.02) (10,000) (.2) = 40 ft/sec (12 m/sec)

Easy-to-Use System

The Mass Shock Amplifiers are very simple to use. The pulse duration is adjusted by changing the thickness of the high density felt programmer. Peak acceleration is controlled by changing drop height or velocity change on the machine.

No adjustment of the elastic shock cords or of any bolt torques are required. When used on machines which product repeatable velocity changes, repeatability of the pulses produced by the shock amplifiers is excellent.

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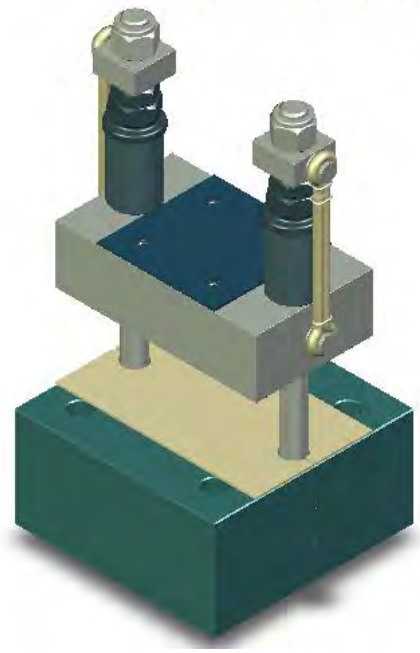
Mounting Guide

To install the MSA, it may be necessary to back off the adjusting nuts on either side of the adjuster block in order to permit insertion of an Allen wrench between the MSA table and base.

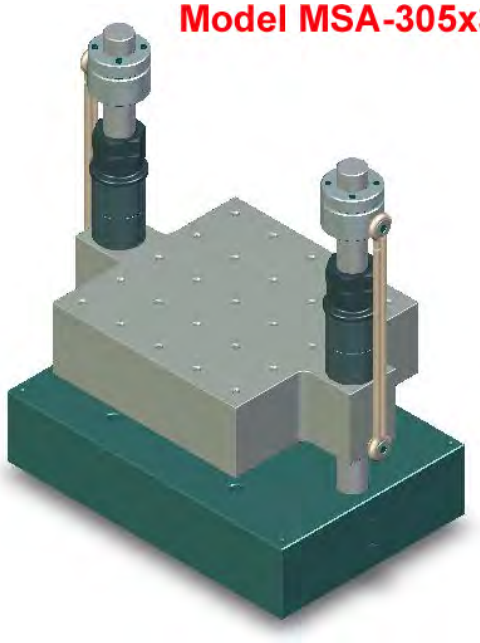
Proper preload can then be applied by positioning the adjusting nuts so that the distance between the bottom surface of the MSA table and the top of the MSA base in 2 – ½ (635 mm).

Center the MSA base on the shock machine table and align the mounting holes. Tighten the hold down bolts. If the mating surface appears to be uneven, apply a coat of grease at the interface and then tighten the hold down bolts. This will improve the mechanical coupling.

Model MSA-89x89



Model MSA-305x305



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