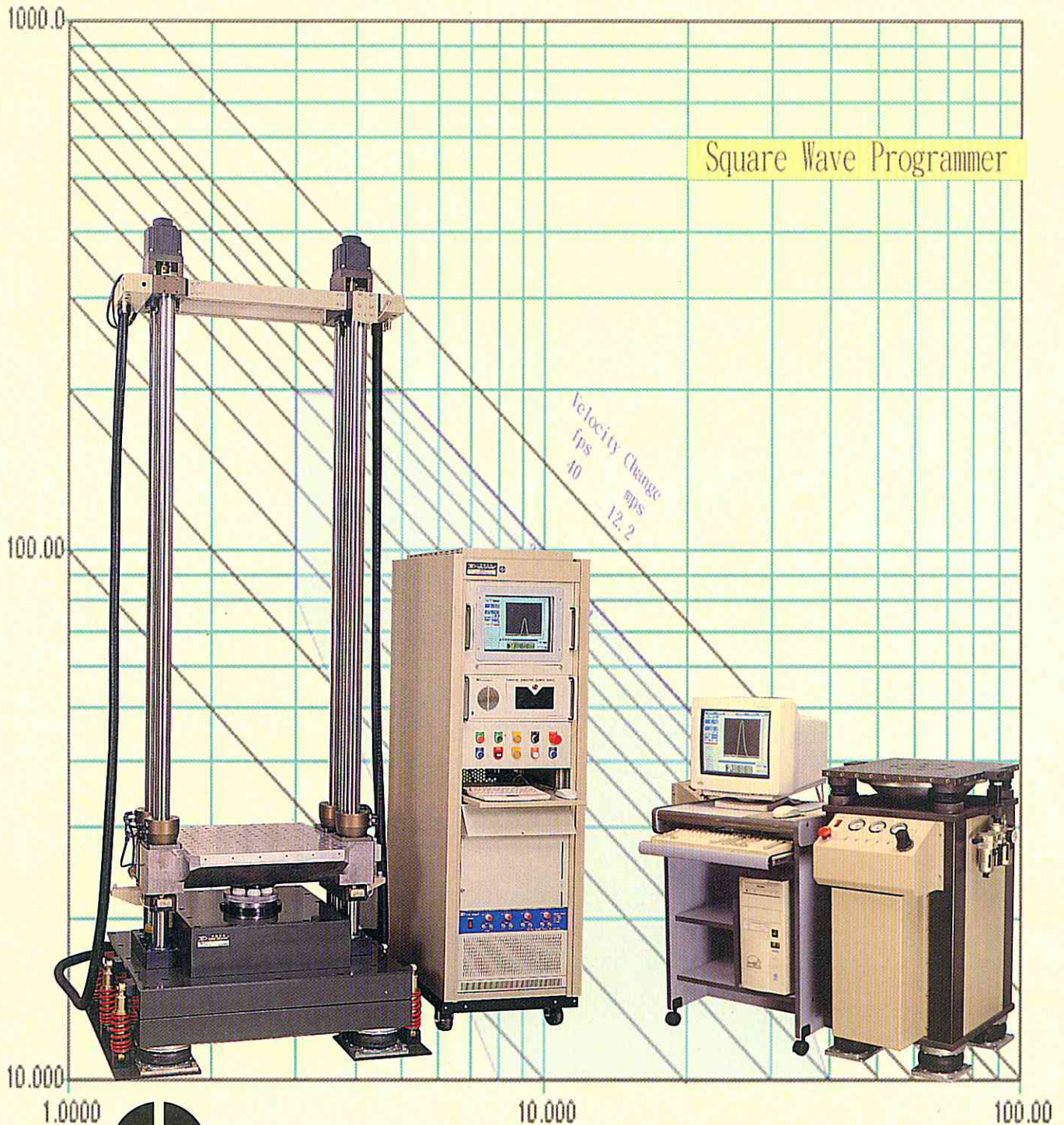


# SHOCK TESTER



GOOD DESIGN  
PRODUCT  
2000

KING DESIGN INDUSTRIAL CO., LTD.

## System Specifications:

Model	DP-1200-ST	DP-1200-SP	DP-1200-ST-S
Pre-test		Pneumatic	Pneumatic
Waveform		Half sine	Half sine
Table dimension (mm)	600x 600		450x 450
Weight of table (kg <sub>w</sub> )	42		37
Material of table	Aluminum Alloy		
Max. loading (kg <sub>w</sub> )	100		60
Min. duration time (ms)	7~11		7~11
Max. acceleration (g)	50		50
Spectrum analyze (option)	Single channel	3D & 3 channels	Single channel
Change rate (time/min)	10~20		10~20
Max. velocity change (m/s)	3.4		
Dimension of machine (cm)	60(L)x 60(D)x 90(H)		45(L) x 45(D)x 90(H)
Weight of Machine (kg <sub>w</sub> )	400		360
Power requirement	110V, 12A/220V, 8A @ 50/60Hz		
Pneumatic pressure (kg/m <sup>2</sup> )	7 (minimum)		

*King Design total solution service items:*

### Products:

Vibration/Shock/Drop Testing Equipment  
 Agree Chamber---Combine Vibration/Temperature & Humidity  
 Telephone Testers

### Laboratory Testing Item:

Vibration Diagnoses/Vibration Testing/Shock Testing/  
 Vibration Measurement/Accelerometer Calibration/  
 Shock Measurement/Drop testing/Temperature Cycling Testing/  
 Low Temperature Cycling Testing/Dry Heat Testing/  
 Temperature-Humidity Cycling Testing/Temperature-Vibration  
 Testing

*Please contact us for more information.*



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*※Specifications subject to change without notice.*

**SYSTEM COMPOSITION:**

- a. Air-bump shock test machine.
- b. Padx 2 pieces.
- c. Control and spectrum analysis software (single or 3D, 3 channel).
- d. Shock accelerometer. (single axis or 3 axis)

**OPTION:**

- a. Air compressor.
- b. PC for controller use.
- c. Pad for duration time.

*Al-alloy with elastic rubber head*



*DP-1200-SP*



*DP-1200-SP-S*



# SHOCK TESTER OF AIR-BUMP TYPE

## Introduction:

DP-1200 air-bump type shock tester series are ideally suited for testing components, assemblies and packaged product ready for shipment or for evaluating the performance of product at the development stage.

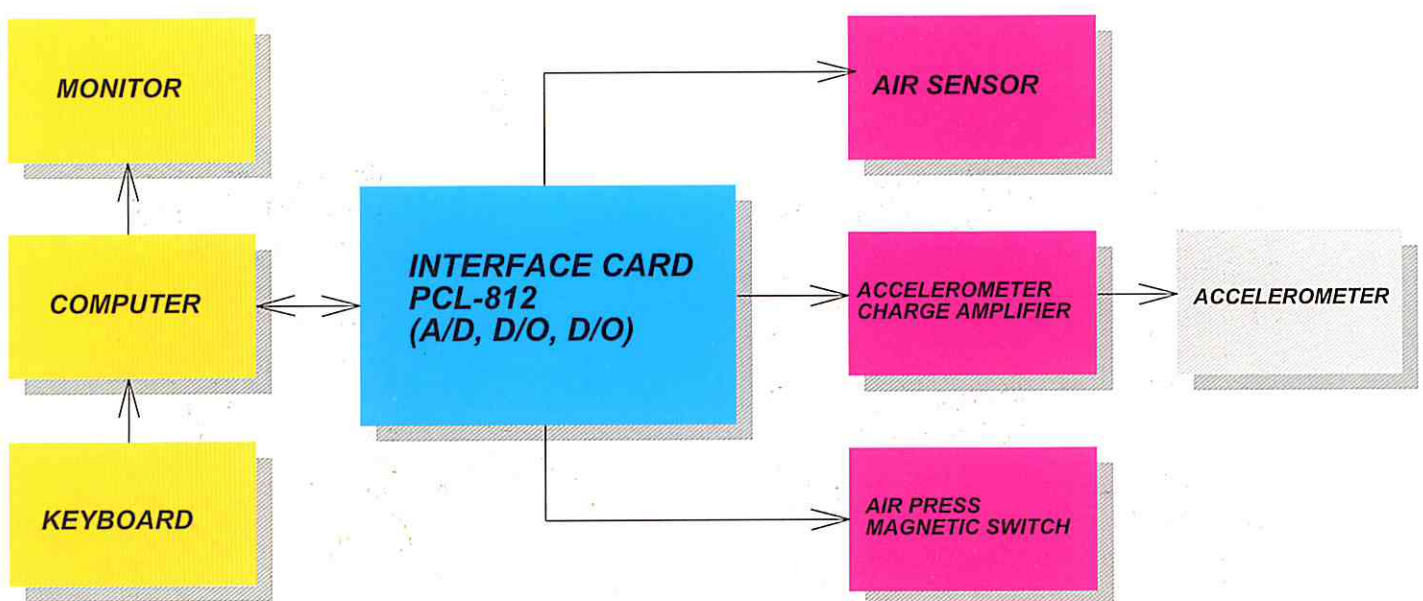
These machines are specially designed to meet the test requirements of industrial and commercial standards. With latest and innovative technology, users can easily program the test specification into the controller and perform test without much professional training.

The rate of generating shock pulse is approximately 10~20 times per minute, and it is suitable for quality control, quality assurance or production line for a screening purpose

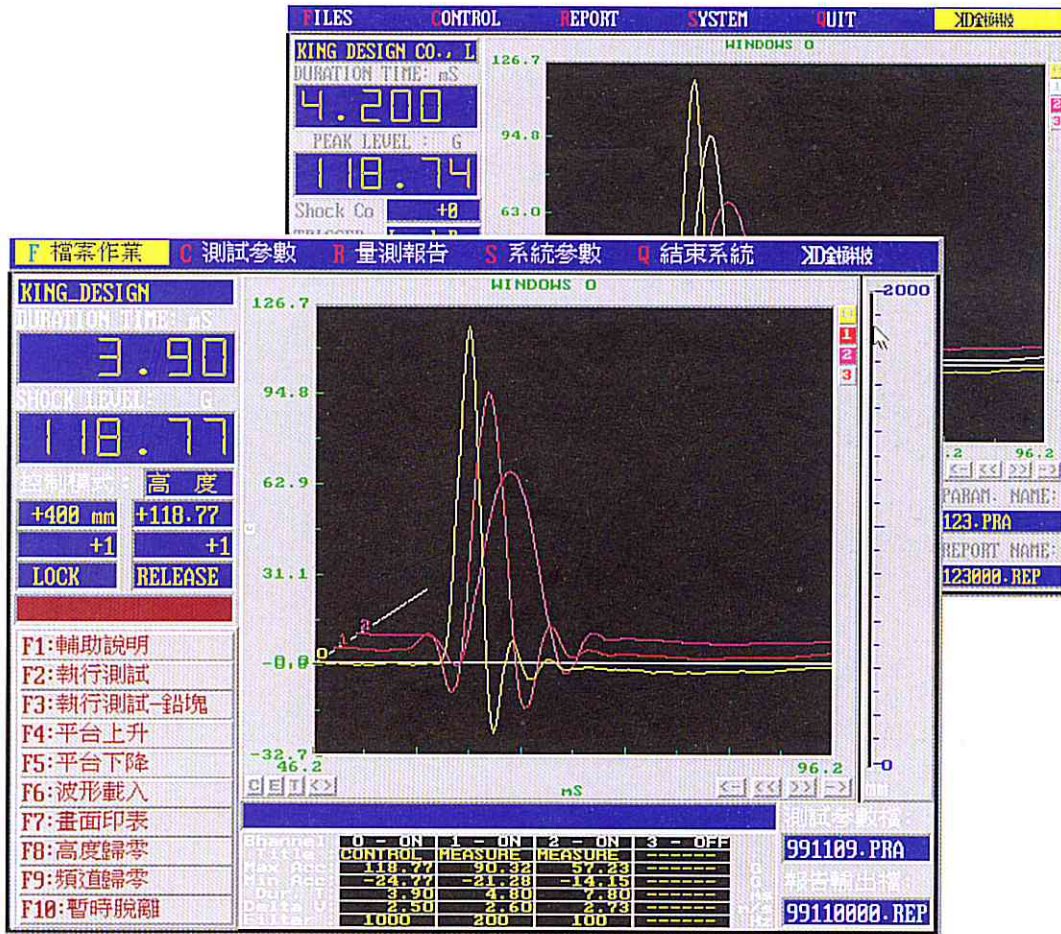
## Features:

- Excellent repeatability.
- User-friendly program interface.
- Shock waveform hardcopy function provided.
- Test condition stored and retrieved.
- High reliability and trouble-free service.

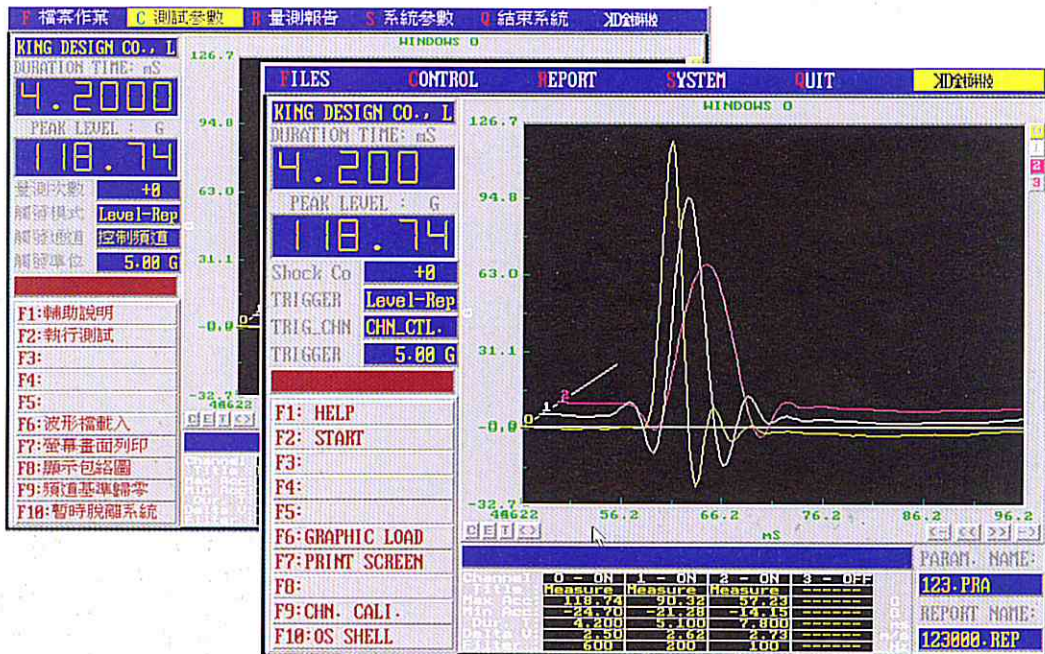
***Block diagram of air-bump shock tester***



# Display Pattern



3 axis of measurement channel display (English / Chinese version)



Shock controller can be separated from shock machine for shock measurement

# SHOCK TESTER OF FREE-FALL TYPE

## **SYSTEM CONSIST : Control section**

Standard 19 Rack

330kHz High Speed Data Acquisition Card PCL-1800

Shock Measurement Software

MS-PC pulse generator card(PCL-240AK)

YSDC-1350 pulse DC servo motor driver

Power Supply Devices

Shock Control Accelerometer

Tri-Axis Accelerometer

Measurement Channel Cables

Accelerometer Charge Amplifier

Signal Transfer Interface Box

Signal Cable D-type 37 pins

Signal Conditioner (Industrial PC & LCD Display), Printer (Option)

## **SYSTEM CONSIST : Machine Section**

M30R4-37 DC servo motor

LHT-001-1000 encoder

Limit switch.

High speed pneumatic magnetic devices.

Free fall shock Table

Guide columns.

Machine base with isolated suspension devices.

## **Programmer :**

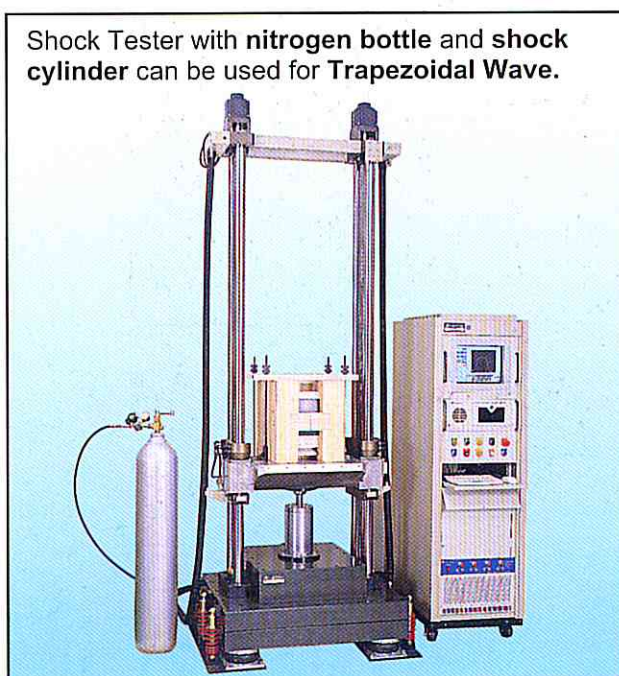
**Pad : Elastic rubber for Half Sine wave.**

**Lead-Tin alloy cone for Square wave & Sawtooth wave.**

To continue and easy operation, a **nitrogen bottle** and **shock cylinder** can be used for **Trapezoidal Wave**. To adjust air pressure control the duration time, test height control the acceleration.

## **Fixtures :**

King Design provides suite and special design fixtures to easily testing procedure.



# SHOCK CONTROLLER

## Operation

Measure Ability

Channel Sensitivity Setting

Classical Pulse Duration

Filter

Sampling Rate

Channel Display Setting

Display Shock Waveform

MAXIMUM COUNT

ACCELERATION

CONTROL MODE

SHOCK HEIGHT

ACC SENSITIVITY

SYSTEM POWER

AIR PRESSURE REQUIRE

Tri-axis in three individual windows (English / Chinese version)

3+1 channel for shock testing (English/Chinese version)

English/Chinese Version Select

Color Monitor Display manu & interactive operation

Testing Results---Save, Restore, Printing

1+3 Channels

1~200mv/g Programmable

2mSec~100mSec(0.2mSec for 1channel measurement)

100Hz~20kHz programmable

100kHz

3+1 Channel Display, Individual Display Window Setting

Acceleration (G s)

Duration (mSec)with time domain Zoom setting

Velocity ( $\Delta V$ ,m/Sec)

DBC(Damage Boundary Curve)Test

90000000 Time(cycling test)

20-100g

1. HEIGHT

2. G level           Close Loop Control

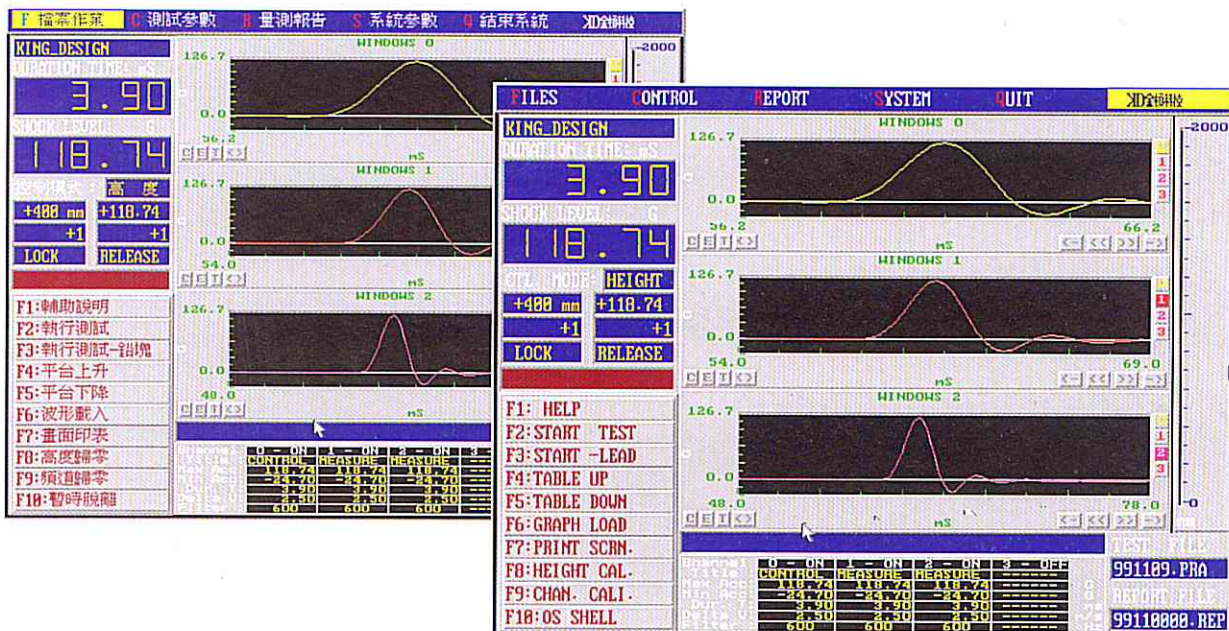
1800mm

1.0-100.0Mv/g

AC 220V 50/60Hz 13A(Continuous)

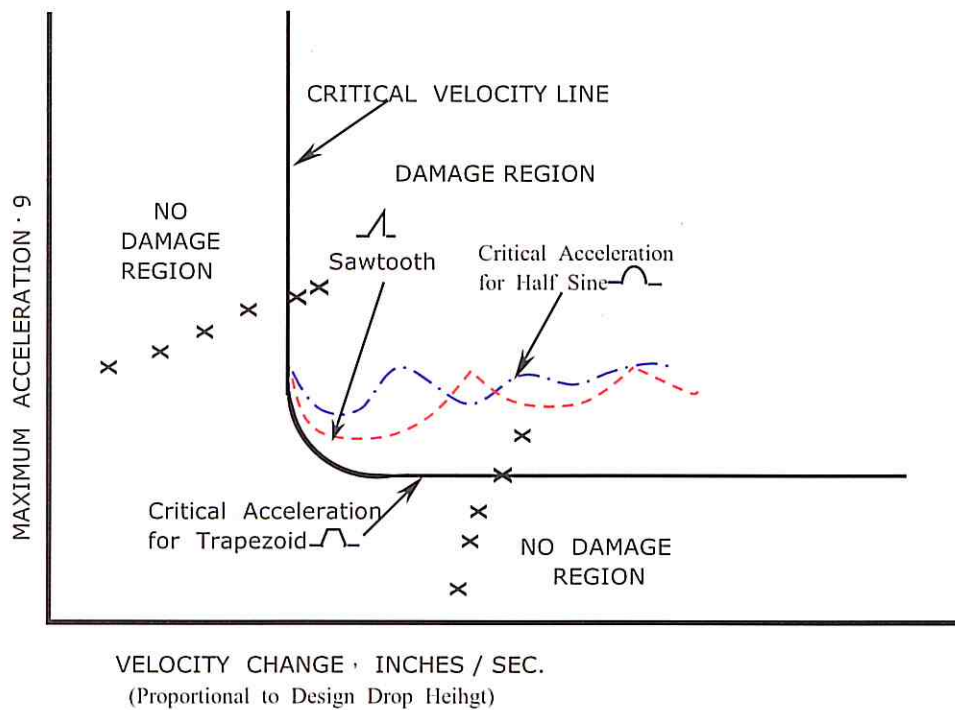
33A(Transient)

5-8kg/sqcm



## Display Pattern

3 axis of measurement channel setting individual display (English / Chinese version)



Many products have different fragility, shock test can plot the fragility boundary curve.

First, we should find out the critical velocity, setting shock tester produce equivalent 15mm or higher, half sine waveform, fix the specimen on shock table, then process first dropping. The specimen is examined for electrical, mechanical, and functional damage. A definition or limit of damage, which can be tolerate must be established, prior to the drop.

After the first and all subsequent drops, we can determine the next step as following:

If no electrical, mechanical, or functional damage is evident, increase the table height (mean is velocity change), slightly each time, until damage occurs or until the product can withstand the highest typical design height established. Increases or increments of 0.15 m/s or less recommended.

If damage is evident, this establishes one point on the fragility bound curve.

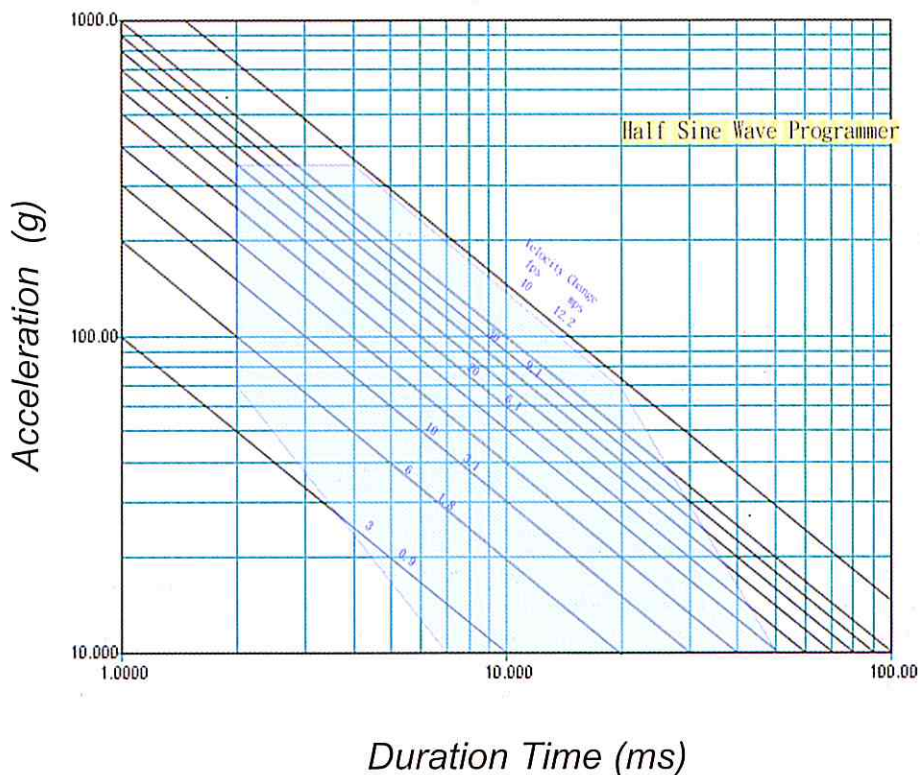
Second find out critical acceleration.

The initial test pulse (trapezoidal pulse) should have a faired acceleration level well below the anticipated failure level of the product. A starting point of 10 G or about  $100 \text{ m/s}^2$  is appropriate for most products. The duration time is 0.50 divided by the resonant frequency. Peak and estimated faired acceleration levels, pulse duration and velocity change.

The fragility or damage boundary curve can now be plotted. Use the last successful shock input before failure to establish the vertical and horizontal lines boundaries of the curve.

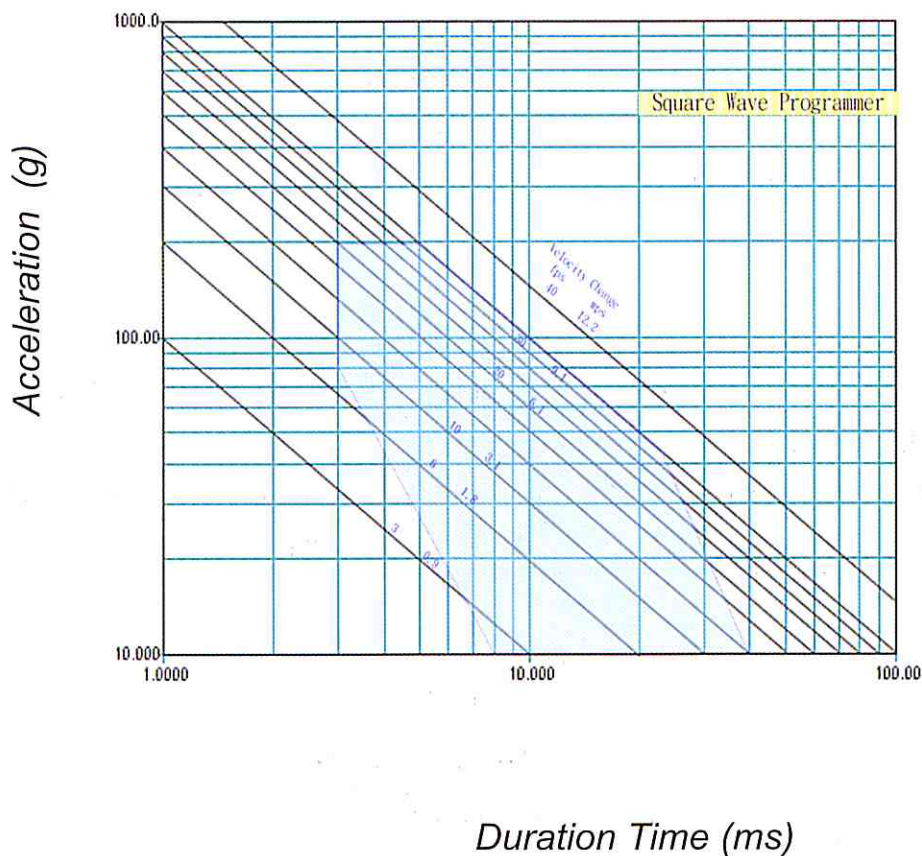


### Square wave Programmer



Velocity Change	
fps	mps
40	12.2
30	9.1
20	6.1
15	4.6
10	3.1
6	1.8
4	1.2
3	0.9

### Half Sine Wave Programmer



Velocity Change	
fps	mps
40	12.2
30	9.1
20	6.1
15	4.6
10	3.1
6	1.8
4	1.2
3	0.9

# FREE-FALL TYPE OF SHOCK TESTER

## Features:

- Waveform: **Half Sine, Trapezoidal, Sawtooth** waves.
- Velocity: minimum 6 m/sec.
- Performing shock test conditions with high accuracy and repeatability.
- Shock impact-point with high consistency, no shift, rotation, and second bumping.
- Full digital control system.
- Color monitor maximum showing 4 channels of shock waves simultaneously.
- Pop-down menu and user-friendly interactive operation.
- Test results report included.
- Enhanced shock absorber design minimizing the interference of floor structure.

## System Specifications:

Model	DP-1200-45	DP-1200-60	DP-1200-80	DP-1200-100	DP-1200-150/75
Table dimension (mm <sup>2</sup> )	450x450	600x600	800x800	1000x1000	750x1500
Table weight (kg <sub>w</sub> )	70	120	160	260	260
Table material	Al - Magnesium Alloy				
Max. payload (kg <sub>w</sub> )	50	90	105	200	200
Min. pulse duration (ms)	3	2	2	2	2
Max. acceleration (g)	350	600	500	600	500
Measuring channel	Single (standard) / 3-Axis (option)				
Max. shock rate(pulse/ min)	2 - 10				
Rise method	M30R4-37 Servo Motor-Spiral Pillar Micro-Control				
Table Stroke Height (mm)	Max. 180				
Acceleration Setting	Controller setting acceleration or Table Height				
Max. velocity change (m/s)					
Half sine	6.7	6.7	6.7	6.7	6.6
Trapezoidal	7.0	7.0	7.0	7.0	7.0
Sawtooth	2.7	3.0	3.0	3.0	3.0
Dimension and weight of shock machine					
L× D× H (mm)	100x60x325	100x60x320	120x80x325	180x120x320	200x100x325
Weight (kg <sub>w</sub> )	1200	1200	2500	3200	3000
Dimension and weight of console					
L× D× H (mm)	Standard 19 rack				
Weight (kg <sub>w</sub> )	265				
Power requirement	110V, 12A /220V, 8A @ 50/60Hz				
Air pressure requirement	5~8 kg/cm <sup>2</sup>				

# WAVEFORM DESCRIPTION

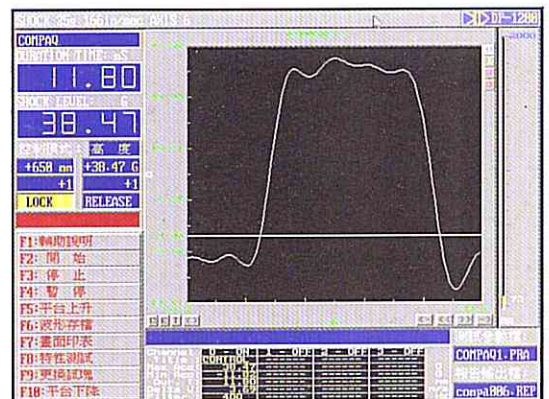
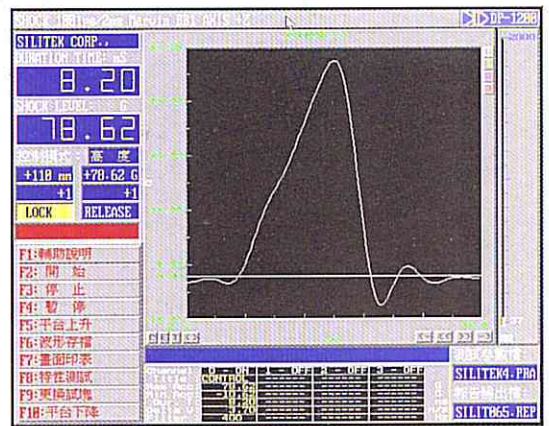
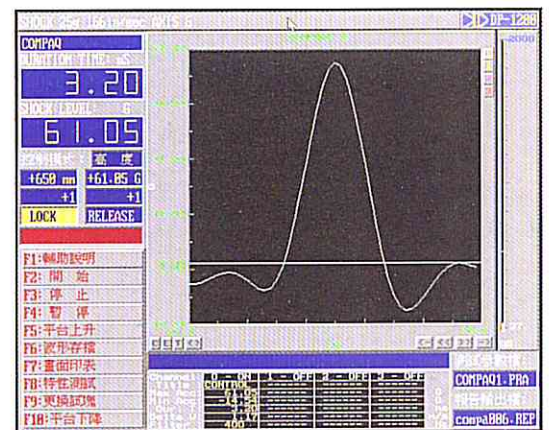
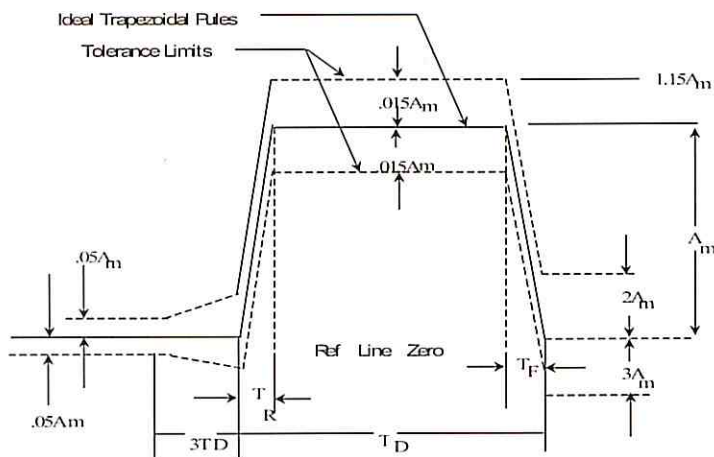
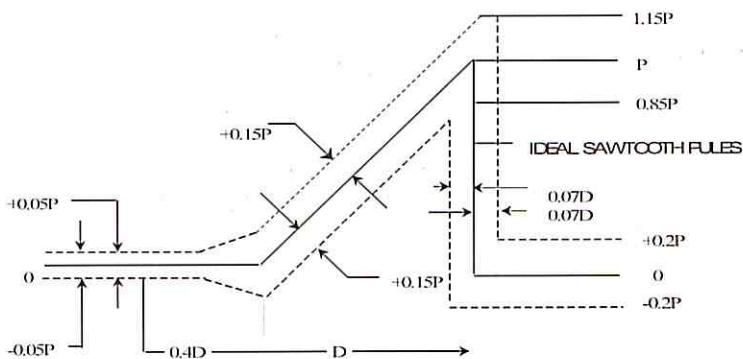
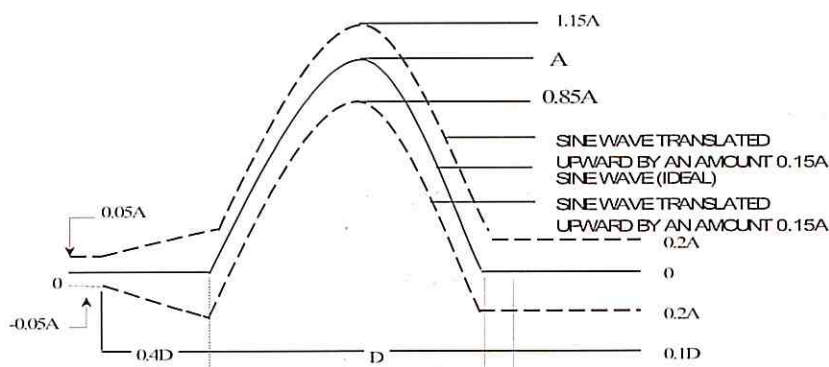
For IEC 60068-2-27: Basic environmental testing procedures---Shock test

Half Sine Wave	• Velocity Change: $2/\pi \times A \times D \times 10$
Sawtooth Wave	• Velocity Change: $0.5 \times A \times D \times 10$
Trapezoidal Wave	• Velocity Change: $0.9 \times A \times D \times 10$

When A = Peak Acceleration (m/S<sup>2</sup>)

D = Duration of Shock Pulse (milli-Second)

- Velocity change tolerance: within  $\pm 15\%$  of the nominal pulse.
- Transverse motion:  $< 30\%$  of the nominal peak acceleration.



Since 1983, KING DESIGN has engaged in research and development of vibration testing system, including temperature / humidity-vibration combined-environmental reliability testing system, shock testing systems and telecom instruments. KING DESIGN also accepts customer- requested regarding designs.

The SHOCK TESTER 1200 series are designed for any kinds of field and laboratory tests, such as quality control and assurance, engineering testing, research and development, etc.

The series of SHOCK TESTER have good quality with easy operations and installations. Its control system is a PC-based type, and DOS or Windows versions are available. Depending on the principle of operation, these 1200 series are classified into air-bump and free-fall types. The waveform, measuring channel, and pad for tuning waveform of SHOCK TESTER are summarized as the following table:

Type	Air-Bump	Free-Fall
Waveform	<ul style="list-style-type: none"> <li>● Half Sine</li> </ul>	<ul style="list-style-type: none"> <li>● Half Sine</li> <li>● Trapezoidal</li> <li>● Sawtooth</li> </ul>
Measuring Channel	<ul style="list-style-type: none"> <li>● Single</li> </ul>	<ul style="list-style-type: none"> <li>● Single / 3-axis</li> </ul>
Pad	<ul style="list-style-type: none"> <li>● Al-alloy with elastic rubber head</li> </ul>	<ul style="list-style-type: none"> <li>● Elastic rubber</li> <li>● Lead-Tin alloy cone</li> <li>● Pneumatic Cylinder</li> </ul>
Characteristics	<ul style="list-style-type: none"> <li>● Fast repeating test,</li> <li>● Low Velocity change</li> <li>● Support with fast air pressure</li> </ul>	<ul style="list-style-type: none"> <li>● Wide Velocity change</li> <li>● Multi-purpose for Laboratory</li> </ul>

Basically, parameters of shock test are described as the following:

1. *Waveform? (Half Sine, Trapezoidal, Sawtooth)*
2. *Pulse duration (ms)?*
3. *Peak acceleration (g)?*
4. *other: Number of pulses for each axis? Function check?*

As aforementioned, the user must provide the information of waveform to be generated, pulse duration and its peak acceleration to manufacturer or its agent in order to select the SHOCK TESTER properly. All those materials could be abstracted from the test specification they encountered.

For SHOCK TESTERS of the KING DESIGN, proper arrangement of pads can adjust the waveform, peak acceleration and pulse duration as desired. The user purchases combination of elastic pads according to our recommendations.