L.A.B. Equipment, Inc.

Mechanical Vibration Testing

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004
Introduction

• If a device is exposed to vibration of any kind or nature at any time during its useful life, the designer must anticipate the effect of such vibrations on the device.
Origin of AGREE Testing

• Developed by the Advisory Group on Reliability of Electronic Equipment - established 1959

• Recommended test methods based on military and industrial standards
Vibration Test Applications

- Product Development
- Quality Control
- Reliability Evaluation
- Engineering Analysis
Destructive In-Use Elements Include

- Shock
- **Vibration**
- Temperature
- Humidity
Combined Environment Test System

- Unit Under Test
- Temperature/Humidity and/or Altitude Chamber
- Vibration Machine
- Data Acquisition Instrumentation

BR-Series Shaker

Environmental Chamber

www.labequipment.com
L.A.B. Equipment, Inc.
All rights Reserved 2004
Definition: Vibration Machine

• A vibration machine produces controlled and reproducible mechanical vibration for the purpose of vibration testing mechanical systems, components and structures.
Fundamental Forms of Vibration

- Sinusoidal
  - cyclic, repetitive, function of time

- Random
  - Lacking a definite pattern
Vibration Machine Types

- hydraulic
- mechanical
- electrodynamic

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004
Mechanical Shaker Features

- Built-in table suspension (isolates vibration from floor)
- Adjustable frequency
- Adjustable amplitude
- Vertical motion
- Horizontal motion

L.A.B. BR-Series Shaker

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004
Theory of Operation

- Offset Eccentrics
- Rotate on Shafts
- Vibration Results

L.A.B. BR-Series Shaker

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004
BR-Series Performance

- Frequency Range: 8--60 Hz
- Max. Acceleration: 3.2, 5 or 10G
- Max. Displacement: .070 - .100”
- Payload Ratings: 10#-100#-1000’s#
- Interface with environmental chamber
- Minimal maintenance
- Long life cycle
- Portable
Devices Tested Include...

- Electronics
  - Subassemblies
    - Boards
    - Connectors
  - Assembled Devices
    - Military
    - Industrial
    - Aerospace
    - Consumer

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004
Electronics Vibration Testing

- **Shake-out**
  - Loose solder connections
  - Small hardware/fasteners
  - Components

- **Burn-In**

[Image of electronic components]

[Website URL]

L.A.B. Equipment, Inc.
All rights Reserved 2004
Additional Vibration Test Applications

- Fatigue
  - Single resonance point testing
  - Frequency sweep testing
- Reliability & QC
- Small Parts Packing
AGREE Test Criteria

- Simultaneous
  - Temperature
  - Humidity
  - Vibration
Battery Leak Vibration Test

- Frequency: 32 Hz
- Acceleration: 5G
- Stainless steel drip pan
  - protects vibration table
  - fixturing anchors battery to vibration table

www.labequipment.com
Key Advantages of BR-Series Shakers

- Maintain adjusted amplitude accurately throughout frequency range
- Shaft deflection and bearing wear have very little influence on amplitude and UUT
- Relatively insensitive to resonance of UUT
- Low maintenance
- Low power consumption
- Portable
- No foundation requirements for installation
- High payloads
- Assorted table sizes
- Interface with environmental chamber controls
Thank You

For any questions contact us at sales@labequipment.com

www.labequipment.com

L.A.B. Equipment, Inc.
All rights Reserved 2004