Circuit boards are key components in controlling various aircraft systems. Northrop Grumman currently tests the durability of these circuit boards using a shock test method that occupies an entire room, requires three people to operate, is unsafe, and can yield inaccurate results. Air Strike addresses these issues and more with an innovative, efficient design that outperforms the competition.

**Background**

Circuit boards are key components in controlling various aircraft systems. Northrop Grumman currently tests the durability of these circuit boards using a shock test method that occupies an entire room, requires three people to operate, is unsafe, and can yield inaccurate results. Air Strike addresses these issues and more with an innovative, efficient design that outperforms the competition.

**Overview**

Air Strike is a desktop testing apparatus that can deliver a mechanical shock to a mounted circuit board; testing its durability. Air Strike comprises of a pneumatic actuator and self-calibration system to shock up to 4500 g's independently in the x, y, and z directions using a movable mounting plate. This automated system increases user safety and reduces the time required to obtain data from about two weeks to less than an hour. Air Strike also costs a fraction of current market offerings.

**Process Flowchart**

Air Strike works by using a user-specified pressure and pneumatic actuator to shock the mounted circuit board. The Shock data is analyzed and a Shock Response Spectrum Graph is output.

**The Design**

Air Strike is an innovative, automated, self-calibrating, safe apparatus that delivers mechanical shocks of up to 4500 g's. The LabVIEW environment enables the self-calibration feature of Air Strike after delivering an initial shock.

**Crucial Components**

- **The LabVIEW environment**: The user can control the air pressure and desired acceleration using the LabVIEW program. This program also enables the self-calibration feature of Air Strike after delivering an initial shock.

**Mounting Plate**

The versatile mounting plate can be configured to shock each of the three axes, saving time to detach and reattach the circuit board from this plate.

**Pneumatic Actuator**

The pneumatic actuator attaches to the mounting plate either directly or with a clevis. The high pressures in the pneumatic allow Air Strike to reach the required accelerations.

**Safety Mechanisms**

There are numerous precautions in place that make Air Strike a safe, dependable apparatus (counter-clockwise from top left):

- Mechanical release valve
- Acrylic shatter-proof lid
- Vibration/shock isolators
- Fuses
- Lid Switch
- Pressure regulator

**Shock Level Results**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Benchmark</th>
<th>Goal</th>
<th>Air Strike</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to use</td>
<td>~2 weeks</td>
<td>&lt; 30 min</td>
<td>~1 hour</td>
</tr>
<tr>
<td>People required to run machine</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Footprint (ft²)</td>
<td>~100</td>
<td>&lt; 6</td>
<td>4.3</td>
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<tr>
<td>Deceleration (g's)</td>
<td>4500</td>
<td>4500</td>
<td>5000</td>
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<tr>
<td>Weight (lbs.)</td>
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<td>150</td>
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