



Shock, impact and vibration testing of ODYSSEY® batteries

The ODYSSEY® battery has been subjected to several tests that prove their high resistance to shock and vibration.

(A) MIL S-901C shock, high impact test

This is a test specified by the US Navy to determine suitability of equipment to be installed on warships. A 26Ah battery (equivalent to the PC 925 but without the metal jacket) was installed in an UPS system aboard a Navy MHC51 class coastal mine hunter.

The object of this test is to simulate the shock generated by a 16-in. naval gun and a depth charge going off simultaneously. Testing is performed by hitting the UPS, while in operation, with a



2,500 lb. hammer from varying distances. After several such impacts the battery system was load tested for proper functioning.

The 26Ah battery passed the test without metal jackets. Equipping the ODYSSEY® batteries with metal jackets will only increase their ability to withstand harsh shock and impact situations that may be encountered in automotive applications.

(B) MIL S-167-1 for mechanical vibrations

The Drycell™ batteries were subjected to three classes of vibration — *exploratory vibration*, *variable frequency* and *endurance test*.

Exploratory vibration test

The UPS unit containing the battery was vibrated from 5Hz to 33Hz at a table vibratory single amplitude of 0.010 ± 0.002 in., in discrete frequency intervals of 1Hz. Vibration at each frequency was maintained for 15 seconds.

Variable frequency test

The UPS unit was vibrated from 5Hz to 33Hz at 1Hz intervals at different amplitudes. At each frequency the vibration was maintained for 5 minutes.

Endurance test

The test was conducted at 33Hz for two hours in the *x*- and *y*- axes at a table vibratory double amplitude of 0.010 ± 0.002 in. The *z*-axis endurance test was conducted at 33Hz for two hours at a table vibratory single amplitude of 0.020 ± 0.004 inch.

(C) Ford vehicle vibration test

Two batteries, equivalent to the PC 925 and PC 1200 were mounted in a special fixture and tested per the following parameters:



<i>Test direction</i>	<i>Frequency, Hz</i>	<i>Acceleration, g</i>	<i>Duration, min.</i>
<i>Vertical</i>	10 - 12	3	40
<i>Transverse</i>	10 - 17	3	40
<i>Horizontal</i>	15 - 30	3	40

None of the four batteries showed noticeable failures at the end of the test.

(D) Three axis vibration test

This test was conducted for Hawker Energy Products Inc. by an independent test facility. Two batteries, equivalent to the PC 925 and PC 1200 were mounted in a special fixture and tested in the following manner:

<i>Test direction</i>	<i>Frequency, Hz</i>	<i>Acceleration, g</i>	<i>Duration, hrs.</i>
<i>Vertical</i>	33	3	2
	33	4	2
	33	6	2
<i>Transverse</i>	33	3	2
	33	4	2
	33	6	2
<i>Horizontal</i>	33	3	2
	33	4	2
	33	6	2

Once again none of the four batteries showed any noticeable failures at the end of this test.

Summarizing on the basis of tests described in this section, there is little doubt about the ability of the ODYSSEY® Drycell™ battery to withstand substantial levels of mechanical abuse. This in itself is a very desirable feature in SLI batteries.

