

**Lightweight Shock Test Report**  
**on**  
**Power Supply PS1503-H-MB and Adapter Plate**  
**for**  
**Powerstar Inc.**  
**Gaithersburg, MD**



**NU LABORATORIES**

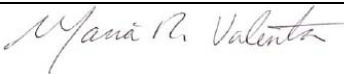
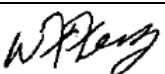
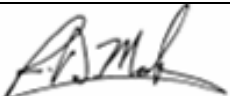
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**16 May 2012**

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| 16 May 2012   | 16 May 2012   | 16 May 2012   |

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**1. PURPOSE OF TEST**

The purpose of this test was to demonstrate that the Power Supply PS1503-H-MB and Adapter Plate (herein collectively referred to as the "Power Supply and Plate") complied with the requirements of MIL-S-901D for a Grade A, Class I, Type A, nine (9) blow lightweight shock test.

**2. MANUFACTURER**

Powerstar Inc.  
9073 Shady Grove Court  
Gaithersburg, MD 20877

**3. MANUFACTURER'S TYPE OR MODEL NO.**

Uninterruptible Power Supply and Adapter Plate  
Model Number PS1503-H-MB  
Serial Number 10101101T

**4. SPECIFICATIONS**

**4.1 MILITARY**

**MIL-S-901D** (NAVY) Military Specification, Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for MIL-S-901D, dated 17 March 1989

**4.2 POWERSTAR INC.**

Purchase Order No.: 11532

Drawing Number: 153-AMBL-A-00, PS1503 Assembly, Model PS1503, Revision A dated 28 February 2004

**4.3 NU LABORATORIES**

Lightweight Shock Test Procedure No. 9792.1 dated 26 February 2003

**5. NUMBER OF ITEMS TESTED**

One (1)

**6. SECURITY CLASSIFICATION OF ITEMS**

Unclassified

**7. DATE TESTING COMPLETED**

20 March 2012

**8. TEST CONDUCTED BY**

NU Laboratories  
312 Old Allerton Road  
Annandale, NJ 08801  
(NAVY Certified Shock Test Facility by NAVSEAINST 9491.1C)

**9. WITNESSES**

Mike Taglia, Powerstar Inc. representative

**10. DISPOSITION OF TEST ITEMS**

Upon completion of testing, the Power Supply and Plate were returned to Powerstar Inc.

**11. LABORATORY CONDITIONS**

Ambient Temperature: 70°F  
Relative Humidity: 69.8%  
Atmospheric Pressure: 30.20 in. Hg

*NOTE: cited conditions are averages of all laboratory conditions recorded throughout testing*

**12. ABSTRACT**

The Power Supply and Plate were subjected to nine (9) lightweight shock blows in accordance with the referenced test specifications. Discrepancies were noted. Refer to Section 13 for additional information.

**13. LIGHTWEIGHT SHOCK TEST DESCRIPTION**

**13.1 ACCEPTANCE CRITERIA**

In addition to the requirements of MIL-S-901D, Section 3.1.10.1, the Power Supply and Plate will be considered to have failed the shock test if they fail to perform their specified functions and/or any portion comes adrift and/or otherwise becomes a hazard to personnel or Grade A equipment.

**13.2 PRE-TEST INSPECTION**

Upon receipt, a visual inspection performed on the Power Supply and Plate revealed no obvious physical damage or discrepancies. The Power Supply and Plate were weighed and the weight was recorded in the test log. The weight of the Power Supply and Plate was 58.5 pounds.

**13.3 TEST SETUP**

The Adapter Plate was bolted to Fixture 4C, Platform 3 of MIL-S-901D using four (4) 5/16"-18 stainless steel bolts torqued to 11.5 ft-lbs. The Power Supply PS1503-H-MB was placed upon the Adapter Plate and secured by two (2) metal straps bolted to the Adapter Plate using one (1) 5/16"-18 stainless steel bolt torqued to 11.5 ft-lbs in each strap, for a total of four (4) 5/16"-18 stainless steel bolts. Fixture 4C of MIL-S-901D was secured to the lightweight shock machine, oriented in the first axis of test. Refer to Figure 1 for photographs of the test setups. The total weight on the lightweight shock machine was 320 pounds; refer to Table 1 for a breakdown of the test weights.

**Table 1: Lightweight Shock Test Weights**

|   |                   |
|---|-------------------|
| <b>Power Supply and Plate</b>                     | <b>58.5 lbs.</b>  |
| <b>Adapter Plate Mounting Straps and Hardware</b> | <b>14.0 lbs.</b>  |
| <b>One (1) Set of Standard Channels</b>           | <b>83.0 lbs.</b>  |
| <b>Fixture 4C of MIL-S-901D Mounting Hardware</b> | <b>13.5 lbs.</b>  |
| <b>Fixture 4C, Platform 3 of MIL-S-901D</b>       | <b>151.0 lbs.</b> |
| <b>Total Weight Fixture 4C of MIL-S-901D</b>      | <b>320.0 lbs.</b> |

**13.4 TEST CONDITIONS**

The Power Supply PS1503-H-MB was energized with 120 VAC, 1 phase, 60 Hz throughout shock testing. A light was attached to the rear panel in order to monitor the output voltage and determine the system operation throughout shock testing.

**13.5 BLOW #1**

- 13.5.1 Conditions: Side-to-Side Axis, 1' hammer height
- 13.5.2 Observations: A post-blow visual inspection revealed no obvious physical damage or discrepancies.
- 13.5.3 Action: The mounting hardware was retorqued and testing was continued.

### **13.6 BLOW #2**

- 13.6.1 Conditions: Side-to-Side Axis, 3' hammer height
- 13.6.2 Observations: A post-blow visual inspection revealed that the top brackets had bent; refer to Figure 2. No additional obvious physical damage or discrepancies were noted.
- 13.6.3 Action: Testing was continued.

### **13.7 BLOW #3**

- 13.7.1 Conditions: Side-to-Side Axis, 5' hammer height
- 13.7.2 Observations: A post-blow visual inspection revealed a crack in the front plastic control panel cover. It was further noted that the top brackets had bent further, and the front plastic control panel cover was pulled away from the metal frame. Additionally, the light used to monitor the Power Supply output voltage became momentarily de-energized and then re-energized. Refer to Figure 3 for photographs. No additional obvious physical damage or discrepancies were noted.
- 13.7.3 Action: Testing was continued.

### **13.8 BLOW #4**

- 13.8.1 Conditions: Top Axis, 1' hammer height
- 13.8.2 Observations: A post-blow visual inspection revealed that the neoprene cushion that was attached to a mounting strap had become detached and remained on top of the Power Supply and Plate; refer to Figure 4. No additional obvious physical damage or discrepancies were noted.
- 13.8.3 Action: Testing was continued.

### **13.9 BLOW #5**

- 13.9.1 Conditions: Top Axis, 3' hammer height
- 13.9.2 Observations: A post-blow visual inspection revealed no additional obvious physical damage or discrepancies.
- 13.9.3 Action: Testing was continued.

### **13.10 BLOW #6**

- 13.10.1 Conditions: Top Axis, 5' hammer height
- 13.10.2 Observations: The light used to monitor the Power Supply output voltage became momentarily de-energized and then re-energized. A post-blow visual inspection revealed no additional obvious physical damage or discrepancies.
- 13.10.3 Action: Testing was continued.

### **13.11 BLOW #7**

- 13.11.1 Conditions: Front-to-Back Axis, 1' hammer height
- 13.11.2 Observations: A post-blow visual inspection revealed no additional obvious physical damage or discrepancies.
- 13.11.3 Action: Testing was continued.

### **13.12 BLOW #8**

- 13.12.1 Conditions: Front-to-Back Axis, 3' hammer height
- 13.12.2 Observations: A post-blow visual inspection revealed that the front plastic control panel cover had become significantly damaged. The plastic on the bottom of the Power Supply and Plate also displayed damage. Refer to Figures 5 and 6 for photographs. No additional obvious physical damage or discrepancies were noted.
- 13.12.3 Action: Testing was continued.

**13.13 BLOW #9**

13.13.1 Conditions: Front-to-Back Axis, 5' hammer height

13.13.2 Observations: A post-blow visual inspection revealed extensive damage to the front panel of the Power Supply and Plate. In addition, a screw and plastic shards had come adrift from the front panel of the Power Supply and Plate. It was further noted that the metal mounting straps had become twisted. The Powerstar Inc. representative noted that a rivet had become detached from a metal mounting strap. Refer to Figures 7 and 8 for photographs. No additional obvious physical damage or discrepancies were noted.

13.13.3 Action: Shock testing was complete.

Refer to the Factory Test Record, Figure 8, and the Shock Acceptance Form, Figure 9, for additional information.



**Side-to-Side Axis**



**Front-to-Back Axis**



**Top Axis**

**Test Setups  
Figure 1**



**Post-Blow #2, Bent Top Brackets**  
**Figure 2**



**Crack in Front Plastic Control Panel Cover**



**Bent Top Brackets**



**Front Plastic Control Panel Cover Pulled Away from Metal Frame**

**Post-Blow #3**  
**Figure 3**





**Detached Neoprene Cushion**

**Post-Blow #4  
Figure 4**



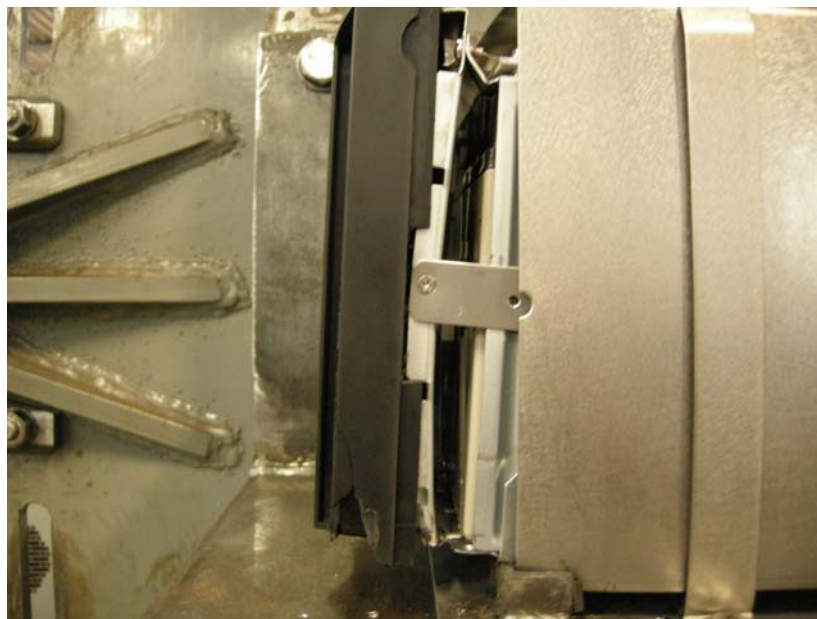
**Damage to the Front of the Power Supply and Plate**

**Post-Blow #8  
Figure 5**



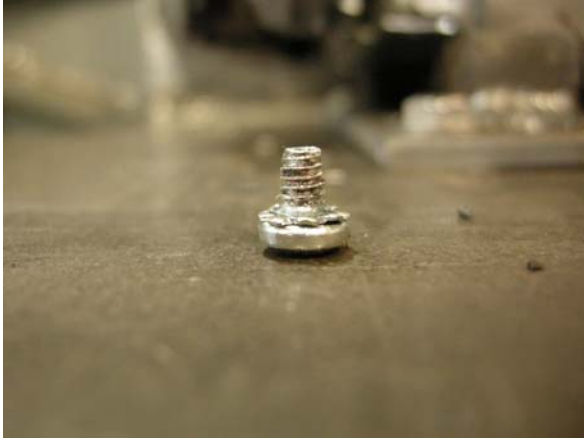
**Damage to the Front of the Power Supply and Plate**

**Post-Blow #8  
Figure 6**



**Damage to the Front Panel of the Power Supply and Plate**

**Post-Blow #9  
Figure 7**



**Detached Screw**



**Front Panel, Source of Detached Screw**



**Detached Plastic Shard**



**Damage to the Front Panel**




**Twisted Metal Mounting Strap**



**Damage to the Front Panel**

**Post-Blow #9  
Figure 8**

|  |      |  |                 |
|--|------|--|-----------------|
| <b>FACTORY TEST RECORD: CLASS HI SHOCK</b>   |      | DATE: 20 March 2011  | TEST # 11543.1  |
| 1. ITEM NAME OF EQUIPMENT SHOCK TESTED<br>Power Supply PS1503-H-MB and Adapter Plate   |      | 2. RATING (KW, VOLTS, GPM, CFM, ETC.)<br>120 VAC, 1 phase, 60 HZ                                     |                 |
| 3. MAJOR PARTS   |      | GOV DWG NO.  |                 |
| PUMP, ETC.   |      | IDENTIFYING #  |                 |
| TESTED FOR<br>Powerstar Inc.   |      | ADDRESS<br>9073 Shady Grove Court<br>Gaithersburg, MD 20877  |                 |
| MOTOR, ETC.  |      | GOV DWG NO.  |                 |
| MANUFACTURER   |      | ADDRESS  |                 |
| STARTER, ETC.  |      | GOV DWG NO.  |                 |
| MANUFACTURER   |      | ADDRESS  |                 |
| 4. CONTRACT NO.  |      | CONTRACTOR   |                 |
| 5. TYPE OF SHOCK TEST <input checked="" type="checkbox"/> ASSEMBLY <input type="checkbox"/> SUB-ASSEMBLY <input type="checkbox"/> PART   |      | WEIGHT OF INDIVIDUAL MOTOR PARTS   |                 |
| 6. TOTAL WEIGHT OF ASSEMBLY TESTED<br>58.5 pounds  |      | MOTOR  |                 |
| 7. WEIGHT CLASSIFICATION OF ITEM<br><input checked="" type="checkbox"/> LIGHT <input type="checkbox"/> MEDIUM  |      | STARTER  |                 |
| 8. APPLICABLE MOUNTING FIXTURE IN SPECIFICATION (ML-S-901D)<br><input type="checkbox"/> Fig 7, FIX 4A <input checked="" type="checkbox"/> Fig 8, FIX 4C <input type="checkbox"/> FIG 13 <input type="checkbox"/> FIG 15 <input type="checkbox"/> FIG 16 <input type="checkbox"/> FIG 11C |      |  |                 |
| 9. FOR LIGHTWEIGHT ITEMS   |      |  |                 |
| CONDITION A  |      |  |                 |
| BLOW   | DROP | AXIS   | DAMAGE INCURRED |
| 1  | 1'   | Side-to-Side   | None            |
| 2  | 3'   | Side-to-Side   | Refer to report |
| 3  | 5'   | Side-to-Side   | Refer to report |
| 4  | 1'   | Top  | Refer to report |
| 5  | 3'   | Top  | None            |
| 6  | 5'   | Top  | Refer to report |
| ITEMS SUBJECT TO ABOVE TWO CONDITIONS WERE   |      |  |                 |
| REMARKS  |      |  |                 |
| CONDITION A  |      |  |                 |
| DAMAGE INCURRED  |      |  |                 |
| 1  | 7    | 1'   | Front-to-Back   |
| 2  | 8    | 3'   | Front-to-Back   |
| 3  | 9    | 5'   | Front-to-Back   |
| 10. FOR MEDIUM WEIGHT ITEMS  |      |  |                 |
| BLOW   | DROP | AXIS   | DAMAGE INCURRED |
|  |      |  |                 |
|  |      |  |                 |
|  |      |  |                 |
|  |      |  |                 |
|  |      |  |                 |
| TOTAL WEIGHT ON ANVIL TABLE  |      |  |                 |
| FIX 4C: 320 pounds   |      |  |                 |
| TEST LABORATORY<br>NU Laboratories   |      | TEST ENGINEER<br> |                 |
| ADDRESS<br>312 Old Allerton Road, Annandale, NJ 08801  |      |  |                 |

Factory Test Record  
Figure 8

**MIL-S-901D: SHOCK ACCEPTANCE FORM**

1. The item identified below has met the requirements of Military Specification MIL-S-901D, based upon:

- Shock testing of the item identified below
- Previous shock testing of an item similar to the item identified below (shock test extension)
- Previous shock testing of an item identical to the item identified below (shock test extension)

2. Item (Nomenclature) Power Supply and Plate

3. Item (Description) Power Supply PS1503-H-MB and Adapter Plate

4. Tested For Powerstar Inc.

5. S/N: 10101101T

6. M/N PS1503-H-MB

7. Dwg. Number 153-AMBL-A-00

8. Revision and Date Rev. A dated 28 February 2004

9. Military Specification MIL-S-901D

10. Ship \_\_\_\_\_

11. Service \_\_\_\_\_

12. Contract No. \_\_\_\_\_

13. Shock Test Facility NU Laboratories

14. Report No. 11543.1

15. Previous Shock test approval reference (if this form conveys shock test Extension approval) \_\_\_\_\_

16. Test Category  Lightweight  Medium weight  Heavyweight

17. Shock Grade  A  B

18. Equipment Class  I  II  III

19. Shock Test Type  A  B  C

20. Mounting Location  Deck  Hull  Shell  Wetted-Surface

21. Shipboard mounting plane represented during shock test:

- Base  Front or Face  Back
- Top  Combination  Other \_\_\_\_\_

22. Mounting orientation of item relative to ship's fore-and-aft axis (for medium weight and heavyweight test items only): \_\_\_\_\_

23. Approval Limitations: \_\_\_\_\_

24. Approved. \_\_\_\_\_



Authorized Signature

Approval Activity

20 March 2011

Date

**Shock Acceptance Form  
Figure 9**

**LIST OF APPARATUS**

| <b>DESCRIPTION</b>               | <b>MANUFACTURER</b>     | <b>MODEL NO.</b>       | <b>SERIAL NO.</b> | <b>CAL DATE</b>   | <b>DUE DATE</b> |
|----------------------------------|-------------------------|------------------------|-------------------|-------------------|-----------------|
| <b>Temp/Humidity Sensor</b>      | <b>Radio Shack</b>      | <b>63-1013</b>         | <b>006</b>        | <b>06/09/11</b>   | <b>06/09/12</b> |
| <b>Torque Wrench</b>             | <b>CDI</b>              | <b>2503MFRMH</b>       | <b>1002602828</b> | <b>07/19/11</b>   | <b>07/19/12</b> |
| <b>Lightweight Shock Machine</b> | <b>New Eng. Trawler</b> | <b>10-T-2145-L-ALT</b> | <b>N/A</b>        | <b>Functional</b> |                 |
| <b>Barometer</b>                 | <b>B&amp;K</b>          | <b>UZ001</b>           | <b>BAR003</b>     | <b>03/23/11</b>   | <b>03/23/12</b> |
| <b>Platform Scale</b>            | <b>Fairbanks-Morse</b>  | <b>1124A</b>           | <b>G-511379</b>   | <b>02/24/12</b>   | <b>02/24/13</b> |

*All calibrations are traceable to the National Institute of Standards and Technology. Procedures satisfy the requirements set forth in MIL-STD-45662A. Calibration records are on file at NU Laboratories.*

*All weights and scales are traceable to the State of NJ Office of Weights and Measures (NJSA 51:1-61; 75; NJAC 13:47E-1.2)*