

# GARWOOD LABORATORIES, INC.

Tel: 562-949-2727

Fax: 562-949-8757



July 23, 2006

Report No.: R2358  
Rev.: N/C  
Page 1 of 8

Since 1954

## ENVIRONMENTAL TEST REPORT

ON  
ONE (1) OHMETER  
P/N: 620 UK  
FOR  
AMPTEC RESEARCH

PERFORMED For: AMPTECH RESEARCH  
10900 Research, Ste 160C1  
Austin, TX 78759

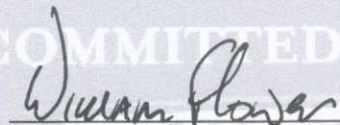
PERFORMED By: GARWOOD LABORATORIES, INC.  
7829 Industry Ave.  
Pico Rivera, CA 90660

*Garwood Laboratories, Inc., does hereby certify that all inspection(s) and test(s) have been performed in accordance with the documents referenced herein with exceptions as noted in this report. The results in this report pertain only to the specified equipment tested. This report shall not be reproduced, except in full, without the written authorization of Garwood Laboratories, Inc.*

Prepared By:

  
R.M. "RICK" CLEMENS, Technical Writer

Approved By:

  
WILLIAM FLOWER, Quality Assurance Manager



Approved By:

  
SCOTT A. MILLER, Laboratory Manager



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: **R2358**  
Page No.: **2 of 8**

---

---

## **ENVIRONMENTAL TEST REPORT**

---

---

### **TABLE OF CONTENTS**

<u>PARA.</u>	<u>PAGE</u>
TITLE PAGE.....	1
TABLE OF CONTENTS.....	2
DISCLAIMER.....	3
1.0 PURPOSE.....	4
2.0 REFERENCES.....	4
3.0 SUMMARY.....	5
4.0 TEST CONDITIONS AND EQUIPMENT .....	6
5.0 TEST SEQUENCE.....	7
6.0 TEST METHODS AND RESULTS.....	7 – B2
6.1 Explosive Environment.....	7 – 8
Appendix A: Lab Data Sheets, Logs, Plots, etc. ....	A1 – A4
Appendix B: Photograph(s) .....	B1 – B2



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: **R2358**  
Page No.: **3 of 8**

---

## **ENVIRONMENTAL TEST REPORT**

---

### **DISCLAIMER**

UNLESS OTHERWISE STATED, THIS REPORT ANALYZES A PRODUCT AGAINST CRITERIA ESTABLISHED BY A CUSTOMER'S SPECIFICATIONS OR REFERENCED STANDARDS. THE ANALYSIS AND CONCLUSIONS EXPRESSED HEREIN RELATE ONLY TO THE TESTS PERFORMED BY GARWOOD AS DESCRIBED HEREIN. PRODUCT AND PROCESS SPECIFICATIONS MAY BE CHANGED BY THE MANUFACTURER. SUCH CHANGES MAY RENDER THE REPORT INAPPLICABLE OR INACCURATE FOR THE READER'S PURPOSES. THE READER SHOULD OBTAIN INFORMATION RELEVANT TO THE READER'S NEEDS DIRECTLY FROM THE MANUFACTURER OF THE PRODUCT ANALYZED HEREIN.

THE CONCLUSIONS EXPRESSED IN THIS REPORT ARE SUBJECT TO CHANGE WITHOUT NOTICE AS A RESULT OF CHANGES IN THE MANUFACTURE OF THE PRODUCT TESTED HEREIN, CHANGES TO SPECIFICATIONS, OR TO MANUFACTURING PROCESSES.

GARWOOD LABORATORIES, INC. MAKES NO WARRANTY OR GUARANTEE AS TO THE QUALITY, CHARACTER, PERFORMANCE, OR CONDITION OF THE PRODUCT THAT IS THE SUBJECT OF THIS REPORT; PROCESSES OR SERVICES RECORDED IN THIS REPORT, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OR GUARANTEE OF MERCHANTABILITY OR FITNESS FOR USE FOR A PARTICULAR PURPOSE. GARWOOD LABORATORIES, INC. FURTHER DISCLAIMS ANY LIABILITY FOR ANY DAMAGE, DIRECT OR INDIRECT, SPECIAL OR CONSEQUENTIAL, SUFFERED RESULTING FROM ANY RELIANCE ON THIS REPORT OR ITS CONCLUSIONS. GARWOOD LABORATORIES, INC. DOES NOT WARRANT OR GUARANTEE THE PRODUCT OR PROCESSES RECORDED HEREIN, NOR SHOULD ANY PART OF THIS REPORT BE INTERPRETED TO CONSTITUTE AN ENDORSEMENT OR RECOMMENDATION OF ANY PRODUCTS, PROCESSES OR SERVICES.



---

## **ENVIRONMENTAL TEST REPORT**

---

### **1.0 PURPOSE**

- 1.1 The purpose of this report is to present the procedures employed and the results obtained, while conducting the Environmental Tests of Explosive Environment, on one (1) Ohmeter, P/N: 620 UK, S/N: PER-05-0025, submitted by Amptech Research.
- 1.2 The Environmental Test specified herein was performed in accordance with the references of Para. 2.0 of this report.
- 1.3 The matrix/sequence of the program is tabulated in Para. 5.0 of this report.

### **2.0 REFERENCES**

- 2.1 0707EKC Amptech Research, Purchase Order
- 2.2 MIL-STD-810F Department of Defense, Test Method Standard for Environmental Engineering Considerations and Laboratory Tests
- 2.4 ANSI/NCSL Z540-1-1994 Calibration Laboratories and Measuring and Test Equipment General Requirements



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: R2358

Page No.: 5 of 8

---

## ENVIRONMENTAL TEST REPORT

---

### 3.0 SUMMARY

- 3.1 The one (1) Ohmeter, P/N: 620 UK, S/N: PER-05-0025, was subjected to and completed the specified Environmental Test with no visible evidence of damage, or deterioration noted due to testing. There were no main chamber explosions. See data sheets.
- 3.2 The Ohmeter was considered to have met the requirements of the specified Environmental Test, as conducted by Garwood Laboratories, Inc., in accordance with the references shown in Para. 2.0 of this report.
- 3.3 The Ohmeter was then returned to Amptech Research for further evaluation after completion of testing.



---

**ENVIRONMENTAL TEST REPORT**

---

**4.0 TEST CONDITIONS AND EQUIPMENT****4.1 Ambient Conditions:**

Unless otherwise specified herein, all tests were performed at an atmospheric pressure of  $28 \pm 2.5$  inches of mercury absolute, a temperature of  $75 \pm 15^\circ\text{F}$ , and a relative humidity of  $50 \pm 30\%$ .

**4.2 Instrumentation and Equipment:**

4.2.1 Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ANSI/NCSL Z540-1-1994, by Garwood Laboratories, Inc., or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

4.2.2 Garwood Laboratories, Inc., attests that the commercial sources providing calibration services on the above referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Garwood Laboratories, Inc., Quality Assurance. Certifications of all calibrations performed are retained on file in the Garwood Laboratories, Inc., Quality Assurance Department, and are available for inspection upon request by customer representatives.

4.2.3 The test equipment utilized during this test program is listed on individual Data Sheets, beginning on page number A1 of Appendix A of this report.

**4.3 Tolerances:**

4.3.1 Unless otherwise stated, test conditions were maintained within the tolerances specified in the references of Para. 2.0 of this report.



---

---

## **ENVIRONMENTAL TEST REPORT**

---

---

### **5.0 TEST SEQUENCE**

5.1 The specified Environmental Test was conducted on July 14, 2006.

### **6.0 TEST METHODS AND RESULTS**

#### **6.1 EXPLOSIVE ENVIRONMENT:**

(Ref.: Amptech S.O.W.)

- 6.1.1 One (1) Ohmeter, P/N: 620 UK, S/N: PER-05-0025, was installed inside an explosive atmosphere test chamber, at station ambient conditions, with an electrical set-up capable of performing the required functional check during the test. See photo of test set-up.
- 6.1.2 The fuel used to conduct the explosive atmosphere testing was n-hexane. Thermocouples were mounted to the chamber wall, the test unit, and placed into the chamber air, for the measurement and recording of temperature.
- 6.1.3 With the test unit de-energized, the chamber door was sealed and the chamber temperature was ramped to +50°C.
- 6.1.4 With chamber pressure at site level, fuel was introduced, allowing three (3) minutes for vaporization. The potential explosiveness of the air-vapor mixture was verified by igniting a sample of the mixture with a spark gap and the results observed for any evidence of ignition. The test unit was then operated by opening and closing the unit's contacts four-hundred (400) times, verifying the explosiveness of the air-vapor mixture periodically.
- 6.1.5 After four-hundred (400) successful operations (no resulting explosion), the potential explosiveness of the air-vapor mixture was verified by igniting a sample of the mixture with a spark gap and the results observed for any evidence of ignition.
- 6.1.6 Chamber pressure was not increased to simulate an altitude below sea level. The rate of change in pressure did not exceed 2,000 feet per minute.
- 6.1.7 Upon completion of the Explosive Environment Test, the chamber controls were turned off and the test unit was allowed to stabilize at station ambient conditions.



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: R2358  
Page No.: 8 of 8

---

## ENVIRONMENTAL TEST REPORT

---

- 6.1.8 The Ohmeter completed the specified Explosive Environment Test with no visible evidence of damage or deterioration noted. There were no main chamber explosions detected throughout the test.
- 6.1.9 The one (1) Ohmeter, P/N: 620 UK, S/N: PER-05-0025, was considered to have met the requirements of the Explosive Environment Test, as conducted by Garwood Laboratories, Inc., in accordance with Amptech Research Statement of Work.
- 6.2 The one (1) Ohmeter, P/N: 620 UK, S/N: PER-05-0025, was returned to Amptech Research, for further evaluation after completion of testing.



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: R2358

---

---

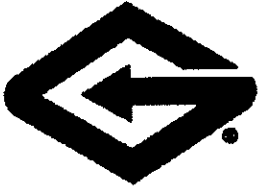
**ENVIRONMENTAL TEST DATA**

---

---

**APPENDIX A**





# Garwood Laboratories Inc.

"EXCELLENCE BUILT ON INTEGRITY"

7829 Industry Ave, Pico Rivera, CA 90660-4305 PH: 562-949-2727 FAX 562-949-8757

JOB NO.: 2358

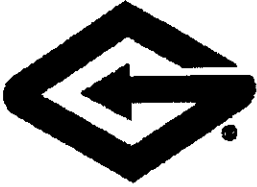
Page No.: A-2

### \*\*\* GENERAL DATA LOG SHEET \*\*\*

Customer: Amptech Research		Date: 14 Jul 06
Test Title: Explosive Atmosphere		Witness? yes    Photos: 5958, 59
Test Item: Ohmmeter		Quantity: 1
Part/Model No.: 620 UK	Serial No(s): PER-05-0025	
Specification: Mil Std 810	Rev: F	Method/Para 511.4 Pro. 1

DATE	TIME	LOG ENTRIES	Initials
14 Jul 06	-----	Test Unit shall be placed into Explosive Atmosphere test chamber with all Electrical connectors connected to make operational / functional testing possible. Test chamber shall be sealed and internal chamber air temperature shall be increased to the recommended high operating temperature of + 50 deg C. Chamber Walls and test Unit shall be allowed to rise within 11 Deg C of chambers Air temperature. Then 171 ml. of n-Hexanes shall be introduced into test chamber At site level ambient pressure / altitude then circulated for 3 to 4 minutes to insure a homogenous air / fuel mixture. A sample of air / fuel mixture shall be isolated from main chamber and ignited to verify potential explosiveness of test Mixture. Once mixture is verified explosive test specimen shall be operated by Customer by opening and closing contacts ( 400 ) times and visualizing proper Functioning of test specimen through chamber's glass Vision port. Explosiveness of test mixture shall be verified periodically throughout Test. Following ( 400 ) operationals explosiveness of test mixture shall be verified Once more then test chamber shall be opened and test specimen shall visually Examined.	D.G
		Test specimen in Explosive atmosphere test chamber. Data Logger channels are as follows: CH 1 = Chamber Ambient Air temperature deg C CH 2 = Test Specimen temperature deg C CH 3 = Chamber Wall temperature. deg C CH 4 = Chamber Wall Temperature deg C	
		All testing will be performed at site level ambient pressure / altitude. n-Hexane shall be used to create an explosive atmosphere Customer shall perform related functionals / operational.	

Sub-Page: <u>2</u> of <u>3</u>	Test Technician: 	Test Engineer: <u>JG</u>
Inspector: 	DCMC:	



# Garwood Laboratories Inc.

"EXCELLENCE BUILT ON INTEGRITY"

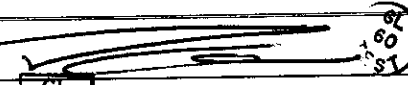

7829 Industry Ave, Pico Rivera, CA 90660-4305 PH: 562-949-2727 FAX 562-949-8757

JOB NO.: 2358

Page No.: A-3

### \*\*\* GENERAL DATA LOG SHEET \*\*\*

Customer: Amptech Research		Date: 14 Jul 06	
Test Title: Explosive Atmosphere		Witness? yes    Photos: 5958, 59	
Test Item: Ohmmeter		Quantity: 1	
Part/Model No.: 620 UK	Serial No(s): PER-05-0025		
Specification: Mil Std 810	Rev: F	Method/Para 511.4 Pro. 1	
DATE	TIME	LOG ENTRIES	Initials
14 Jul 06	0900	Increase test chamber air temperature to a high operating temperature of +50 deg C And stabilize walls and test specimen within 11 deg C of air temperature.	D.G
	1211	Test chamber ambient air, test chamber walls and test specimen all within 11 deg C Of one-another. Introduce 171 ml. of n-Hexane into test chamber and circulate for 3 to 4 minutes To ensure a homogeneous air / fuel / vapor mixture.	
	1215	3 to 4 minutes of circulation satisfied. Isolate a sample of fuel / vapor mixture in Sample vessel then ignite to verify potential explosiveness of mixture. Results: Test mixture is deemed explosive.	
	1220	Customer shall begin operationals / functionals by opening and closing contacts ( 400 ) times and visually verifying test specimen. Isolate a sample of fuel / vapor mixture in Sample vessel then ignite to verify potential explosiveness of mixture. Results: Test mixture is deemed explosive.	
	1225	Isolate a sample of fuel / vapor mixture in Sample vessel then ignite to verify potential explosiveness of mixture. Results: Test mixture is deemed explosive.	
	1230	Isolate a sample of fuel / vapor mixture in Sample vessel then ignite to verify potential explosiveness of mixture. Results: Test mixture is deemed explosive.	
	1235	Customer has performed operational / functional 400 times, Isolate a sample of fuel / vapor mixture in Sample vessel then ignite to verify potential explosiveness of mixture. Results: Test mixture is deemed explosive.	
	1245	Final Results: Test specimen was heated up to +50 deg C then exposed to an Explosive atmosphere while being operated continuously by and did not cause The surrounding test environment to ignite.	
		Explosive Atmosphere test completed.	

Sub-Page: 3 of 3	Test Technician: 	Test Engineer: <u>JG</u>
Inspector: 	DCMC:	



TESTING SERVICES SINCE 1954

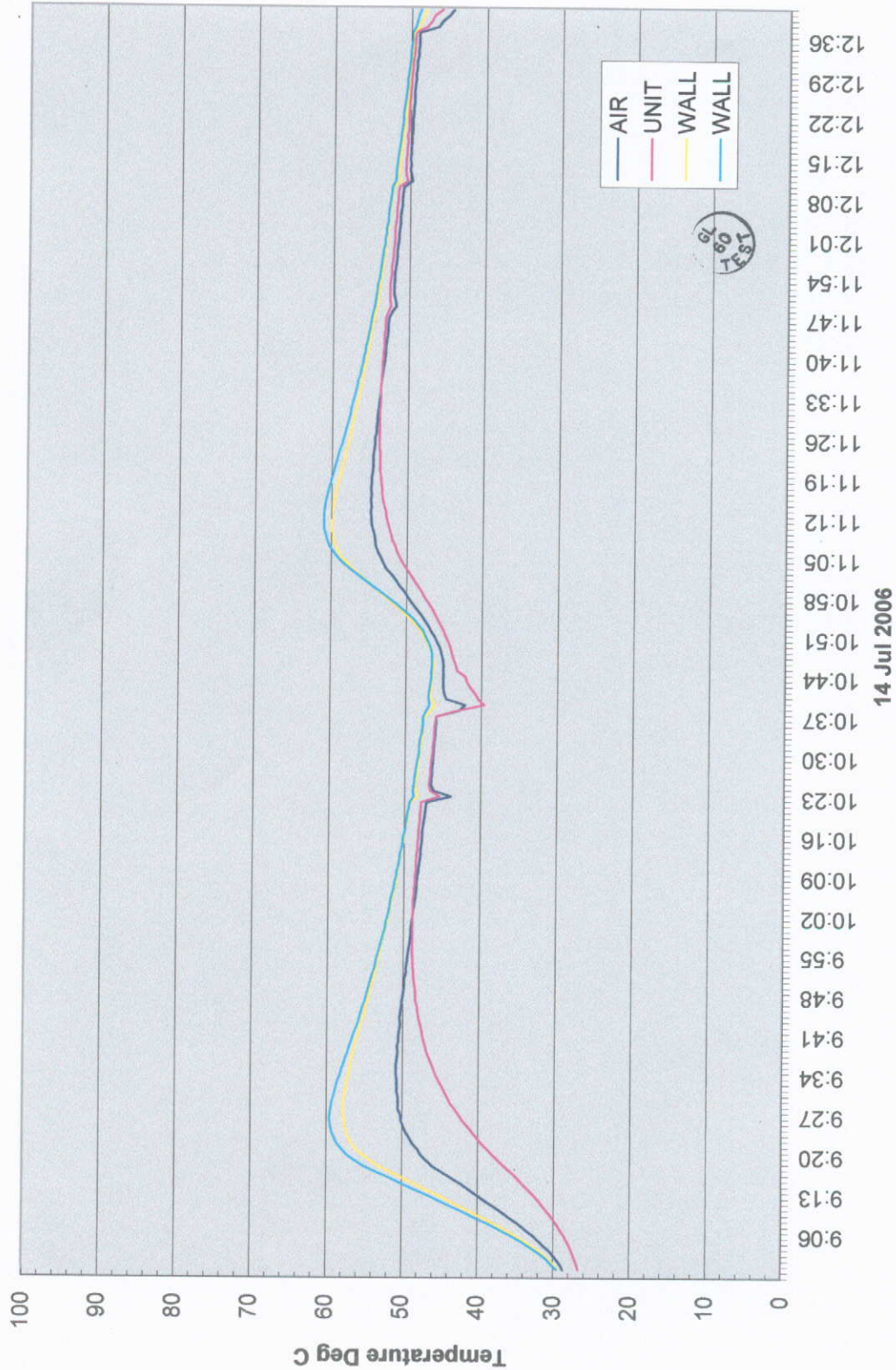
7829 Industry Ave.  
Pico Rivera, CA 90660

# GARWOOD LABORATORIES, INC.

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: R2358  
Page No. A - 4

Amptech Research / Job # 2358 / Explosive Atmosphere / Ohmmeter / P/N: 620 UK / S/N: PER-05-0025





TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

REPORT NO.: R2358

---

---

**ENVIRONMENTAL TEST PHOTOGRAPH(S)**

---

---

**APPENDIX B**



TESTING SERVICES SINCE 1954

7829 Industry Ave.  
Pico Rivera, CA 90660

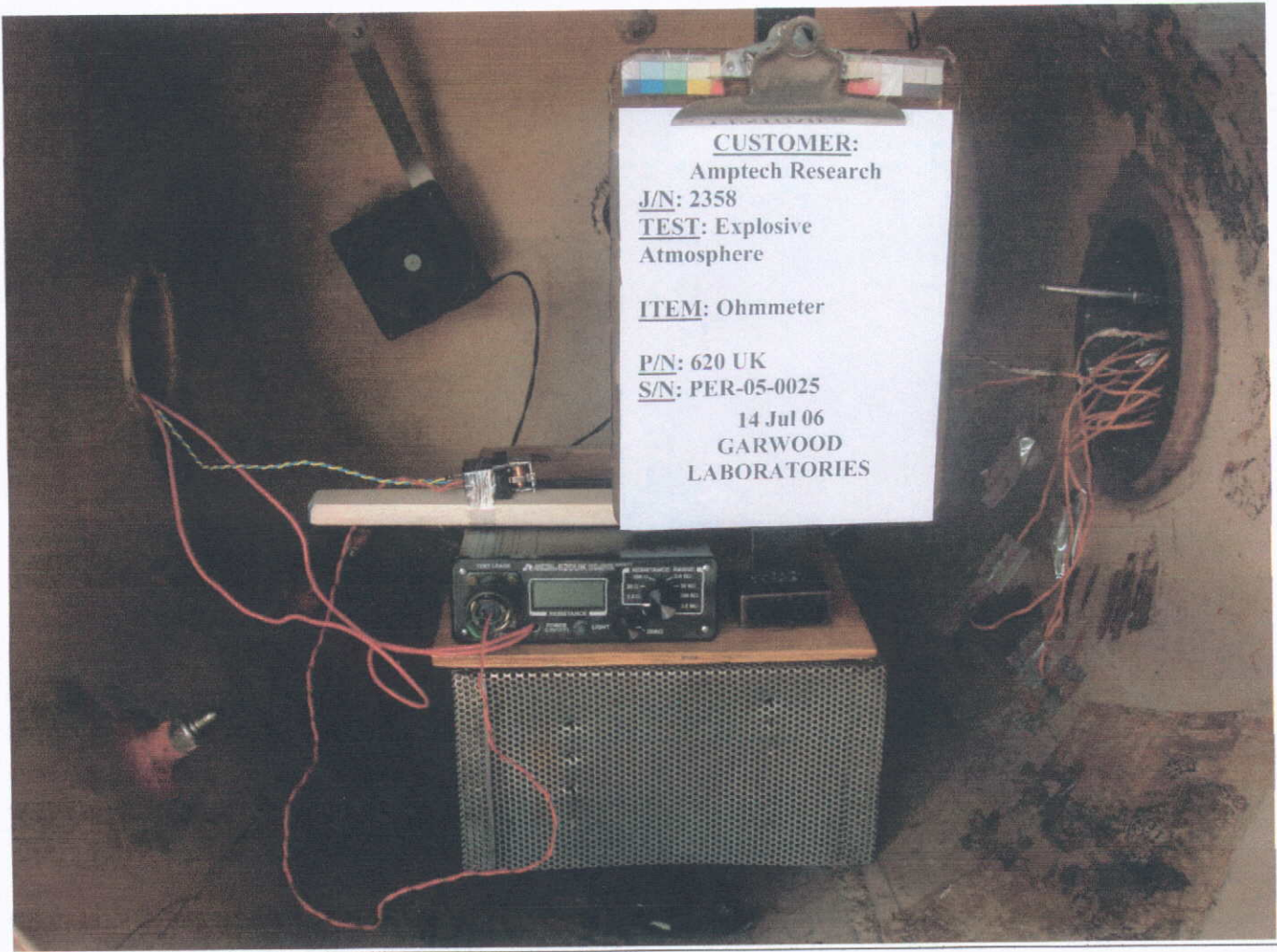
**GARWOOD LABORATORIES, INC.**

Tel: (562)949-2727  
Fax: (562)949-8757

JOB NO.: R2358  
Page No.: B-1

**ENVIRONMENTAL TEST PHOTOGRAPH(S)**

**EXPLOSIVE ENVIRONMENT**  
**ONE (1) OHMMETER**  
**P/N: 620 UK, S/N: PER-05-0025**





TESTING SERVICES SINCE 1954

**GARWOOD LABORATORIES, INC.**

7829 Industry Ave.  
Pico Rivera, CA 90660

Tel: (562)949-2727  
Fax: (562)949-8757

JOB NO.: R2358  
Page No.: B-2

**ENVIRONMENTAL TEST PHOTOGRAPH(S)**

**EXPLOSIVE ENVIRONMENT**  
**ONE (1) OHMMETER**  
**P/N: 620 UK, S/N: PER-05-0025**

