OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		1

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0001	7/12/04	N/A	

6. ISSUED BY CODE N00164

Contracting Officer (Code 1164ES; Tara Singleton)
NAVSURFWARCENDIV
300 Highway 361
Crane, IN 47522-5011

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No. Street, county, State and ZIP: Code)*

(✓)	9A. AMENDMENT OF SOLICITATION NO.
X	N00164-04-R-6939
	9B. DATED *(SEE ITEM 11)*
X	01 July 2004
	10A. MODIFICATION OF CONTRACT/ORDER NO.
	10B. DATED *(SEE ITEM 13)*

CODE FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(✓)		
	A.	THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B.	THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C.	THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D.	OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

"This amendment is being issued to incorporate the Contract Data Requirements List (Data Items A0001, A0002, and A0003), and to provide the Government's Test Procedures for informational purposes only. Notwithstanding the Test Procedures provided herein, the Government reserves the right to test the items in any manner deemed necessary to ensure the items meet all specified requirements."

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY *(Signature of Contracting Officer)*	

CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
	A	TDP X TM OTHER

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
A001	STATUS REPORT	

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
DI-MGMT-80368	CONTRACT SOW	NSWC, CRANE, CODE 6095

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	SEE BLK 16	MTHLY	45DAC
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
		05	05DARP

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE
INSERT IN SECT. B

16. REMARKS:

BLK 4: Blk 10 of Data Item (DI-MGMT-80368). Contractor format acceptable.
E-MAIL submission acceptable. Send to brown_harry@crane.navy.mil
Delete paragraphs 10.2.2.1b-e and h, 10.2.2.2 and 10.2.2.3

BLK 7: Submit one info copy only of letter to:
COMMANDER
Code 1165, BLDG 64 (Att. Contracting Officer)
NAVSURFWARCENDIV
300 HIGHWAY 361
CRANE, IN 47522-5001

BLK 9 –Distribution Statement A – Approved for public release; Distribution is unlimited.

BLK 14: Addressee List (AL) – AL-01
COMMANDER
CODE 6095 BLDG 3287 ATT H Brown
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE IN 47522-5001

The reproducible media and format shall be as agreed by the Govt And contractor.

14. DISTRIBUTION	b. COPIES		
a. ADDRESSEE	Draft	Final	
		Reg	Repro
AL-01			1
15. TOTAL			1

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Crane Data Manager	

DD Form 1423-1, 1 Jun 90

CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
	A	TDP X TM OTHER

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
A002	CERTIFICATION/DATA REPORT	

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE
INSERT IN SECT. B

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
DI-MISC-80678	CONTRACT SOW	NSWC, CRANE, CODE 6095

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	SEE BLK 16	0TIME	SEE BLK 16
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**

16. REMARKS:

BLK 4: BLK 7 of Data Item (**DI-MISC-80678), Delete 7.2**
BLK 4: BLk 10 of Data Item (**DI-MGMT-80227). Contractor format acceptable.** Report shall **include results certification of all assemblies tested in accordance with Contract Quality Assurance Requirements**

BLK 7: Submit one info copy only of letter to:
COMMANDER
Code 1165, BLDG 64 (Att. Contracting Officer)
NAVSURFWARCENDIV
300 HIGHWAY 361
CRANE, IN 47522-5001

BLK 9 –Distribution Statement **A – Approved for public release; Distribution** is unlimited.

BLK 12: Submit prior to DD**250 Inspection of Battery Charger 7334743.**

BLK 14: Addressee List (AL) – AL-01
COMMANDER
CODE 6095 BLDG 3287 **ATT H Brown**
NAVAL SURFACE WARFARE **CENTER**
300 HIGHWAY 361
CRANE IN 47522-5001

The reproducible media and format shall be as agreed by the Govt And contractor.

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES		
	Draft	Final	
		Reg	Repro
AL-01			1
15. TOTAL			1

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Crane Data Manager	

DD Form 1423-1, 1 Jun 90

CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
	A	TDP X TM OTHER

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
A003	AS BUILT CONFIGURATION LIST (ABCL)	

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
DI-CMAN-81516	CONTRACT SOW	NSWC, CRANE, CODE 6095

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	SEE BLK 16	0TIME	SEE BLK 16
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE
INSERT IN SECT. B

16. REMARKS:

BLK 4: Blk 10 of Data Item DI-CMAN-81516 Shall include identification of all major assemblies, Charger, Shunt Modules, Interface Boards, A/D Board, Power Supply Boards, Battery Interface Units, polarity tester and cables.

BLK 7: Submit one info copy only of letter to:
COMMANDER
Code 1165, BLDG 64 (Att. Contracting Officer)
NAVSURFWARCENDIV
300 HIGHWAY 361
CRANE, IN 47522-5001

BLK 9 –Distribution Statement A – Approved for public release; Distribution is unlimited.

BLK 12: Submit 15 days prior to material shipping date and in time for material DD250 approval.

BLK 14: Addressee List (AL) – AL-01
COMMANDER
CODE 6095 BLDG 3287 ATT H Brown
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE IN 47522-5001

The reproducible media and format shall be as agreed by the Govt And contractor.

14. DISTRIBUTION		b. COPIES	
a. ADDRESSEE	Draft	Final	
		Reg	Repro
AL-01			1
15. TOTAL			1

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
		Crane Data Manager	

DD Form 1423-1, 1 Jun 90

TEST PROCEDURE
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

SHUNT MODULE ASSEMBLY P/N 7449399-1
SHUNT MODULE POWER SUBASSEMBLY P/N 7449406-1
SHUNT MODULE CONTROL BOARD SUBASSEMBLY P/N 7449410-1

INTERFACE BOARD ASSEMBLY P/N 7449411-1
A/D I/O BOARD ASSEMBLY P/N 7449416-1

ELECTRONIC DEVELOPMENT DIRECTORATE
POWER SYSTEMS DEPARTMENT
CODE 609

ISSUE DATE: 9/4/03
REVIEW DATE: 9/2008
DOCUMENT CONTROL DATE: 9/2/2003

TEST PROCEDURE REVIEW & APPROVAL
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

	NAME/CODE	SIGNATURE	DATE
(1) PREPARER	**Harry Brown Code 6095**	**/RL/**	**8/8/2003**
(2) TEST LEAD	**Scott Pate Code 6095**	**/RL/**	**9/18/2003**
(3) PROJECT REPRESENTATIVE	**Harry Brown Code 6095**	**/RL/**	**9/5/2003**
(4) BRANCH	**Brad Secrest Code 6095**	**/RL/**	**9/19/2003**
(5) DEPARTMENT SAFETY	**Janna Foxx for Don Mains Code 609**	**/RL/**	**9/22/2003**
(6) INDUSTRIAL HYGIENE	**NA**	**NA**	**NA**
(7) RESOURCE PROTECTION	**NA**	**NA**	**NA**
(8) FIRE PROTECTION	**NA**	**NA**	**NA**
(9) ENVIRONMENTAL PROTECTION	**NA**	**NA**	**NA**
(10) SAFETY	**NA**	**NA**	**NA**
(11) DEPARTMENT APPROVAL	**JANNA FOXX CODE 609**	Janna Foxx	9-1-03

RECORD OF CHANGES
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

CHANGE NUMBER	REASON FOR CHANGE	PAGE	PARAGRAPH	DATE OF CHANGE

CHANGE APPROVAL	SIGNATURE/DATE
PREPARED BY	

HAZARD CONTROL BRIEFING
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

All test operators and other personnel working in the laboratory must be given a hazard control briefing every year* throughout the test period.

Project Representative – I have instructed the test operator in the requirements of paragraph 3 of this procedure.
Test Operator – I have been instructed and understand the requirements of paragraph 3 of this procedure.

PROJECT REPRESENTATIVE	DATE	TESTOPERATOR	DATE

*This time frame may be reduced at the discretion of the project representative.

VALIDATION
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

TEST PROCEDURE VALIDATION			
THE BELOW INITIALS INDICATE THAT THIS PROCEDURE HAS BEEN PROOFED BY SUBJECTING ONE OR MORE BATTERIES/CELLS TO EACH TEST DESCRIBED IN THE PROCEDURE AND CERTIFIES THE PROCEDURE ACCURATELY DEFINES AND DESCRIBES ALL CONDITIONS, EQUIPMENT AND PROCEDURES FOR TESTING THIS ITEM. AT LEAST ONE SET OF INITIALS MUST BE DIFFERENT FROM THE PERSON WRITING THE PROCEDURE.			
PARAGRAPH NUMBER	OPERATOR SIGNATURE AND DATE	TEST LEAD SIGNATURE AND DATE	PROJECT REP. SIGNATURE AND DATE

TEST PERSONNEL CERTIFICATION
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

Verification of instruction and understanding of safety precautions, test operations and recording of test data is in accordance with the reference test procedure or noted paragraphs thereof.

Test Lead

I have instructed the test operator in the requirements for each of the following.

1. Safety Requirements
2. Test Operation
3. Recording of Data

Test Operator

I have been instructed and understand the requirements for each of the following.

1. Safety Requirement
2. Test Operation
3. Recording of Data

Test Lead	Date	Procedure	Test Operator	Date

RISK ASSESSMENT
FOR
SDV MK 8 MOD 1 BATTERY CHARGER ELECTRONIC MODULES

The Final Risk Index for operation of the test has been defined as a/an 14, as determined by a hazard analysis using NAVSURFWARCENDIVCRANEINST 8020.8A latest revision. The mitigated Mishap Risk Assessment Value of a/an 14 as defined by Table 3a of the instruction represents a/an "marginal" event that can occur with the frequency of a/an "remote". The Mishap Risk Category for this operation is a/an "Medium", as defined by Table 3-1 of the instruction.

Determined By: Rudy Pirani, Engineer, 6-6095
Person's Name, Title, Code

Date: 5 September 2003

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS, ABBREVIATIONS & DEFINITION

Analogy/Digital	A/D
Bill of Materials	BOM
Counter-clockwise	CCW
Degrees Celsius	°C
Emergency Medical Technicians	EMTs
Input/Output	I/O
Maximum	max.
Minimum	min.
Operational Risk Management	ORM.
Part Number	P/N
Printed Circuit Board	PCB

TEST PROCEDURE
FOR
SDV MK 8 MOD 1 BATTERY CHARGER
ELECTRONIC MODULES

GENERAL

1.1 Purpose: The purpose of this test is to verify the performance of the electronics modules used in the SDV MK 8 MOD 1 Battery Charger. The procedure will also be used to trouble shoot any failed units.

1.2 Description of Items: The items to be tested are electronic circuit assemblies that are specifically built to be used in the SDV MK 8 MOD 1 Battery Charger. The specific items to be tested are:

1.2.1 SHUNT MODULE ASSEMBLY P/N 7449399-1
1.2.2 SHUNT MODULE POWER SUBASSEMBLY P/N 7449406-1
1.2.3 SHUNT MODULE CONTROL BOARD SUBASSEMBLY P/N 7449410-1
1.2.4 INTERFACE BOARD ASSEMBLY P/N 7449411-1
1.2.5 A/D I/O BOARD ASSEMBLY P/N 7449416-1

1.3 Test Stand: The electronic modules are tested using the Battery Charger Electronic Module Test Stand (referred to as Test Stand). The Test Stand is a semi-automatic test system capable of subjecting the test item to functional performance evaluation of the electronic subsystems of the Battery Charger Unit. A simplified block diagram is shown in Figure 1-1.

1.3.1 Figures 1-2 through 1-3 show physical layout views of the test stand.
1.3.2 Figure 1-4 shows the test stand control panel layout.
1.3.3 Figure 1-5 shows the test stand battery simulator panel layout

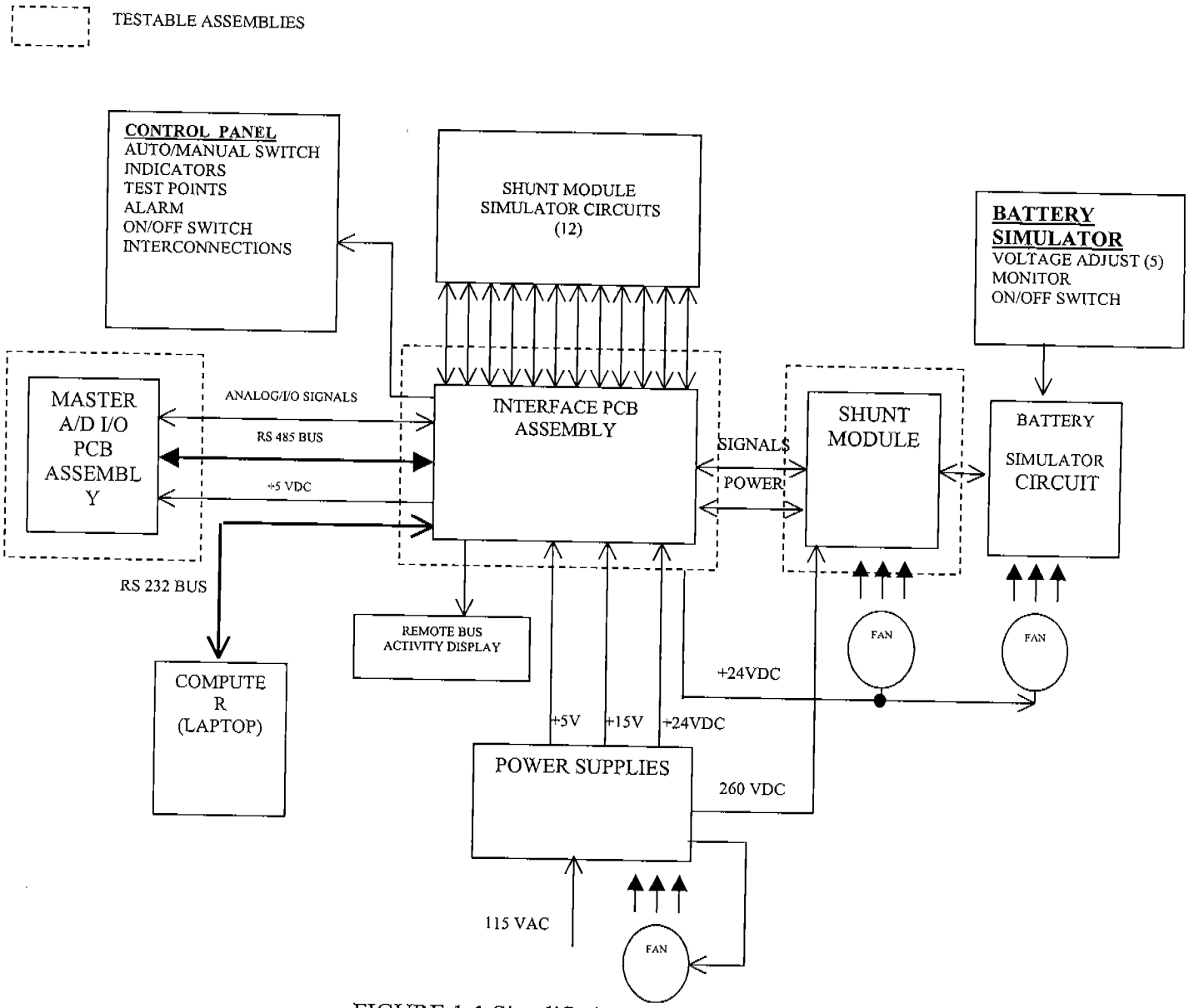

FIGURE 1-1 Simplified Block Diagram

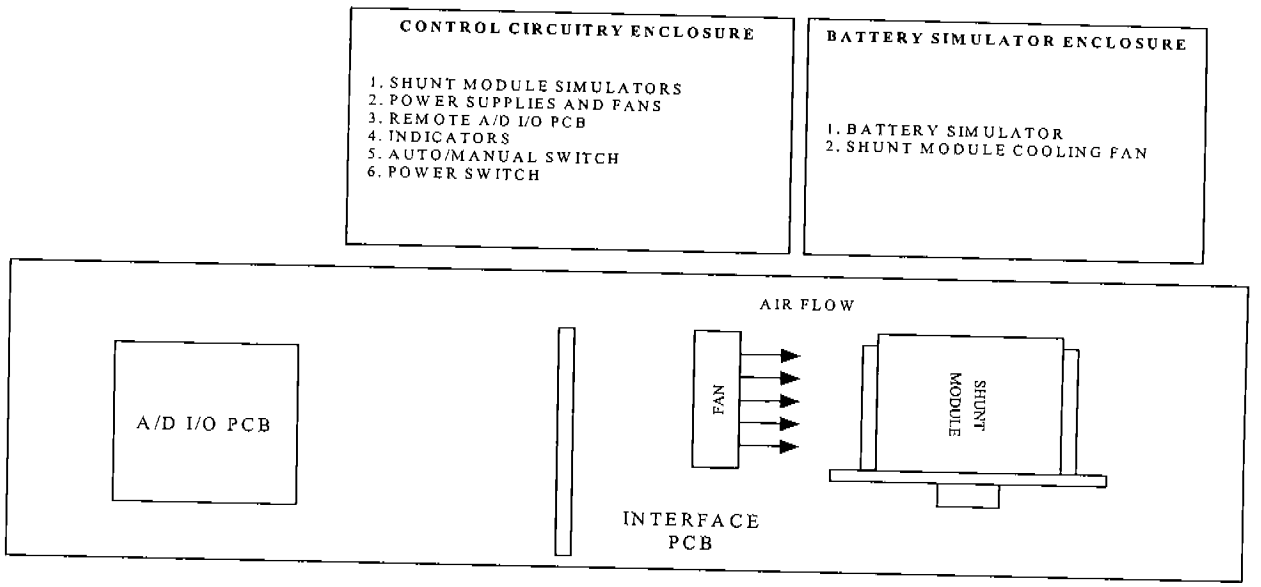

FIGURE 1-2 Top view of Test Stand

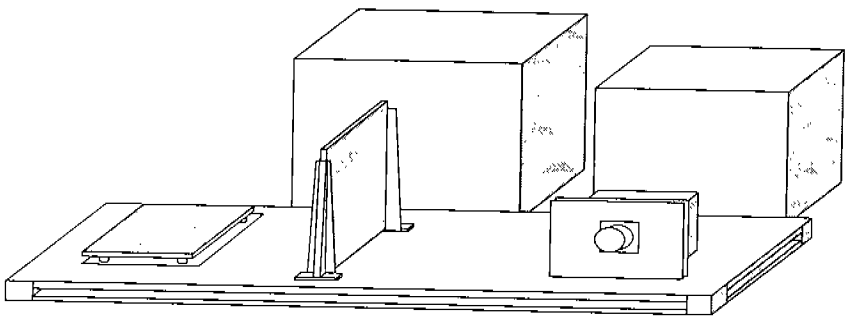

FIGURE 1-3 Isometric view of Test Stand

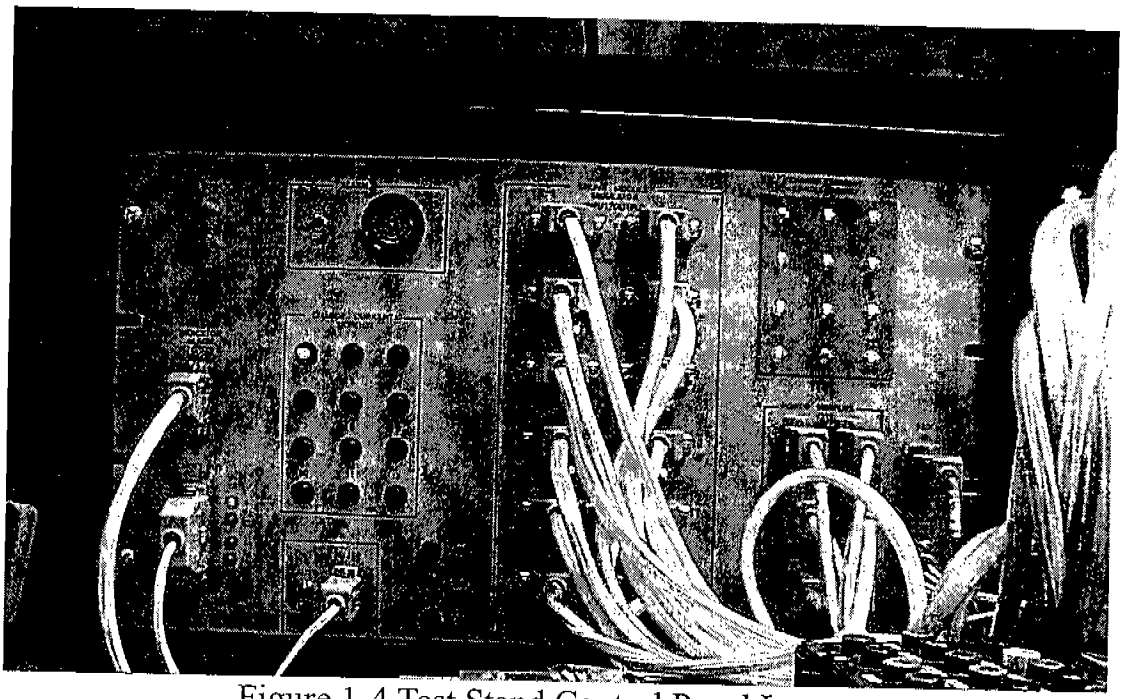

Figure 1-4 Test Stand Control Panel Layout

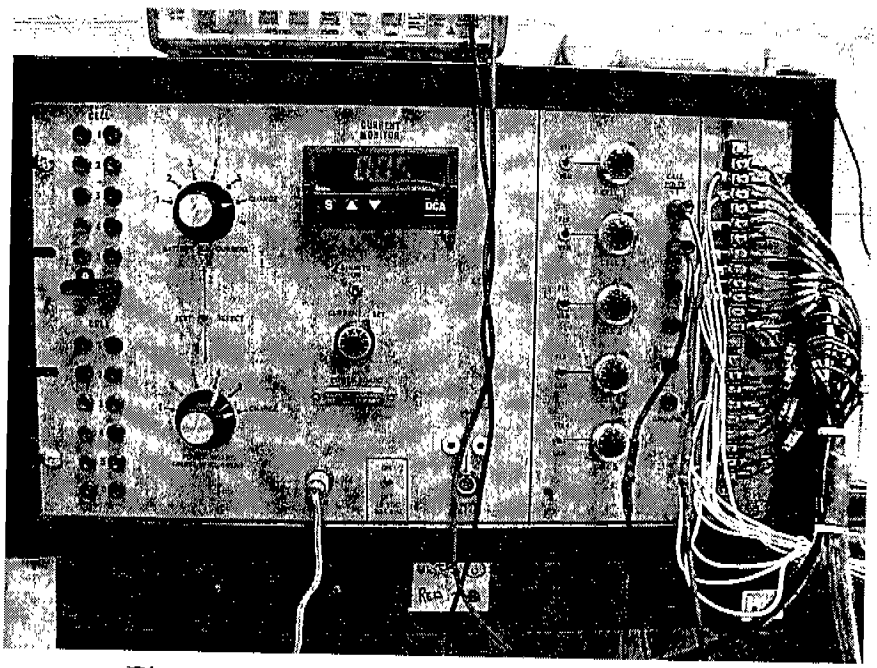

Figure 1-5 Battery Simulator Panel Layout

2.0 Reference Documents

2.1 Drawing 7449399 SHUNT MODULE ASSEMBLY AND DETAILS
2.2 Drawing 7449401 SHUNT MODULE, BOM
2.3 Drawing 7449402 SHUNT MODULE, POWER PCB SCHEMATIC
2.4 Drawing 7449403 SHUNT MODULE, POWER PCB ARTWORK
2.5 Drawing 7449405 SHUNT MODULE, CONTROL PCB ARTWORK
2.6 Drawing 7449415 SHUNT MODULE, CONTROL PCB SCHEMATIC
2.7 Drawing 7449406 SHUNT MODULE, POWER PCB BOM
2.8 Drawing 7449410 SHUNT MODULE, CONTROL PCB BOM
2.9 Drawing 7449411 INTERFACE PCB BOM
2.10 Drawing 7449412 INTERFACE PCB SCHEMATIC
2.11 Drawing 7449414 INTERFACE PCB ARTWORK
2.12 Drawing 7449416 A/D-I/O PCB ASSEMBLY
2.13 Drawing 7449398 SDV MOD I BATTERY CHARGER UNIT, BOM
2.14 Drawing 7449422 SDV MOD I BATTERY CHARGER, DRAWING TREE
2.15 Drawing 7449417 INTERNAL CABLE ASSEMBLIES AND WIRING DIAGRAM
2.16 Drawing 7449392 SDV MOD I BATTERY CHARGER UNIT, ASSEMBLY
2.17 Drawing 7449400 HOUSING WELDMENT AND MISC. DETAILS

3.0 Hazard Briefing

3.1 Operational Risk Management (ORM) Review

3.1.1 Scope: The purpose of this Operational Risk Management (ORM) review is to examine the safety related test system issues concerns. The purpose of an ORM review is to recognize and document possible hazards within the system, determine tools, concepts or procedures to mitigate those hazards, and finally assign a risk assessment number to that hazard. Appendix A contains information on the operational hazard analysis of the test system and the materials to be tested. Personnel assigned the responsibility of operating the SDV MK 8 MOD 1 Battery Charger Electronic Modules shall review and understand the general safety information discussed within the ORM section of this procedure.

3.1.2 General Precautions: Before operating the Battery Charger Electronic Modules, assigned personnel should familiarize themselves with the *Safety Precautions* and *Hazard Analysis* (ORM) sections of the building, lab and test manuals/procedures. In each of the test labs eye wash stations are located in general areas for ease of use. Personnel should locate these stations and ensure they are approved and accessible prior to any operations. If an incident does accrue contact Emergency Medical Technicians (EMTs) by calling 854-1333 or 911. If the phone is not available, pull a manual fire pull station, EMTs will respond.

3.1.3 Specific Safety Issues: Personnel responsible for the Battery Charger Electronic Modules shall become familiar with, and frequently review, the following safety precautions. These precautions apply to personal and equipment.

3.1.4 Electrical: In working with the Battery Charger Electronic Modules potential electrical hazards exist. Proper facility, lab, and technical safety measures should be followed while working with the equipment. In the case of an incident proper first aid procedure should be followed to treat electrical burns, unconsciousness, and/or any other related problems.

3.1.5 System Overview: The Battery Charger Electronic Modules are primarily isolated, however, the interface PCB board, the A/D I/O Board, and Shunt Module are exposed and do have wiring and cable connections that are also exposed. The potential exist for the user to injure himself while working around the equipment, suffering from minor scratches and potential of electrical shock. Items under test can also be damaged resulting in asset loss. These issues have been minimized with the utilization of a plexiglass test fixture for board and shunt mounting as well as procedural guidelines. The safety issues concerning the Battery Charger Electronic Modules with the implementation of the hazard mitigation requirements are at an acceptable level for operations

4.0 Test Equipment

4.1 Battery Charger Electronic Module Test Stand.
4.2 Multi-meter 4 ½ digit display
4.2.1 A calibrated meter is required when performing acceptance tests.
4.2.2 A calibrated meter is not required when performing repair.
4.3 Interface PCB board P/N 7449411-1 for operational checkout.
4.4 A/D I/O Board P/N 7449416-1 for operational checkout
4.5 Shunt Module Assembly P/N 7449399-1 for operational checkout
4.6 Shunt Module Control board P/N 7449410-1 for operational checkout

5.0 Battery Charger Electronic Module Test Stand Setup

5.1 Setup the test stand in accordance with Figures 1-2 through 1-4.
5.2 Install checkout A/D I/O Board in accordance with Figure 5-1
5.3 Install checkout Interface Board in accordance with Figure 5-1
5.4 Install checkout Shunt Module Assembly in accordance with Figure 5-1
5.5 Verify proper wiring of all boards in accordance with Figure 5-1
5.6 Verify proper operation of the test stand by performing the test to be run using the known good checkout boards.

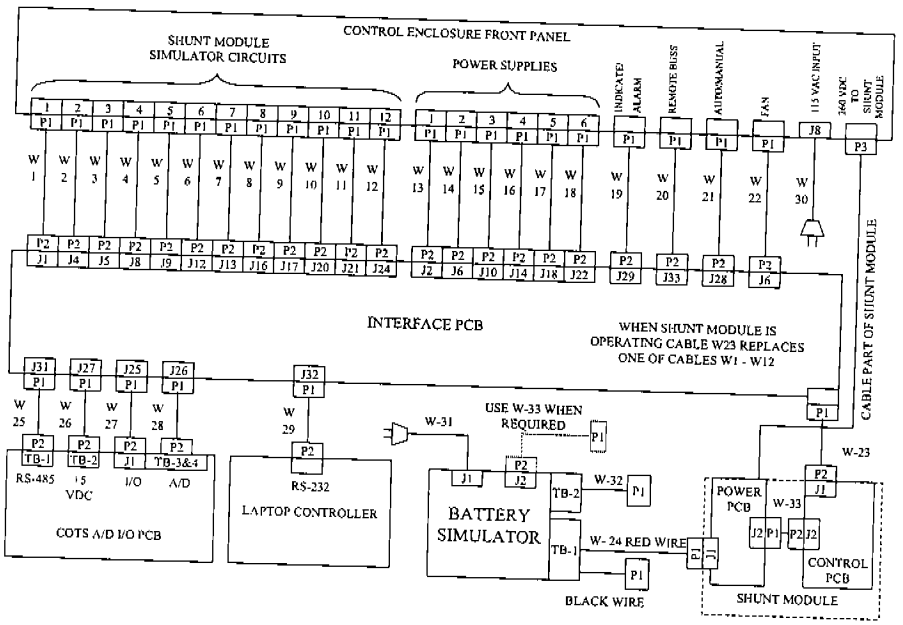

FIGURE 5-1 EXTERNAL CABLE DIAGRAM

6.0 TEST PROCEDURE

6.1 SHUNT MODULE POWER BOARD/HEATSINK ASSEMBLY -- P/N 7449406-1

6.1.1 Preliminary Inspection

6.1.1.1 Verify the Power switch on the Test Stand Control Panel (Figure 1-4) is "OFF".

6.1.1.2 Check for shorts between each output wires (W1, W2, W3, W4, W5, W9, W10 and ground with the multi-meter set for "ohms". (See Figure 6-1 Power PCB Layout)

6.1.2 Setup for Shunt Sensor Check

6.1.2.1 Test Set Control Panel switches

6.1.2.1.1 Set Power Switch to "OFF"

6.1.2.1.2 Set Auto/Manual Switch to "Manual"

6.1.2.2 Battery Simulator Panel Switches (Figure 1-5)

6.1.2.2.1 Set Battery Simulator 15 volts switch to "Off".

6.1.2.2.2 Set Current Set Potentiometer fully CCW.

6.1.2.2.3 Set the "Shunt On/Off" switch to "On".

6.1.2.2.4 Set the "Test/Select" switch to "Battery SIM Current"

6.1.2.2.5 Set the Battery Simulator Panel "Battery Sim Current Switch" to "Charge"

6.1.3 Shunt Sensor Check Procedure

6.1.3.1 Replace the checkout shunt module with the test unit. (Figure 1-3).

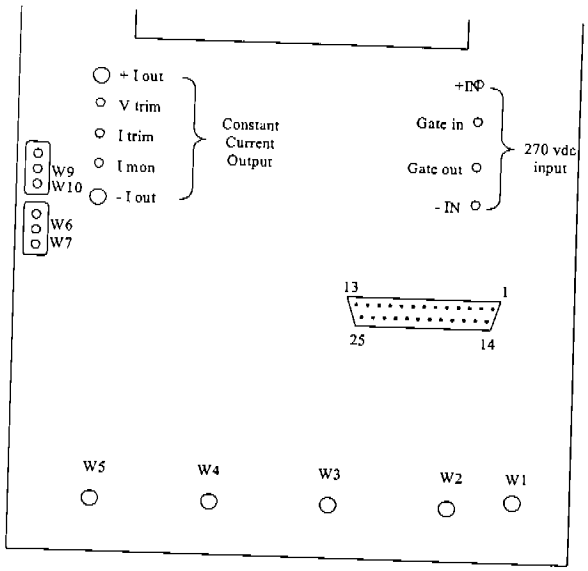

Figure 6-1 POWER
PCB LAYOUT
(Track Side)

6.1.3.2 Connect the Battery Simulator Terminal Strip TB-1 output cable (black wire cable) to J1 (large round connector on the module).

6.1.3.2.1 Connect the Module Power PCB input connector J2 (25 pin "D" connector) to the Power Board connector on the center of the Battery Simulator Panel

6.1.3.2.2 Connect the high voltage pig tailed cable attached to the Module to the connector labeled "260 VDC TO THE SHUNT MODULE" located on the lower right side of the Test Set Control Panel.

6.1.3.2.3 Turn Test Set Control power switch "On".

6.1.3.2.4 Set the Current Set Pot on Battery Simulator Panel to 5.00 ± 0.01 amps as indicated by the Panel Meter.

6.1.3.2.5 Switch the Test /Select switch to Power Board Shunt Current.

6.1.3.2.6 Compare the "Charge Current" and each "Shunt Current", displayed on the Panel Meter, to the current set in paragraph 6.1.3.2.4.

6.1.3.2.7 **Limit:** Charge Current set in Step 2 +/- 0.05 amps)

6.2 CONTROL PCB ASSEMBLY – P/N 7449410-1

6.2.1 Preliminary Inspection

6.2.1.1 Using a multi-meter check for shorts between IC pins and TP's listed in Table 6-1 and ground

IC or TP No.	PINS
U1, U2, U3, U6, U7, U8, U11, U12, U13, U16, U17, U18, U21, U22, U23, U26	1, 7, 8,
U4, U5, U9, U10, U14, U15, U19, U20, U24, U25	2, 6
U27, U28	1, 27
TP1, TP5, TP9, TP13, TP17, TP21	

Table 6-1 Measurement Points

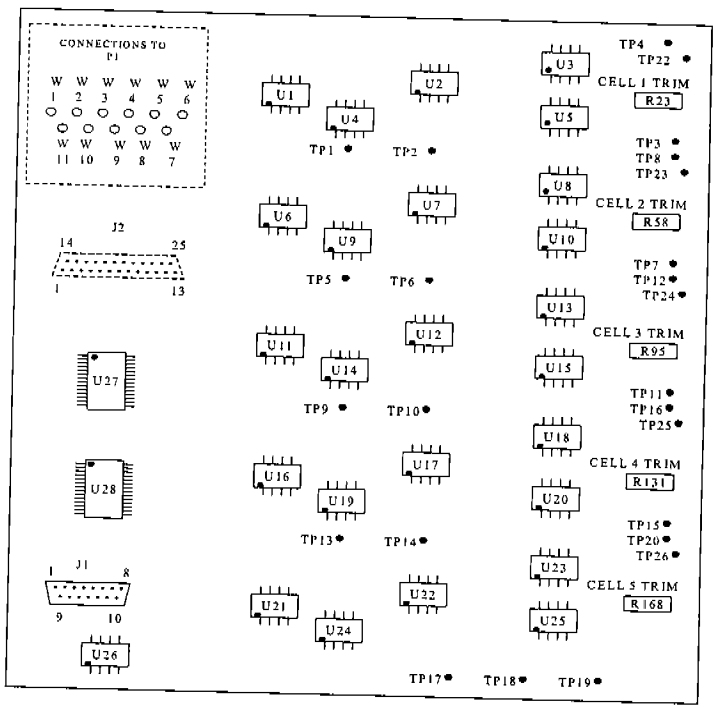

Figure 6-2 Control PCB Layout (Component Side)

6.2.2 Functional Test

6.2.2.1 For newly assembled PCB's, set 10 turn Trim Pots on the board completely CCW

6.2.2.2 Assemble Control PCB assembly to a known good Shunt Module Power Board/Heat Sink Assembly.

6.2.2.3 Perform the tests of paragraph 6.3.

6.3 COMPLETE SHUNT MODULE – P/N 7449399-1

6.3.1 Initial Set-up Test Set Control Panel Switches.

6.3.1.1 Set Power Switch "Off".

6.3.1.2 Auto/Manual Switch to "Auto".

6.3.2 Battery Simulator Panel Switches

6.3.2.1 Set Battery Simulator 15 volts switch to "On".

6.3.2.2 Set the "Shunt On/Off switch" to "Off".

6.3.2.3 Set the "Test/Select" switch to "Battery SIM Current"

6.3.2.4 Set the "Battery SIM Current Switch" to "Charge".

6.3.2.5 Set all 5 Cell Voltage Switches to Fixed

6.3.3 Cable Connections

6.3.3.1 Mount the test unit shunt assembly into the Test System

6.3.3.2 Connect the Battery Simulator Terminal Strip TB-1 output cable (Red wire cable) to J1 (large round connector on the module)

6.3.3.3 Connect the Shunt Module control PCB input connector J1 (15 pin "D" connector) to the Interface PCB connector J1.

6.3.3.4 Connect the high voltage pig tailed cable attached to the Shunt Module to the connector labeled "260 VDC TO THE SHUNT MODULE" located on the lower right side of the Test Set Control Panel.

6.3.4 Turn Test system power switch "On"

6.3.4.1 Load the Shunt Module Test program into the Computer. Double click on the ICON labeled "Shunt Module"

6.3.4.2 Select Set Number "SHUNT". Press "Done"

6.3.4.3 Press OK when message "New Activation file is required" displays.

6.3.4.4 Press OK when the message "Data file was not found Default Values of Zero will be used for total Amp hours" displays.

6.3.4.5 Select "Module Testing" from the menu header.

6.3.4.6 Press "Complete Shunt Module Testing" button.

6.3.5 Test 1: Cell Voltage Measurement Accuracy, Temperature Accuracy, and ID Numbers.

6.3.5.1 Select the Shunt Module Test 1 Program

6.3.5.2 Wait until voltage readings are displayed on the Screen.

Note:
The counter at the bottom of the screen counts during the time the data is being read. The updated readings will be displayed each time the counter reaches 46.

6.3.5.3 Measure the cell voltages using a calibrated digital voltmeter.

6.3.5.3.1 Voltages are measured using the "Cell Voltage Test Points" located on the right side of the Battery Simulator Front Panel. Use the Test Points shown in Table 6-2 to make the manual measurements.

Table 6-2 Battery Simulator Test Points

CELL No.	(+) TEST LEAD	(-) TEST LEAD
1	TP (+1)	TP (1-2)
2	TP (1-2)	TP (2-3)
3	TP (2-3)	TP (3-4)
4	TP (3-4)	TP (4-5)
5	TP (4-5)	TP (-5)

6.3.5.4 Compare computer displayed voltages with "Manually" measured cell voltages.

6.3.5.5 **Limit:** The difference between the displayed voltage and measured voltage shall be no greater than +/- 0.002 volts. (Operator Pass/Fail decision)

6.3.5.6 Displayed shunt current should be 0.00 +/- 0.05. (Operator Pass/Fail decision)

6.3.5.7 Temperature Display Reading **Limit:** 3.70 +/- 0.20 volts (Operator Pass/Fail decision)

6.3.5.8 Battery Charger Interface Unit ID 421. (Operator Pass/Fail decision)

ID Voltage Limits:
ID1 = 0.50 +/- 0.05 volts
ID2 = 1.00 +/- 0.05 volts
ID3 = 2.00 +/- 0.05 volts

6.3.5.9 Record data using Test Data Sheet Appendix B.

6.3.5.10 Press appropriate "Pass" or "Fail" button to complete the test

6.3.6 Test 2: Charge Current Control Accuracy

6.3.6.1 Select the Shunt Module Test **2** Program

6.3.6.2 Sequentially press the 5amp, 8amp, 10amp, and 15 amp Charge Current Buttons on the Computer display

6.3.6.3 Read the charge current on the Battery Simulator Panel Meter.

Note:
Panel Meter reads 0.05 amps when the Charge Current is set to "0 amps"

6.3.6.4 **Limit:** Commanded Current +/- 0.4 amps (Operator Pass/Fail decision)

6.3.6.5 Record data using Test Data Sheet Appendix B.

6.3.6.6 Press appropriate "Pass" or "Fail" button to complete the test

6.3.7 Test 3: Cell Voltage Shunt Level

6.3.7.1 Select the Shunt Module Test 3 Program

Note:
The displayed readings are updated every 5 counts.

6.3.7.2 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2.

6.3.7.3 Set the computer current to 5 amps (Press the 5 amp button).

6.3.7.4 Verify the "Battery Sim Panel" panel meter displays 5.00 +/-.5 amps.

6.3.7.5 Check computer display for Shunt Currents = 0.00 +/-.05 amps. (Operator Pass/Fail decision)

6.3.7.6 On the Battery Simulator Panel set "Battery Sim Current" switch to 1 (represents cell 1).

6.3.7.7 On the Battery Simulator Panel set Cell 1 "FIXED/VAR" switch to "VAR".

6.3.7.8 Slowly increase (turn clockwise) the voltage using the 10-turn POT, until the "Battery Sim Panel" meter displays between 2 and 4 amps. The displayed Shunt Current should be between 1 and 3 amps. (Computer display).

Note:
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.7.9 The displayed Cell voltage shall be 2.029 +/- 0.003 volts. This is displayed on both the digital voltmeter and computer display. (Operator Pass/Fail decision)

6.3.7.10 Return Cell 1 selector switch to "Fixed"

6.3.7.11 Shunt Current must return to 0.000 +/-.050 amps. (This should be the same value as in paragraph 6.3.7.5).

6.3.7.12 Repeat paragraph 6.3.7.4 through 6.3.7.11 for the remaining 4 cells. Selecting the appropriate positions for the "Battery Sim Current" switch..

6.3.7.13 Record data using Test Data Sheet Appendix B.

6.3.7.14 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.

6.3.7.15 Press appropriate "Pass" or "Fail" button to complete the test

6.3.8 Test 4: Full Shunt Current Adjustment

6.3.8.1 This test is performed to adjust the full shunt current value.

6.3.8.2 Select the Shunt Module Test 4 Program

Note:
The displayed readings are updated every 5 counts

6.3.8.3 Set the "Battery SIM Current" Switch to 1.

6.3.8.4 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2.

6.3.8.5 On the Battery Simulator Panel set Cell 1 FIXED/VAR selector switch to "VAR".

6.3.8.6 Slowly increase (adjust the cell "POT" clockwise) the Simulator Cell 1 voltage until the current displayed on the panel meter is below 6 amps. (The

computer displayed Shunt Current will be above 4 amps). The Shunt will switch to the Full Shunt Mode.

Note:
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.8.7 Return the Battery Simulator Front Panel Cell 1 switch to the "Fixed" position

6.3.8.8 Adjust the Cell 1 "trim pot" on the Shunt Module control board until the Battery Simulator current is between 0.30 +/- .01 amps as indicated on the Panel Meter. See Figure 6-2 for location of the trim pots.

6.3.8.9 Repeat paragraph 6.3.8.2 through 6.3.8.8 for each of the 5 cells. Position the Digital Voltmeter, Battery Sim Current switch, Cell FIXED/VAR switch, and adjust the Cell "POT" for the Cell being tested.

6.3.8.10 Record data using Test Data Sheet Appendix B.

6.3.8.11 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.

6.3.8.12 Press appropriate "Pass" or "Fail" button to complete the test

6.3.9 Test 5: Full Shunt Mode Inhibit

6.3.9.1 Select the Shunt Module **Test 5** Program

6.3.9.2 Wait for Cell Voltage Readings to Display

Note:
The displayed readings are updated every 5 counts

6.3.9.3 *Press 5.5 amp* Charge Current Button on Display

6.3.9.4 On the Battery Simulator Panel set Cell 1 FIXED/VAR selector switch to "VAR".

6.3.9.5 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2

6.3.9.6 Set the "Battery SIM Current" Switch to 1.

6.3.9.7 Slowly increase (adjust the cell "POT" clockwise) the Simulator Cell 1 voltage until the current displayed on the panel meter is below 1 amp. (The computer displayed Shunt Current will be above 4 amps)

. **Note:**
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.9.8 Switch Cell 1 selector switch to Fixed. **Limit:** Shunt current must return to "0.000 +/-0.050 amps".

6.3.9.9 Repeat paragraphs 6.3.9.4 through 6.3.9.8 for each of the 5 cells. Position the Digital Voltmeter, Battery Sim Current switch, Cell FIXED/VAR switch, and adjust the Cell "POT" for the Cell being tested.

6.3.9.10 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.

6.3.9.11 *Press 8.0 amp* Charge Current Button on Display

6.3.9.12 On the Battery Simulator Panel set Cell 1 FIXED/VAR selector switch to "VAR".

6.3.9.13 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2

6.3.9.14 Set the "Battery SIM Current" Switch to 1.

6.3.9.15 Slowly increase (adjust the cell "POT" clockwise) the Simulator Cell 1 voltage until the current displayed on the panel meter is below 4 amps. (The computer displayed Shunt Current will be above 4 amps). The Shunt will switch to the Full Shunt Mode displaying 0.30 +/-0.05 amps on the Panel Meter.

Note:
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.9.16 Switch Cell 1 FIXED/VAR selector switch to Fixed. The shunt will stay latched. **Limit:** Panel Meter Battery Current must remain at 0.30 +/- 0.05 amps.

6.3.9.17 Record data using Test Data Sheet Appendix B. Operator check Pass or Fail.

6.3.9.18 Repeat paragraphs 6.3.8.12 through 6.3.8.17 for each of the 5 cells. Position the Digital Voltmeter, Battery Sim Current switch, Cell FIXED/VAR switch, and adjust the Cell "POT" for the Cell being tested.

6.3.9.19 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.

6.3.9.20 *Press 0.0 amps* button to **Deactivate** the Full Shunt mode (All 5 shunt currents should return to "0.000 +/-0.050" amps).

6.3.9.21 *Press 10.0 amp* Charge Current Button on Display

6.3.9.22 On the Battery Simulator Panel set Cell 1 FIXED/VAR selector switch to "VAR".

6.3.9.23 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2

6.3.9.24 Set the "Battery SIM Current" Switch to 1.

6.3.9.25 Slowly increase (adjust the cell "POT" clockwise) the Simulator Cell 1 voltage until the current displayed on the panel meter is below 6 amps. (The computer displayed Shunt Current will be above 4 amps). The Shunt will switch to the Full Shunt Mode displaying 0.30 +/-0.05 amps on the Panel Meter.

Note:
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.9.26 Switch Cell 1 FIXED/VAR selector switch to Fixed. The shunt will stay latched. **Limit:** Panel Meter Battery Current must remain at 0.30 +/- 0.05 amps.

6.3.9.27 Record data using Test Data Sheet Appendix B. Operator check Pass or Fail.

6.3.9.28 Repeat paragraphs 6.3.9.22 through 6.3.9.27 for each of the 5 cells. Position the Digital Voltmeter, Battery Sim Current switch, Cell FIXED/VAR switch, and adjust the Cell "POT" for the Cell being tested.

6.3.9.29 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.
6.3.9.30 *Press 0.0 amps* button to Deactivate the Full Shunt mode
6.3.9.31 *Press 15.0 amp* Charge Current Button on Display
6.3.9.32 On the Battery Simulator Panel set Cell 1 FIXED/VAR selector switch to "VAR".
6.3.9.33 Set the digital voltmeter to read the voltage of Cell 1 in accordance with Table 6-2
6.3.9.34 Set the "Battery SIM Current" Switch to 1.
6.3.9.35 Slowly increase (adjust the cell "POT" clockwise) the Simulator Cell 1 voltage until the current displayed on the panel meter is below 11 amps. (The computer displayed Shunt Current will be above 4 amps).

Note:
The current does not decrease until the displayed voltage is 2.029 +/- 0.003.

6.3.9.36 Switch Cell 1 selector switch to Fixed. **Limit:** Shunt current must return to "0.000 +/-0.050 amps".
6.3.9.37 Record data using Test Data Sheet Appendix B. Operator check Pass or Fail.
6.3.9.38 Repeat paragraphs 6.3.9.32 through 6.3.9.37 for each of the 5 cells. Position the Digital Voltmeter, Battery Sim Current switch, Cell FIXED/VAR switch, and adjust the Cell "POT" for the Cell being tested.
6.3.9.39 Adjust all 5 cell "POT's" counterclockwise at least 2 turns.
6.3.9.40 Press appropriate "Pass" or "Fail" button to complete the test
6.3.10 Press "DONE" on "Shunt Module Test" screen.
6.3.11 Press "EXIT" on "Battery Charger Electronic Sub Assembly Test System" screen.
6.3.12 Press "EXIT" on "Advanced Charger Menu Screen"

6.4 INTERFACE BOARD ASSEMBLY – P/N 7449411-1

6.4.1 Initial Set-up
6.4.1.1 Install Interface Board Assembly test unit into the test stand into the Test System
6.4.1.2 Connect cables as shown in Figure 5-1
6.4.1.3 Test Set Control Panel Switches
6.4.1.3.1 SET Power Switch "Off"
6.4.1.3.2 SET Auto/Manual Switch to "Auto"
6.4.1.4 Battery Simulator Panel Switches
6.4.1.4.1 SET 15 volts switch to "Off".
6.4.1.4.2 SET Test/Select switch to "Battery SIM Current"
6.4.1.4.3 SET Battery SIM Current Switch to "Charge".
6.4.1.4.4 SET Voltage Controls to "Fixed" and "Pots" to Minimum Voltage (Controls full CCW)
6.4.1.5 Test Procedure Setup
6.4.1.5.1 Turn Test System Power "On"

6.4.1.5.2 Load Interface Test Program. Double click on ICON labeled "Interface and Azonix Test".

6.4.1.5.3 Select Set Number "hew_000".

6.4.1.5.4 Press "Done" Press OK when message "New Activation file is required" displays.

6.4.1.5.5 Press OK when the message "Data file was not found Default Values of Zero will be used for total Amp hours" displays.

6.4.1.5.6 Click on "Module Testing"

6.4.2 Test 1: Bus Communications Function

6.4.2.1 Select the Interface PCB Assembly **Test 1** Program

6.4.2.2 Check for Flashing LEDs RxD and TxD on the A/D - I/O PCB Assembly (AZONIX)

6.4.2.3 Check for Flashing LEDs Rx (-), Tx (+), Tx (-) and continuous "On" Rx (+) for the Remote Bus on the Test Set Control Panel.

6.4.2.4 Record data using Test Data Sheet Appendix B

6.4.2.5 Press appropriate "Pass" or "Fail" button to complete the test

6.4.3 Test 2: +/- 15 VDC Power Supply Output Voltage

6.4.3.1 Select the Interface PCB Assembly **Test 2** Program

6.4.3.2 Manually measure the +/- 15 volts at the Test Set Control Panel Test Points **Limit:** 15 +/- 0.3 volts

6.4.3.3 Record data using Test Data Sheet Appendix B

6.4.3.4 Press appropriate "Pass" or "Fail" button to complete the test

6.4.4 Test 3: Charge Current Enable/Inhibit Operation

6.4.4.1 Select the Interface PCB Assembly **Test 3** Program

6.4.4.2 Sequentially Press: Button 1,2,3, Button 4,5,6, Button 7,8,9, Button 10,11,12, Button 1,4,7,10, Button 2,5,8,11, and Button 3, 6, 9, 12.

6.4.4.3 For each corresponding output, the "Charge Current Monitor" LED on the Test Set Front Panel must turn "On" and the "Charge Current Enable/Inhibit" LED must turn "Off".

6.4.4.4 Record Pass or Fail on Test Data Sheet Appendix B

6.4.4.5 Press appropriate "Pass" or "Fail" button to complete the test

6.4.5 Test 4: Accuracy of Voltages, Currents, Temperature, and IDs

6.4.5.1 Select the Interface PCB Assembly **Test 4** Program.

6.4.5.2 The computer will display "Acquiring Data". Wait until Voltage readings are displayed. **Note:** Be patient this test takes awhile to complete. The displayed readings are updated every 76 counts. The computer will display "DATA Ready".

6.4.5.3 The Computer will make the Pass/Fail determination for this test. "Blue" backgrounds indicates a "Pass" and "Red" backgrounds indicates a "Failure"

6.4.5.4 After the voltage readings are displayed, record Pass or Fail on the Test Data Sheet Appendix B

6.4.5.5 Press the Current Button at the bottom of the screen. The computer will display "Acquiring Data".

6.4.5.6 Wait until Current readings are displayed. The computer will display "DATA Ready". The Computer will make the Pass/Fail determination for this test. "Blue" backgrounds indicates a "Pass" and "Red" backgrounds indicates a "Failure"

6.4.5.7 Record Pass or Fail on Test Data Sheet Appendix B

6.4.5.8 Press "Done" to complete the test.

6.4.6 Test 5: Charge Current Display

6.4.6.1 Select the Interface PCB Assembly **Test 5** Program.

6.4.6.2 Sequentially Press: Button 1,2,3, Button 4,5,6, Button 7,8,9, Button 10,11,12, Button 1,4,7,10, Button 2,5,8,11, and Button 3, 6, 9, 12.

6.4.6.3 For each corresponding output the "Charge Current Monitor" LED on the Test Set Front Panel must turn "On"

6.4.6.4 Record Pass or Fail on Test Data Sheet Appendix B

6.4.6.5 Press appropriate "Pass" or "Fail" button to complete the test

6.4.7 Test 6: Bus Activity Monitor Circuit

6.4.7.1 From the test unit labeling determine if the test unit is original version or revision 1. If the test unit is original version proceed with paragraph 6.4.7.2. If the test unit is Revision 1 skip to paragraph 6.4.7.3.

6.4.7.2 For original version of interface board, select the Interface PCB Assembly **Test 6** Program

6.4.7.2.1 **Pass Indication:** The Front Panel Charge Current Enable/Inhibit LEDs blink "On" and "Off" as the Charge Current Monitor LEDs sequentially come "On"

6.4.7.2.2 Record Pass or Fail on Test Data Sheet Appendix B

6.4.7.2.3 Press appropriate "Pass" or "Fail" button to complete the test.

6.4.7.3 For Revision 1 of interface board, select the Interface PCB Assembly **Test 6** Program

6.4.7.3.1 Wait for the Test Stand to begin sequentially turning on the Charge Current Monitor LEDs.

6.4.7.3.2 With one or more Charge Current Monitor LEDs "ON" remove connector J32 from the unit under test.

6.4.7.3.3 **Pass Indication:** The Test Stand Panel Charge Current Enable/Inhibit LEDs come "On" about 10 seconds after the connector is removed.

6.4.7.3.4 Reconnect J32 to the unit under test, the Charge Current LEDs continue to sequentially turn on.

6.4.7.3.5 Record Pass or Fail on Test Data Sheet Appendix B

6.4.7.3.6 Press appropriate "Pass" or "Fail" button to complete the test.

6.4.8 Test 7: Alarm Circuit

6.4.8.1 Select the Interface PCB Assembly **Test 7** Program

6.4.8.2 Press Alarm "On" Button

6.4.8.3 **Pass Indication:** Alarm sounds
6.4.8.4 Press Alarm "Off" Button
6.4.8.5 Record Pass or Fail on Test Data Sheet Appendix B
6.4.8.6 Press appropriate "Pass" or "Fail" button to complete the test

6.4.9 Test 8: Automatic/Manual Mode
6.4.9.1 Select the Interface PCB Assembly **Test 8** Program
6.4.9.2 Switch the Test Set Control Panel Auto/Manual Switch to "Manual"
6.4.9.3 All 12 Front Panel Charge Current Monitor LEDs must turn "On"
6.4.9.4 Measure Itrim voltages at the Itrim Test Points on the Test Set Control Panel using a manual voltmeter **Limits:** 1.764 min., 1.837 max.
6.4.9.5 Return the Auto/Manual Switch to "Auto"
6.4.9.6 Record Pass or Fail on Test Data Sheet Appendix B
6.4.9.7 Press appropriate "Pass" or "Fail" button to complete the test.

Note:
When leaving this test the Test Program is automatically "Closed". This is done because, once the Auto/Manual switch is set to "Manual" the computer is disabled and future test readings will be in error unless, the Computer Test Program is closed.

6.4.10 Test 9 Shunt Module Verification
6.4.10.1 Setup the test stand in accordance with paragraph 6.3.1 through 6.3.4.6. Ensure a known good shunt module assembly is mounted to the Test System in paragraph 6.3.3.1.
6.4.10.2 Perform Test 1: Cell Voltage Measurement Accuracy, Temperature Accuracy, and ID Numbers in accordance with paragraph 6.3.5.
6.4.10.3 Record Pass or Fail on Test Data Sheet Appendix B
6.4.10.4 Press appropriate "Pass" or "Fail" button to complete the test.
6.4.11 Press "DONE" on "Interface Board Test" screen.
6.4.12 Press "EXIT" on "Battery Charger Electronic Sub Assembly Test System" screen.
6.4.13 Press "EXIT" on "Advanced Charger Menu Screen"

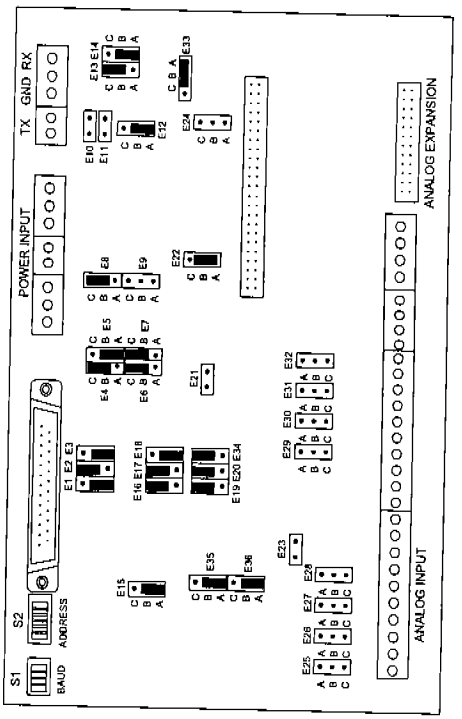

Figure 6-3 Jumper settings for A/D board

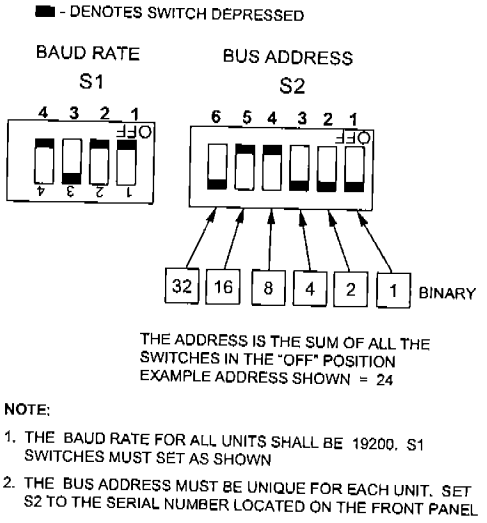

Figure 6-4 Baud Rate and Bus Address settings

6.5 A/D-I/O BOARD ASSEMBLY – P/N 7449416-1

6.5.1 A/D I/O Board Set-up
6.5.1.1 Set/verify jumpers are as shown in Figure 6-3.
6.5.1.2 Set switches for Baud Rate switch as shown in Figure 6-4.
6.5.1.3 Set the BUS address to "1" in accordance with Switch 2 of Figure 6-4.
6.5.1.4 Record completion of verification on Test Data Sheet Appendix B
6.5.1.5 Install unit to be tested in Test System
6.5.1.6 Connect Cables as shown in Figure 5-1
6.5.2 Test Set Control Panel Switches
6.5.2.1 Power Switch "Off"
6.5.2.2 Auto/Manual Switch to "Auto"
6.5.2.3 Alarm On/Off switch to "On"
6.5.3 Battery Simulator Panel Switches
6.5.3.1 Set the "Shunts On/Off switch" to "Off".
6.5.3.2 Set the "Test/Select" switch to "Battery SIM Current"
6.5.3.3 Set the "Battery Sim Current Switch" to "Charge".
6.5.3.4 Set Battery Simulator Voltage Controls "Fixed

6.5.4 Test System Start -Up.
6.5.4.1 Turn Test System Power "On"
6.5.4.2 Double click the ICON "Interface and Azonix Test" to load the Test Program
6.5.4.3 Select Set Number "hew_000". Press "Done"

6.5.4.4 Press "Done" Press OK when message "New Activation file is required" displays.

6.5.4.5 Press OK when the message "Data file was not found Default Values of Zero will be used for total Amp hours" displays

6.5.4.6 Click on "Module Testing"

6.5.5 Test 1: Bus Communications with Computer

6.5.5.1 Select the Azonix PCB Assembly **Test 1** Program

6.5.5.2 Compare Address displayed to the Address set by the switches on the PCB Assembly.

6.5.5.3 **Pass Criteria:** Address agreement

6.5.5.4 Apply "Address Label" to the PCB Assembly

6.5.5.5 Record data using Test Data Sheet Appendix BPress appropriate "Pass" or "Fail" button to complete the test

6.5.6 Test 2: A/D - I/O Accuracy

6.5.6.1 Select the Azonix PCB Assembly **Test 2** Program

6.5.6.2 The computer will display "Acquiring Data". Wait until Voltage readings are displayed. **Note:** Be patient this test takes awhile to complete. The displayed readings are updated every 76 counts. The computer will display "DATA Ready".

6.5.6.3 The Computer will make the Pass/Fail determination for this test. "Blue" backgrounds indicates a "Pass" and "Red" backgrounds indicates a "Failure"

6.5.6.4 After the voltage readings are displayed, record Pass or Fail on the Test Data Sheet Appendix B

6.5.6.5 Press the Current Button at the bottom of the screen. The computer will display "Acquiring Data".

6.5.6.6 Wait until Current readings have been displayed. The computer will display "DATA Ready". The Computer will make the Pass/Fail determination for this test. "Blue" backgrounds indicates a "Pass" and "Red" backgrounds indicates a "Failure"

6.5.6.7 Record Pass or Fail on Test Data Sheet Appendix B

6.5.6.8 Press "Done" to complete the test.

6.5.7 Test 3: D/A Output Accuracy

6.5.7.1 Select the Azonix PCB Assembly **Test 3** Program

6.5.7.2 Connect Voltmeter between Ground and Iset (Yellow) Test Point on cable interface box.

6.5.7.3 Press 1.000 volt Button **Limit:** 0.980 volts min, 1.020 volts max

6.5.7.4 Press 2.500 volt Button **Limit:** 2.450 volts min, 2.550 volts max

6.5.7.5 Press 5.000 volt Button **Limit:** 4.900 volts min, 5.100 volts max

6.5.7.6 Record data using Test Data Sheet Appendix B

6.5.7.7 Press appropriate "Pass" or "Fail" button to complete the test.

6.5.8 Press "DONE" on "Azonix PCB Board Test" screen.

6.5.9 Press "EXIT" on "Battery Charger Electronic Sub Assembly Test System" screen.

6.5.10 Press "EXIT" on "Advanced Charger Menu Screen"

6.6 THERMAL SHOCK TEST

6.6.1 Equipment: Two temperature chambers, one set at –20°C and the other at 85°C

6.6.1.1 Condition one temperature chamber to –20°C for a minimum of 4 hrs.

6.6.1.2 Condition a second temperature chamber to 85°C for a minimum of 4 hrs

6.6.2 Place the board in the –20°C chamber. Monitor the thermocouple until it reads –20°C. Wear thermal gloves when handling the test item at temperature.

6.6.2.1 Position the board near the center of a temperature chamber. The surface of the board shall not be in contact with any metal or conducting surface. Tape a thermal couple to the largest component of the board. More then one board may be placed in the chambers at a time, but only one board requires a thermocouple. The other boards will be assumed to heat at the same rate

6.6.3 Move the board to the 85°C chamber. Wear thermal gloves when handling the test item at temperature. When the thermocouple reads 85°C return the board to the –20°C chamber.

6.6.4 Repeat the temperature cycle for a total of 10 thermal cycles.

6.6.5 After the 10 cycles, allow the board to return to ambient temperature and return the board to Building 3287.

APPENDIX A

HAZARD ANALYSIS

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Table 3-1 OPERATION HAZARD ANALYSIS PROCEDURE FOR SDV MK 8 MOD 1 CHARGER				BRANCH 6095	REVISION NUMBER 1		
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIMINARY RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY/ PREVENTATIVE ACTIONS**
6.0			Test Procedure				
6.1			Shunt Module Power Board/Heat Sink Assembly				
	Electrical - ESD (Static)	Inadvertent contact with PCB boards, shunt modules, & cabling with user or other foreign material	• Equipment Damage	IVD	Non-conducting Test Fixture for PC Board Mounting, Interface Cabling, and Procedural Guidelines	IVD	
	Electrical – Inadvertent Activation		• Personal Injury • Equipment Damage	IVD		IVD	
	Sharp Edges, Corners, etc.		• Personal Injury • Equipment Damage	IVC		IVD	
	1.1.1 Total Risk					IVD	
6.2			Control PCB Assembly				
	Electrical - ESD (Static)	Inadvertent contact with PCB boards, shunt modules, & cabling with user or other	• Equipment Damage	IVD	Non-conducting Test Fixture for PC Board Mounting, Interface	IVD	
	Electrical – Inadvertent Activation		• Personal Injury • Equipment Damage	IVD		IVD	

Table 3-1 continued OPERATION HAZARD ANALYSIS PROCEDURE FOR SDV MK 8 MOD 1 CHARGER				BRANCH 6095	REVISION NUMBER 1		
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIMINARY RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY/ PREVENTATIVE ACTIONS**
	Electrical - Shock	foreign material	• Personal Injury • Equipment Damage	IVC	Cabling, and Procedural Guidelines	IVD	
	Sharp Edges, Corners, etc.		• Personal Injury • Equipment Damage	IVC		IVD	
	1.1.2 Total Risk					IVD	
6.3			Complete Shunt Module				
	Electrical - ESD (Static)	Inadvertent contact with PCB boards, shunt modules, & cabling (260V) with user or other foreign material.	• Equipment Damage	IVD	Non-conducting Test Fixture for PC Board Mounting, Interface Cabling, Procedural Guidelines and 260 Volt Power Isolated with Proper Connector and Cable	IVD	
	Electrical – Inadvertent Activation		• Personal Injury • Equipment Damage	IVD		IVD	
	Electrical - Shock		• Personal Injury • Equipment Damage	IIIC		IIID	
	Sharp Edges, Corners, etc.		• Personal Injury • Equipment Damage	IVC		IVD	
	1.1.3 Total Risk					IIID	

Table 3-1 continued OPERATION HAZARD ANALYSIS PROCEDURE FOR SDV MK 8 MOD 1 CHARGER | BRANCH 6095 | REVISION NUMBER 1

PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIMINARY RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY/ PREVENTATIVE ACTIONS
6.4			Interface Board Assembly				
	Electrical - ESD (Static)	Inadvertent contact with PCB boards, shunt modules, & cabling with user or other foreign material	• Equipment Damage	IVD	Non-conducting Test Fixture for PC Board Mounting, Interface Cabling, and Procedural Guidelines	IVD	
	Electrical – Inadvertent Activation		• Personal Injury • Equipment Damage	IVD		IVD	
	Electrical - Shock		• Personal Injury • Equipment Damage	IVC		IVD	
	Sharp Edges, Corners, etc.		• Personal Injury • Equipment Damage	IVC		IVD	
	1.1.4 Total Risk					IVD	
6.5			A/D-I/O Board				
	Electrical - ESD (Static)	Inadvertent contact with PCB boards, shunt modules, & cabling with user or other	• Equipment Damage	IVD	Non-conducting Test Fixture for PC Board Mounting, Interface	IVD	
	Electrical – Inadvertent Activation		• Personal Injury • Equipment Damage	IVD		IVD	

Table 3-1 continued OPERATION HAZARD ANALYSIS PROCEDURE FOR SDV MK 8 MOD 1 CHARGER				BRANCH 6095	REVISION NUMBER 1		
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIMINARY RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY/ PREVENTATIVE ACTIONS**
	Electrical – Shock	foreign material	• Personal Injury • Equipment Damage	IVC	Cabling, and Procedural Guidelines	IVD	
	Sharp Edges, Corners, etc.		• Personal Injury • Equipment Damage	IVC		IVD	
	1.1.5 Total Risk					IVD	
6.6			Temperature Shock				
	Temperature – cold	Handling of PC boards during changing chambers and contact with chamber	• Personal Injury	IVC	Wear insulating gloves	IVD	
	Temperature -- hot						
	1.1.6 Total Risk					IVD	

APPENDIX B

TEST DATA SHEETS

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Test and Inspection Sheet: Shunt Module Assembly

Shunt Module Assembly NSN 0098-LL-H7A-2871 P/N 7449399-1 **Serial No.** _____

Multi-meter S/C _____ CAL Due Date _____

Test 1. Cell voltage measurement, temperature, and ID Number Accuracy : Pass _____ Fail _____

1. Verify readings of voltage (+/- 0.002)

		Value	Current	Reference
Voltage	Cell 1	_____	_____	_____
Voltage	Cell 2	_____	_____	_____
Voltage	Cell 3	_____	_____	_____
Voltage	Cell 4	_____	_____	_____
Voltage	Cell 5	_____	_____	_____

Temperature = 3.70 +/- 0.20 volts _____

BIU = 421, _____ ID1 = 0.50 +/- 0.05 volts, ID2 = 1.00 +/- 0.05 volts. ID3 = 2.00 +/- 0.05 volts

Test 2. Charge Current Control Accuracy: Pass _____ Fail _____

1. 5.0 +/- .4 (4.6 to 5.4) = _____
2. 8.0 +/- .4 (7.6 to 8.4) = _____
3. 10.0 +/- .4 (9.6 to 10.4) = _____
4. 15.0 +/- .4 (14.6 to 15.4) = _____

Test 3. Cell Voltage Shunt Level:

1. Cell 1 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 5 Pass _____ Fail _____
   Cell 3 Pass _____ Fail _____

Test 4. Full Shunt Current Adjust:

1. Cell 1 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 5 Pass _____ Fail _____
   Cell 3 Pass _____ Fail _____

Test 5. Full Shunt Current Inhibit:

1. 5.5 amps
   Cell 1 Pass _____ Fail _____ Cell 3 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 5 Pass _____ Fail _____
2. 8.0 amps
   Cell 1 Pass _____ Fail _____ Cell 3 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 5 Pass _____ Fail _____
3. 10.0 amps
   Cell 1 Pass _____ Fail _____ Cell 3 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 5 Pass _____ Fail _____
4. 15.0 amps
   Cell 1 Pass _____ Fail _____ Cell 3 Pass _____ Fail _____
   Cell 2 Pass _____ Fail _____ Cell 4 Pass _____ Fail _____
   Cell 5 Pass _____ Fail _____

Board Certification: Certified _____ Failed _____

Test performed by: _____ Date: _____

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Test and Inspection Sheet: Interface Board

Interface Board NSN 0098-LL-H7A-2870 P/N 7449411-1 **Serial No.** _____
Multi-meter S/C _____ CAL Due Date _____

Test 1. Bus Communications Function:

1. Check for Flashing LEDs RxD and TxD on the A/D - I/O PCB Assembly (Azonicx) Pass _____ Fail _____
2. Check for Flashing LEDs Rx (-), Tx (+), Tx (-) and continuous "On" Rx (+) for the Remote Bus on the Front Panel. Pass _____ Fail _____

Test 2. +/- 15 VDC Power Supply Output Voltage:

1. + 15 volts to Ground at the Front Panel Test Points = _____
2. - 15 volts to Ground at the Front Panel Test Points = _____

Limit: 15 +/- 0.2 volts Pass _____ Fail _____

Test 3. Charge Current Enable/Inhibit Operation:

1. For each corresponding output, the "Charge Current Monitor" LED on the Test Set Front Panel must turn "On" and the "Charge Current Enable/Inhibit" LED must turn "Off". Pass _____ Fail _____

Test 4. Accuracy of Voltages, Currents, Temperature, and Ids:

1. The computer will display the PASS/FAIL for this test. Pass _____ Fail _____

Test 5. Charge Current Display:

1. For each corresponding output the "Charge Current Monitor" LED on the Test Set Front Panel must turn "On" Pass _____ Fail _____

Test 6. Bus Activity Monitor Circuit:

1. Verify the BUS interrupt occurred in approx. 10 seconds: Pass _____ Fail _____

Test 7. Alarm Circuit:

1. Verify Alarm sounded Pass _____ Fail _____

Test 8. Automatic/Manual Mode:

1. Record Itrim voltages at the Itrim Test Points on the Test Set Front Panel using a manual voltmeter

Limits: 1.764 min., 1.837 max Itrim _____. Pass _____ Fail _____

Test 9. Perform Shunt Module Test 1 – Cell voltage accuracy, Temperature and BIU.

1. Verify readings of voltage (+/- 0.002)

		Value	Current	Reference
Voltage	Cell 1	_____	_____	_____
Voltage	Cell 2	_____	_____	_____
Voltage	Cell 3	_____	_____	_____
Voltage	Cell 4	_____	_____	_____
Voltage	Cell 5	_____	_____	_____

Temperature = 3.70 +/- 0.20 volts _____
BIU = 421, ID1 = 0.50 +/- 0.05 volts, ID2 = 1.00 +/- 0.05 volts. ID3 = 2.00 +/- 0.05 volts _____
Pass _____ Fail _____

Board Certification: Certified _____ Failed _____
Test performed by: _____ Date: _____

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TEST DATA SHEET: A/D-I/O Board

A/D I/O Board NSN 0098-LL-H7A-2869 Part No. 7449416-1 **Serial No.** _____
Multi-meter S/C _____ CAL Due Date _____

1. Board Setup – Verify switches and jumper settings IAW Reference (b) Figure 6-12.
   Set BUS ADDRESS SWITCH (S2) position 1 to ON _____

2. Test 1: Bus Communications with Computer
   Verify the Address displayed is 1 Record Address _____

3. Test 2: A/D-I/O Accuracy: The computer will make the determination of Pass/Fail
   Data shown in "blue" is Pass, data shown in "red" is Fail. Record Pass/Fail _____

4. D/A Output Accuracy
   1.000 volt (Limit: 0.980 volts min., 1.020 volts max) Record Value _____
   2.500 volt (Limit: 2.450 volts min., 2.550 volts max) Record Value _____
   5.000 volt (Limit: 4.900 volts min., 5.100 volts max) Record Value _____

Board Certification: Certified _____ Failed _____
Test performed by: _____ Date: _____

OPERATING PROCEDURE
FOR
CHARGING USING
SDV MK 8 MOD 1 BATTERY CHARGER
AND
DISCHARGING USING
SDV LOAD SYSTEM

NAVAL SURFACE WARFARE CENTER CRANE DIVISION
ELECTRONIC DEVELOPMENT DIRECTORATE
POWER SYSTEMS DEPARTMENT
CODE 609

ISSUE DATE: 1/15/2004

REVIEW DUE DATE: 1/2009

DOCUMENT CONTROL DATE: 1/15/2004

Harnessing the Power of Technology for the Warfighter

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TEST PROCEDURE REVIEW & APPROVAL

	NAME/CODE	SIGNATURE	DATE
(1) PREPARED BY	Harry Brown Code 6095	/RL/	11/4/2003
(2) TEST LEAD	Scott Pate Code 6095	/RL/	11/17/203
(3) PROJECT REPRESENTATIVE	Harry .Brown Code 6095	/RL/	11/4/2003
(4) BRANCH	Brad Secrest Code 6095	/RL/	11/17/2003
(5) DEPARTMENT SAFETY	Don Mains Code 609	/RL/	12/5/2003
(6) INDUSTRIAL HYGIENE (OES)	V. E. Goodin Code OES	/RL/	12/9/2003
(7) FIRE PREVENTION	T. Courson Code 0131	/RL/	12/30/2003
(8) ENVIRONMENTAL PROTECTION	J. McCracken Code 0951	/RL/	12/11/2003
(9) SAFETY (OES)	J. F. Cruz Code OES	/RL/	12/11/2003
(10) EOD – IF APPLICABLE	Not Applicable		
(11) DEPARTMENT APPROVAL	JANNA FOXX CODE 609	Janna Foxx	1-15-04

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RECORD OF CHANGES

CHANGE NUMBER	REASON FOR CHANGE	PAGE	PARAGRAPH	DATE OF CHANGE

CHANGE APPROVAL	SIGNATURE/DATE
PREPARED BY	

HAZARD CONTROL BRIEFING

All test operators and other personnel working in the laboratory must be given a hazard control briefing every year* throughout the test period.

Project Representative – I have instructed the test operator in the requirements of paragraph 3 of this procedure.

Test Operator – I have been instructed and understand the requirements of paragraph 3 of this procedure.

PROJECT REPRESENTATIVE	DATE	TEST OPERATOR	DATE

*This time frame may be reduced at the discretion of the project representative.

TEST PROCEDURE VALIDATION			
THE BELOW INITIALS INDICATE THAT THIS PROCEDURE HAS BEEN PROOFED BY SUBJECTING ONE OR MORE BATTERIES/CELLS TO EACH TEST DESCRIBED IN THE PROCEDURE AND CERTIFIES THE PROCEDURE ACCURATELY DEFINES AND DESCRIBES ALL CONDITIONS, EQUIPMENT AND PROCEDURES FOR TESTING THIS ITEM. AT LEAST ONE SET OF INITIALS MUST BE DIFFERENT FROM THE PERSON WRITING THE PROCEDURE.			
PARAGRAPH NUMBER	OPERATOR SIGNATURE AND DATE	TEST LEAD SIGNATURE AND DATE	PROJECT REP. SIGNATURE AND DATE

RISK ASSESSMENT

The Final Risk Index for operation of the test has been defined as a/an "MEDIUM", as determined by a hazard analysis using NAVSURFWARCENDIVCRANEINST 8020.8B latest revision. The mitigated Mishap Risk Assessment Value of a/an "MEDIUM" as defined by Table 3 of the instruction represents a/an marginal event that can occur with the frequency of a/an "occasional". The Mishap Risk Category for this operation is a/an "MEDIUM", as defined by Table 4 of the instruction.

Determined By:
Harry Brown, Lead Project Engineer 6095
Person's Name, Title, Code

Date: 4 November 2003

TEST PERSONNEL CERTIFICATION

Verification of instruction and understanding of safety precautions, test operations and recording of test data is in accordance with the reference test procedure or noted paragraphs thereof.

Test Lead

I have instructed the test operator in the requirements for each of the following.

1. Safety Requirements
2. Test Operation
3. Recording of Data

Test Operator

I have been instructed and understand the requirements for each of the following.

1. Safety Requirement
2. Test Operation
3. Recording of Data

Test Lead	Date	Procedure	Test Operator	Date

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TABLE OF CONTENTS

APPENDIX

LIST OF FIGURES

LIST OF TABLES

List of Acronyms, Abbreviations, & Definition

Battery Interface Unit ..... BIU
Depot Level Repair ..... DLR
Inch ..... in.
Operational Risk Management ..... ORM
Pounds ..... lbs
Personal Protective Equipment ..... PPE
Ready For Fleet Issue ..... RFI
Seal Delivery Vehicle ..... SDV

OPERATING PROCEDURE
FOR
CHARGING USING
SDV MK 8 MOD 1 BATTERY CHARGER
AND
DISCHARGING USING SDV LOAD SYSTEM

1.0 Introduction

1.1 The SDV MK 8 MOD 1 Battery Charger P/N 7334743 is used to charge SDV Mk Mod 1 silver-zinc cells. The battery charger is repaired by NAVSEA Crane and must be checked out prior to material being accepted in "A" condition, ready for Fleet issue (RFI). Charging of the cells is required to evaluate proper operation of the charger.

1.2 The SDV Load System was designed to discharge the SDV Mk8 Mod 1 silver-zinc cells. This resistive load bank discharges the cells in preparation for charging.

1.3 Purpose: The purpose of this procedure is to define the procedure used to charge and discharge SDV Mk 8 MOD 1 silver-zinc cells in order to test the SDV Mk 8 Mod 1 Battery Charger.

1.4 Description of Item:

1.4.1 The SDV MK 8 MOD 1 Battery Charger consists of two battery charger units (P/N 7449392), one computer, cabling and battery interface units up to 24 trays of five silver-zinc cells each. The charger performs an automatic charge to fully charge the silver-zinc cells. The system is fully described in reference 2.1.

1.4.2 The SDV Load System consists of resistors and electronics to discharge up to 24 trays of five silver-zinc cells for a specified time.

1.4.3 The silver-zinc cell is an alkaline rechargeable cell, rated 300 Ahr, uses potassium-hydroxide as an electrolyte, and is vented.

1.5 Testing is to be done in Building 3287 repair laboratory.

2.0 Reference Documents

2.1 SG270-BM-MMM-010 Technical Manual SDV MK 8 MOD 1 Battery Charger Operation And Maintenance Manual.

2.2 NAVSURFWARCENINST 5100.5A-21 Occupational Safety & Health Electrical, Electronic, & Battery Safety Program.

2.3 NAVSURFWARCENINST 5100.5A-11A Lock Out Tag Out Program

3.0 Hazard Briefing

3.1 Operational Risk Management (ORM) Review

3.1.1 Scope: The purpose of this ORM review is to examine the safety related test system issues concerns. The purpose of an ORM review is to recognize and document possible hazards within the system, determine tools, concepts or procedures to mitigate those hazards, and finally assign a risk assessment number to that hazard. The following will contain information on the operational risk of the test system and the materials to be tested. Personnel assigned the responsibility of operating the SDV MK 8 MOD 1 Battery Charger and discharge load bank shall review and understand the general safety information discussed within the ORM section of this procedure.

3.1.2 General Precautions: Before operating the SDV Mk 8 Mod 1 Battery Charger and Discharge Load Bank, assigned personnel should familiarize themselves with the *Safety Precautions* and *Hazard Analysis* (ORM) sections of the building, lab and test manuals/procedures. In each of the test labs emergency eye wash stations are located in general areas for ease of use. Personnel should locate these stations and ensure they are approved and accessible prior to any operations. Personnel should be familiar with basic first aid needs and the location of first aid supplies. If an incident does occur contact Emergency Medical Technicians (EMTs) by calling 911 (cell phone must dial 812-854-1333). **In case of fire**, activate the nearest fire alarm pull station, evacuate the building, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

3.1.3 Specific Safety Issues: Personnel responsible for the SDV Mk 8 Mod 1 Battery Charger and Discharge Load Bank shall become familiar with, and frequently review, the following safety precautions. These precautions apply to personnel and equipment.

3.1.3.1 Electrical: In working with the SDV Mk 8 Mod 1 Battery Charger and Discharge Load Bank potential electrical hazards exist. Proper facility, lab, and technical safety measures should be followed while working with the equipment. In the case of an incident proper first aid procedure should be followed to treat electrical burns, unconsciousness, and/or any other related problems.

3.1.3.2 Lockout and Tag-Out Procedure: A lockable energy-isolating device shall be installed on equipment before personnel begin any servicing or maintenance activity that might result in the unexpected release of hazardous energy. Non-lockable energy-isolating devices shall be designed or modified to accept a lockout device whenever equipment is replaced, new equipment is installed, or a major modification is performed. In addition, personnel must use appropriate personal protective equipment (PPE) when performing these activities and

follow the procedures outlined in the *Crane Division Lockout and Tag (Energy Control) Program* manual offered by the NSWC Crane Occupational Safety and Health Department.

3.1.4 System Overview:

3.1.4.1 The SDV Mk 8 Mod 1 Battery Charger is primarily isolated, however, the Discharge Load Bank is open and does have wiring and cable connections that are exposed. The potential exist for the user to injure himself while working around the equipment, suffering from minor scratches and potential of electrical shock. Items under test can also be damaged resulting in asset loss. These issues have been minimized with the location of the Discharge Load Bank. The operator should not have to reach into or behind the discharge load bank.

3.1.4.2 The SDV Mk8 Mod 1 Battery Charger and Discharge Load Bank is used to charge and discharge Mk 89 Silver Zinc cells. These cells require connection to the charger or load bank for charge and discharge. The potential exists for the user to come in contact with the battery terminals with either personal jewelry or uninsulated tools. The battery is capable of delivering a severe burn or shock to the user. This issue has been minimized by requiring the removal of personal jewelry and by using insulated tools.

3.1.4.3 The MK 89 cells are of silver zinc chemistry, they contain potassium hydroxide (KOH) electrolyte, which can be caustic to skin and can cause loss of sight if it gets in the eyes. Personnel working around the cells while on charge shall wear chemical goggles as a minimum and a face shield over the goggles if spill/spray potential. An ANSI Z358.1 approved emergency eyewash station shall be adjacent to the process. The potential for the cells to spill or spray electrolyte is minimal unless the cells are abused If skin contact with KOH occurs, irrigate exposed area with copious amounts of water for at least 15 minutes or longer, depending on the concentration, amount and duration of exposure. Should KOH contact the eyes, irrigate the open eyes at an emergency eyewash for a minimum of 30 minutes and immediately have EMTs contacted (dial 911or for cell phones dial 812-854-1333) or pull the fire alarm.

3.1.4.4 The MK 89 cells can develop a hot short during charge or discharge. The hot short is caused by an internal short of the cell. This can occur during charge and is usually preceded by gradual drops in voltage under charge. Hot shorts can also occur during discharge and are usually preceded by a rapid drop in voltage with respect to the other cell voltages. If these conditions are seen during testing, discontinue testing and remove the cell from the tray. Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray.

3.1.4.5 When a hot short occurs, the cell gets hot, vents gas, and can catch on fire, burning through or breaching the case. If a hot short occurs,

disconnect the electrical equipment, (if it can be accomplished remotely without exposing personnel to a hazardous situation) and evacuate personnel from the area. **In case of fire**, activate the nearest fire alarm pull station, evacuate the building, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

3.1.4.6 Do not attempt to remove vent relief valve or vent plug to relieve pressure. Keep away from the cell until cell case integrity has been self breached. When this happens, the cell will not have any internal pressure, but should be handled with extreme care.

3.1.4.7 Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray. Move the tray to the outside of the building. If the cell has breached and the fire is extinguished, remove the shorted cell and any adjacent cells that are damaged. Place the damaged cell(s) in a plastic bucket or other suitable container. Cover the cells with a minimum 6 inches of water. Allow the cell(s) to remain in the water for at least 24 hrs.

3.1.4.8 After 24 hrs the cells may be removed from the water. Dispose of the water as hazardous waste.

3.1.4.9 Place the cell(s) in a zip-lock plastic bag. Dispose of the cells with other silver zinc cells. The hot shorted cell is now inert.

3.1.5 The safety issues concerning the operation of the SDV Mk 8 MOD 1 Battery Charger and SDV Load System with the implementation of the hazard mitigation requirements are at an acceptable level for operations.

3.2 The Operational Hazard Analysis is contained in Appendix A.

4.0 Test Equipment: No additional equipment is required.

5.0 Test Procedure

5.1 Charge Procedure

5.1.1 The purpose of the charge is check out one or more components of the charger that have been repaired. The charging procedure is the normal charge method used in charging the SDV trays in the Fleet. The operator may select the Boost charge, Operational charge, or Fast charge methods as desired. Usually the Fast charge will be selected as this method uses the maximum current output of the charger.

5.1.2 Display the "Test In Progress" signs of Appendix B on the doors entering the test area and on the test station.

WARNING
Potassium hydroxide (KOH) Electrolyte - CAUSTIC

The MK 89 cells are of silver zinc chemistry, they contain potassium hydroxide (KOH) electrolyte, which can be caustic to skin and can cause loss of sight if it gets in the eyes. Personnel working around the cells while on charge shall wear chemical goggles as a minimum and a face shield over the goggles if spill/spray potential. An ANSI Z358.1 approved emergency eyewash station shall be adjacent to the process. The potential for the cells to spill or spray electrolyte is minimal unless the cells are abused. If skin contact with KOH occurs, irrigate exposed area with copious amounts of water for at least 15 minutes or longer, depending on the concentration, amount and duration of exposure. Should KOH contact the eyes, irrigate the open eyes at an emergency eyewash for a minimum of 30 minutes and immediately have EMTs contacted (dial 911 or for cell phones dial 812-854-1333) or pull the fire alarm.

WARNING
Potential for Hot Short

Silver-zinc cells can develop a hot short during charge or discharge. The hot short is caused by an internal short of the cell. This can occur during charge and is usually preceded by gradual drops in voltage under charge. Hot shorts can also occur during discharge and are usually preceded by a rapid drop in voltage with respect to the other cell voltages. If these conditions are seen during testing, discontinue testing and remove the cell from the tray. Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray.

When a hot short occurs, the cell gets hot, vents gas, and can catch on fire, burning through or breaching the case. If a hot short occurs, disconnect the electrical equipment, (if it can be accomplished remotely without exposing

personnel to a hazardous situation) and evacuate personnel from the area. **In case of fire**, activate the nearest fire alarm pull station, evacuate the building, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

Do not attempt to remove vent relief valve or vent plug to relieve pressure. Keep away from the cell until cell case integrity has been self breached. When this happens, the cell will not have any internal pressure, but should be handled with extreme care.

Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray. Move the tray to the outside of the building. If the cell has breached and the fire is extinguished, remove the shorted cell and any adjacent cells that are damaged. Place the damaged cell(s) in a plastic bucket or other suitable container. Cover the cells with a minimum 6 inches of water. Allow the cell(s) to remain in the water for at least 24 hrs.

After 24 hrs the cells may be removed from the water. Dispose of the water as hazardous waste.

Place the cell(s) in a zip-lock plastic bag. Dispose of the cells with other silver zinc cells. The hot shorted cell is now inert.

5.1.3 Connect the SDV Mk 8 Mod 1 Battery Charger, P/N 7449392, (Figure 5-1) to the cell trays to be tested as shown in Figure 5-2. Each charger is capable of charging from 1 to 12 trays of cells. Connect the number of trays necessary to check out the charger. Setup the charge in accordance with Reference 2.1.

5.1.4 Double click the SDV Charge ICON on the WINDOWS screen.

5.1.5 Select a "Set Number" from the list or enter a new "Set Number" for this charge. Enter technician initials, and Select "DONE"

5.1.6 If a new "Set Number" is entered, enter a new activation file when requested.

5.1.6.1 Select "Battery Activation" from the main menu.

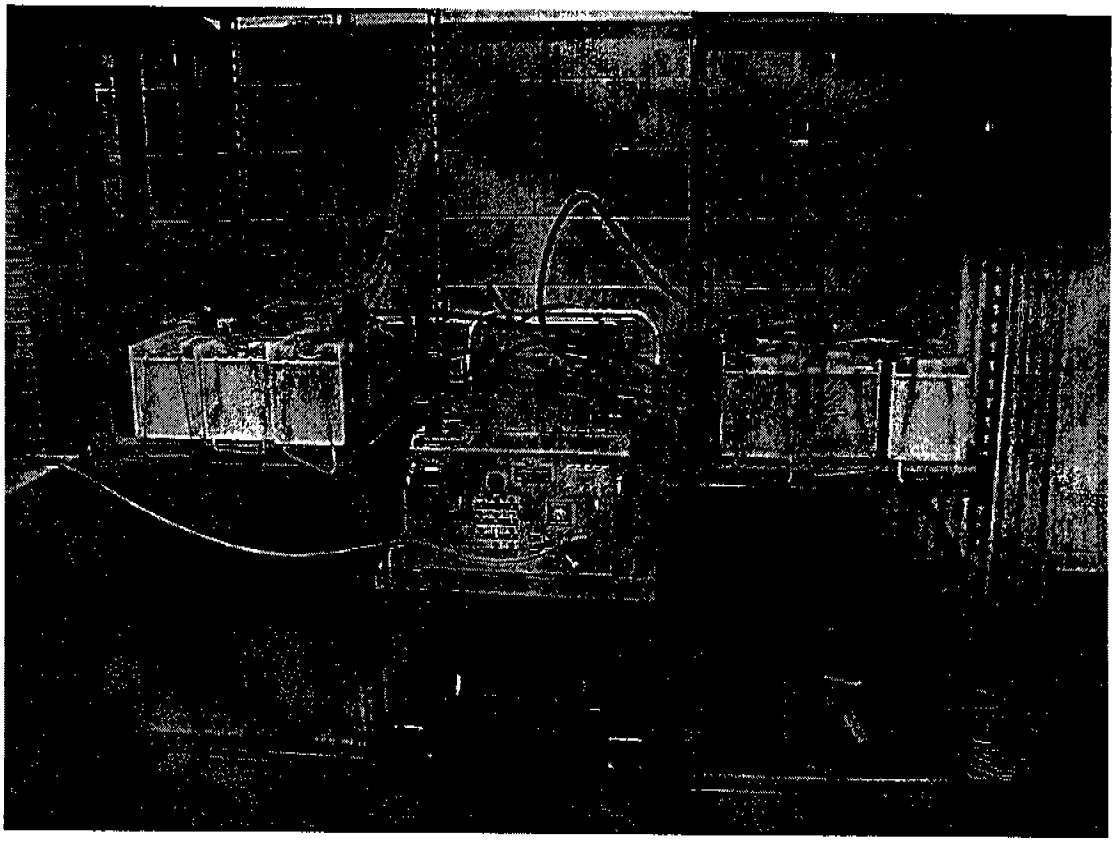

Figure 5- 1 SDV Battery Charger Setup

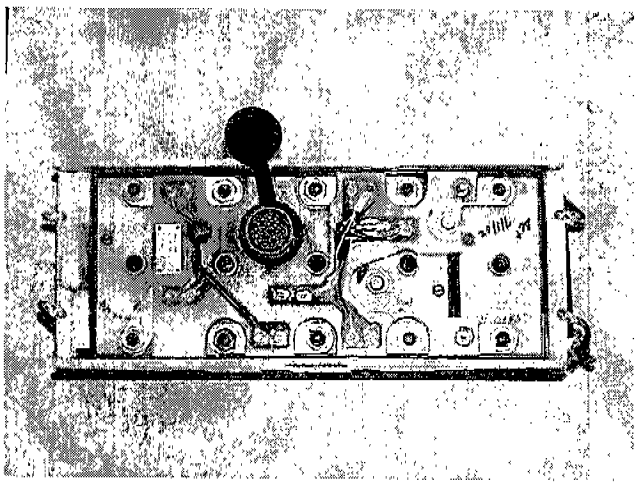

Figure 5- 2 SDV 5-cell TRAY with BIU installed

5.1.6.2 For each "ID Num" select a "TYPE". For these test the "TYPE" does not matter. Just select a different "TYPE" for each "ID Num".

5.1.6.3 Select "DONE" to record the data and return to the main menu.

5.1.7 Select "Charge" from the main menu

5.1.8 Select the type of charge to be performed – Boost, Operational, or Fast.

5.1.9 Enter the charge cycle number. The last cycle is displayed. Enter the Last cycle number to continue the last cycle or enter the next higher cycle number to start a new charge cycle.

5.1.10 If a new cycle number is entered, enter the discharge Amp Hrs for the ET and Prop cells.

NOTE
In most cases discharge Amp Hrs does not apply to the test. Enter a number to fulfill the data field. Example: Enter 100 in the discharge box

5.1.11 On the Charge screen, verify the trays are "ON" or "OFF" as desired. Verify the voltages are appropriate. The voltage should be above 1.200 volts at the start of charge.

5.1.12 On the Charge screen, start the charge by clicking the "START" button.

5.1.13 After the initialization mode completes and when the "Normal" charge mode begins, click the "DIG OFF" button to turn on the Diagnosis mode. With the "Dig ON" the controller will record data in 1 minute intervals for the length of the charge.

5.1.14 The charge will continue with automatic control and monitoring until all trays attached to the chargers have completed charge.

5.1.15 Upon completion of the charge the alarm will sound.

5.1.16 Click the button on the controller screen to turn OFF the alarm.

5.1.17 Click "Exit" on the main menu screen.

5.1.18 Shut down the controller by clicking on the "START" button on the WINDOWS screen and selecting "Shutdown".

5.1.19 Turn OFF the power on each charger.

5.2 Discharge Procedure

5.2.1 The SDV Load Unit is a resistive load bank that places a .5 ohm resistor across the 5 cells in a tray. The discharge is continued for the time period specified or until the voltage of the tray equals 7.50.

5.2.2 Display the "Test In Progress" signs of Appendix B on the doors entering the test area and on the test station

WARNING
Potassium hydroxide (KOH) Electrolyte - CAUSTIC

The MK 89 cells are of silver zinc chemistry, they contain potassium hydroxide (KOH) electrolyte, which can be caustic to skin and can cause loss of sight if it gets in the eyes. Personnel working around the cells while on charge shall wear protective chemical goggles as a minimum and a face shield over the goggles if spill/spray potential. An ANSI Z358.1 approved emergency eyewash station shall be adjacent ot the process. The potential for the cells to spill or spray electrolyte is minimal unless the cells are abused. If skin contact with KOH occurs, irrigate exposed area with copious amounts of water for at least 15 minutes or longer, depending on the concentration, amount and duration of exposure. Should KOH contact the eyes, irrigate the open eyes at an emergency eyewash for a minimum of 30 minutes and immediately have EMTs contacted (dial 911or for cell phones dial 812-854-1333) or pull the fire alarm.

5.2.3 Connect the SDV Load System (Figure 5-3) to the SDV cell trays to be discharged.

5.2.3.1 Attach the green and white wires to the positive terminal of the battery interface unit and the black wire to the negative terminal of the battery interface unit. The terminal nuts should be torque to 50 in. lbs.

5.2.3.2 The battery charger BIU cable connection may be left attached to the Battery interface units during the discharge. This may be used to monitor the discharge of the cells.

5.2.4 Turn on the power to the SDV Load Bank (Figure 5-3).

5.2.5 Set the desired discharge time on the timer (Figure 5-3).

5.2.5.1 Press the 5 buttons on the timer (Figure 5.4) until the desired discharge time is shown. The timer displays Hours as xxx.xx hrs.

5.2.5.2 To reset the timer (top row) to the displayed time (bottom row) press the "RST " button.

WARNING
Potential for Hot Short

Silver-zinc cells can develop a hot short during charge or discharge. The hot short is caused by an internal short of the cell. This can occur during charge and is usually preceded by gradual drops in voltage under charge. Hot shorts can also occur during discharge and are usually preceded by a rapid drop in voltage with respect to the other cell voltages. If these conditions are seen during testing, discontinue testing and remove the cell from the

tray. Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray.

When a hot short occurs, the cell gets hot, vents gas, and can catch on fire, burning through or breaching the case. If a hot short occurs, disconnect the electrical equipment, (if it can be accomplished remotely without exposing personnel to a hazardous situation) and evacuate personnel from the area. **In case of fire**, activate the nearest fire alarm pull station, evacuate the building, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

Do not attempt to remove vent relief valve or vent plug to relieve pressure. Keep away from the cell until cell case integrity has been self breached. When this happens, the cell will not have any internal pressure, but should be handled with extreme care.

Use PPE, (chemical goggles, face shield, rubber apron, and chemical resistant gloves). Approach the cell with caution. Be sure the charger or discharge unit is off. Remove the BIU cabling and/or discharge cable from the tray. Move the tray to the outside of the building. If the cell has breached and the fire is extinguished, remove the shorted cell and any adjacent cells that are damaged. Place the damaged cell(s) in a plastic bucket or other suitable container. Cover the cells with a minimum 6 inches of water. Allow the cell(s) to remain in the water for at least 24 hrs.

After 24 hrs the cells may be removed from the water. Dispose of the water as hazardous waste.

Place the cell(s) in a zip-lock plastic bag. Dispose of the cells with other silver zinc cells. The hot shorted cell is now inert.

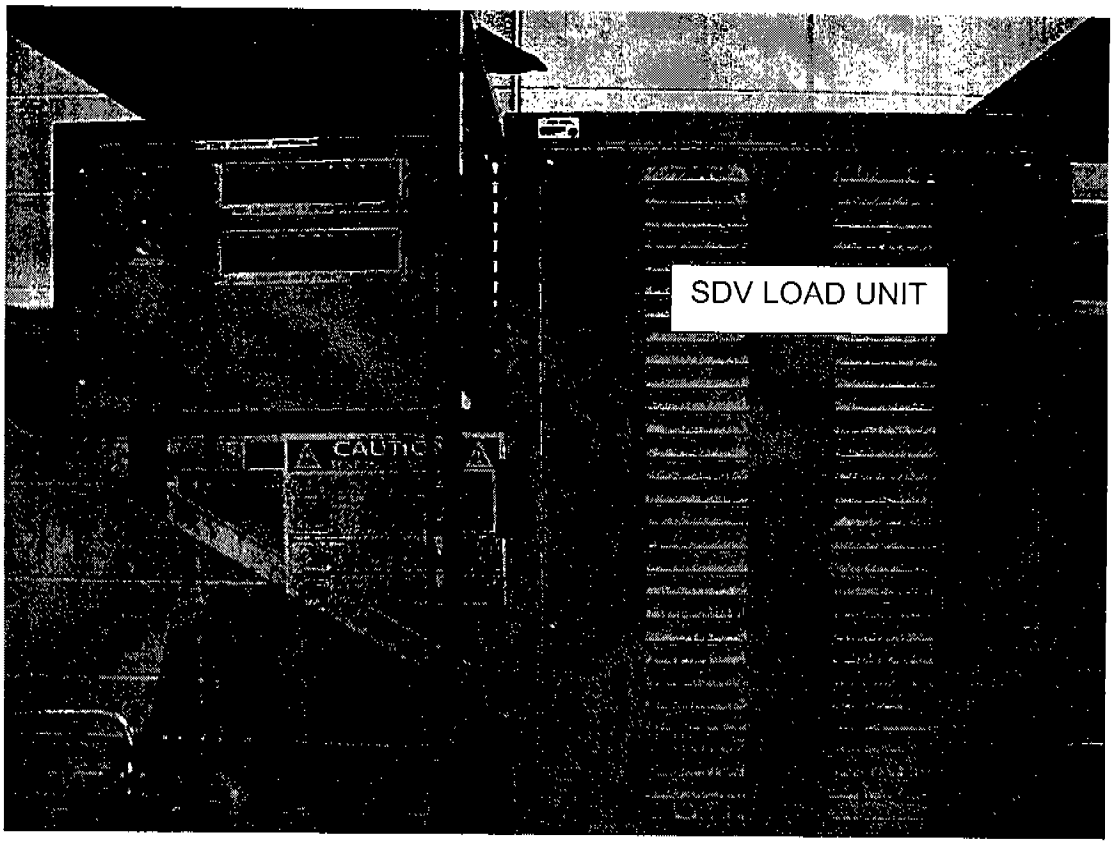

Figure 5- 3 SDV Load System

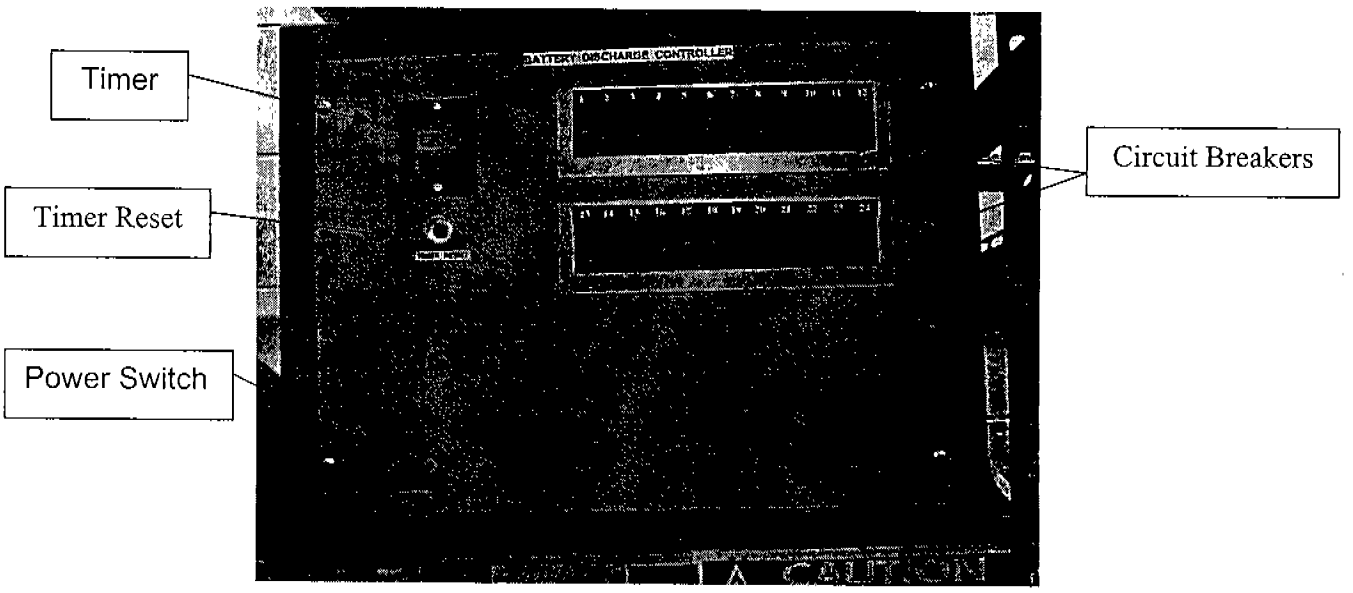

Figure 5- 4 SDV Load System Controller

5.2.6 To start the discharge, Switch the circuit breakers for the trays to be charged to "ON". Press the "Timer Reset" button.

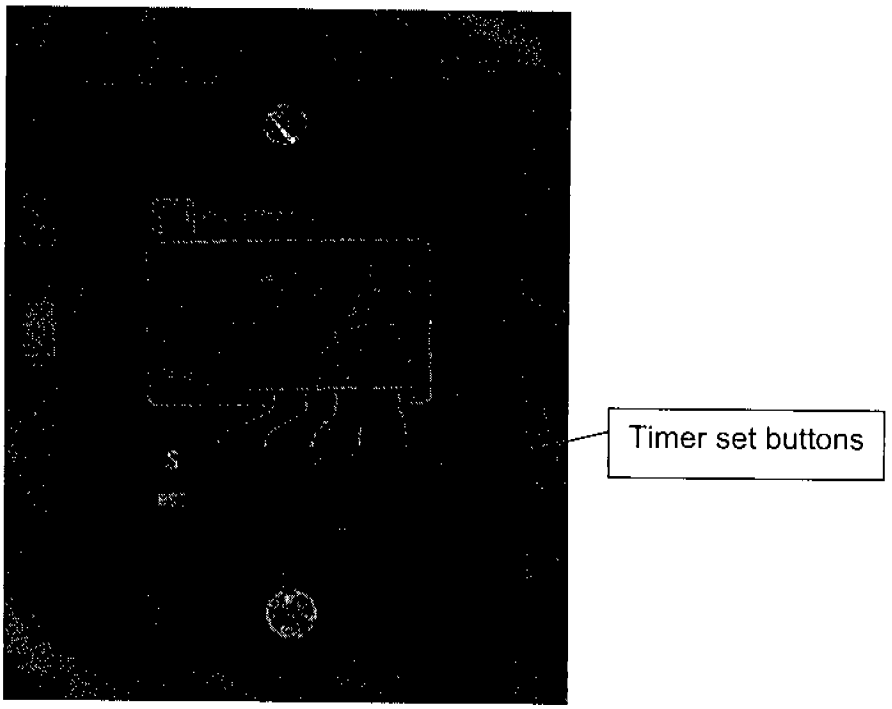

Figure 5- 5 Timer Display

5.2.7 To monitor and record the discharge cell voltages, setup the charger controller in accordance with reference 2.1.

5.2.7.1 From the Main Menu screen select the "Monitor Rate" then click on the rate of data recording required. The rates are 1 minute, 5 minutes, 10 minutes, 30 minutes, and 1 hour. The check mark indicates the rate used.

5.2.7.2 From the Main Menu screen select "Monitor". When the monitor screen displays click on "Start" and click "Dig OFF" to turn on the monitoring.

5.2.7.2.1 The controller will verify that you want to turn ON diagnosis: "ARE YOU SURE? Do you really want to turn Diagnosis ON". Click "yes" to this box. The controller will display "Dig ON" and begin recording the discharge voltage at the rate selected.

5.2.7.2.2 To discontinue the recording of data, click the "Dig ON" button. The controller will verify you want to turn OFF diagnosis, "ARE YOU SURE? Do you really want to turn Diagnosis OFF?". Click "yes" to turn diagnosis OFF. The controller will display "Dig "OFF" on the monitor screen button.

5.2.7.2.3 To view the recorded data, locate the file monitor.txt in the folder C://BATCHRG/<*set number*>/<*Cycle number*>. Open the file using Microsoft EXCEL.

5.2.7.3 To remove a tray from the discharge unit, switch the circuit breaker for the tray that is to be discontinued to the "OFF" position.

5.2.7.4 To stop the discharge, switch the POWER switch to :OFF"

APPENDIX A

Operational Hazard Analysis

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Table A-1 TEST PROCEDURE FOR CHARGING USING SDV MK 8 MOD 1 BATTERY CHARGER AND DISCHARGING USING SDV LOAD SYSTEM 609-TP-0473				BRANCH 6095	Prepared BY: H. Brown Revision - Original		Date 10/29/03
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIMINARY RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY/ PREVENTATIVE ACTIONS**
5.2	**Charging Procedure**						
	Moving/ handling of cells/trays	Dropping or otherwise mishandling of cells or trays	• Cell damage case crack or chemical spray • Electrolyte (KOH) leakage causing chemical burn • Personal injury • Environment hazard	IIIC	Don't drop or abuse cells. Make sure trays are firmly secured. Wear safety shoes. Have absorbent material available and container for used material on hand	IVC	If electrolyte contacts skin or eyes wash immediately with water and seek medical attention (Call 911), see page 3 para. 3.1.6.3*If electrolyte spill spread absorbent over the area. Wear chemical resistant gloves, chemical goggles and apron, clean spill. Dispose of materials in specified container
	Electrical shock	Shorting of cells by improper test	• Electrical shock or skin burn	IIIC	Use insulated tools.	IVC	Seek medical attention Call 911*

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

Table A-1 TEST PROCEDURE FOR CHARGING USING SDV MK 8 MOD 1 BATTERY CHARGER AND DISCHARGING USING SDV LOAD SYSTEM 609-TP-0473				BRANCH 6095	Prepared BY: H. Brown Revision - Original		Date 10/29/03
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIMINARY RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY/ PREVENTATIVE ACTIONS**
		setup, personal jewelry, uninsulated tools, or test equipment failure			Remove personal jewelry. Power OFF test equipment when not in use		
	• Hydrogen gas • Fire, flame	Cell Internal (hot Short) short as a result of charging Or equipment failure	Elevated temperature, generation of hydrogen gas, and/or molten material which could start a fire Or Ignition of gas	IIIC	Do not charge cells if voltage is dropping or below 1.2v Monitor tests closely to identify potential shorts in cells.	IIIC	Wear safety PPE (chemical goggles, face shield, chemical resistant gloves, and apron). Disconnect all power from the cells/tray. If the cell(s) are not active, move the cells/tray outside the building.

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

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							Place the cells/ tray in a bucket of water for 24 hrs. Dispose of as silver material reclamation If cells are active (fire or flame) activate the nearest fire alarm pull station, evacuate the building, contact Fire Department Call 911
	Total Risk					IIIC"MEDIUM"	
5.3	**Discharge Procedure**						
	Moving/ handling of cells/trays	Dropping or otherwise mishandling of cells or trays	• Cell damage case crack or chemical spray.	IIIC	Don't drop or abuse cells. Make sure trays are	IVC	electrolyte contacts skin or eyes wash immediately with water and seek

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

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			• Electrolyte (KOH) leakage causing chemical burn • Personal injury • Environment hazard		trays are firmly secured. Wear safety shoes. Have absorbent material available and container for used material on hand		medical attention (Call 911)), see page 3 para. 3.1.6.3* If electrolyte spill spread absorbent over the area. Wear chemical resistant gloves, goggles and apron, clean spill. Dispose of materials in specified container
	Electrical shock	Shorting of cells by improper test setup, personal jewelry, uninsulated tools, or test equipment failure	• Electrical shock or skin burn	IIIC	Use insulated tools . Remove personal jewelry. Power OFF test	IVC	Seek medical attention Call 911*

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

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					equipment when not in use		
	• Hydrogen gas • Fire, flame	Cell Internal (hot short) short as a result of charging Or Equipment failure	Elevated temperature, generation of hydrogen gas, and/or molten material which could start a fire Or Ignition of gas	IIIC	Do not charge cells if voltage is dropping or below 1.2v Monitor tests closely to identify potential shorts in cells.	IIIC	Wear safety PPE (chemical goggles, face shield, chemical resistant gloves and apron). Disconnect all power from the cells/tray. If the cell(s) are not active, move the cells/tray outside the building. Place the cells/ tray in a bucket of water for 24 hrs. Dispose of as silver material reclamation

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

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							If cells are active (fire or flame) activate the nearest fire alarm pull station, evacuate the building, contact Fire Department Call 911*
	Total Risk					IIIC "MEDIUM"	

*In case of fire, evacuate the building, activate the nearest fire alarm pull station, and immediately contact the fire department at 911 (cell phones must dial 812-854-1333). Reentry into the building will not be permitted until cleared by fire department/industrial hygiene.

Appendix B

TEST IN-PROGRESS SIGNS

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CAUTION
TEST IN PROGRESS

Test Item: SDV Mk 8 MOD 1 Battery Charger
Cell Chemistry: SILVER ZINC

Test Conditions:

- Verify Performance of SDV Mk 8 Mod 1 Battery Charger repaired components
- Charge Silver Zinc Mk 8 Mod 1 cells using Automatic Charger
- Discharge Silver Zinc cells using SDV Load Bank
-

SPECIFIC HAZARDS:

- SILVER, MERCURY, AND ZINC
- ELECTROLYTE POTASSIUM HYDROXIDE
- VENTING AND FIRE RESULTING FROM HOT SHORT

Test Procedure: 609-TP-0473
Technical Manual SG260-BM-MMM-010

Emergency Response:

- Pull nearest fire alarm, evacuate the building, Call 911 or fire department 854-1333
- To shut down chargers, turn off 30 amp breakers on front of each charger.
- To shut down SDV Load Bank, switch off the Power button on front of unit.
- To Secure 120 and 208 volt power: Turn off breakers 5, 7, 9, 11, and 8-10 in Panel RPIA on East wall of Room To Secure 240 volt power: Turn off breaker 19/21 and 23/25 in Panel PP6 located on building support in BETC lab.
- If battery is on fire use **S.C.B.A.**

Points of contact:	Office phone:	Home phone:	Verified by:	Office phone:	Home phone:
Harry Brown	854-6149	812-254-2236	Scott Pate	854-2654	812-824-2373
Bill Gilliland	854-3502	812-876-3943	Signature: _____		

Test Item: Fill in the common name of the item being tested. For batteries or other items that contain a characteristic chemical, include the chemical name

me. *Battery tests must specifically identify the cell couple chemistry*, such as zinc-silver oxide or lead-sulfuric acid. Do not identify a test item by a part number only—a descriptive name will mean more to emergency response crews. Example:

Nike Ajax Missile Guidance Thermal Battery,
Cell Chemistry: calcium-chromate ($CaCrO_4$)

Specific Hazards: Enter descriptions of major hazards that the test item contains or is capable of exhibiting during the test. Example:

- Battery contains asbestos, chromates
- When activated, battery can produce 45 volts at currents of >20 amps and case temperatures in excess of 450°F

Test Conditions: Enter the type of test being performed and any specific test conditions or requirements under this heading. *For tests involving temperature chambers, set-point, upper and lower limits must be specified and a signature block for the test operator included to document that the temperature limit switches have been set on the chamber.* Example:

- Cycle life test
- approx. test dates of 22 June through 22 June 1998
- Temperature Chamber Set-Point: 155 to 165°F
- Chamber Limits: no low limit, 170°F high limit

Limits set by (operator):

Test Procedure: Enter the Code 609 test procedure number.

Sign Verified By: Each test placard will be signed by the appropriate manager (or acting manager). This signature indicates that the information written on the placard has been reviewed for completeness and accuracy.

Emergency Response: Enter any necessary information in this section that will be needed by first response personnel. This section should include enough detail that Fire Dept. personnel will be informed about specific fire hazards the test and test item present. *Sufficiently detailed test shutdown steps must be included in this section so that emergency response crews can shut-off the test equipment being used, if necessary.* Example:

- Pull the nearest manual fire alarm and call the Fire Department/Emergency Medical Technicians at 854-1100/1333 for assistance.
- Shut down test by turning chamber off at rear power switch or remove power at breaker 17, panel C (in northwest corner of room 110)
- Fire Dept: use CO_2 type fire extinguisher
- Avoid breathing battery fumes

Points of Contact: Enter the office phone extension and home numbers for the test operator, a knowledgable alternate and the branch manager here. *At least two home phone numbers must be present on the placard.*

- This form must be printed on "pink" color paper or cardstock
- Handwritten placards must be legible!
- Use multiple placards if necessary
- Place the placard in a position that allows for easy viewing

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