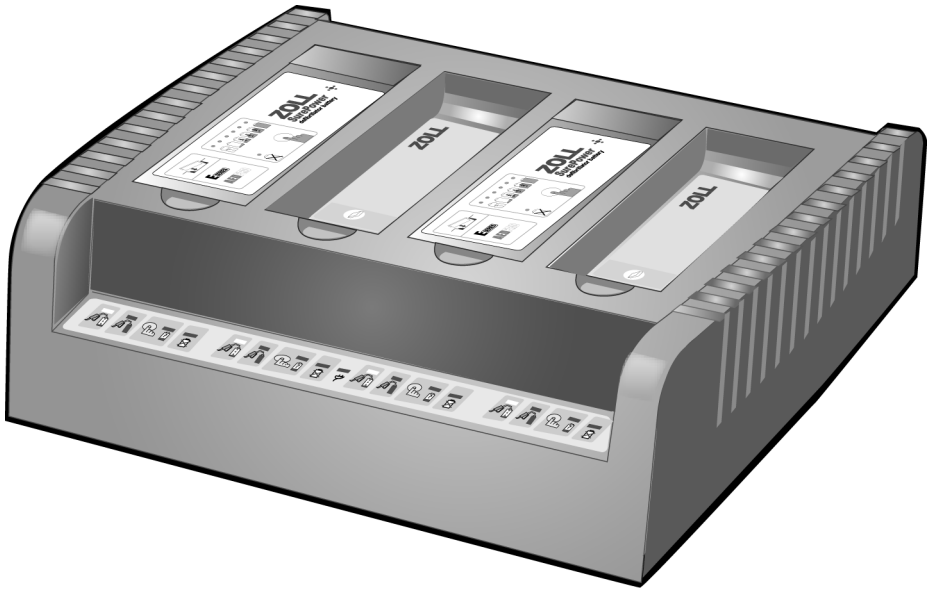
SurePower ™ Charger Station
Operator's Guide



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If more than three years have elapsed since the issue date, contact ZOLL Medical Corporation to determine if additional product information updates are available.

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Preface

This manual describes how to set up, use, and maintain ZOLL Medical Corporation's *SurePower* ™ *Charger Station*, which you use to test, recalibrate, and charge ZOLL's rechargable defibrillator batteries.

It is important that you read and understand the information in this manual. The proper charging and maintenance of ZOLL's rechargable defibrillator batteries is critical to the reliable operation of your ZOLL defibrillator.

Using this Manual

This section describes the organization of the **ZOLL** *SurePower Charger Station* **Operator's Guide**.

Organization

The manual is organized as follows:

Preface

Provides introductory information about this manual: the manual's organization, the symbols and conventions that the manual uses, and important warnings and notices regarding the *SurePower Charger Station*.

Chapter 1 Product Overview

Provides a general overview of the *SurePower Charger Station*.

Chapter 2 Set Up

Describes how to set up the *SurePower Charger Station*.

Chapter 3 Operation

Describes how to use the *SurePower Charger Station* to test, recalibrate, and charge ZOLL's rechargable defibrillator batteries.

Chapter 4 Maintenance and Troubleshooting

Describes how to clean and maintain the *SurePower Charger Station* and how to troubleshoot operating problems.

Chapter 5 Battery Management

Provides general information on how to run an effective battery management program. This chapter also provides general information on how to set up a battery recyling program.

Chapter 6 Product Specifications

Provides a detailed list of product specifications for the ZOLL *SurePower Charger Station*.

Appendix A Manufacturer's Declaration -- Electromagnetic Emissions

Provides information on electromagnetic emissions in regard to the *SurePower Charger Station*.

Symbols Used on the Equipment

This manual, the *SurePower Charger Station*, or the *SurePower Battery Pack* may display any or all of the following symbols:

Symbol	Description
	Attention! Refer to *Operator's Guide* for more information.
	DANGER high voltage present.
	Protective (earth) ground terminal.
	Alternating current.
	Temperature Limitation.
	Conformité Européenne Complies with medical device directive 93/42/EEC.
LEAD RETURN RECYCLE Pb	Contains lead. Recycle or dispose of properly.
LI-ION RETURN RECYCLE Li-ION	Contains lithium. Recycle or dispose of properly.
	Keep away from open flame and high heat.
	Do not discard in trash. Recycle or dispose of properly.
	Nonionizing electromagnetic radiation.

Symbol	Description
	Return to a collection site intended for waste electrical and electronic equipment (WEEE). Do not dispose of in unsorted trash.
	Signal I/O connector (RS-232) for connection to a personal computer for use with optional software.
	With respect to electric shock, fire, mechanical, and other specified hazards only in accordance with UL 60601-1 and CAN/CSA C22.2 No. 601.1, Medical Equipment Certified for USA and Canada 58NA.
	Manufacturer.
EC REP	Authorized representative in the European Community.
SN	Serial Number.
REF	Catalogue number.
	Consult instructions for use.

Conventions

This manual uses the following conventions:

Warning!	**Warning statements describe conditions or actions that can result in personal injury or death.**

Caution	Caution statements describe conditions or actions that can result in damage to the *SurePower Charger Station*.

Note: Notes contain additional information on using and maintaining the *SurePower Charger Station*.

The manual displays button and LED labels in **bold** face type.

Inspection and Service

When unpacking the *SurePower Charger Station*, carefully inspect each container for damage. If the shipping container or cushion material is damaged, keep it until you have checked the contents for completeness and the unit has been checked for mechanical and electrical integrity.

If the contents are incomplete, if there is physical damage, or if the unit does not pass its electrical self-test, North American customers should call ZOLL's Technical Service Department. Customers outside of the United States and Canada should contact their ZOLL authorized representative. If the shipping container is damaged, also notify the carrier.

Contacting Technical Service

The *SurePower Charger Station* does not require periodic recalibration or adjustment. You should, however, periodically perform the tests that this manual describes to verify proper operation of the unit.

If the *SurePower Charger Station* requires service, North American customers should contact the ZOLL Technical Service Department:

Telephone: 1-800-348-9011
1-978-421-9655

FAX: 1-978-421-0010

Customers outside of the United States and Canada should contact their ZOLL authorized representative.

When requesting service for the *SurePower Charger Station*, please provide the following information to the Technical Service representative:

- Unit serial number
- Description of the problem
- Department using the equipment
- Purchase order to allow tracking of loan equipment
- Purchase order for a unit with an expired warranty

Returning a unit for service

If you need to send a *SurePower Charger Station* to the ZOLL Technical Service Department for repair, obtain a service request (SR) number from the service representative.

If you are returning a *SurePower Charger Station*, remove all battery packs from the unit, and return the unit in the original containers or equivalent packaging, and be sure to include the service request number with the unit.

For customers	Return the unit to
In the U.S.A.	ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Attention: Technical Service Department (*SR number*) Telephone: 1-800-348-9011 1-978-421-9655 Fax: 1-978-421-0010
In Canada	ZOLL Medical Canada, Inc. 1750 Sismet Rd., Unit #1 Mississauga, ON L4W 1R6 Attention: Technical Service Department (*SR number*) Telephone: 1-866-442-1011
In other locations	The nearest authorized ZOLL Medical Corporation representative. To locate an authorized service center, contact the International Sales Department at ZOLL Medical Corporation 269 Mill Road Chelmsford, MA 01824-4105 Telephone: 1-978-421-9655

The ZOLL Serial Number

Each ZOLL product displays a serial number that contains information about that product. From left to right, ZOLL serial numbers are structured as follows:

- A two-character product code
- A three-character date-of-manufacture code
- A product serial number of six or more alphanumeric characters.

The product code for the *SurePower Charger Station* is “AC” and one product code for the *SurePower Battery Pack* is “AE.”

The first two characters of the date-of-manufacture code give the last two digits of the year (for example, “05” would appear for products manufactured in 2005). The last character of the date-of-manufacture code gives the month in which the product was manufactured. The month appears in the form of a single alphabetic character: “A” for January, “B” for February, “C” for March, and so on through “L” for December.

The product serial number is a unique set of alphanumeric characters that ZOLL assigns to each individual unit.

Safety

The following sections provide important warnings and notices regarding the ZOLL *SurePower Charger Station*.

Warnings

- Accidental sliding or drop of the *SurePower Charger Station* or battery may cause physical injury. Operate the *SurePower Charger Station* on a stable surface and be careful when carrying or moving the unit to avoid injury. Damaged batteries may expose users to a safety hazard. Should the *SurePower Charger Station* or *SurePower Battery Pack* be dropped, inspect and test the unit prior to further use following the procedures described in this manual. Use caution when handling batteries with damaged cases.
- Avoid prolonged exposure of the *SurePower Charger Station* or *SurePower Battery Pack* to direct sunlight to minimize charger and battery heating and the damage that may occur from exposure to ultraviolet light.
- The *SurePower Charger Station* and ZOLL rechargable defibrillator batteries have been tested against interference from radio frequency emissions typical of two-way radios used in emergency service/public safety activities. Refer to Appendix A to determine recommended operating distances from RF transmission equipment.
- Use only the AC cord supplied with the device. Failure to use the proper line cord could result in excess leakage currents, EMC problems, and reduced safety.
- Do not disassemble the *SurePower Charger Station*. A shock hazard exists. Refer all problems to qualified personnel.
- Do not place anything on top of or beneath the *SurePower Charger Station*, such as blankets or cloths. Doing so may block the vents on the unit, preventing proper dissipation of heat during operation.
- Do not use the *SurePower Charger Station* unit stacked with other equipment.
- Do not use a battery unless the charger's **Ready** LED is lit and the **Fault** LED is off. Failure to do so may result in the use of a fully depleted battery.
- Use the *SurePower Charger Station* only in a well-ventilated area. Should a battery become overheated, the battery can vent gas that is harmful and potentially explosive.
- An insulation or ground failure in the *SurePower Charger Station* can result in dangerous leakage currents. To avoid this, perform periodic inspection following the procedures described in this manual.
- Do not operate the *SurePower Charger Station* in the presence of flammable agents (such as gasoline), oxygen-rich atmospheres, or flammable anesthetics. Using the device in the presence of flammable agents can cause an explosion.
- Do not immerse or set the *SurePower Charger Station* or *SurePower Battery Pack* in liquid. Using the device near or within puddles of water may present a shock hazard to the operator, patient, and nearby personnel.
- A pinch hazard exists when installing a battery into a charging bay.
- If the display indicators on a *SurePower Battery Pack* are not consistent with the indicators on the *SurePower Charger Station* or ZOLL defibrillator, a fault condition may be present. Remove the battery from service as soon as practical, and verify the correct operation of the charger, defibrillator, and battery.
- Do not use the *SurePower Charger Station* in environmental conditions that fall outside of those specified in Chapter 6, "Product Specifications -- *SurePower Charger Station*." Using the *SurePower Charger Station* in environmental conditions that fall outside those described in the product specifications can result in failure of the unit.
- Do not use the *SurePower Charger Station* in the proximity of Electrosurgical Units (ESU).

Cautions

- Follow all recommended maintenance instructions. If a problem occurs, obtain service immediately.
- Do not use alcohol or ketones (MEK, acetone, etc.) to clean the *SurePower Charger Station*.
- Do not sterilize or autoclave the *SurePower Charger Station*.
- Do not touch the exposed pins in the bottom of a charging bay -- if the pins are damaged, the charging bay won't be usable. These pins do *not* pose an electrical hazard.
- Do not install batteries into Monitor/Defibrillators or a *SurePower Charger Station* that is not plugged into live AC mains when storage may exceed 90 days. Battery damage may occur.

Notes

- If you are disposing of your *SurePower Charger Station*, contact your local authorities to determine the requirements for the recycling and disposal of electrical equipment and follow those requirements.
- The end-of-life for the *SurePower Charger Station* is determined by the availability of replacement parts and service for the unit. Contact ZOLL's Technical Service Department for information on the availability of replacement parts and service for the *SurePower Charger Station*.

FDA Tracking Requirements

U.S. Federal Law (21 CFR 821) requires the tracking of defibrillators. Under this law, owners of this device must notify ZOLL Medical Corporation if this product is

- received
- lost, stolen, or destroyed
- donated, resold, or otherwise distributed to a different organization

If any such event occurs, contact ZOLL Medical Corporation in writing with the following information:

1. Originator's organization – Company name, address, contact name, and contact phone number
2. Part number, model number, and serial number of the device
3. Disposition of the device (for example, received, lost, stolen, destroyed, distributed to another organization), new location and/or organization (if known and different from originator's organization) – company name, address, contact name, and contact phone number
4. Date when the change took effect

Please address the information to:

ZOLL Medical Corporation
Attn: Tracking Coordinator
269 Mill Road
Chelmsford, MA 01824-4105

Fax: (978) 421-0025
Tel: (978) 421-9655

Notification of Adverse Events

As a health care provider, you may have responsibilities under the Safe Medical Devices Act (SMDA) for reporting the occurrence of certain events to ZOLL Medical Corporation and possibly, in the United States, to the Food and Drug Administration (FDA).

These events, described in 21 CFR Part 803, include device-related death and serious injury or illness. In any event, as part of our Quality Assurance Program, ZOLL Medical Corporation should be notified of any device failures or malfunctions. This information is required to ensure that ZOLL Medical Corporation provides only the highest quality products.

Chapter 1
Product Overview

The ZOLL *SurePower Charger Station* is a four-bay unit that can test, recalibrate, and charge up to four ZOLL rechargable defibrillator batteries at once. It is a multi-chemistry charger that works with both ZOLL lithium ion and lead acid batteries.

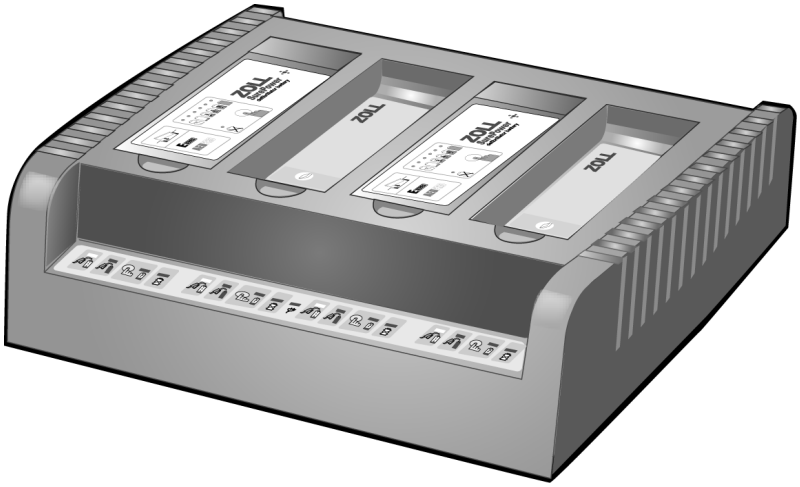


Figure 1-1 *SurePower Charger Station*

SurePower Charger Station Charging Bays

The charging bays in the *SurePower Charger Station* are designed to accommodate the following ZOLL rechargable lithium ion battery:

- *SurePower Battery Pack*

and the following ZOLL rechargable lead acid batteries:

- Battery Pack PD4410
- Smart Ready Battery
- Smart Battery
- XL Smart Ready Battery
- XL Smart Battery

Battery Bay Panels

At the front of each bay is an information and control panel:

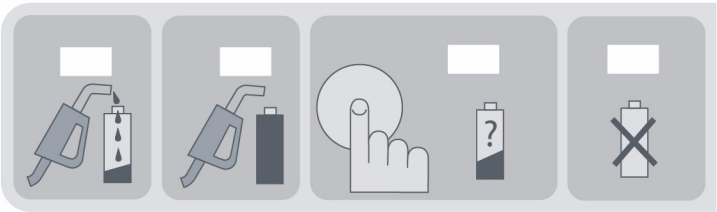
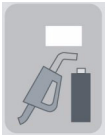


Figure 1-2 Battery Bay Control Panel

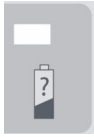
Each panel has four LEDs with identifying icons and a **Test** button:

Charging. The LED lights above this icon to indicate that the battery is charging.

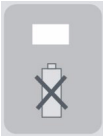


Ready. The LED lights above this icon to indicate that the battery is fully charged and ready for use.

Test button. Pressing this button initiates a manual test of the battery or, if the bay is empty, a test of the charging bay.



Test. The LED lights above this icon to indicate that the charger is testing the battery. If the bay is empty, this icon lights to indicate that the charger is testing the charging bay.



Fault. The charger has determined that there is a fault with the battery. If there is no battery in the charging bay, the charger has determined that there is a fault with that bay.

Charger and Battery Keys

ZOLL's defibrillator batteries and the bays in the *SurePower Charger Station* are keyed to prevent incompatible batteries from seating in the charging bays and damaging the *SurePower Charger Station*. The following illustration shows the key on the *SurePower Battery Pack*.

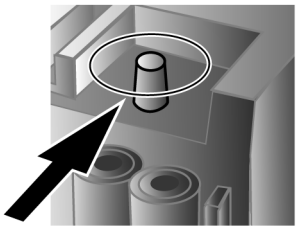


Figure 1-3 Battery Key

Batteries that do not have the correct keys will not seat in the charging bays and cannot be charged and tested by the *SurePower Charger Station*. For example, the AED PRO defibrillator's disposable battery pack is keyed differently and will not seat in the *SurePower Charger Station*.

Caution Do not use the *SurePower Charger Station* to charge any battery packs which are not designed for use with *SurePower Charger Stations*.

Battery Charging Requirements

Each battery type has its own charging requirements. When you place a *SurePower Battery Pack* into the bay of a *SurePower charger*, the charger identifies the battery type and the battery communicates its charging requirements to the charger.

Charging Methods

The *SurePower Charger Station* supports a variety of charging methods: **AutoTest**, **QuickCharge**, and **ManualTest**. These charging methods control how quickly the charger brings the battery to full charge and whether or not the battery's runtime indicator is recalibrated.

AutoTest

The **AutoTest** charging method drains the remaining charge from a depleted battery before recharging it. During this process, the charger measures the battery's capacity to ensure that the battery meets or exceeds the minimum runtime requirements for emergency defibrillator use.

The **AutoTest** charging method is the default charging method for ZOLL's lead acid batteries because it helps lead acid batteries maintain their storage capacity and extend their usable life.

QuickCharge

The **QuickCharge** charging method immediately charges the depleted battery.

The **QuickCharge** charging method is the default charging method for ZOLL's lithium ion batteries, such as the *SurePower Battery Pack*. The **QuickCharge** method is the quickest way to charge lithium ion batteries, which do not require frequent testing to maintain their usable life.

ManualTest

The **ManualTest** charging method tests and recalibrates ZOLL batteries.

ZOLL's lead acid batteries with runtime indicators periodically require recalibration through the use of the **ManualTest** charging method. The *SurePower Battery Pack* automatically recalibrates itself.

We describe how to perform a **ManualTest** in Chapter 3.

Chapter 2
Set Up

Place the *SurePower Charger Station* on a stable, secure surface.

Position the charger so that the control panel and LED's face the area from which you'll be working -- this will make it easier to see the LED's and install and remove batteries.

Make sure that there are *at least* four inches of clear space surrounding the charger. This provides the air circulation necessary for the charger to dissipate the heat that it generates during operation.

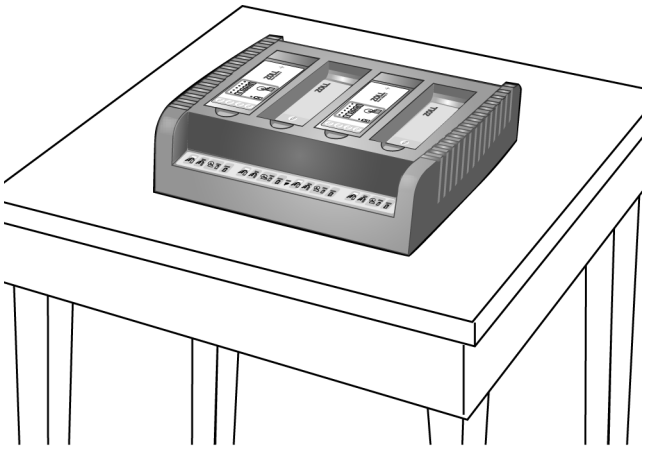


Figure 2-1 Charger Setup

Caution	Do not place anything on top of or beneath the unit that might block the vents.

Warning!	**Do not place open containers of liquids (drink cups, etc.) on or near the charger. Spilling liquids on the charger can result in an electrical safety hazard.**

The charger rests on four rubber feet when you place it on a table top or counter.

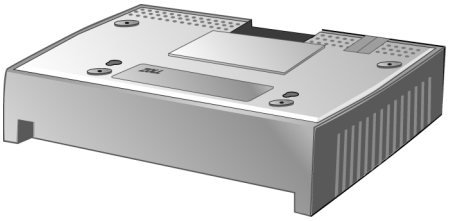


Figure 2-2 ***SurePower Charger Station*** **Bottom View**

Caution Do not remove the rubber feet from the charger base. The rubber feet provide a space between the charger base and the work surface that is necessary for adequate heat dissipation.

Powering on the Charger

To power on the charger, plug the AC cord attached to the rear of the charger into live AC mains.

Use *only* the AC cord that ZOLL Medical Corporation provides.

Note: There is no power switch on the *SurePower Charger Station* -- the unit is powered on at all times when it is plugged in and AC power is available.

Warning! **Always inspect the AC cord before use. Do not use the AC cord if it is defective -- for example, the cord's insulation is cracked or the cord is severely kinked.**

Self Test at Power On

When you connect to the AC mains without batteries in the charging bays, the charger performs a self-test which briefly lights *all* LEDs and then sounds an audible alarm tone. After a few seconds all LEDs, except the **Power** LED in the middle of the control panel, will go out. Should the charger detect a fault with its operation, it will light the **Fault** LED for the charger bay or bays affected by this fault.

Note: If batteries are installed in the charging bays when you power on the *SurePower Charger Station*, the charger performs only a partial self test; the *SurePower Charger Station* performs a full self test when you remove the batteries from the charger bays.

Installing Battery Well Spacers (Optional)

The *SurePower Charger Station* is designed to accept molded plastic battery well spacers that you can install in the back of the charging bays (**REF** 8050-0032-01). Use these well spacers if you will be charging only *SurePower Battery Packs*. The well spacers improve the fit of *SurePower Battery Packs* in the charger bays and prevent older ZOLL lead acid batteries from being used with the charger.

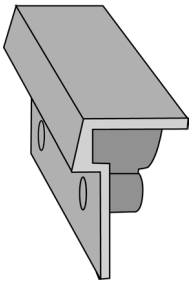


Figure 2-3 Battery Well Spacer (REF 8050-0032-01).

To install the battery well spacer, use the screws provided and the pre-drilled holes in the back of the battery bay to secure the bay spacers as shown in the following illustration.

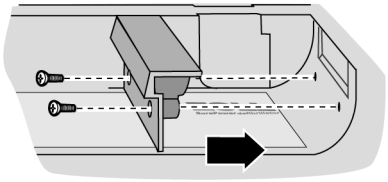
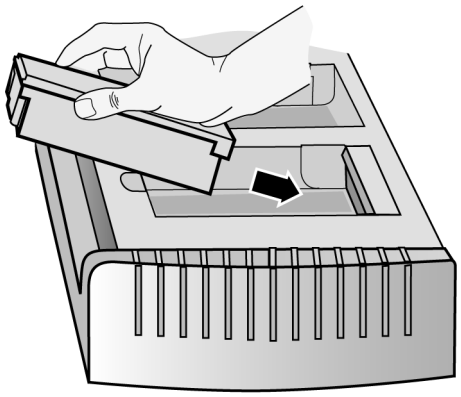


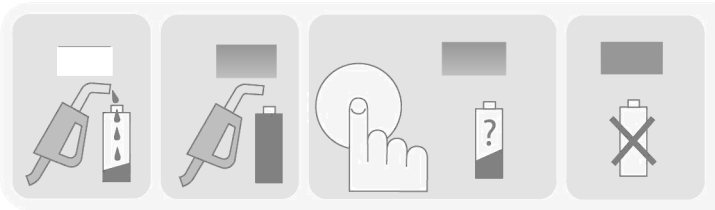
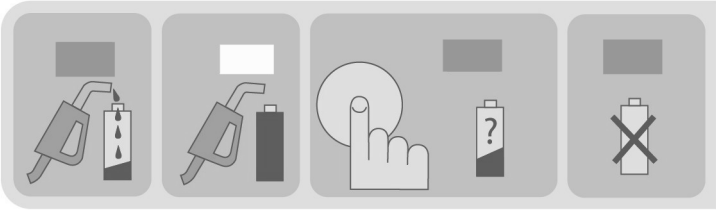
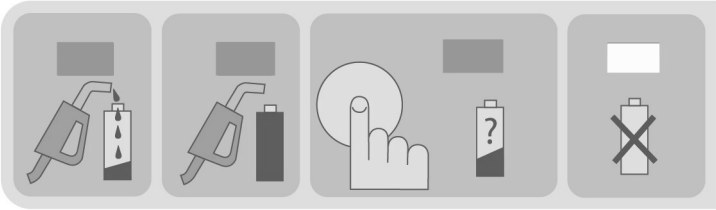
Figure 2-4 Installing the Battery Well Spacer

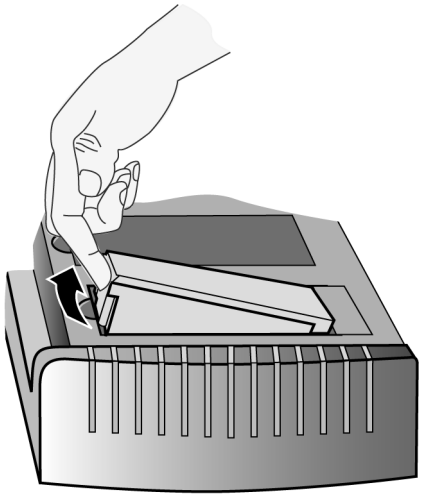
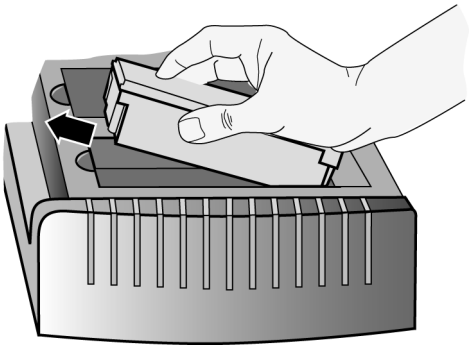
Chapter 3
Operation

You can charge up to four batteries at once -- one in each bay.

To charge a battery pack, follow this procedure:

Step	Action
1.	Insert the battery into an open battery bay. Place the back of the battery against the back of the charging bay, and then press the battery down until it clicks.  **Warning!** To avoid pinching your fingers, hold the battery by the top edges as shown in the illustration above when inserting the battery into the charging bay.

Step	Action
2.	After you insert the battery, the charger begins charging the battery and lights the **Charging** LED.  See the table at the end of this chapter for information on how the charger indicates its operational state after you insert a battery.
3.	Allow the battery time to charge. The charging time will depend on the battery type, how depleted the battery was when you put it into the charger, and which charging method the battery requires. When the battery is fully charged, the charger lights the **Ready** LED:  **Note:** If you remove a battery before it is fully charged, the *SurePower Charger Station* beeps to alert you. If the battery fails the capacity test during testing, the *SurePower Charger Station* always lights the **Fault** LED: 

Step	Action
4.	Remove the battery To remove the battery, insert a finger into the recess at the semi-circular opening of the charging bay, press the battery's locking clip to disengage it from the latch, and then lift the battery out.   **Note:** If the charged battery has failed the capacity test and the **Fault** LED is on, the charger beeps to alert you. Do not use this battery in a defibrillator.

Testing Batteries (Manual Procedure)

Performing a battery test in one charger bay will not affect the operation of any other bay (other than to possibly extend charge time).

The battery test measures the battery's capacity.

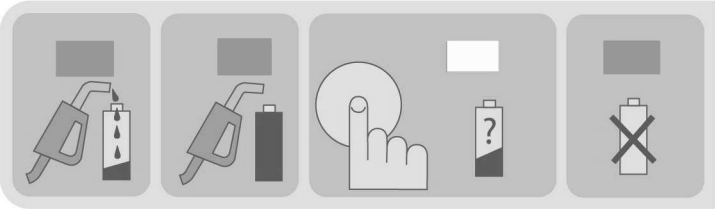
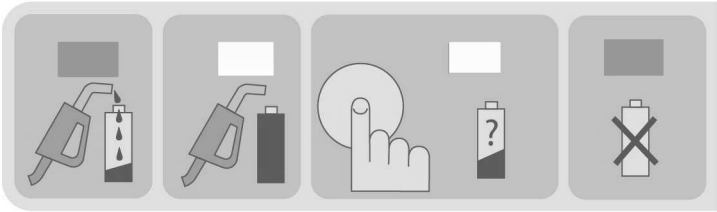
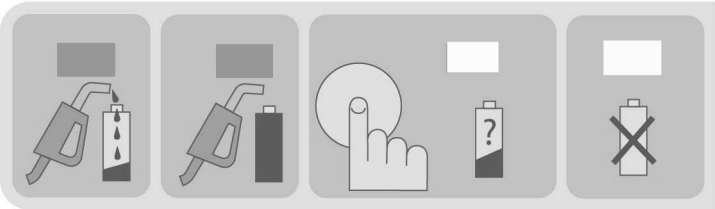
When Should You Test and Recalibrate a Battery?

You should test and recalibrate batteries after a certain number of use (charge/discharge) cycles. The number of use cycles between battery tests depends on the battery type. For example, all ZOLL smart lead acid batteries require testing every twenty use cycles or every three months. The *SurePower Battery Pack* automatically recalibrates when necessary.

Note: A battery will pass a battery test (the charger lights the **Ready** LED) if the battery can be charged to at least 60% of its original factory charge capacity. Lead acid batteries that fail the test may have a significantly reduced operating time when installed in a defibrillator. You should remove these batteries from service.

Performing a Manual Battery Test

To perform a manual battery test, follow this procedure:

Step	Action
1.	Insert the battery into the charging bay and press the **Test** Button on the bay's control panel. The charger lights the **Test** LED and begins testing the battery. The **Test** LED will remain lit for the duration of the test.  When the battery is fully charged and has passed a factory-configured minimum capacity test, the charger lights the **Ready** and **Test** LED's.  If the charger determines that the battery has insufficient capacity, it lights the **Fault** and **Test** LED's. 

Testing Battery Bays

In the *SurePower Charger Station*, the four battery bays work independently of each other, and you can test bays individually to determine if a specific bay is working correctly.

Warning! **Test the charger's battery bays on a regular basis. Neglecting these tests may result in using a charger that is not fully functional and, as such, not capable of maintaining a sufficient number of fully charged batteries to operate all of your ZOLL defibrillators effectively.**

To test a battery bay, follow this procedure:

Step	Action
1.	Remove the battery from the bay.
2.	Press the **Test** Button on the battery bay's control panel. The charger lights all four LEDs, operates the fan, and beeps for several seconds. If the LEDs go out and the beep stops, the battery bay is fully functional and without defects. If the **Fault** LED remains lit, the battery bay is defective.

Charger Operation -- General Information

As you use the *SurePower Charger Station*, the unit will light its LEDs and issue audible beeps to indicate various operational states. Generally, the charger will issue two beeps whenever a fault condition occurs.

The following tables summarize what the LED display and beeps indicate during different operating modes. The charger lights LEDs in one of two ways: **steady** (persistent) or **brief** (periodic).

Indicators When Powering On or Testing the Unit

Charger Operational State	**Charge LED**	**Ready LED**	**Test LED**	**Fault LED**	**Power LED**	**Audible Alarm**
No power to charger.						
Charger powered on.	**ON** (brief)	**ON** (brief)	**ON** (brief)	**ON** (brief)	**ON** (steady)	**1 Beep**
Charger Unit Test initiated (TEST button pressed, no battery in bay).	**ON** (brief)	**ON** (brief)	**ON** (brief)	**ON** (brief)	**ON** (steady)	**1 Beep**
Charger Unit Test successful.					**ON** (steady)	
Charger Unit Test fails.				**ON** (steady)	**ON** (steady)	**2 Beeps**

Indicators When Charging a Battery

Charger Operational State	**Charge LED**	**Ready LED**	**Test LED**	**Fault LED**	**Audible Alarm**
Battery in bay (QuickCharge Method -- battery charging).	**ON** (steady)				
Battery in bay (AutoTest or Manual Test Method -- battery being drained).			**ON** (steady)		
Battery Test in progress (AutoTest or Manual Test Method -- battery charging).	**ON** (steady)		**ON** (steady)		
Battery Capacity Test successful.		**ON** (steady)	**ON** (steady)		
Battery Capacity Test failed.			**ON** (steady)	**ON** (steady)	**2 Beeps when battery removed.**
Battery or charger fault detected when charging.				**ON** (steady)	**2 Beeps when battery removed.**

Indicators When Removing a Battery

Charger Operational State	**Charge LED**	**Ready LED**	**Test LED**	**Fault LED**	**Audible Alarm**
Battery removed from bay -- **no** battery fault detected.					
Battery removed from bay -- battery fault detected.					**2 Beeps**
Battery removed from bay -- not fully charged.					**2 Beeps**
Battery removed from bay -- charger fault detected.				**ON** (steady)	**2 Beeps**

Chapter 4 Maintenance and Troubleshooting

This chapter describes a series of non-technical operational checks that you should perform annually to ensure the proper operation of the *SurePower Charger Station*.

Inspection

Begin by inspecting the charger to ensure that it's clean (with no fluid spills). Make sure that nothing has been placed on top of the charger and that there are *at least* four inches of clear space around the charger so that it can dissipate heat effectively.

You can then perform the following quick, non-technical operational checks:

1. Inspect for cracks or damage to the charger housing.
2. Inspect the AC cord for severe kinks or exposed wires.
3. Connect the charger to live AC mains. The charger will beep, turn on the fan, and light all LEDs for several seconds. The **Power** LED will remain lit after the other LEDs go off.
4. With all battery bays empty, check that all LEDs on the control panel except the **Power** LED are off.
5. Press the **Test** button under each bay to verify that the bays are fully operational (for more information, see the section, "Testing Battery Bays," in Chapter 3).
6. Insert a battery into each bay. Verify that the appropriate LEDs in each bay immediately illuminate.

Cleaning

Clean the *SurePower Charger Station* with a soft cloth, mild soap, and water.

Do not immerse any part of the *SurePower Charger Station* in water. Do not use alcohol or ketones (MEK, acetone, etc.). Do not autoclave the *SurePower Charger Station*.

Troubleshooting

The following troubleshooting procedures are for use by non-technical personnel using the *SurePower Charger Station*. This section addresses many common problems or questions that can arise during operation.

If problems persist after you perform these troubleshooting procedures, contact the ZOLL Technical Service Department or your authorized ZOLL representative.

1. **Power** LED does not light.

- Check that the charger is plugged into an appropriate power source.
- Check that the power cord is securely inserted into the charger.
- Check for a defective power cord.
- Plug the charger into another power source.

2. **Charging** LED does not light when a battery is in the battery bay.

- Check to see if the charger is in the drain phase of a battery test (**Test** LED is illuminated).
- Check that the battery is properly seated in the bay.
- Check that the contacts are clean and not damaged.
- Test the battery bay for proper functionality.
- Use another battery that you know is good.

3. **Test** LED does not light when you press the **Test** button.

- Check that the battery is properly seated in the battery bay.
- Check that the contacts are clean and not damaged.
- Test the battery bay for proper functionality.
- Use another battery that you know is good.

4. Battery fails test cycle (both the **Fault** and **Test** LEDs light).

- Test the battery bay for proper functionality.
- Repeat the battery test cycle.

Chapter 5
Using ZOLL Rechargable Batteries Effectively

This chapter describes how you can use ZOLL rechargable batteries most effectively. This chapter also describes what a Battery Management Program is and how you use it to ensure that your ZOLL defibrillators always have adequate battery power.

Getting the Most from Your Lead Acid Batteries

The ZOLL 4410/Smart/Smart Ready and XL Battery Packs are lead acid batteries. Lead acid batteries require full recharging after use. The continuous short-cycle recharging of lead acid batteries will result in reduced capacity and early battery failure. An effective battery management plan can maximize the usable life of your batteries by ensuring that the batteries are correctly recharged.

Replacing Batteries

Several factors contribute to the loss of a battery's charge capacity: frequency of use, the number of batteries used, and the pattern of discharging and recharging batteries. Because of this, it is good practice to replace and discard used batteries on a preventive, scheduled basis. The most effective preventive replacement interval should be based on anticipated use patterns, battery pack testing results, and your experience with the device in actual operation. We recommend battery replacement every eighteen months or sooner.

For more information about battery replacement schedules, contact your ZOLL Technical Service Representative.

Low Battery Message

As a battery's capacity diminishes, the amount of operating time remaining after a LOW BATTERY message will also diminish. For newer or lesser-used batteries, the operating time remaining after this warning will be significantly longer than the operating time remaining on batteries that have seen more use. In either case, this warning will ultimately lead to defibrillator shut-off, and consequently, the low battery should be replaced with a fully-charged battery as soon as possible.

Caution When a LOW BATTERY message is displayed, replace the battery pack as soon as possible to ensure continuous defibrillator operation.

Getting the Most from Your *SurePower Battery Pack*

The *SurePower Battery Pack* is a lithium ion battery. You can recharge a depleted *SurePower Battery Pack* at any time. Unlike lead acid batteries, the repeated short-cycle recharging of a lithium ion battery will *not* result in reduced charge capacity and early battery failure.

It is very important that you recharge a depleted *SurePower Battery Pack* as soon as possible.

Caution *Never* store the *SurePower Battery Pack* in a fully depleted state -- this will damage the battery.

Developing a Battery Management Program

The safe, reliable use of ZOLL defibrillators requires an adequate, available supply of battery power. To ensure that an adequate supply of battery power is always available, you need to have a well-designed Battery Management Program.

A Battery Management Program requires the following:

1. Have a sufficient number of batteries and chargers.

   Have a sufficient number of batteries and battery chargers to insure that every ZOLL resuscitation device has fully charged main and spare batteries ready at all times.

2. Assign someone to be responsible for the Battery Management Program.

   Assign someone who can oversee all aspects of the Battery Management Program, including the training of staff who use ZOLL's resuscitation devices.

3. Define the battery exchange and charging routines.

   Clinical and technical staff should determine desired use patterns and an optimum sequence to insure consistent battery exchange and charging routines.

4. Ensure sufficient spare battery capability.

   A fully-charged spare battery should be immediately available with all ZOLL resuscitation devices. We recommend that you keep more than one spare battery available where prolonged or repeated use of the device may be required, such as long transport situations.

5. Develop backup procedures.

   You must develop backup procedures to maintain appropriate life support (such as cardiopulmonary resuscitation) should a battery or resuscitation device fail and need to be replaced.

6. Test Batteries regularly.

   Develop a testing schedule as part of your organization's Battery Management Program. The appropriate frequency of testing depends on the age of the battery pack and the frequency and type of use. As the battery ages, testing should be more frequent since failure may occur rapidly at the battery's end-of-life. At a minimum, ZOLL recommends testing every three months.

7. Develop a battery recycling and disposal plan.

The disposal of used batteries can have a negative environmental impact if it is not done correctly, and there are often regulations specifying how batteries should be disposed of or recycled. You should become familiar with any applicable regulations and develop a plan that satisfies these regulations.

We encourage you to recycle your used batteries whenever possible.

Chapter 6
Product Specifications -- *SurePower Charger Station*

This chapter gives the product specifications for the ZOLL *SurePower Charger Station* :

Size	16 (Length) x 11 (Width) x 6 (Height) in 40.6 (Length) x 27.9 (Width) x 15.2 (Height) cm
Weight	15 lb (6.8 kg) without batteries
Equipment Type	IEC Class I
Power Requirements	100-240 Vrms, 50/60 Hz 120 Vrms, 400 Hz
Power Consumption	200 VA maximum.
Output per Bay	**Voltage:** +6 to 16.8 V dc **Charging Current:** 0 to +3.00 A dc **Discharging Current:** 0 to -3.00 A dc
Maximum Thermal Output	682 BTU
Design Standards	Designed to meet or exceed UL 60601-1, EN 60601-1, and CSA 22.2 standards for medical equipment safety
Temperature	**Operation:** 32°F to 122°F 0°C to 50°C **Optimal battery charging:** 59°F to 95°F 15°C to 35°C **Storage and transportation:** -40°F to 158°F -40°C to 70°C
Humidity	5% to 95% (relative humidity - non condensing).
Safety Specification	Stationary, Class I, Type B

Altitude of Operation	-300 ft through 20,000 ft (below and above sea level) -91 m through 6096 m (below and above sea level) 1060 through 500 mBar
Ingress Protection	IP X1

Appendix A
Manufacturer's Declaration -- Electromagnetic Emissions and Immunity-Guidance and Manufacturer's Declaration -- Electromagnetic Emissions

The *SurePower Charger Station* is intended for use in the electromagnetic environment specified below. The customer or the user of the *SurePower Charger Station* should assure that they are used in such an environment.

RF emissions CISPR 11	Group 1	The *SurePower Charger Station* only uses RF energy for internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The *SurePower Charger Station* is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emission IEC 61000 3-2	Class A	
Voltage Fluctuations/ Flicker Emission IEC 61000 3-3	Complies	
Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to EMC information provided in this document.		

Electromagnetic Immunity Declaration (EID)

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000 4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000 4-4	± 2 kV for power supply lines ± 1 kV for input/ output lines	± 2 kV for power supply lines ± 1 kV	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000 4-5	± 1 kV differential mode ± 2 kV for common mode	± 1 kV differential mode ± 2 kV for common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the *SurePower Charger Station* unit requires continued operation during power mains interruptions, it is recommended that the *SurePower Charger Station* unit be powered by an uninterruptable power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
U_T is the AC mains voltage prior to application of the test level.			

EID for Non-Life-Support Functions

The non-life-support functions of the *SurePower Charger Station* are intended for use in the electromagnetic environment specified below. The customer or the user of the *SurePower Charger Station* should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2.5 GHz	3 Vrms 10 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the *SurePower Charger Station*, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance d = 1.2 $\sqrt{P}$ 150 KHz to 80 MHz d = 0.35 $\sqrt{P}$ 80 MHz to 800 MHz d = 0.7 $\sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1 At 80 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the *SurePower Charger Station* unit is used exceeds the applicable RF compliance level above, the *SurePower Charger Station* unit should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the *SurePower Charger Station* unit.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances from RF Equipment for Non-Life-Support Functions

The non-life-support functions of the *SurePower Charger Station* are intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the *SurePower Charger Station* can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the *SurePower Charger Station* as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter (W)	**Separation Distance According to Frequency of Transmitter (m)**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 0.35\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 0.7\sqrt{P}$
0.01	0.12	0.035	0.070
0.1	0.38	0.111	0.221
1	1.2	0.350	0.700
10	3.8	1.110	2.214
100	12	3.500	7.000

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.