Operator's Manual

Model 2500C

Charger Stand

CE

English

Consult Instructions for Use.

Nonin® reserves the right to make changes and improvements to this manual and the products it describes at any time, without notice or obligation.

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CE

EC REP

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References to “Nonin” in this manual shall imply Nonin Medical, Inc.

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Intended Use

The Nonin Model 2500C Charger Stand is intended for use with the PalmSAT Models 2500 and 2500A Pulse Oximeters and the Model 2500B Rechargeable NiMH (Nickel Metal Hydride) Battery Pack.

Contraindications

Do not use this product in an MR environment.
Do not use this product in an explosive atmosphere.
This product is not defibrillation proof per IEC 60601-1.

Warnings

As with all medical equipment, carefully route patient cabling to reduce the possibility of patient entanglement or strangulation.
This product should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the product should be observed carefully to verify normal operation.
The use of accessories, sensors, cables, and power supplies other than those listed in the Parts and Accessories List may result in increased electromagnetic emission and/or decreased immunity of this product.

⚠ *Cautions*

This equipment complies with International Standard 60601-1-2 for electromagnetic compatibility for medical electrical equipment and/or systems. This standard is designed to provide reasonable protection against harmful interference in a typical medical installation. However, because of the proliferation of radio-frequency transmitting equipment and other sources of electrical noise in healthcare and other environments, it is possible that high levels of such interference due to close proximity or strength of a source might disrupt the performance of this product. Medical electrical equipment needs special precautions regarding EMC, and all equipment must be installed and put into service according to the EMC information specified in this manual.
Portable and mobile RF communications equipment can affect medical electrical equipment.
Do not connect this product to an AC outlet controlled by a wall switch. If the switch is accidentally turned off before the battery pack is recharged, the pulse oximeter may not function.
Grounding reliability can only be achieved when the equipment is connected to an equivalent receptacle marked “Hospital Only” or “Hospital Grade”.
This product contains sensitive electronic components and must be repaired by trained Nonin personnel only.
Do not immerse this product in liquid.
Do not place liquids on top of this product.
Do not use caustic or abrasive cleaning agents on this product.

⚠ *Cautions (Continued)*

Do not remove any covers from the product. There are no user-serviceable parts inside the unit.
Do not attempt to charge disposable batteries. Disposable batteries may leak or explode if used improperly.
Follow local, state and national governing ordinances and recycling instructions regarding disposal or recycling of the product and product components, including batteries. Use only Nonin-approved battery packs.
In compliance with the European Directive on Waste Electrical and Electronic Equipment (WEEE) 2002/96/EC, do not dispose of this product as unsorted municipal waste. This product contains WEEE materials; please contact your distributor regarding take-back or recycling of the product. If you are unsure how to reach your distributor, please call Nonin for your distributor's contact information.

Guide to Symbols

This table describes the symbols that are found on the Model 2500C and in this manual.

Table 1: Labeling Symbols

Symbol	Description
	Caution!
	Consult Instructions for Use.
	Follow Instructions for Use.
	**UL Mark for Canada and the United States** with respect to electric shock, fire, and mechanical hazards only in accordance with UL 60601-1 and CAN/CSA-C22.2 No. 601.1.
	Type BF Applied Part (Patient isolation from electrical shock).
	Direct Current
SN	Serial Number
	**CE Marking** indicating conformance to EC directive No. 93/42/EEC concerning medical products.
	Indicates separate collection for electrical and electronic equipment (WEEE).

Using the Model 2500C

General Description

To use, place a PalmSAT Pulse Oximeter containing a rechargeable battery pack into the charger stand. Next, connect the charger power supply to the charger, then plug the power supply into an appropriate AC power source (wall outlet).

The fast charge feature will fully charge a depleted battery pack in approximately 180 minutes. The charge indicator shows a steady green light when charging, and a flashing green light when the battery pack is fully charged.

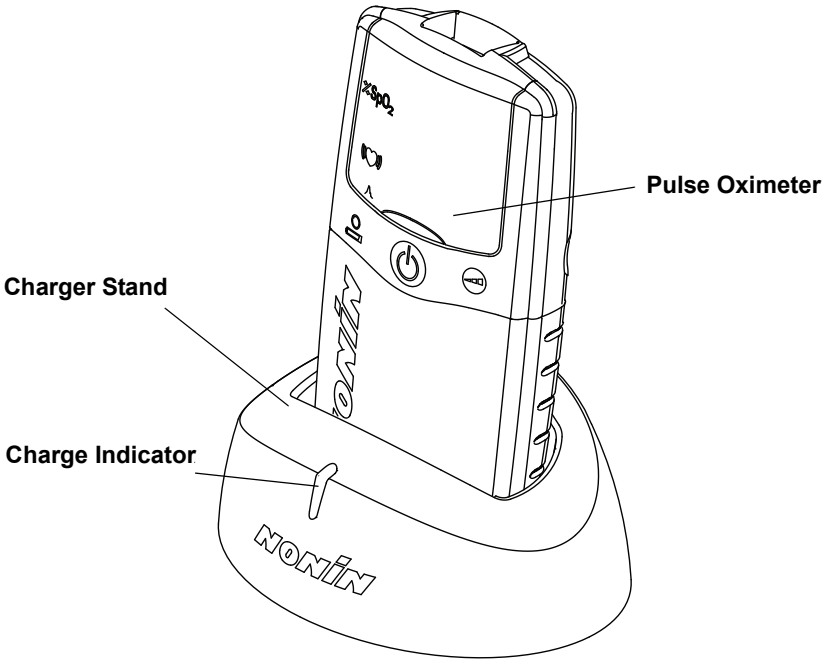

Figure 1: Charger Stand and Pulse Oximeter

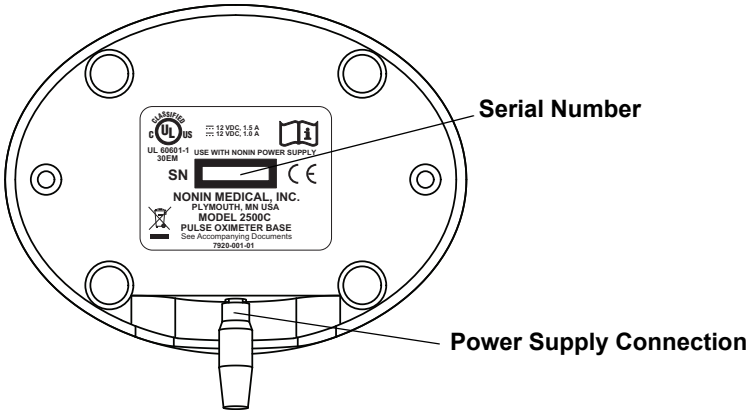

Figure 2: Bottom View Showing the Serial Number, Power Supply Connection, and Symbols

Unpacking the Model 2500C

The complete package includes the following items:

- 1 Model 2500C Charger Stand
- 1 Model 2500B Rechargeable NiMH Battery Pack
- 1 Power Supply*
- 1 Model 2500C-INS Operator's Manual (on CD)

Confirm that the items listed are included in the package. If any item on this list is missing or damaged, contact your distributor. Contact the carrier immediately if the shipping carton is damaged.

*Certain power supply models will be provided with a separate power cord.

Operation

Follow the steps below to recharge the Model 2500B NiMH Battery Pack.

NOTES:

- The NiMH battery pack must be fully charged before the first use.
- Various Nonin-specified power cords are available for use with certain power supplies. See “Accessories” on page 11 or contact your distributor.
- It is normal for the battery pack and charger to become warm during the charge cycle.

To Charge the Battery Pack Using the Charger Stand

1. Insert the battery pack into the PalmSAT Pulse Oximeter. (See the PalmSAT Operator’s Manual for battery pack placement instructions.)
2. Place the pulse oximeter into the charger stand.
3. Plug the power supply into the back of the charger stand.
4. Connect the appropriate power cord into the power supply, when necessary.
5. Plug the power cord assembly into an appropriate AC power outlet.
6. The battery pack will be fully charged in approximately 90 minutes. Refer to Table 2 for a description of the charging conditions.

Table 2: Charging Conditions

Charge Indicator	Status
GREEN constant	Charging up to full capacity.
GREEN alternating ON 1/8 sec, OFF 1/8 sec	Fully charged (and trickle charging to prevent battery pack self-discharge).
GREEN alternating ON 1/8 sec, OFF 1 3/8 sec	Preparing for charge (adjusting the minimum voltage).
AMBER ON 1 3/8 sec alternating with AMBER/GREEN ON 1/8 sec	ERROR. See “Troubleshooting Guide” on page 12.
OFF (not illuminated)	Not in use.

NOTES:

- You can maintain a full charge in the battery pack by charging the PalmSAT Pulse Oximeter in the charger stand until needed. (NiMH battery packs will self-discharge approximately 20% over a 30-day period when removed from the charger.)
- You can use the PalmSAT Pulse Oximeter while it is charging in the stand. For added stability, route the sensor cable under the charger stand as shown in Figure 3.

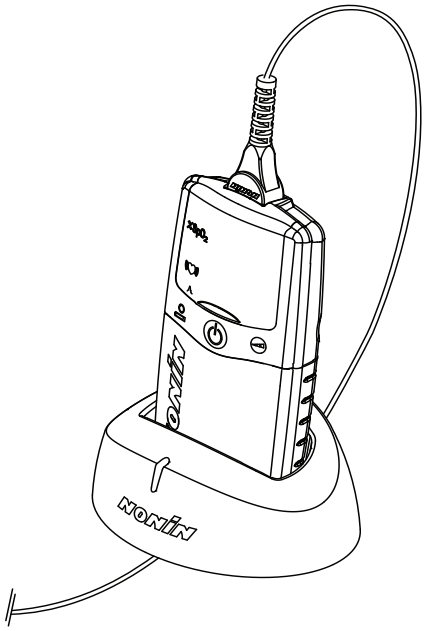

Figure 3: Using the PalmSAT Pulse Oximeter while Charging the Battery Pack

Cleaning

To Clean the Charger Stand

1. Unplug the power supply from the AC power outlet.
2. Clean the product with a soft cloth dampened with isopropyl alcohol. Do not pour or spray any liquids onto the product, and do not allow any liquid to enter any openings in the product. Allow the product to dry thoroughly before reusing.

⚠ **CAUTION:** Do not immerse this product in liquid.

⚠ **CAUTION:** Do not use caustic or abrasive cleaning agents on this product.

⚠ **CAUTION:** Do not place liquids on top of this product.

Service

⚠ **CAUTION:** This product contains sensitive electronic components and must be repaired by trained Nonin personnel only.

⚠ **CAUTION:** Do not remove any covers from the product. There are no user-serviceable parts inside the unit.

NOTE: Any sign or evidence of opening the system, field service by non-Nonin personnel, tampering, or any kind of misuse or abuse of the system, shall void the warranty in its entirety.

Nonin does not recommend field repair of this product. The circuit board in the Model 2500C is a multi-layer board using very narrow traces. Due to the very small trace size, extreme care must be used when replacing components to prevent permanent, non-repairable damage to the circuit board. Most components are surface-mounted and require special hot-air jet soldering and desoldering equipment. After any repairs are made, the product must be tested to ensure correct operation.

For additional technical information, contact Nonin's Technical Service department at:

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All non-warranty work shall be done according to Nonin standard rates and charges in effect at the time of delivery to Nonin. All repairs include a complete retest of the Model 2500C using factory test fixtures.

Warranty

NONIN MEDICAL, INCORPORATED, (Nonin) warrants to the purchaser, for a period of one year from the date of delivery, each Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, and Power Supply, exclusive of power cords and other accessories. (Refer to the individual package inserts for specific warranty information for power cords and other accessories.) Nonin shall repair or replace any Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, or Power Supply found to be defective in accordance with this warranty, free of charge, for which Nonin has been notified by the purchaser by serial number that there is a defect, provided said notification occurs within the applicable warranty period. This warranty shall be the sole and exclusive remedy by the purchaser hereunder for any Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, or Power Supply delivered to the purchaser which is found to be defective in any manner whether such remedies be in contract, tort or by law.

This warranty excludes cost of delivery to and from Nonin. All repaired units shall be received by the purchaser at Nonin's place of business. Nonin reserves the right to charge a fee for a warranty repair request on any device that is found to be within specifications.

The Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, or Power Supply is a precision electronic instrument and must be repaired by knowledgeable and specially trained Nonin personnel only. Accordingly, any sign or evidence of opening the Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, or Power Supply, field service by non-Nonin personnel, tampering, or any kind of misuse or abuse of the Model 2500C Charger Stand, Model 2500B Rechargeable NiMH Battery Pack, or Power Supply, shall void the warranty in its entirety.

All non-warranty work shall be done according to Nonin standard rates and charges in effect at the time of delivery to Nonin.

DISCLAIMER/EXCLUSIVITY OF WARRANTY:

THE EXPRESS WARRANTIES SET FORTH IN THIS MANUAL ARE EXCLUSIVE AND NO OTHER WARRANTIES OF ANY KIND, WHETHER STATUTORY, WRITTEN, ORAL, OR IMPLIED INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY SHALL APPLY.

Accessories

For more information about Nonin parts and accessories:

- See the Parts and Accessories List on the Operator's Manual CD.
- Contact your distributor or Nonin at (800) 356-8874 (USA and Canada), +1 (763) 553-9968, or +31 (0)13 - 79 99 040 (Europe).
- Visit www.nonin.com

Troubleshooting Guide

Problem	Possible Cause	Possible Solution
The product will not turn on.	The power supply/power cord assembly is not properly connected to the charger and an appropriate AC outlet.	Check all connections. Check that the AC outlet is not turned off via a wall switch.
	The pulse oximeter is improperly inserted into the charger.	Insert the pulse oximeter into the charger correctly.
	The battery pack is improperly inserted into the pulse oximeter.	Insert the battery pack into the pulse oximeter correctly.
The charge indicator is flashing amber alternating with amber/green (an error condition).	The battery pack is stored or used outside of specified environmental conditions.	Warm the battery pack to room temperature, place it into the pulse oximeter, and then reinsert into the charger.
	Either disposable batteries, a faulty battery pack, or a non-specified pack is in the pulse oximeter.	Place a new Nonin-specified rechargeable battery pack into the pulse oximeter and then reinsert into the charger.
	The charge connections are faulty.	Check all connections and reinsert the pulse oximeter into the charger, or contact Nonin Technical Service.

If these solutions do not correct the problem with your product, please contact Nonin Technical Service at (800) 356-8874 (USA and Canada), +1 (763) 553-9968, or +31 (0)13 - 79 99 040 (Europe).

Technical Information

Manufacturer's Declaration

Refer to the following tables for specific information regarding this product's compliance to IEC Standard 60601-1-2.

Table 3: Electromagnetic Emissions

Emissions Test	Compliance	Electromagnetic Environment—Guidance
This product is intended for use in the electromagnetic environment specified below. The customer and/or user of this product should ensure that it is used in such an environment.		
RF Emissions CISPR 11	Group 1	This product uses RF energy only for its 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 B	This product is suitable for use in all establishments, including domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	N/A	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	N/A	

Table 4: Electromagnetic Immunity

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment Guidance
This product is intended for use in the electromagnetic environment specified below. The customer and/or user of this product should ensure that it is used in such an environment.			
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 for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV 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 product requires continued operation during power mains interruptions, it is recommended that the product be powered from an uninterruptible power supply or battery pack.
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.
NOTE: U_T is the AC mains voltage before application of the test level			

Table 5: Guidance and Manufacturer's Declaration—Electromagnetic Immunity

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
This product is intended for use in the electromagnetic environment specified below. The customer and/or user of this product should ensure that it is used in such an environment.			
Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.			
			Recommended Separation Distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	$d = 1.17\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	80 MHz to 800 MHz $d = 1.17\sqrt{P}$ 800 MHz to 2.5 GHz $d = 2.33\sqrt{P}$
Radiated RF per ISO 9919 clause 36 and ISO 80601-2-61 clause 202.6.2.3	20 V/m 80 MHz to 2.5 GHz	20 V/m	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: 
NOTES: 1) At 80 MHz and 800 MHz, the higher frequency range applies. 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 product is used exceeds the applicable RF compliance level above, the product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the product.

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

Table 6: Recommended Separation Distances

The following table details the recommended separation distances between portable and mobile RF communications equipment and this product.

This product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Customers or users of this product can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and the product as recommended below, according to maximum output power of the communications equipment.

	Separation Distance According to Frequency of Transmitter		
Rated Maximum Output Power of Transmitter W	150 kHz to 80 MHz $d = 1.17\sqrt{P}$	80 MHz to 800 MHz $d = 1.17\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.33\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.2	1.2	2.3
10	3.7	3.7	7.4
100	12	12	23

NOTES:

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

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

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated 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.

Specifications

Charge Time	180 minutes
Power Requirements	12 VDC / 1.5 A
Charge Indicator	Bicolor LED (green, amber)
Temperature (Operating)	-20 to +40 °C (-4 to +104 °F)
Temperature (Storage/Transportation):	-30 to +50 °C (-22 to +122 °F)
Humidity (Operating)	10 to 90% noncondensing
Humidity (Storage/Transportation):	10 to 95% noncondensing
Dimensions	5.5 cm H x 11.6 cm W x 8.6 cm D (2.2 in H x 4.6 in W x 3.4 in D)
Weight	90.3 g (3.2 oz)
Patient Isolation	Not applicable
Leakage Current	<0.5 mA at 265 VAC, 50 Hz