Rad-8™

Signal Extraction Pulse Oximeter

(Home Care Edition)

Service Manual

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The Rad-8 Pulse Oximeter Service Manual is intended to provide the necessary information for proper servicing of all models of the Rad-8 Pulse Oximetry systems. This manual is structured to support troubleshooting to the assembly or module level. This manual does not provide instructions for troubleshooting to the printed circuit board component level. There may be information provided in this manual that is not relevant for your system. Do not service the Rad-8 Pulse Oximeter without completely reading and understanding these instructions.

NOTICE:
Purchase or possession of this device does not carry any express or implied license to use this device with replacement parts which would, alone or in combination with this device, fall within the scope of one of the patents relating to this device.

CAUTION:
Federal law (U.S.) restricts this device to sale by or on the order of a physician.

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CONFORMS TO UL STD 60601-1 AND
CERTIFIED TO CAN/CSA STD C22.2 NO. 601.1

Covered by one or more of the following U.S patents: 5482036, 5490505, 5632272, 5685299, 5758644, 5769785, 5919134, 6002952, 6011986, 6067462, 6157850, 6229856, 6236872, 6263222, 6360114, 6430525, 6463311, 6501975, 6606511, 6643530, 6650917, 6654624, 6684090, 6699194, 6745060, 6816741, 6826419, 6850787, 7215984, 7215986, 7221971, 7254433, 7295866, 7328053, 7373194, 7376453, 7377899, 7467002, 7469157, 7471969, 7489958, 7496393, 7499741, 7509154, 7530955, RE38476, RE38492, international equivalents, or one or more of the patents referenced at www.masimo.com/patents. Other patents pending.

Table of Contents

1 Overview

1.1 About this Manual

This manual explains how to service the Rad-8 Pulse Oximeter. Important safety information relating to general use of the Rad-8 Pulse Oximeter appears in the Rad-8 Pulse Oximeter Operator's Manual. Other important safety information is located throughout this manual where appropriate.

1.2 Warnings, Cautions and Notes

Please read and follow any warnings, cautions and notes presented throughout this manual. An explanation of these labels is as follows:

A **warning** is provided when actions may result in a serious outcome (i.e., injury, serious adverse affect, and or death) to the patient or user. Look for text in a gray shaded box.

Sample of Warning:

WARNING: THIS IS A SAMPLE OF A WARNING STATEMENT.

A **caution** is given when any special care is to be exercised by the patient or user to avoid injury to the patient, damage to this device or damage to other property.

Sample of Caution:

CAUTION: This is a sample of a Caution statement.

A **note** is provided when extra general information is applicable.

Sample of Note:

Note: This is a sample of a Note statement.

2 Maintenance

2.1 Introduction

This chapter covers how to test the operation of the Rad-8 and how to properly clean the Rad-8 Pulse Oximeter, how to recharge and replace the batteries, and how to obtain service under normal operation. No internal adjustment or recalibration is required. Service should be performed by qualified service personnel only. Safety checks should be performed at regular intervals or in accordance with local and governmental regulations.

Note: Opening or repairing the Rad-8 Pulse Oximeter will void the Masimo warranty. Products that require repair while under warranty should always be returned to Masimo for warranty service.

WARNING: ELECTRICAL SHOCK AND FLAMMABILITY HAZARD. ALWAYS TURN THE UNIT OFF AND DISCONNECT THE POWER CORD FROM THE BACK OF THE UNIT FOR ANY MAINTENANCE, SUCH AS CLEANING, DISASSEMBLY OR ASSEMBLY.

2.2 Cleaning

The outer surface of the Rad-8 Pulse Oximeter can be cleaned with a soft cloth dampened with a mild detergent and warm water solution. Do not allow liquids to enter the interior of the instrument. The outer surface of the instrument can also be wiped down using the following solvents: Cidex Plus (3.4% Glutaraldehyde), 10% Bleach, and 70% Isopropyl Alcohol.

2.2.1 To clean the display panel use a cotton swab moistened with the cleaning solvent and gently wipe the panel.

2.2.2 To clean the outer surface of the Rad-8 Pulse Oximeter, use a soft cloth moistened with cleaning solvent. Do not allow liquids to enter the interior of the instrument.

2.2.3 To decontaminate unit, refer to Section 7.1.2.

WARNING:

- DO NOT AUTOCLAVE, PRESSURE STERILIZE, OR GAS STERILIZE THE OXIMETER.

- DO NOT SOAK OR IMMERSE THE MONITOR IN ANY LIQUID.
- USE THE CLEANING SOLUTION SPARINGLY. ALLOW THE UNIT TO AIR DRY. EXCESSIVE SOLUTION CAN FLOW INTO THE MONITOR AND CAUSE DAMAGE TO INTERNAL COMPONENTS.

- DO NOT TOUCH, PRESS OR RUB THE DISPLAY PANELS WITH ABRASIVE CLEANING COMPOUNDS, INSTRUMENTS, BRUSHES, ROUGH-SURFACE MATERIALS OR BRING THEM INTO CONTACT WITH ANYTHING THAT COULD SCRATCH THE PANEL.
- DO NOT USE PETROLEUM-BASED, ACETONE SOLUTIONS OR OTHER HARSH SOLVENTS TO CLEAN THE OXIMETER. THESE SUBSTANCES ATTACK THE DEVICE'S MATERIALS AND DEVICE FAILURE CAN RESULT.

3 Battery Operation and Maintenance

3.1 Overview

3.1.1 The Rad-8 Pulse Oximeter uses a 6 volt, 1.4AHr lead acid, sealed, rechargeable battery.

3.1.2 Please reference the Rad-8 Pulse Oximeter Operator's Manual for specifications on battery charge time and capacity.

CAUTIONS:

- At low battery warning, connect the Rad-8 Pulse Oximeter to AC power to prevent interruption of power.
- Additional information on the Rad-8 Pulse Oximeter batteries may be found in the Rad-8 Pulse Oximeter Operator's Manual.

Note: If the Rad-8 Pulse Oximeter has not been charged for 1 month or more, then recharge the battery prior to use.

3.2 Replacing the Battery

3.2.1 Turn the Rad-8 Pulse Oximeter off and remove the patient cable connection.

3.2.2 Place the unit on its side with the rubber footings touching the surface.

3.2.3 Remove the four screws from the housing assembly.

3.2.4 Carefully remove the speaker-side housing assembly. **DO NOT pull housing away as it may damage the speaker cable.**

3.2.5 Remove the speaker connector from the system board and set the housing aside.

3.2.6 Carefully lift the battery out of the housing and remove the positive and negative battery connections.

3.2.7 Install the replacement battery. Verify proper positioning of the (+) positive and (-) negative connectors. Reverse steps 3.2.1 through 3.2.6 to re-assemble.

3.2.8 Verify the unit turns on, that all the LEDs momentarily light (AC LED will not illuminate when powering on with battery power only), that the low battery LED is not illuminated, and that the unit stabilizes to a normal operation mode.

4 Performance Verification

CAUTION: Follow local governing guidelines for proper disposal of the internal battery. Do not incinerate.

CAUTION: Do not over-tighten screws. Tighten the screws throughout the Rad-8 Pulse Oximeter to 80 in.- oz.

Note: It will be necessary to perform safety testing after replacement.

Note: Under normal operation, no internal adjustment or recalibration is required.

4.1 Overview

4.1.1 To test the performance of the Rad-8 Pulse Oximeter following repairs or during routine maintenance, follow the procedure outlined in this section. If the Rad-8 Pulse Oximeter fails any of the described tests, discontinue its use and correct the problem before returning the unit back to the user.

4.2 Power-On Self-Test

4.2.1 Plug the Rad-8 Pulse Oximeter into an AC power source with no cables or sensors attached, turn the monitor on with the “Power Button”. For about 2 seconds all available LEDs are illuminated and a brief beep tone sounds. The unit will then cycle through Saturation and Pulse alarm limits on the LED display.

4.2.2 After this initialization “boot” cycle, the No Sensor, Alarm Suspend Mode LED indicator’s will light. Also, the %SpO2 and BPM monitoring display will indicate “no” “sen”. The Rad-8 Pulse Oximeter is ready to begin normal operation.

4.2.3 Turn power off and then back on as many times as necessary to verify this Power-On cycle.

4.3 Key Press Button Test

4.3.1 With the exception of the Power Button, press each soft key button and verify that the Rad-8 Pulse Oximeter acknowledges

each key-press with an audible beep tone or by indicating an associated change on the display.

4.4 Alarm Suspend Indicator

4.4.1 Induce an alarm condition.

4.4.2 Press the Alarm Suspend button and cycle through the different indicator levels. The yellow indicator will blink on when the alarms have been suspended.

4.5 Alarm Volume Test

4.5.1 Press the Enter button. Monitor displays should show “AL” and “3”.

4.5.2 Press the UP arrow button and cycle through the four different volume levels. Make sure the tone does not have a harsh or raspy tone due to the speaker rattling in the plastic housing. The tone heard should be louder with each press. Press the DOWN arrow button and cycle through the different volume levels. The tone heard should be quieter with each press. Verify both speakers are working.

4.5.3 Return the volume to the factory default level 3.

4.6 Alarm Limit Test

4.6.1 With the monitor turned on, depress the ALARM LIMITS button and enter alarm menu. Change the High Saturation Alarm parameter to a value two points below the currently selected value, and accept the change by pressing the Enter button.

4.6.2 Verify that the newly set parameter is shown on the Saturation Alarm Limit Display.

4.6.3 Return the High Saturation Alarm parameter to its original setting and accept the change by pressing the Enter button.

4.6.4 Repeat steps 4.6.1 to 4.6.3 with the Low Saturation Alarm parameter.

4.6.5 Repeat steps 4.6.1 to 4.6.3 with the Low and High Pulse Rate Alarm parameter.

4.6.6 Reset the alarm limits again to the original settings and accept the changes by pressing the Enter button.

4.7 Brightness Test

4.7.1 Press the Display Brightness button. LED displays should show “brt” above and “2” below.

4.7.2 Press the Display Brightness button and cycle through the different brightness levels. There are four brightness levels.

4.7.3 Press the Enter button to return to patient monitoring mode or wait for display to time out.

4.8 Testing with Masimo SET Tester

4.8.1 Turn the Rad-8 Pulse Oximeter off and then on again.

4.8.2 Set the alarm limits to:

	% SpO_2	Pulse Rate
High	100	140
Low	90	50

4.8.3 Connect the Masimo tester to the Rad-8 Pulse Oximeter. A patient cable may be required to connect a modular tester to the Rad-8 Pulse Oximeter.

4.8.4 Verify that within 20 seconds a plethysmographic and a Signal IQ number displays.

4.8.5 Verify that the SpO_2 measurement is between 78% and 84%. (with tester values of 81% +/- 3%)

4.8.6 Verify that the pulse rate measurement is between 59 bpm and 63 bpm (with tester values of 61 +/- 1 bpm).

4.8.7 Verify that an audible alarm occurs and that the SpO_2 measurement and the low SpO_2 alarm are flashing

4.8.8 Press the Alarm Silence button once and verify that the alarm is silenced.

4.8.9 Wait 120 seconds and verify that the alarm silence times out and the audible alarm is activated again. Disable the Alarm before continuing.

4.8.10 Press the Up Arrow button several times and verify that the loudness of the pulse beep tone increases.

4.8.11 Press the Down Arrow button and verify that the loudness of the pulse beep tone decreases. Press the Down Arrow button and verify that the loudness of the pulse beep tone can be turned off.

4.9 Serial Port

4.9.1 The serial port outputs ASCII data using standard RS-232 protocol via a straight through serial cable.

4.9.2 Validation of the port can be done by connecting a serial printer or using a PC with Hyper Terminal and the following setup:

4.9.3 Communication Parameters

baud rate	9600 bps
data bits	8
stop bit	1
parity	none
Flow Control	none

4.9.4 With the Rad-8 Pulse Oximeter connected as per the above setup, attach a patient cable and sensor to the Rad-8 Pulse Oximeter. Refer to page 4-11 of the Operator's Manual and set the output to ASCII 1. The printer (or PC monitor) will print in the following format every second.

05/15/07 08:12:21 SPO2=---% BPM=--- ALARM=0000 EXC=000000

5 Electrical Safety Tests

Masimo recommends that you perform all safety tests presented in this section.

- **Upon receipt of the device**
- **Each time the main enclosure is disassembled or a circuit board is removed, repaired, tested, or replaced.**

5.1 Test Equipment

The recommended test equipment required to perform electrical safety tests is listed below.

Fluke 180 Electrical Safety Analyzer or compatible.

5.2 Ground Wire Leakage Current Tests

Leakage-HI: 300.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: Ground To Line	Neutral : Closed	Reverse: Off	Ground: Open

5.2.1 Connect the power cord of the monitor to the power receptacle on the leakage tester.

5.2.2 Turn the monitor being tested ON.

5.2.3 Read the current leakage on the Electrical Safety Analyzer.

5.2.4 Set the polarity on the Electrical Safety Analyzer to Reverse.

Leakage-HI: 300.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: Ground To Line	Neutral : Closed	Reverse: On	Ground: Open

5.2.5 Read the current leakage on the Electrical Safety Analyzer.

Note: The readings should not exceed 300 µA or 0.3 volts at 100-120V /50-60Hz on the Electrical Safety Analyzer with the monitor powered on.

5.2.6 Turn the monitor off.

5.3 Enclosure Leakage Current Tests

Leakage-HI: 300.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: Ground To Line	Neutral : Closed	Reverse: Off	Ground: Open

5.3.1 Connect the probe of the Electrical Safety Analyzer to the Equipotential lug on the back of the monitor.

5.3.2 Set the Ground switch to the Open position on the Electrical Safety Analyzer.

5.3.3 Turn the monitor on.

5.3.4 Read the current leakage on the Electrical Safety Analyzer.

5.3.5 Set the polarity on the Electrical Safety Analyzer to Reverse.

5.3.6 Read the current leakage on the Electrical Safety Analyzer.

Note: The readings should not exceed 300 µA or 0.3 volts at 100-120V /50-60Hz on the Electrical Safety Analyzer with the monitor powered on.

Leakage-HI: 100.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: Ground To Line	Neutral : Closed	Reverse: Off	Ground: Closed

5.3.7 Set the Ground switch to the Closed position on the Electrical Safety Analyzer.

5.3.8 Read the current leakage on the Electrical Safety Analyzer.

5.3.9 Set the polarity on the Electrical Safety Analyzer to Reverse.

5.3.10 Read the current leakage on the Electrical Safety Analyzer.

Note: The readings should not exceed 100 µA or 0.1 volts at 100-120V /50-60Hz on the Electrical Safety Analyzer with the monitor powered on.

5.3.11 Turn the Monitor off.

5.4 Source Leakage Current Tests

Leakage-HI: 100.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: High To Line	Neutral : Closed	Reverse: Off	Ground: Open

5.4.1 Set the Ground switch to the Open position on the Electrical Safety Analyzer.

5.4.2 Set the polarity on the Electrical Safety Analyzer to Normal.

5.4.3 Connect a patient cable with all the wires spliced together to the Electrical Safety Analyzer.

5.4.4 Read the current leakage on the Electrical Safety Analyzer.

5.4.5 Set the polarity on the Electrical Safety Analyzer to Reverse.

5.4.6 Read the current leakage on the Electrical Safety Analyzer.

Note: The readings should not exceed 100 µA or 0.1 volts at 100-120V /50-60Hz on the Electrical Safety Analyzer with the monitor powered on.

Leakage-HI: 100.00 uA	Leakage-LO: 0.00 uA	Voltage HI: 120.0V	Voltage LO: 100.0V
Probe: High To Line	Neutral : Closed	Reverse: Off	Ground: Open

5.4.7 Set the Ground switch to the Closed position on the Electrical Safety Analyzer.

5.4.8 Set the polarity on the Electrical Safety Analyzer to Normal.

5.4.9 Read the current leakage on the Electrical Safety Analyzer.

5.4.10 Set the polarity on the Electrical Safety Analyzer to Reverse.

5.4.11 Read the current leakage on the Electrical Safety Analyzer.

Note: The readings should not exceed 100 µA or 0.1 volts at 100-120V /50-60Hz on the Electrical Safety Analyzer with the monitor powered on.

5.4.12 Turn the Monitor off.

6 Repair

6.1 Safety Precautions:

WARNING: DO NOT DISASSEMBLE OR ASSEMBLE THE UNIT WITH THE AC POWER CORD ATTACHED.

WARNING: ENSURE THE UNIT HAS BEEN CLEANED PER THE CLEANING INSTRUCTIONS.

WARNING: WHEN REMOVING OR INSTALLING ANY INTERNAL ELECTRICAL COMPONENTS, BE SURE TO FIRST DISCONNECT AT LEAST ONE TERMINAL OF THE BATTERY. **VERIFY RECONNECTION OF THE BATTERY PRIOR TO REASSEMBLY OF THE UNIT FOR PATIENT MONITORING.**

6.2 General Procedures

Note: Opening the Rad-8 Pulse Oximeter will void the Masimo warranty. Products that require repair while under warranty should always be returned to Masimo for warranty service.

6.2.1 Masimo or other qualified service personnel must perform warranty repair and service. Do not use malfunctioning equipment until the cause of the malfunction has been identified and the unit has been repaired in accordance with the instructions set forth herein.

6.2.2 Inspect the unit for cosmetic damage prior to disassembly or troubleshooting. External damage may be helpful in determining the root cause of the failure.

6.2.3 Note any markings or labeling on the unit that may have been placed by the end user. Duplicate or transfer this information in the event the housing or ancillary components are replaced.

6.2.4 Make note of the unit's serial number.

6.2.5 Make note of the software versions in the event the Oximeter board or system boards are replaced. These boards require software updates to make them compatible with the end user's version of software.

6.2.6 Contact Masimo Corporation using the information in Section 7.2.9 to research warranty history.

6.3 Troubleshooting

6.3.1 The troubleshooting procedures in this manual instruct the technician to isolate the failure down to the sub-assembly level. The intention is to have the Unit Under Test (UUT) repaired with minimal steps. The Masimo SET Tester is needed to perform the Performance Verification in Section 4-1 upon completion of repairs.

Note: The Masimo SET Tester is not a calibrated device. It is to be used for evaluation purposes only and not to determine if an Oximeter is "calibrated".

6.3.2 Tools required are as follows:

Phillips head screwdriver

6.3.3 The troubleshooting steps below are presented in order of the most probable cause first. Proceed to the next step only if the unit continues to fail.

Symptom	Cause and Corrective Action Steps
• **Speaker Alarming (very loud) and unit is not functioning or displaying.**	• **Probable Watchdog error.** 1. Replace System board. 2. Replace User Interface board.
• **Alarm LED does not Illuminate** 1. Unit must be in alarm state. 2. Audible alarm can be heard.	1. Replace User Interface board. 2. Replace Display board.
• **Alarm Condition But No Audible Indication.** 1. Unit is in alarm condition.	1. Replace Speaker. 2. Replace System board.
• **Display Missing Segments**	1. Replace User Interface board. 2. Replace Display board.
• **Button Function Error** 1. Any front panel button Affected. 2. Buttons do not activate feature.	1. Replace Keypad. 2. Replace User Interface board.
• **"No Sen", or "Sen Off" Displayed.** 1. Cable is connected with sensor attached.	1. Replace sensor. 2. Replace patient cable. 3. Replace flex cable. 4. Replace oximeter board.

Symptom	Cause and Corrective Action Steps
• **Unit Will Not Turn Off**	1. Replace Keypad. 2. Replace System board.

If unable to repair unit, then please call (800)326-4890 option #2 to arrange for return to Masimo Corporation.

6.4 Service Messages:

Upon detection of a system error, the main software alerts the user with an audible alarm indicator and displays the appropriate error code on the display. The MS board is held in reset and no other runtime functionality is available to the user until the unit is power cycled or until power is completely removed and re-applied to the system (removal and/or replacement of battery).

System Error	System Error Code
MS-2000 board Failure	1
MS-2000 board Diagnostic Failure	2
User Interface Waveform Overwrite	3
Sound Processor Waveform Overwrite	4
Main Processor Waveform Overwrite	5
Sat Pulse Rate Update Failure User Interface	6
Sat Pulse Rate Update Failure Sound Processor	7
User Interface One Time Command Overwrite	8
Sound Processor One Time Command Overwrite	9
Main Processor One Time Command Overwrite	10
Vor Voltage Error	11
Vbatt Voltage Error	12
V5 Voltage Error	13
Vcc Voltage Error	14
User Interface Revision Table Mismatch	15
Sound Processor Revision Table Mismatch	16

7 Return Procedure

To return the unit for service, please follow the Return Procedure outlined in this section.

7.1 Product Decontamination

7.1.1 Please clean contaminated/dirty equipment before returning and make sure it is completely dry before packing the equipment.

7.1.2 Recommended decontamination procedure for equipment that has the potential for being exposed to blood or other potentially infectious materials:

7.1.2.1 Put on Lab coat or other protective garment.

7.1.2.2 Put on gloves.

7.1.2.3 Place equipment on the designated decontamination table.

7.1.2.4 Apply cleaning agent (10% bleach to water solution) to paper towel or use Cidex wipes.

7.1.2.5 Wipe down all aspects of the equipment.

7.1.2.6 Let the equipment air dry completely.

7.1.2.7 Remove gloves.

7.1.2.8 Move equipment to the area designated for equipment that has been through the decontamination process.

7.1.2.9 Dispose of all contaminated products properly.

7.2 Return Transportation

7.2.1 Package the equipment securely – in the original shipping container if possible – and enclose the following information and items:

7.2.2 Call Masimo “domestically” at (800)326-4890, option #2, “internationally” at 949-297-7498, option #2 and ask for an RMA number.

7.2.3 A letter or email describing in detail any symptoms or difficulties experienced with the pulse oximeter. Please include the RMA number in the letter.

7.2.4 Warranty information – a copy of the invoice or other applicable documentation must be included.

7.2.5 Purchase order number to cover repair if the oximeter is not under warranty, or for tracking purposes if the warranty is in effect.

7.2.6 Ship-to and bill-to information.

7.2.7 Person (name, telephone/Telex/fax number, email and country) to contact for any questions about the repairs.

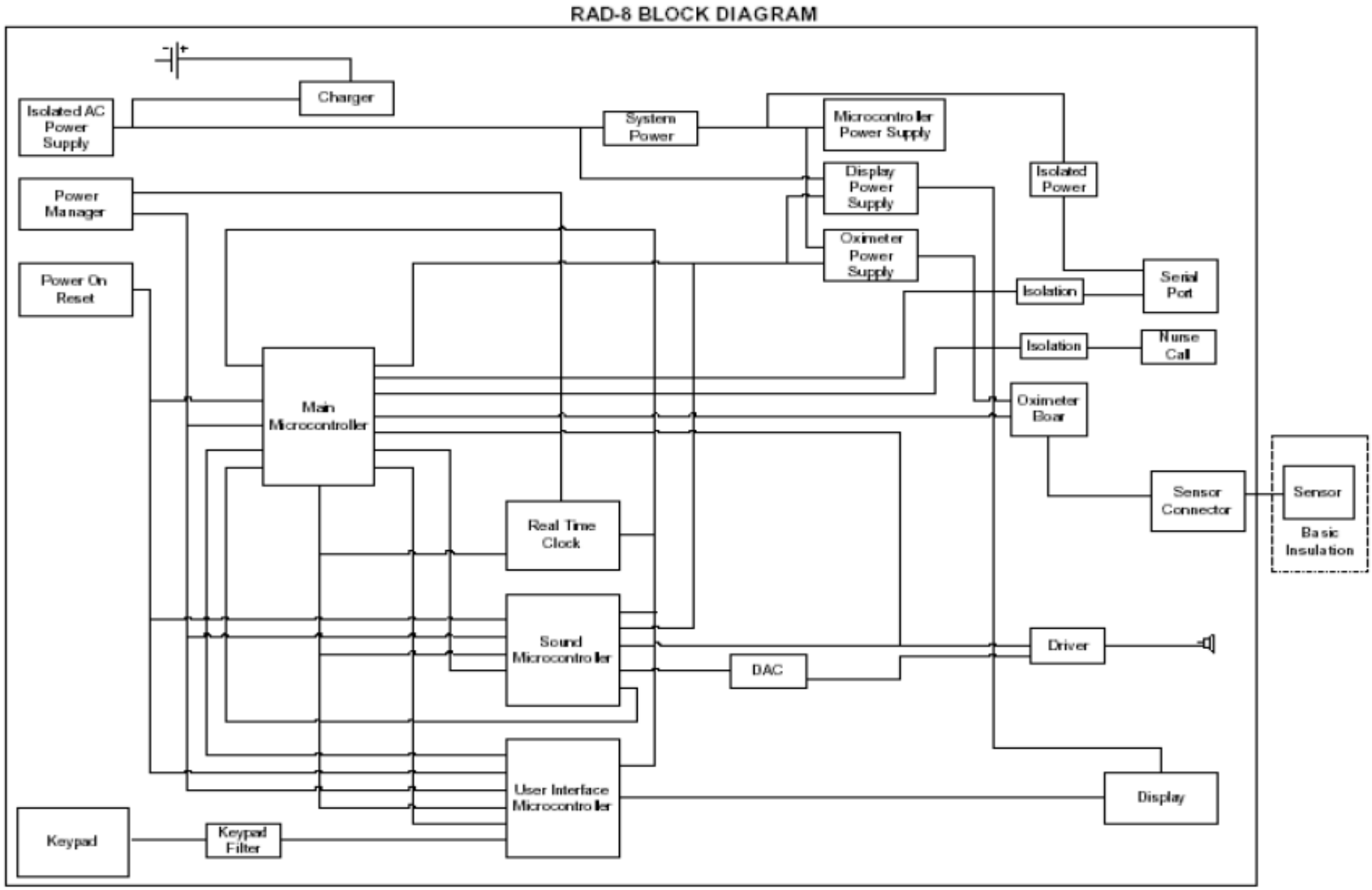
7.2.8 A document stating the oximeter has been decontaminated for bloodborne pathogens.

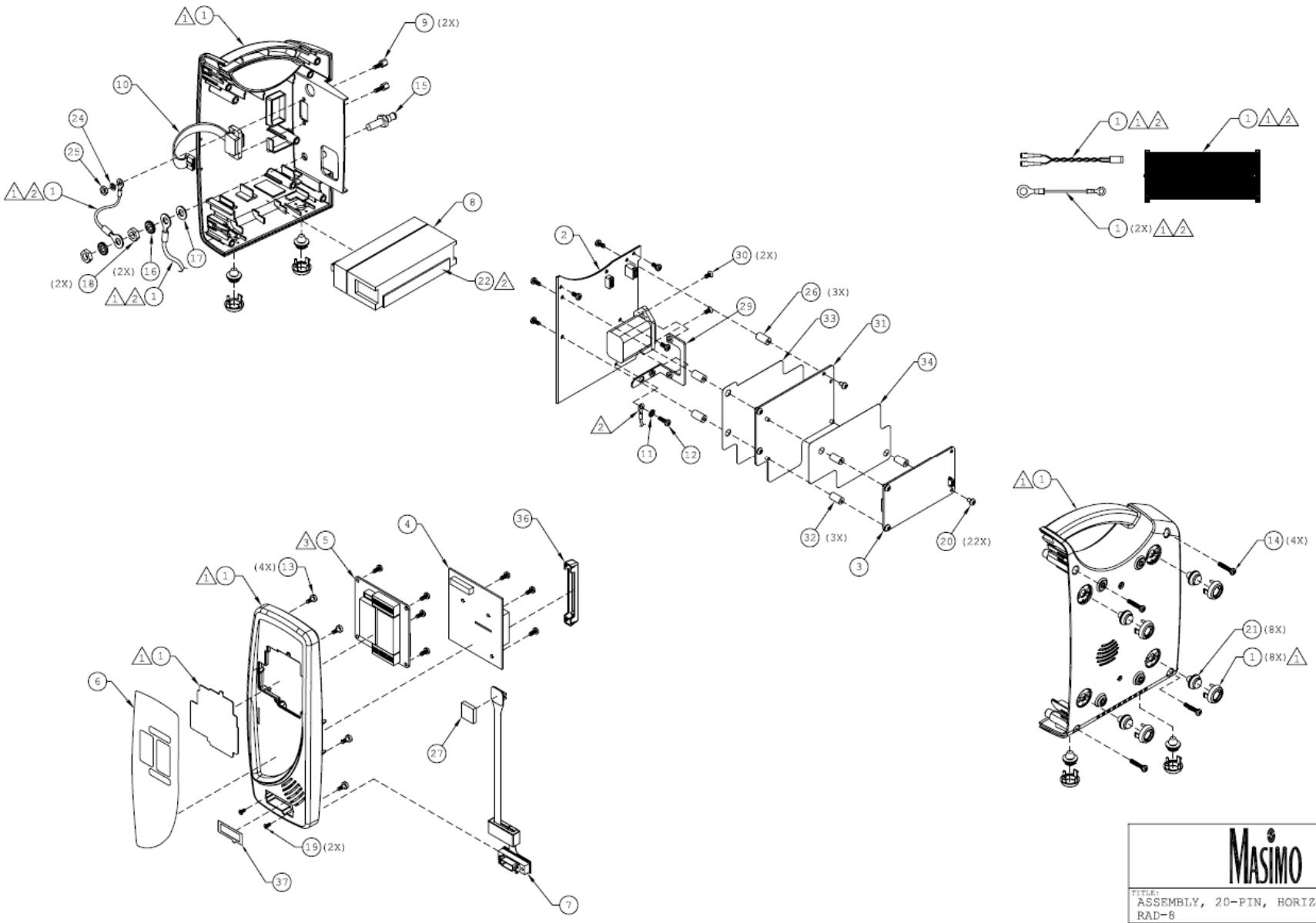
7.2.9 Return pulse oximeter to the following shipping address:

Masimo Corporation
40 Parker
Irvine, California
USA 92618

(Domestic Toll Free): 800-326-4890, option #2
(International): 949-297-7498, option #2
FAX: 949-297-7499
Email: tech@masimo.com

8 Drawings and Schematics




MASIMO
TITLE:
ASSEMBLY, 20-PIN, HORIZONTAL, RAD-8
SCALE: NONE
SHEET:

ITEM #	DESCRIPTION
1	Kit, Enclosure, 20 pin
2	System Circuit Board w/Alternate grounding, Programmed
3	MS-2011 Board
4	User Interface Circuit Board
5	LED Display Circuit Board
6	Keypad, Horizontal
7	Flex Instrument Cable, 20 pin
8	Battery, Lead-Acid, 6V, 1.3 AHr Minimum
9	Jackscrew, 3/16” Hex, #4-40 Male-Female, 3/8” male thread. Length
10	RS232 Cable, Adapter
11	Washer, #4, Lock, External Tooth, SS
12	Screw, #4-40 x 3/8", Phillips, Pan Head Machine, 18-8 SS
13	Screw, #4-40 x .125", Shoulder, .125" Dia
14	Screw, #4-40 x 5/8", Phillips, Pan Head Machine, 18-8 SS
15	Stud, Equipotential
16	Washer, M6, Serrated, Nickel Plated
17	Washer, M6, Flat, SS
18	Hex Nut, M6, Nickle Plated
19	Screw, M2.5 x 5mm, Phillips Flat Head, 18-8 SS
20	Screw, #4-40 x 3/16”, Phillips, Pan Head Machine, 18-8 SS, Pre-Treated
21	Foot, Bumper, Grommet
22	Tape, Foam, 5/8” Wide, 1/16” Thick
23	Label, Rad-8, Serial Number
24	Washer, #4, Splitlock, SS
25	Hex Nut, #4, Small Pattern, SS
26	Standoff, 1/4” Round, Threaded, Female, #4-40 x 15/32” L, Aluminum
27	Bumper, Foam Rubber, Neoprene, 1/2” x 3/16”
28	Adhesive, Hot Melt, Encapsulation
29	Bracket, IEC Connector

ITEM #	DESCRIPTION
30	Screw, M2.5 x 5mm, Phillips Flat Head, 18-8 SS
31	Rad-8 Isolation Circuit Board
32	Standoff, 1/4” Round, Threaded, Female, #4-40 x 15/32” L, Nylon
33	Insulator, Isolation Board, Bottom, Rad-8
34	Insulator, Isolation Board, Top, Rad-8
35	Deleted
36	Ejector Header Cap, 50 Pins
37	Label, Connector with Notch