


## Calibration Procedure for Index 2 and CardioSat

Rev. Level	ECN #	Description/Pages Affected
1	9368	Initial Release

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## EQUIPMENT REQUIRED

List on SF8	Description	Item Number
No	AC Power Adapter	
No	Adapter, Ohmeda Probe	2226489
No	Communications software	Hyperterminal or Equiv.
No	Datex Test Jig	2511034
Yes	DVM	Keithley 2000 or Equiv.
No	Oximeter direct connect cables	2226007 & 2226018
No	PC, 286 or greater	
No	Printer	Seiko DPU-414 or Equiv.
Yes	Probe Simulation Jig	2510752
Yes	Nellcor Pulse Oximeter with Probe	N-200 or Equiv.
Yes	Ohmeda Pulse Oximeter with Probe	BIOX3700 or Equiv.
No	RS232 Cable	2238626

## INSTRUCTIONS

## NOTE:

1. When testing using the Ohmeda Pulse Oximeter, ensure that the Ohmeda Probe Adapter, 2226489 is used.

## FIRMWARE CHECK

1. Verify that the firmware version and check-sum are correct. Refer to Service ECO instructions. Record on data sheet.

## DOWNLOAD MAKES

1. Observe that the UUT display follows the indicated download sequences. [Refer to 5220000-SP, INDEX-2 Product Specification]. Make a note of any other makes that are stored, and do not load defaults over them unless requested to do so.

**For INDEX-2E go to step 4.**

## DC VOLTAGE CHECKS

NOTE: During VDC checks observe caution so as not to cause electrical damage. All voltages are made in reference to circuit ground (negative battery terminal).

2. Turn UUT off. Measure resistance between finger assembly and ground terminal of battery using DVM. Verify resistance is less than 0.5 ohms to both finger screws.
3. Visually verify bottom and top finger windows are intact.
4. Turn the UUT on utilizing the external power supply if necessary. With the DVM verify the following regulated DC voltages. Record on data sheet.

LOCATION	VDC
Base PCB @ ground side of R102	+11.6 → +12.15
Base PCB @ ground side of R103	-10.6 → - 12.15
Base PCB @ ground side of R104	+4.6 → + 5.1

## THRESHOLD TEST

5. Carefully connect the DVM to (U4 pin 6) of the BASE PCB. Verify VDC of 0.425 to 0.475. Record on data sheet.
6. On the front panel controls sequentially press CUST, TECH, +TEC. Beeper should respond to each press. Verify VDC is 0.125 to 0.175. Record on data sheet.

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**For INDEX-2F, 2PF, 2MF or Cardio Stat 100F, go to step 11.**

**DATEX SWITCH TEST:**

7. Connect the Datex test jig (9-pin D connector) to P1 of the UUT PTHW PCB. Connect the Datex test jig red wire to the + battery terminal of the UUT.
8. Verify VDC at (U1-pin 1) is 0.72 to 1.12, and VDC at (U1-pin 14) is 1.4 to 2.2. Record on data sheet.
9. On front panel controls press +TEC. Verify VDC at (U1-pin 1) is 0.26 to 0.66 and VDC at (U1-pin 14) is .23 to .53. Record on data sheet.
10. Disconnect Datex test jig from UUT.

**NO LED TEST**

**For INDEX-2E, 2PFE, 2MFE or Cardio Stat 100FE, use Direct Connect Cable instead of Finger Probe.**

11. With no Oximeter probe connected to the finger of UUT, select the "Nellcor" as a MAKE" model for the UUT. On the front panel controls press ESC (to main menu), then press SIM. The unit should display "NO RED LED NO IRED LED".
12. Connect the Nellcor probe to the UUT finger, within 5 seconds of pressing "SIM" and verify that the UUT display immediately changes to show "SIMULATIONS". Check off data sheet.

**SIMULATION TEST**

13. On the front panel of UUT press MAN. Verify the oximeter reads 96% SpO2 +/- 1% and 75BPM +/- 1 BPM. Record readings on data sheet.
14. On the front panel of UUT press 02- four times. Verify oximeter reads 88% SpO2 +/- 2% and 75BPM +/- 1 BPM. Record readings on data sheet.

*For INDEX-2F, 2PF, 2MF or Cardio Stat 100F, go to step 17.*

**DIRECT CONNECT TEST**

15. With the UUT still running at 88%, disconnect the Oximeter probe from both the UUT and the Oximeter. Connect the appropriate direct connect cable the UUT (9-pin D connector of the PTHW PCB) and the Oximeter probe input. Verify oximeter reads 88% SpO2 +/- 2% and 75BPM +/-1 BPM. Record readings on data sheet.
16. Using the 02- key adjust %SpO2 to 96% on UUT, likewise using the BPM+ key adjust rate to 95 BPM on UUT. Verify oximeter reads 96% SpO2 +/- 2% and 95 BPM +/-1 BPM. Record readings on data sheet.

**SUN CURRENT SOURCE TEST**

17. Connect the RS232 serial cable from the PC station to UUT J3 (9 pin D connector) of the DIGITAL PCB.

**For INDEX-2E, 2PE, 2ME or Cardio Stat 100E, go to "Ohmeda Calibration via RS232"**

18. Verify that the UUT display menu is on MAIN MENU 1. Using Kermit or ProComm, send the command [amb 40] and observe the UUT finger top LED brightens slightly. Note: covering finger from ambient light might be necessary to observe LED.
19. Send the command [amb 0] and observe the finger LED dimming. Check off data sheet.

**OHMEDA CALIBRATION VIA RS232**

**CAUTION:** *The following information is proprietary only and is not under any circumstances available to users. The [IRCAL] command is extremely powerful and incorrect usage can completely corrupt accurate functionality of the unit. All Index2 units create an initial installation of default IR values upon first boot-up. [IRCAL] is the ONLY command, which can modify these values. Closely observing correct syntax is vital to insure against unit corruption.*

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**For INDEX-2E or 2PFE, 2MFE or Cardio Stat 100FE, use Direct Connect Cable and Ohmeda Biox with firmware below Rev 23.**

20. Verify that the printer is disabled for this test. Connect only Oximeter (Ohmeda) probe unit to the UUT finger. Connect the PC-station to the RS232 port on the UUT. With the UUT set to MAIN MENU 1, send the command [make 8]. The PC display should show "MAKE: Ohmeda" This sets the unit into the Ohmeda mode.
  21. Send the command [settings]. The PC should display a listing of current settings including an IRDC value. IE: IRDC = 3535 Observe the IRDC value indicated.
  22. Send the command [oxy 65] and turn on the Ohmeda Oximeter. The settled reading on the Ohmeda should be 61 to 68 SpO2. If this reading is within these limits, skip step 23 and 24.
  23. To adjust the SpO2 reading, enter the two commands: [IRCAL, 8, X] (where X stands for the new value. Then send [oxy 65]. The unit will then calculate the SpO2 reading with the new value you entered. IE: if the current IRDC value = 3535, and the SpO2 reading is below 65%, enter a new value by sending [IRCAL, 8, 3540] [oxy 65]. The unit will then re-calculate the 65% SpO2 output with the value 3540. Sending the [settings] command should then verify the new value.
  24. Adjust IRDC value as needed to obtain an Ohmeda output of 65%, check on data sheet.
- Note: Steps 26 → 29 may be accomplished using PC command [OXY X] and [BPM]. To do this Skip step 25.*
25. Disconnect the PC-station from UUT, return to main menu 1. Press (SIM). From the simulations menu, press the (MAN) key.
  26. Press the (02-) and adjust the 02 percent level to 65% and BPM rate to 75. Verify pulse oximeter reads 62% and 68%, and BPM reads 74 - 76 BPM. Record on data sheet.
  27. Press the (02+) key and adjust the 02 percent level to 85%. Verify pulse oximeter reads 82% and 88%, and rate reads 74 - 76 BPM. Record on data sheet.
  28. Press the (BPM+) key and adjust the rate to 105 BPM. Verify pulse oximeter reads 82% and 88%, and rate reads 104 - 106 BPM. Record on data sheet.
  29. Press the (BPM+) key and adjust the rate to 150 BPM. Verify pulse oximeter reads 82% and 88%, and rate reads 149 - 151 BPM. Record on data sheet.
  30. Return UUT to main menu 1.

**For INDEX-2F or 2PF, go to step 32.**

**PROBE SIMULATION TEST:**

31. With the PC station RS232 and the Probe simulation test jig connected to the UUT (PTHW PCB - P2), send the two commands [ohmscal 0] [probe]. The PC should display: Probe Test Results.

R = 1.5	1.2 → 1.8
IR = 1.5	1.2 → 1.8
PHTO = 0.6	0.4 → 0.8
PHOTO: R = n, IR = n	n > 200
Pin 12 to Pin 13	87.26 → 94.54 k
Pin 11 to Pin 13	91.20 → 98.80 k
Pin 11 to Pin 12	3.96 → 4.28 k
Pin 7 to Pin 8	3.68 → 3.98 k
Pin 5 to Pin 6	0.24 → 0.26 k

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**INDEX-2E, INDEX-2FE, INDEX-2PFE, INDEX-2MFE or Cardio Stat 100FE, PROBE OHMS CAL**

- 31.1 Observe the value displayed from {Pin 11 to Pin 12 of PROBE TEST}. If it is 3.96 → 4.28 k ohms, skip step 31.2.  
31.2 Calculate an adjustment number (- /+) to be added to the displayed number to obtain a value of 4,120 ohms. Send the two RS232 commands [ohmscal n] (where n = the adjustment number), [probe].  
Examples: If displayed value = 3.62 k, send [ohmscal 500] [probe]. If displayed value is 4.62 k, send [ohmscal -500] [probe]. Check off the data sheet at completion insuring that the new displayed values are all within 4% tolerance.

move the Probe Simulation Test Jig from the UUT.

**PRINTER TEST**

32. With the Printer serial cable connected to the UUT printer port, enter the following commands to the UUT from the UUT top panel controls ESC (to get to MAIN MENU 1), MORE, UTIL, PTST. The printer should continuously display: “\*\*\*This is a test of the printer port\*\*\*”  
33. Press ESC to stop printing. Turn printer, then UUT off.

**FINAL CHECK:**

34. Temporarily turn the UUT OFF and ON, and verify the correct Model. Perform final visual inspection of UUT cleanliness, tightness of all fastening hardware and battery connections. Confirm battery is dated with installation date. Complete paper work as required.

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