


---

## Service Bulletin 404D

P/N 10999653

Service Bulletins are supplements to Cardinal Health Technical Service/Maintenance Manuals.  
A list of Service Bulletins can be found at [cardinalhealth.com/alaris](http://cardinalhealth.com/alaris).

**Model Affected:** MedSystem III® Infusion Pump Multi-Channel, Model 286X  
**Date:** June 2008  
**Subject:** Level of Testing Guidelines/Functional Test Updates

 This supersedes Service Bulletin 404C, to provide information related to the use of Model 1561C and 1565C AC Adapters.

### PURPOSE

The purpose of this bulletin is to provide Biomedical Technicians the following:

- A Level of Testing Guidelines table, to replace all existing references to testing required after repair (reference “Repair” chapter of Service Manual).
- A new Audio Test, and updated procedures for Electrical Safety and Run-In tests (reference “System Functional Tests” chapter, and “Procedures Following Repair” section in “Repair” chapter of Service Manual).
- Procedures to help troubleshoot:
  - NiCad battery problems (reference “NiCad Battery Problems Table” in “Troubleshooting” chapter of Service Manual).
  - Instrument memory loss problems.
- Information related to release of Model 1561C and 1565C AC Adapters.

This is reference information only and is not intended to suggest a need for component changes.

---

**Technical Inquiries:** United States: 888.876.4287  
Canada: 800.387.8309  
United Kingdom: 0800.389.6972  
International: [cardinalhealth.com/alaris](http://cardinalhealth.com/alaris) (for contact information)

ALARIS® and MedSystem III® are registered trademarks of Cardinal Health, Inc. or one of its subsidiaries.  
All other trademarks belong to their respective owners.

©1996, 20004, 2008 Cardinal Health, Inc. or one of its subsidiaries. All rights reserved.

## EXPLANATION

- The tests currently specified in the service manual as being required after repair/reassembly might not reflect current testing requirements or recommendations. To help provide the most current minimum test requirements and recommended tests, a Level of Testing Guidelines table has been provided.
- The Electrical Safety and Run-In tests currently specified in the service manual have been replaced to provide the current test procedures (Electrical Safety Test, Run-In On AC Power). An Audio Test procedure has been provided to check the audio volume.
- Procedures have been provided to verify:
  - NiCad battery is being charged within specification (NiCad Battery Charge Current Test).
  - Current drawn from NiCad battery, when instrument is operating on battery power, is within specification (Standby Current Test).
  - NiCad battery can provide sufficient instrument operating time after being discharged and recharged (Battery Functional Test).
  - Current drawn from backup battery, when instrument is off, is within specification (RAM Standby Current Test).

Models 1561/1565 (see illustrations in “Electrical Safety Test” section) has only two connections to AC power, is double insulated as a medical grade power adapter and does not require a connection to earth ground. Models 1561/1565 are compatible with all previously released MedSystem III<sup>®</sup> Infusion Pumps. Certification to the applicable standards for ElectroMagnetic Compatibility (EMC) has been validated by TÜV America.

---

**NOTE:** Model 1561 is ordered as 143032 and or Model 1565 is ordered as 2861089

## REFERENCES

Model 2860/2863 Technical Service Manual (identified as P/N 139981; ordered as P/N 2863012)  
Applicable Field Maintenance Software Operating Instructions (FMS DFU)  
Applicable Instrument's Directions For Use (DFU).

## PARTS AND TOOLS REQUIRED\*

- Equipment referenced, as necessary, under each test procedure in this Service Bulletin.
  - Appropriate field Maintenance Software (FMS) Kit.
- \* These are in addition to parts, tools, and equipment referenced in the service manual.

## RECOMMENDED ACTION

### CAUTION

Turn the instrument off and disconnect it from AC power before disassembly. Static charges will damage instrument circuitry. Observe proper grounding techniques (use grounding strap) to prevent possible harm to static-sensitive components.

Add this Service Bulletin to the Technical Service Manual, as a supplement to the “System Functional Tests”, “Troubleshooting”, and “Repair” Chapters.

---

**NOTE:** Restoration of Configured Parameters, Battery History Log Memory contents, serial number, and special message can be corrupted during repair. Field Maintenance Software (FMS) may have been used to customize configuration settings or program drug lists for Dose Rate Calculator. All settings should always be verified for accuracy after repair. For reprogramming instructions, refer to the appropriate FMS DFU.

### 1. Level of Testing Guidelines

Any instrument repair or disassembly requires testing, determined by the level of the repair/disassembly. Use the Level of Testing Guidelines, Table 1, in place of the test requirements specified in the “Repair” chapter of the Service Manual.

Repair or replacement of the following parts does not require testing unless part of a higher level repair, as listed in Table 1.

- Chassis Mounts
- Dust Cap
- Lower Housing Assembly
- Universal Pole Clamp

**RECOMMENDED ACTION** (Continued)

**Table 1** Level of Testing Guidelines

Tests to Perform ➔	Battery Charge Current Test	Standby Current Test	RAM Standby Current Test	Pump Latch Height Adjustment (7.3.2)	Valve Actuator Height Verification (7.3.6)	Full Calibration using FMS (5.0)	Electrical Safety Test (3.1)	Power Tests (3.2)	Cassette and Sensor Test (3.3)	PSOD Test (3.4)	FSOD Test (3.5)	AIL Test (3.6)	Volume Accuracy Test (3.7)	Watchdog Audio Test (3.9)	Audio Test	Battery Functional Test	Run-In AC Power
Repair/Replacement of ↓																	
No Fault Found							●	●									
Adapter							●	●									
Air-in-Line Sensor						●	●	●	●								
Audio PCBA (Side Bd. Assy.)							●	●							●		
Backup Battery			●			●	●	●									
Battery Pack	●	●					●	●								×	
Display Module							●	●									
Drive Module Assembly				●	●	●	●	●	●	●	●		●				
EPROM Module							●	●									
Main Housing Assembly							●	●						●			
MEA (Logic Board Assy.)		●	●			●	●	●	●	●	●	●	●	●	●	×	×
Optomodule						●	●	●	●								
Power Supply Board Assembly	●	●				●	●	●								×	×
Power Supply Fuse							●	●									
Pressure Transducer						●	●	●	●	●							
Pump Latch Assembly and Shaft Seal (case was removed)				●		●	●	●	●	●	●		●				
Pump Latch Assy. and Shaft Seal (case was not removed)				●				●	●				●				
Pump Latch Movable Jaw								●	●								
Pump Shaft				●	●	●	●	●	●	●	●		●				
Slide Link						●		●	●				●				
Valve Actuator Assembly				●	●	●	●	●	●	●	●		●				

**RECOMMENDED ACTION** (Continued)

**2. Electrical Safety Test**

This test checks for ground continuity and leakage current of the AC adapter/instrument, and can only be performed when the AC adapter is connected to the instrument.

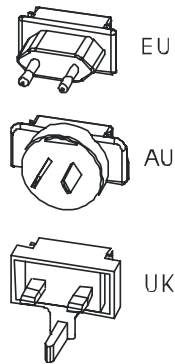
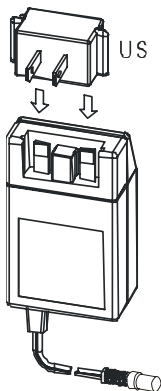
Equipment Required:

- Electrical Safety Tester, Dale Technology Corporation, Model LT544D or equivalent.

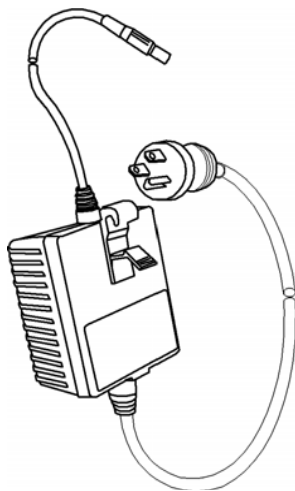
**NOTE:** The Pole clamp is isolated from the internal electronics and, therefore, not grounded. It should not be used to perform electrical safety test.

- Refer to service manual for proper setup and measurement technique for electrical safety tester.
- Connect AC adapter to instrument.
- Plug AC adapter into electrical safety tester.
- Measure leakage current. Instrument’s aluminum chassis can be used for testing. A black-coated chassis can only be tested at uncoated test point, located toward back of chassis under lower housing (reference Figure 3-1 in “System Functional Tests” chapter of Service Manual) and verify leakage current does not exceed 100µA.
- Model 1550, 1555 and 1560 AC Adapters provide a low resistance functional ground to chassis (**not** to exceed 2.0 ohms) not required with Model 1561 and 1565 AC Adapters.

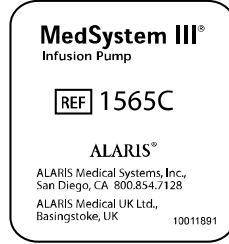
**NOTE:** If AC Adapter Tester 2861180 is used on Model 1561/1565, the earth ground LED will not light.



**Model 1561/1565 AC Adapter**  
Order with part numbers:  
US 321239    EU 321238  
AU 1098437    UK 321240



**Model 1560A AC Adapter**



**Adapter Labels**

---

**RECOMMENDED ACTION** (Continued)**3. NiCad Battery Charge Current Test**

Equipment Required:

- Digital Multimeter (DMM)
  - Test harness for measuring battery charge current (reference Figure 2)
  - Anti-Sabotage Inspection Lacquer, or equivalent
  - Charged battery pack (confirmed to be in good condition)
- a. Ensure:
- Instrument is **off** and **not** connected to AC power.
  - Battery pack is **not** connected to instrument.
  - Case assembly is mounted to instrument.
- b. Determine if power supply board assembly has potentiometer R5. Potentiometer (R5) is used for adjusting battery charge current and, if present, will be found only on earlier versions of power supply board assembly. Current versions are identified by having components on both sides. If earlier version of power supply board assembly is present, check for presence of R5, as follows:

---

**NOTE:** The battery charge current specification depends on the version of the power supply board assembly in use.

- If case was removed for instrument repair, check power supply board prior to reinstalling case assembly (reference Figure 1A).

---

**NOTE:** Component layout versions might vary, if present, R5 will always be located in the same area.

OR

- View instrument from above and check for R5 at edge of power supply board (reference Figure 1B).
- c. Set up Digital Multimeter (DMM) to measure mA DC.
- d. Connect a known good battery pack, in series with DMM, to battery pack cable assembly on instrument (reference Figure 2).
- e. Connect instrument to AC power. Verify AC indicator (green plug-shaped light on side connector panel) is lit and does **not** flash if AC connection is wiggled. Verify instrument powers **on** and **off**.
- f. With instrument **off**, verify charge current to battery pack meets one of the following specifications, as appropriate for power supply board assembly in use:
- Power supply board assembly with potentiometer (R5):  
170 mA - 180 mA

**RECOMMENDED ACTION (Continued)**

**3. NiCad Battery Charge Current Test (Continued)**

- Power supply board assembly with components on both sides and without R5: 160 mA - 235 mA
- Power supply board assembly with components only on one side: 100 mA - 410 mA

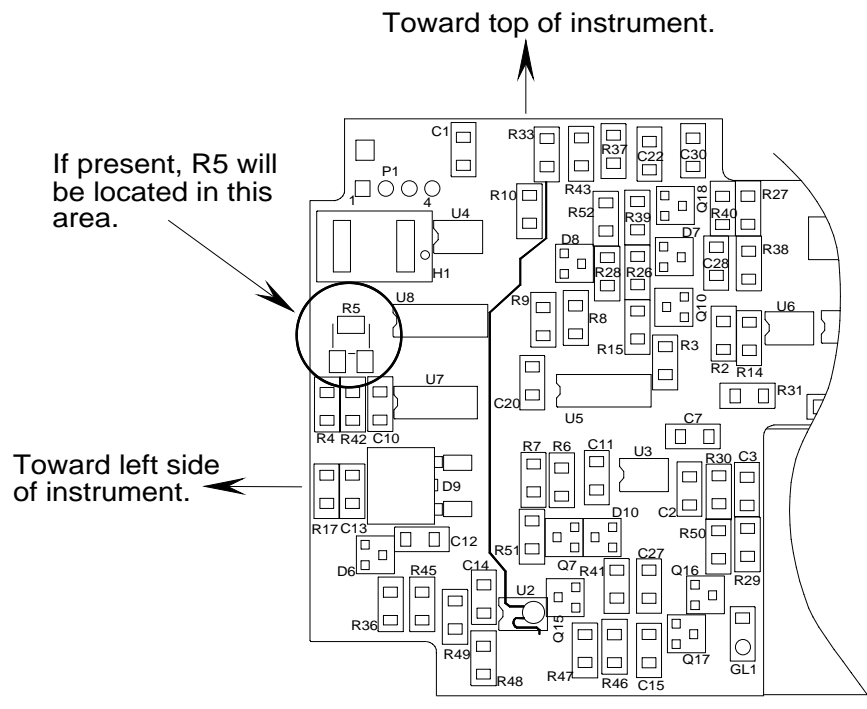
**NOTE:** If there is no current measurement, ensure the fuse on the power supply board is not blown.

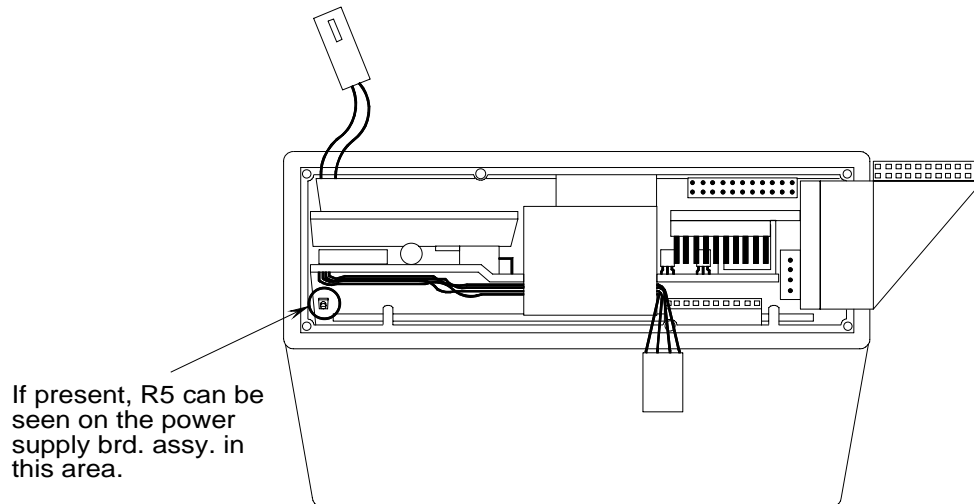
- g. If charge current is slightly out of specification, R5 may be adjusted to bring charge current within specification. After adjustment, apply Inspection Lacquer (or equivalent) to lock adjustment in place.

**CAUTION**

Use extreme care if adjusting R5. It can be easily damaged.

**Figure 1A** – R5 Location - Partial top view of power supply board assembly (sample version).



**RECOMMENDED ACTION** (Continued)**3. NiCad Battery Charge Current Test** (Continued)**Figure 1B** – R5 Location - Top view of instrument.**4. Standby Current Test**

## Equipment Required:

- Digital Multimeter (DMM)
  - Test harness for measuring battery charge current (reference Figure 2)
  - Charged battery pack (confirmed to be in good condition)
- a. Ensure:
    - Instrument is **off** and **not** connected to AC power.
    - Battery pack is **not** connected to instrument.
    - Case assembly is mounted to instrument.
  - b. Set up Digital Multimeter (DMM) to measure mA DC.
  - c. Connect a known good battery pack, in series with DMM, to battery pack cable assembly on instrument (reference Figure 2).
  - d. Connect instrument to AC power. Verify AC indicator (green plug-shaped light on side connector panel) is lit and does **not** flash if AC connection is wiggled. Verify instrument powers **on** and **off**.
  - e. Disconnect instrument from AC power.



**RECOMMENDED ACTION** (Continued)**4. Standby Current Test** (Continued)

- f. Turn instrument **on**.
- g. With instrument **on** but not running, verify current drawn by instrument is less than 400 mA.
- h. Turn instrument **off**.
- i. Set DMM to  $\mu\text{A}$  DC range.
- j. Verify current drawn by instrument is less than 100  $\mu\text{A}$ .

---

**NOTE:** If current drawn is not within specifications, there might be a problem with the power supply board or MEA board (logic board).

**5. RAM Standby Current Test**

Equipment Required:

- Digital Multimeter (DMM)
- Test harness for measuring RAM standby current (reference Figure 3)

---

**NOTE:** Corruption of existing memory contents might occur when this test is performed. If memory is corrupted, complete recalibration will be necessary. All custom instrument parameters originally set by using FMS will also require reprogramming.

- a. Ensure:
  - Instrument is **off** and **not** connected to AC power.
  - Instrument powers **on** and **off** while on battery power.
- b. Remove battery pack.
  - Model 2860: Leave battery pack harness connected to instrument.
  - Model 2863/2865:
    1. Disconnect battery pack harness.
    2. Remove main housing.
    3. Reconnect battery pack harness.
- c. Set Digital Multimeter (DMM) to  $\mu\text{A}$  DC range.
- d. Connect instrument's backup battery in series with DMM (reference Figure 3).

---

**NOTE:** On Model 2860, the backup battery connects to the top interconnect board on the MEA board (logic board) (reference Figure 7-16 in "Repair" chapter of Service Manual). On Model 2863, the backup battery connects to the MEA board (reference Figure 7-121 in "Repair" chapter of Service Manual).

**RECOMMENDED ACTION** (Continued)

**5. RAM Standby Current Test** (Continued)

e. Verify backup current drawn by instrument is:

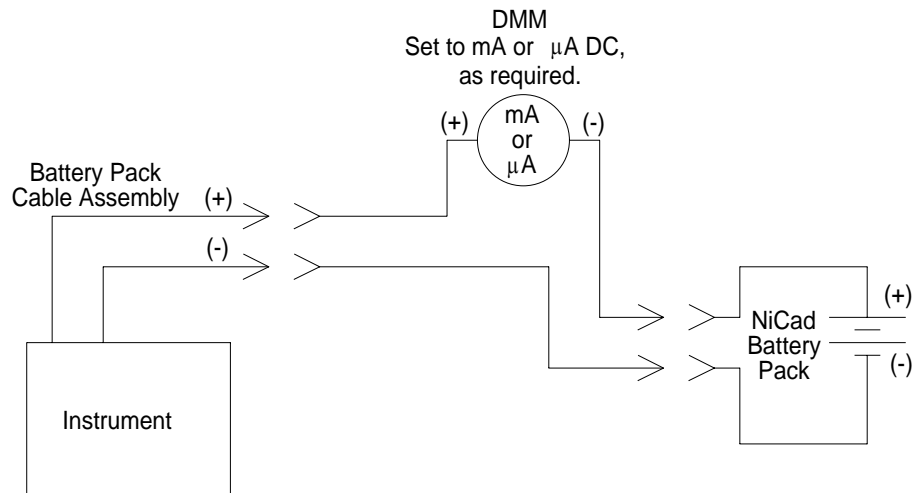
Model 2860: less than 25  $\mu\text{A}$

OR

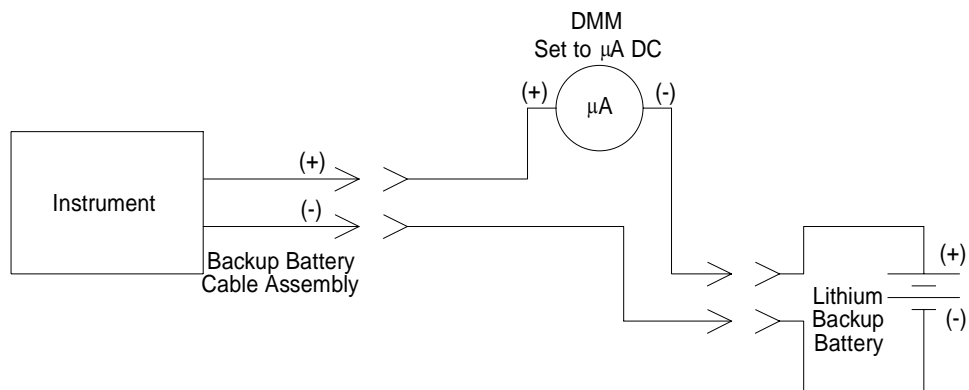
Model 2863/2865: less than 100  $\mu\text{A}$

**NOTE:** If the current drawn is not within the specification, there might be a problem with the MEA board (logic board).

**Figure 2** – Setup for NiCad Battery Charge Current Test and Standby Current Test



**Figure 3** – Setup for RAM Standby Current Test



**RECOMMENDED ACTION** (Continued)**6. Battery Functional Test**

- a. Disconnect instrument from AC.
- b. Operate instrument with all channels set at 999 ml/h, to test 13V circuitry.
- c. Continue operating beyond **Battery Depleted** alarm, until instrument shuts off.
- d. Connect instrument to AC.
- e. Charge instrument for 14 hours, while running all three channels at 2 ml/h, to test 5V circuitry and battery charging circuit.
- f. Perform battery operating time functional test, while operating all three channels of instrument at 125 ml/h (reference "Battery Operating Time" section in "System Functional Tests" chapter of Service Manual). 5½ hours of operating time specified in this test is for new batteries. For used batteries, perform same test with an operating time of 4 hours.
- g. If battery does not meet operating time specification, repeat steps d through f.
- h. With instrument power **off**, recharge for 14 hours.

**7. Run-In On AC Power**

This instrument test includes three modes (secondary, primary, KVO) for a minimum of two hours on all three channels. It should be operated on AC power in General Purpose mode. Fluid-filled cassettes need to be installed during run-in period. Set up a circulating system using a bag of saline.

- a. **Set Primary Mode**  
For all channels, set primary rate to 999 ml/h and Volume Remaining to 1000 ml. Clear Volume Infused on all channels to 0 ml.
- b. **Set Secondary Mode**  
For all channels, set secondary rate to 125 ml/h and Volume Remaining to 125 ml. Clear Volume Infused on all channels to 0 ml.
- c. **Begin running instrument in secondary mode on all channels.** Set instrument to display current infusion information for all channels.

When secondary mode is complete, instrument automatically goes into primary mode. At end of primary mode of operation, it goes into KVO mode at 3 ml/h. It may run in KVO mode until convenient to complete test and should not alarm during run-in.

**RECOMMENDED ACTION** (Continued)**8. Audio Test**

This procedure checks audio volume.

- a. Disconnect AC adapter from instrument.
- b. Remove cassettes (if present) from instrument.
- c. Turn instrument **on** and verify proper power-up, as described in instrument's Directions for Use (DFU).
- d. Refer to instrument's DFU and access **Audio Volume:** in Config (Configuration) option.
- e. There are four distinct volume settings: **Low, Medium, High, and Highest.** Set volume to **Highest.**
- f. Change audio volume down one setting (press down arrow), from **Highest** to **High.** Listen for a musical tone progression and at highest tone verify:
  - Jawhead in each channel does not move
  - A watchdog does not occur
- g. Repeat step f for other three volume settings.
- h. Ensure **Audio Volume** is set to **Highest.**
- i. Remove lower housing.
- j. Close jawhead at each channel.
- k. Verify a four-beep audio alarm with red LED's flashing.

---

**NOTE:** The display returns to STANDARD DISPLAY and identifies the channels are alarming.

- l. To cancel alarm, open jawhead at each channel.
- m. Turn instrument **off.**