ZOLL®

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E SERIES OPERATOR'S GUIDE

SECTION 9

GENERAL MAINTENANCE

Resuscitation equipment must be maintained to be ready for immediate use. Perform the following operational checks at the beginning of every shift to ensure proper equipment operation and patient safety.

Operator's Shift Checklists are included at the end of this section to aid in checking and maintaining the unit. Copy and distribute the appropriate sheet to all individuals responsible for the device's use and readiness.

Note: Self-test defibrillation and pacing data is automatically recorded on the PCMCIA data card, if present. You can configure the unit to erase all self-test data from the data card on power-off. See the E Series Configuration Guide for more information.

Inspection

When you visually inspect the E Series unit, check the items listed in steps 1 through 7 in the Operator's Shift Checklist.

Cleaning

E Series products and accessories are chemically resistant to most common cleaning solutions and non-caustic detergents. ZOLL recommends cleaning the device, paddles, and cables with a soft damp cloth, and the following cleaning agents:

*   90% isopropyl alcohol (except adapters and patient cable)
*   Soap and water
*   Chlorine bleach (30ml/l water)

The recorder parts should be cleaned with a damp, soft cloth only.

Do not immerse any part of the device (including paddles) in water. Do not use ketones (MEK, acetone, etc.). Avoid using abrasives (e.g., paper towels) on the display window. Do not sterilize the device.

Make sure to clean the defibrillation paddles after each use. Build up of gel interferes with paddle ECG monitoring and may produce a shock hazard to the operator. Keep paddle handles clean.

Cleaning the Recorder Printhead

To clean the recorder printhead, perform the following steps:

1. Open the recorder cover on top of the E Series unit.
2. Remove the paper (if necessary).
3. Locate the row of soft, thin bristles on the front edge of the paper compartment.
4. Locate a thin black line (printhead) adjacent and parallel to the bristles.
5. Gently wipe the thin black line with an alcohol (isopropyl) moistened Q-tip.
6. Dry any residual alcohol with a new Q-tip.
7. Reload the recorder with paper.

Testing the E Series Unit

The following sections cover testing of the:

*   stripchart recorder
*   Defibrillator (Semi-Automatic mode)
*   Defibrillator (Manual mode)
*   Pacer (Pacer Version Only)

Testing the Stripchart Recorder

Follow these steps to test the stripchart recorder:

1. Check for adequate supply of paper.
2. Press the **RECORDER** button.

    The stripchart recorder runs until the **RECORDER** button is pressed again.

   Press and hold the **SIZE** button for at least 2 seconds to generate a calibration pulse.

    The calibration pulse remains on the display for as long as the **SIZE** button remains depressed. In addition, the amplitude of the calibration pulse is 1 mV independent of the size setting.

3. Inspect the recorder waveform for uniformity and darkness, and the stripchart data for uniformity of annotation characters and completeness of words.

4. Verify that the calibration pulse is 2.5 ± ½ mm wide and 10 ± 1 mm high.

5. When charge ready tone sounds, use the defibrillator **ENERGY SELECT** buttons on either the sternum paddle or defibrillator front panel to change the selected energy to 20 joules.
6. Verify that the unit disarms itself.
7. Use the defibrillator **ENERGY SELECT** buttons on either the sternum paddle or defibrillator front panel to change the selected energy back to 30 joules.

MFC Setup:

1. Plug the MFC cable into the unit, making sure it is not plugged into the test connector.
2. Set the selector switch on the front panel to DEFIB and select 30 J.
3. Verify that the unit alternately displays the CHECK PADS and POOR PAD CONTACT messages.
4. Insert the end of the Multi-Function Cable into its test connector (Attached to the Multi-function cable), as shown below.
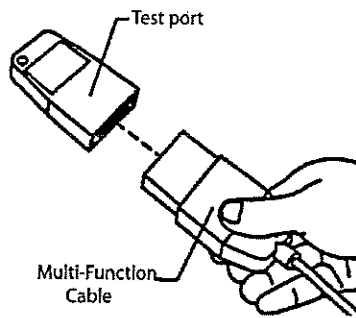
5. Verify that the unit displays the DEFIB PAD SHORT message.

Energy Delivery Test

1. Press the **CHARGE** button on the front panel.
2. Wait for the charge ready tone to sound and verify that the energy ready value displayed on the monitor registers 30 joules (DEFIB 30J READY).
3. Press and hold the **SHOCK** button on the front panel of the defibrillator (or the shock buttons on the paddles) until discharge occurs.
4. Verify that the units displays the TEST OK message and prints a stripchart of the event, noting the energy delivered and impedance data.

Note: If TEST FAILED appears, contact the ZOLL Technical Service Department immediately.

Testing the Pacer (Pacer Version Only)

Perform these tests on all pacer-equipped units periodically.

1. Connect the ECG leads and Multi-function cable to the simulator.
2. Turn the selector switch to PACER.
3. Turn the pacer rate control to 150 ppm.
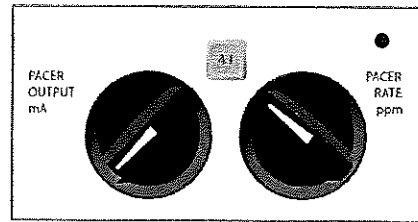
4. Press the **RECORDER** button to generate a strip, and then again to stop printing.

5. Verify that the pacing stimulus markers (⅃Γ) occur approximately every 10 small divisions (2 large divisions or 1 cm).
6. Press the **RECORDER** button to generate another stripchart, then press and hold the **4:1** button on the front panel.
7. Press the **RECORDER** button again to stop printing.
8. Verify that the frequency of the markers decreases (8 large divisions or 4 cm between each marker).
9. Turn the PACER OUTPUT control to 0 mA.
10. Verify there are no CHECK PADS or POOR PAD CONTACT messages.
11. Disconnect MFE Pads or paddles from the Multi-Function cable, and slowly turn the knob up to change the pacer output to 16 mA.
12. Verify that the Pace alarm sounds and a CLEAR PACE ALARM prompt flashes.
13. Connect the Multi-Function cable to the test connector, and press the **Clear Pace Alarm** softkey.
14. Verify that the unit Pace alarm stops and that the unit removes error messages from the LCD.

Setting Time and Date

Check the time and date on the recorder annotation. If it is not correct, reset the time and date (from System Utilities mode) manually, by dial-up to a National Institute for Science and Technology (NIST) site, or using the GPS synchronization feature.

After implementing time reset using any of the methods described below, verify that the time and date are set correctly by pressing the **RECORDER** button to generate a stripchart recording. Check that the stripchart is correctly annotated with the current time and date, selected ECG size, source and heart rate.

Verify that the real-time clock is operating correctly by waiting for several minutes then running the stripchart recorder again.

Set the time on the unit at least once every 2 weeks to prevent significant discrepancies between the unit's time and standard Greenwich Mean Time (GMT).

Turn the selector switch to OFF. The device must remain off for at least 10 seconds before entering System Utilities mode.

Note: Time and date may require resetting if the device's internal battery is depleted or the time zone has changed.

Note: For both automated dial-up and GPS synchronization methods, the correct time zone and DST option must be set in System Configuration mode for the updated date and time to be correct.

Manual Method

1. Press and hold the left-most softkey on the unit while turning the selector switch to MONITOR (ON for AED units). When the "System Utilities" screen appears on the monitor, release the softkey.
2. Press the **Clock Sync** softkey to display the set time option menu.
3. Press the **Manual Time Set** softkey to display the Set Time screen.

   The month field will be highlighted.

Set Time
June 30 , 05   16:37
Prev Field | Inc Value | Dec Value | Next Field | Enter and Return
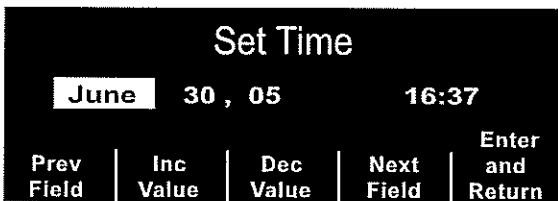
4. Press the **Inc Value** or **Dec Value** softkeys to select the appropriate month.
5. Press the **Next Field** softkey to set the selected month and move the highlight to the next field (day).
6. Repeat steps 4 and 5 to set the correct day, year, hours and minutes field.

Note: The last field does not automatically scroll (wrap) to the beginning. You must press the **Prev Field** softkey to enter the values for the last field.

If you need to make corrections, press the **Prev Field** softkey to move the highlight to the field previously entered.

7. Press the **Enter and Return** softkey to set all values and return to normal monitoring mode.

Automated Dial-up Method

Note: To use this method, a modem connection is required.

1. Press and hold the left-most softkey on the unit while turning the selector switch to the MONITOR or ON position. When the System Utilities screen appears on the monitor, release the softkey.
2. Press the **Clock Sync** softkey to display the set time option menu.
3. Press the **Dial Time Set** softkey. A setting screen appears, allowing the user to choose a NIST (National Institute for Science and Technology) dial location and a prefix for the phone number of the selected NIST location, as required. For example, if the NIST location is outside of the local calling area, users within the continental United States would enter a "1" as the dial prefix. Other users would enter a dial prefix as required for placing calls in the continental United States.
4. Press the **Dial** softkey.

   The word "Initializing" appears briefly, followed by the Clock Synchronization screen, displaying the user configurable NIST phone number with the appropriate prefix. The word "Dialing" appears underneath, along with a seconds counter, as the unit connects to the NIST site.

After receiving the atomic clock information from the NIST site, the unit then displays updated date and time information, unless one of the following errors occurs:

Error Message	Description/Corrective Action
MODEM REQUIRED	The unit determined that there is no modem card installed. Install a supported modem card and retry.
MODEM INIT ERROR	The modem could not be initialized. Replace the modem card and retry.
NO DIALTONE	The unit could not detect a dial tone. Check the connection between the modem and the phone jack, or try a different phone line.
BUSY	The unit detected a busy signal from the selected NIST location. Retry.
NO ANSWER	The unit received no answer from the selected NIST location. Retry or select another NIST location.