LIFEPAK® 500
automated external defibrillator
OPERATING INSTRUCTIONS

LIFEPAK® 500
automated external defibrillator
IMPORTANT

Federal (US) law restricts this device to sale by or on the order of a physician.

This instrument is to be used by authorized personnel only.

Device Tracking

(US only, including US government-owned units)
Under the Safe Medical Devices Act of 1990, defibrillator manufacturers and distributors are required to track the location of defibrillators. If your defibrillator has been sold, donated, lost, stolen, exported, or destroyed or if it was not obtained directly from Physio-Control Corporation, please notify Physio-Control Corporation at 1.800.442.1142, extension 4530.

Responsibility for Information

It is the responsibility of our customers to ensure that the appropriate person(s) within their organization have access to this information, including general safety information provided in Section 1.

Product Recycling Information

Recycle the device at the end of its useful life.

- Preparation
  The device should be clean and contaminant-free prior to being recycled.

- Recycling Assistance
  The device should be recycled according to national and local regulations. Contact your local Physio-Control representative for assistance.

- Recycling of Disposable Electrodes
  After disposable electrodes are used, follow your local clinical procedures for recycling.

- Packaging
  Packaging should be recycled according to national and local regulations.
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About Defibrillation

Defibrillation is a recognized means of terminating certain potentially fatal arrhythmias. A direct current defibrillator applies a brief, high-energy pulse of electricity to the heart muscle. The LIFEPAK® 500 automated external defibrillator (AED) delivers this energy through disposable QUIK-COMBO™ pacing/defibrillation/ECG electrodes applied to the patient's chest.

Defibrillation is only one aspect of the medical care required to resuscitate a patient with a shockable ECG rhythm. Depending on the situation, other supportive measures may include:
• Cardiopulmonary resuscitation (CPR)
• Administration of supplemental oxygen
• Drug therapy

It is recognized that successful resuscitation is related to the length of time between the onset of a heart rhythm that does not circulate blood (ventricular fibrillation, pulseless ventricular tachycardia) and defibrillation. The American Heart Association has identified the following as critical links in the chain of survival from cardiac arrest:
• Early access
• Early CPR by first responders or bystanders
• Early defibrillation
• Early advanced life support

The physiological state of the patient may affect the likelihood of successful defibrillation. Thus, failure to resuscitate a patient is not a reliable indicator of defibrillator performance. Often, patients will exhibit a muscular response (such as jumping or twitching) during energy transfer. The absence of such a response is not a reliable indicator of actual energy delivery or device performance.
Operator Considerations

The LIFEPAK 500 AED is a semi-automatic defibrillator that uses a patented Shock Advisory System™. This software algorithm analyzes the patient's electrocardiographic (ECG) rhythm and indicates whether or not it detects a shockable rhythm. The LIFEPAK 500 AED requires operator interaction in order to defibrillate the patient.

The LIFEPAK 500 AED is intended for use by personnel who are authorized by a physician/medical director and have, at a minimum, the following skills and training:

- CPR training
- AED training equivalent to that recommended by the American Heart Association
- Training in the use of the LIFEPAK 500 AED

Guidelines for Use

The LIFEPAK 500 AED is to be used only on patients in cardiopulmonary arrest. The patient must be unconscious, pulseless, and not breathing spontaneously before the device is used to analyze the patient's ECG rhythm. This device is not intended for use on children less than eight years of age.

The LIFEPAK 500 AED is intended for use in the hospital and out-of-hospital environments. It has been tested to RTCA/DO-160C, “Environmental Conditions and Test Procedures for Airborne Equipment.” (Details available on request.)

Features of the LIFEPAK 500 automated external defibrillator

QUIK-COMBO Electrodes

The LIFEPAK 500 AED is a portable, battery-powered device that provides defibrillation therapy. The AED uses disposable QUIK-COMBO defibrillation/ECG electrodes with or without the REDI-PAK™ preconnect system. The use of QUIK-COMBO electrodes allows rapid transfer of care to other devices that also use QUIK-COMBO electrodes.

Automated Operation

The operator controls AED operation with three top-panel buttons (ON/OFF, ANALYZE, and SHOCK). The AED guides the operator through operating procedures with a combination of:

- Voice prompts
- Tones
- Flashing LEDs
- Screen messages

The screen messages appear on a two-line Liquid Crystal Display (LCD). Other LCD information includes:

- Real-time clock
- Cumulative shock counter
- Status and service messages
Continuous Monitoring
The LIFEPAK 500 AED operates in two modes: ECG analysis and Continuous Patient Surveillance System (CPSS). During analysis, the AED indicates if it detects a shockable or nonshockable rhythm. The CPSS, which is active when the AED is not performing an analysis, automatically monitors for a potentially shockable rhythm. CPSS is not active during CPR time.

Motion Detection
The LIFEPAK 500 AED includes a patented system that detects motion. When motion that could distort the ECG rhythm occurs, the ECG data is automatically excluded from analysis by the motion detection system.

Data Management
The LIFEPAK 500 AED digitally records patient data, including ECG rhythm and delivered shocks. A digital audio recording of scene activity is available as an option. Recorded data may be transferred by direct connection to a printer or computer or by a modem to a remote computer. Two optional, Microsoft Windows™-compatible data management software programs are available. The Data Transfer 500™ program transfers, stores, and prints AED reports. The QUIK-VIEW™ 500 data review program includes all of the Data Transfer 500 functions and the capability to review ECG and audio data.

Automatic Self-Test
The AED performs an automatic self-test every 24 hours and every time you turn on the AED. The AED displays a service icon to inform the operator when service is required.

Battery Options
A rechargeable sealed lead-acid battery or a nonrechargeable lithium battery provides power to the AED. The rechargeable battery may be recharged by an external battery charger.

Customized Setup
AED operation may be customized by accessing a setup mode. Definable operating features include the modem phone number, the time interval allowed for CPR, and other features.

Optional Accessories
An optional carrying case helps to protect the AED and provides a pouch to store electrodes. Use the Physio-Control LIFEPAK AED TRAINER to train operators to use the LIFEPAK 500 AED.

Text Conventions
Throughout this manual, special text characters are used to indicate labels, LCD messages, and voice prompts:
- Operating control labels: CAPITAL LETTERS such as ON/OFF and SHOCK.
- LCD messages: CAPITAL LETTERS such as CONNECT ELECTRODES.
- Voice prompts: CAPITAL ITALICIZED LETTERS such as PUSH ANALYZE.
DECLARATION OF CONFORMITY
according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Physio-Control International
Manufacturer's Address: 11811 Willows Road NE
P.O. Box 97006
Redmond, WA 98073-9706
USA

declares that the CE-marked product
Product Name: LIFEPAK® 500, automated external defibrillator
Model Number: 5005400

complies with:
93/42/EEC (Medical Device Directive) Class IIb

This product complies with:
Safety:
EN60601-1:1990/ IEC 601-1:1998 with amendments 1&2
-Class II, Type BF, Continuous operation.
IEC 601-2-4:1983

EMC:
EN60601-1-2:1993/ IEC 601-1-2:
EN 55011:1991
- Class B, Group 1
EN50000 PT4-2 1st edition
- SkV CD, 15 kV AD
IEC 1000 PT4-3 1st edition
- 3 V/m
EN61000 PT4-8 1st edition
- Not Applicable
IEC 1000 PT4-5/EN61000 PT4-5
1st edition
- Not Applicable

Supplementary Information:

1) Included are the following accessories and Interconnecting cables:
   QUIK-COMBO™ electrode set, p/n 806086 or 3006478
   Sealed lead-acid battery, p/n 3005379
   Lithium battery, p/n 3005380
   Battery Charger (non-m)edical), p/n 3006535
   Data transfer cable (non-m)edical), p/n 3006381

2) This product also complies with:
   UL 2600 1:1991,
   CSA C22.2 No. 601.1 and CSA C22.2 No. 601.2.4,
   AAMI ES1, AAMI DF39

Redmond, November 1, 1995
Michael D. Willingham, VP Quality and Regulatory Affairs
DECLARATION OF CONFORMITY

Ault, Incorporated
7300 Boone Avenue North
Minneapolis, MN 55428-1028
U.S.A.

We hereby declare under our sole responsibility that the product model(s) BCWA-042000-100A and BCWA 043000-100N (PHYSIO CONTROL LIFEPAK 500 Battery Charger), a power supply intended for use as a battery charger in household and other similar applications, to which this declaration relates, meets the requirements of the following New Approach Directives:


This declaration is backed by third party assessments to the noted European Norm standards. Ault Incorporated is an ISO 9001 registered firm, Certificate Number FT11861.

Tim Cassidy
Product Safety Engineer
28 October 1996
Safety Information
SAFETY INFORMATION

This section provides important information to help you operate the LIFEPAK 500 automated external defibrillator (AED). Familiarize yourself with all of these terms, warnings, and symbols.
Terms

The following terms are used either in this manual or on the LIFEPAK 500 AED:

Danger: Immediate hazards that will result in serious personal injury or death.

Warning: Hazards or unsafe practices that could result in serious personal injury or death.

Caution: Hazards or unsafe practices that could result in minor personal injury, product damage, or property damage.

General Warnings and Cautions

The following section provides general warning and caution statements. Other specific warnings and cautions are provided as needed in other sections of this manual.

WARNING

When using the AED, always observe the electrode directions. Failure to do so may result in incorrect operation of the AED and/or damage to the device. Failure to follow the electrode directions also may cause the device to operate improperly.

Possible defibrillator shutdown.

Always have access to a spare, fully charged, properly maintained battery. Replace the battery if the device displays the low battery warning.
**WARNINGS**

All defibrillators and accessories contain ferromagnetic materials. As with all ferromagnetic equipment, these products must not be used in the presence of the high magnetic fields created by MRI scanners. Operating MRI devices in the presence of ferromagnetic objects may cause injury to persons and damage to the equipment. Consult the MRI manufacturer for specific information about using MRI devices. This magnetic field may also damage the equipment.

**INSTRUCTIONS**

Contact your local well-equipped device manufacturer.

---

**CAUTIONS**

Possible equipment damage

The device may be damaged by incorrect or physical damage. If present, contact your local medical equipment manufacturer.

Possible equipment damage

DO NOT use the AED in the presence of dangerous substances in the area that could result in electrical or chemical hazards.

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**Symbols**

The symbols below may be found in this manual or on various configurations of the LIFEPAK 500 AED and accessories:

- ![Symbol](https://example.com/symbol1.png) Defibrillation protected, type BF patient connection

- ![Symbol](https://example.com/symbol2.png) Attention, consult accompanying documents

- ![Symbol](https://example.com/symbol3.png) Warning, high voltage

- ![Symbol](https://example.com/symbol4.png) Indicator: battery voltage is low, replace battery

- ![Symbol](https://example.com/symbol5.png) Indicator: device requires service

- ![Symbol](https://example.com/symbol6.png) Buttons for setting the clock, transferring data, and setting options

- ![Symbol](https://example.com/symbol7.png) Type BF patient connection
Rechargeable battery: recycle battery

Battery Charger: green LED indicates power is on

Battery Charger: battery is charging; amber LED indicates fast charge, green LED indicates trickle charge

Indoor use only

Safety Class II equipment (reinforced insulation)

Data Cable: to printer

Data Cable: to PC

Data Cable: to modem

Exp. date

Reorder number

Do not reuse

CE (European) certification symbol

Canadian Standards Association certification for the United States (Nationally Recognized Test Laboratory) and Canada
Getting Ready
GETTING READY

This section provides a basic orientation to the LIFEPAK 500 automated external defibrillator (AED) and describes how to prepare the AED for use. Topics include:

- Power Indicators and Display
- Battery Status
- Connecting the Shock Cable
- Connecting the AED Monitor
- Connecting Suction Options
- Connecting Electrodes to the AED
Unpacking and Initial Inspection

Remove the LIFEPAK 500 AED from the shipping container. Examine the AED and accessories for any sign of damage during shipping. Make sure that all the required supplies and accessories, including electrodes and batteries, are present. Save the shipping container and foam inserts for use in reshipping the AED.

Controls, Indicators, and Connectors

Figure 2-1 and Table 2-1 provide an overview of the LIFEPAK 500 AED controls, indicators, and connectors. Figure 2-2 and Table 2-2 provide an overview of the accessories.

Figure 2-1 LIFEPAK 500 AED controls, indicators, and connectors
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="Green ON/OFF button" /></td>
<td>Green ON/OFF button turns the power on or off. The LED is lit whenever the AED is on.</td>
</tr>
<tr>
<td>2</td>
<td><img src="image" alt="Yellow ANALYZE button" /></td>
<td>Yellow ANALYZE button begins analysis of the patient's ECG rhythm. The LED is lit while the AED analyzes the rhythm. The LED flashes to prompt the operator to press ANALYZE.</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="Orange SHOCK button" /></td>
<td>Orange SHOCK button delivers energy. The LED flashes to prompt the operator to press SHOCK when the AED is fully charged.</td>
</tr>
</tbody>
</table>
| 4 | **Cable Connector** | Allows connection to the following:  
- QUIK-COMBO electrodes  
- Cables for connection to a printer, computer, or modem  
- Test lead for testing  
- Patient Simulator |
| 5 | **Microphone** | Allows input for audio recording. |
| 6 | **Speaker** | Provides audio voice prompts and tones. |
| 7 | **Battery Compartment** | Accommodates a single removable battery pack that provides power for the AED. |
| 8 | **Liquid Crystal Display (LCD)** | Provides operating messages on two 20-character lines.* |
| 9 | ![Right arrow button](image) | Right arrow button Used to set the clock, transfer data, and set options. |
| 10 | ![Up arrow button](image) | Up arrow button Used to set the clock, transfer data, and set options. |
| 11 | ![Low battery indicator](image) | Low battery indicator Red backlit icon indicates the AED battery is low. |
| 12 | ![Service indicator](image) | Service indicator Red backlit icon indicates the AED requires service by authorized service personnel. |

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*Accent marks are not included in operating message for international languages.*
Figure 2-2  Accessories for the LIFEPAK 500 AED

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>LIFEPAK 500 nonrechargeable lithium battery pak</td>
<td>Provides power for the LIFEPAK 500 AED.</td>
</tr>
<tr>
<td>14</td>
<td>LIFEPAK 500 rechargeable SLA battery pak</td>
<td>Provides power for the LIFEPAK 500 AED. The SLA (Sealed Lead-Acid) battery pak is recharged by the battery charger listed below.</td>
</tr>
<tr>
<td>15</td>
<td>QUIK-COMBO defibrillation/ECG electrodes</td>
<td>Allows delivery of therapy to the patient. Connect to the cable connector on the AED.</td>
</tr>
<tr>
<td>16</td>
<td>Battery Charger</td>
<td>Provides power to recharge the rechargeable SLA battery pak.</td>
</tr>
<tr>
<td>17</td>
<td>Test Load</td>
<td>Provides an external test lead for the AED. Connects to the cable connector on the AED.</td>
</tr>
<tr>
<td>18</td>
<td>Data cable</td>
<td>One of three available cables shown. Allows transfer of data from AED to PC, modem, or printer. Plugs into the cable connector on the AED.</td>
</tr>
<tr>
<td>19</td>
<td>Carrying case</td>
<td>Helps protect the AED and provides storage for electrodes.</td>
</tr>
</tbody>
</table>
About Batteries

Use either of the following battery types to power the LIFEPAK 500 AED:
• LIFEPAK 500 rechargeable SLA battery pak
• LIFEPAK 500 nonrechargeable lithium battery pak

To save battery life if the LIFEPAK 500 AED is accidentally turned on or left on, the AED has a battery conservation feature. If the AED is not connected to a patient and no buttons are pressed for 15 minutes, the AED will automatically turn off.

For information about maintaining or recharging the batteries, refer to page 5-7.

Battery Installation

To install a battery:
1. Insert the connector end of the battery into the battery compartment as shown in Figure 2-3.
2. Slide the battery all the way in until it latches securely.

Figure 2-3 Battery Installation
Battery Removal

To remove the battery:
1. Turn off the AED.
2. Lift the latch release on the battery and slide it out.

Low Battery Detection

The AED monitors the battery power level and indicates when the battery should be replaced:

- Indicator is lit and the LOW BATTERY message is displayed: battery is low.
- Indicator flashes on and off and the REPLACE BATTERY message is displayed: battery is very low and should be replaced immediately.

When the battery power is too low, the AED will automatically turn off.

Setting the Clock

To change the date and time:
1. Turn on the AED. (Be sure the AED has been off for at least 60 seconds and that nothing is connected to the AED.)
2. While the power is on, press the A or B button. The AED displays the date and time setting:

<table>
<thead>
<tr>
<th>24MAY96</th>
<th>12:37</th>
</tr>
</thead>
<tbody>
<tr>
<td>blinking</td>
<td></td>
</tr>
</tbody>
</table>

- A number blinking on and off indicates that the number can be changed.
3. To change the displayed value:
   - Press the A button to increase the value.
   - Press the B button to advance to the next field.
4. Repeat Step 3 as needed to set the minutes, day, month, and year.
5. After the date and time are set, press ON/OFF to turn off the AED.
Defining Setup Options

With the setup options listed in Table 2-3, you can define some of the operating features for the LIFEPAK 500 AED.

Table 2-3 Setup options and factory default settings

<table>
<thead>
<tr>
<th>Setup Options</th>
<th>Factory Default Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device ID</td>
<td>AED serial number</td>
</tr>
<tr>
<td>Modem phone number</td>
<td>Blank</td>
</tr>
<tr>
<td>Modem selection</td>
<td>0</td>
</tr>
<tr>
<td>Modem initialization string</td>
<td>Blank</td>
</tr>
<tr>
<td>Energy sequence</td>
<td>300 pulses</td>
</tr>
<tr>
<td>CPR timer</td>
<td>60 seconds</td>
</tr>
<tr>
<td>Auto analyze</td>
<td>ON</td>
</tr>
<tr>
<td>Audio recording</td>
<td>ON</td>
</tr>
</tbody>
</table>

Device ID

Use the DEVICE ID option to assign a unique identifier that is printed at the top of each report. You can use up to 20 characters with any combination of numbers and upper-case letters (A-Z). The factory default setting is the AED serial number.

Modem Phone Number

The MODEM PHONE NUMBER option is the character string that the AED dials when it transfers data by modem. The dial string may include up to 20 characters as described in Table 2-4. The factory default dial string is blank.

Table 2-4 MODEM PHONE NUMBER dial string characters

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Selects pulse dialing (only allowed as first character)</td>
</tr>
<tr>
<td>T</td>
<td>Selects tone dialing (only allowed as first character)</td>
</tr>
<tr>
<td></td>
<td>Inserts 2-second pause in dialing string</td>
</tr>
<tr>
<td>$</td>
<td>Waits for &quot;dong&quot; (calling card) tone</td>
</tr>
<tr>
<td>W</td>
<td>Waits for second dial tone</td>
</tr>
<tr>
<td>Numeric characters</td>
<td>Numbers 0 through 9 (no special function)</td>
</tr>
<tr>
<td>* # ( )</td>
<td>Other characters (no special function)</td>
</tr>
</tbody>
</table>
Modem Selection

The MODEM SELECTION option allows you to select the initialization string for one of the four modems listed in Table 2-5. Select the number that matches your modem. If you select 0, you must define the modem initialization string in the next option (MODEM INIT STRING). The factory default is 0. A Modem Selection Addendum will specify future and international modems that are compatible with the AED.

Table 2-5 MODEM SELECTION numbers

<table>
<thead>
<tr>
<th>Number</th>
<th>Modem Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No modem selected*</td>
</tr>
<tr>
<td>1</td>
<td>Hayes* ACCURA** External Fax Modem</td>
</tr>
<tr>
<td>2</td>
<td>USRobotics® Sportster® 28.8 Modem</td>
</tr>
<tr>
<td>3</td>
<td>Motorola Lifestyle 28.8 Dat/Fax Modem</td>
</tr>
<tr>
<td>4</td>
<td>SupraExpress™ 33.6 faxmodem</td>
</tr>
</tbody>
</table>

*You must specify the modem initialization string in the MODEM INIT STRING option.

Modem initialization String

The MODEM INIT STRING option allows you to define the modem initialization string for a TIA/EIA-502 compatible modem. You can use up to 75 characters with any combination of displayable characters. The factory default string is blank.

Note: The AED does not display MODEM INIT STRING unless the MODEM SELECTION is 0.

Energy Sequence

The ENERGY-SEQUENCE option defines the energy level for the second shock delivered. The choices are 200 joules and 300 joules. The factory default setting is 300 joules.

CPR Time

The CPR TIME option defines a time period following each three-shock set or NO SHOCK ADVISED message, during which the operator is prompted to perform CPR. The choices are 0, 15, 30, 45, 60, 90, 120, and 180 seconds. The factory default setting is 60 seconds. Check your local protocol for the appropriate CPR TIME.

If 0 is selected, the AED does not prompt the operator to perform CPR. Instead, the AED prompts the operator to CHECK FOR PULSE, IF NO PULSE, PUSH ANALYZE.
Auto Analyze

The AUTO ANALYZE option may be ON or OFF. If it is ON, the second and third rhythm analyses of each three-shock set start automatically without requiring the operator to press ANALYZE. (The operator must always press ANALYZE to start the first analysis of a three-shock set and to analyze after a NO SHOCK ADVISED message or CPR cycle.) If it is OFF, the operator must press ANALYZE to start every analysis. The factory default setting is ON.

Audio Recording

AUDIO RECORDING is only displayed if the option is installed. The AUDIO RECORDING option may be ON or OFF. If it is ON, the AED records the audio during patient care. If it is OFF, the AED does not record the audio. The factory default setting is ON.

Changing Setup Options

To change the setup options:

1. Make sure the LIFEPAK 500 AED power is off for at least 60 seconds and that nothing is connected to the AED.

2. Hold down the ANALYZE, A, and B buttons. Then, press ON/OFF. Do not release ANALYZE, A, and B until the SETUP MODE message appears.

3. Notice that the AED displays the SETUP MODE screen:

```
SETUP MODE

nnnnnnnnn
```

The nnnnnnnn is the configuration code defined in Figure 2-4. This code, which appears at the top of each printed report, summarizes some of the setup and service settings.
1. Press ANALYZE to advance in the DEVICE ID menu:

- Press the ▲ button to change the character (choices are 0-9, A-Z, _, and space characters).
- Press the ▼ button to advance to the next space.
5. Press ANALYZE to advance to the MODEM PHONE NUMBER screen:

**MODEM PHONE NUMBER**

- Press the ▲ button to change the character. The characters available are: @*,–, 0 through 9, P,T,W,#.$.
- Press the ▼ button to advance to the next character location (20 characters maximum).

6. Press ANALYZE to advance to the MODEM SELECTION screen:

**MODEM SELECTION**

- Press the ▲ button to change the modem selection (choices are 0 through 4).

7. Press ANALYZE to advance to the MODEM INIT STRING screen if the MODEM SELECTION is 0 (or advance to the ENERGY SEQUENCE screen if the MODEM SELECTION is 1, 2, 3, or 4):

**MODEM INIT STRING**

- Press the ▲ button to change the character (choices are all displayable characters).
- Press the ▼ button to advance to the next character location (25 characters maximum).

Call your Physio-Control service representative for assistance with defining the correct initialization string.

8. Press ANALYZE to advance to the ENERGY SEQUENCE screen:

**ENERGY SEQUENCE**

- Press the ▲ button to change the energy selection (choices are 200 and 300 joules).

9. Press ANALYZE to advance to the CPR TIME screen:

**CPR TIME**

- Press the ▲ button to change the setting (choices are 0, 15, 30, 45, 60, 90, 120, and 180 seconds).

10. Press ANALYZE to advance to the AUTO ANALYZE screen:

**AUTO ANALYZE**

- Press the ▲ button to turn the option ON or OFF.
11. Press ANALYZE to advance to the AUDIO RECORDING screen:

Audio Recording

- Press the ▲ button to turn the option ON or OFF.

12. Press ON/OFF to turn off the AED. The settings are saved.

Connecting Electrodes to the AED

You can connect the QUIK-COMBO electrodes with the REDI-PAK preconnect system to the AED before patient care to save time. To connect the REDI-PAK-type QUIK-COMBO electrodes:

1. Inspect the electrode package and confirm that the expiration date has not passed.
2. Remove the clear plastic pouch to expose the QUIK-COMBO electrode connector.
3. Insert the electrode connector firmly into the QUIK-COMBO connector on the AED as shown in Figure 2-5.

Figure 2-5  Connecting the QUIK-COMBO electrodes

4. Store the electrodes in the carrying case or the electrode storage tray.

Do not open the electrode package until immediately prior to patient use.

If you use QUIK-COMBO electrodes without the preconnect system, you should:

1. Not open the electrode package until immediately prior to patient use.
2. Inspect the electrode package and confirm that the expiration date has not passed.
3. Store the electrode package in the carrying case or electrode storage tray.
4. When ready for patient use, open the electrode package and connect the electrodes to the AED as shown in Figure 2-5 above.
Using the LIFEPAK 500 AED
USING THE LIFEPAK 500 AED

This section describes how to use the LIFEPAK 500 automated external defibrillator (AED) for ECG analysis and defibrillation. The actual clinical procedures that you use may vary according to your local protocol. Topics include:
Warnings

Possible shock

During defibrillation, the AED delivers up to 360 joules of chest energy. Do not touch QUICK COMBO electrodes when defibrillating the AED.

Possible shock

If the ECG monitor and quick indicators are not vacuumed, do not use the AED. Keep all surfaces clean and vacuumed with contrast cleaning material at all times. Do not store in a container with other contrast solutions.

Possible shock

Always store the AED in a cool, dry place when not in use. Do not store in a container with other contrast solutions. Keep all surfaces clean and vacuumed with contrast cleaning material at all times. Do not store in a container with other contrast solutions.

Possible shock

Do not touch QUICK COMBO electrodes in the event of a chest compression. Use the ECG monitor and quick indicators as described in the manufacturer's manual. Do not use the AED while the patient is still connected to the machine.

Possible shock

In the event of a chest compression, ALWAYS use the ECG monitor and quick indicators as described in the manufacturer's manual. Do not use the AED while the patient is still connected to the machine.

Possible shock

In the event of a chest compression, ALWAYS use the ECG monitor and quick indicators as described in the manufacturer's manual. Do not use the AED while the patient is still connected to the machine.

Possible shock

In the event of a chest compression, ALWAYS use the ECG monitor and quick indicators as described in the manufacturer's manual. Do not use the AED while the patient is still connected to the machine.
Preparing the AED for Operation

Follow these steps to make sure that the AED is always ready for use:

1. Properly maintain the AED and batteries as described on page 5-6 of this manual.
2. Make sure that the QUIK-COMBO electrodes are available and properly stored in the AED carrying case or electrode tray.
3. Keep the following supplies readily accessible:
   - Spare, properly maintained battery
   - Spare QUIK-COMBO electrodes
   - Supplies to clean and shave the patient
4. Keep the AED and accessories within an optimal temperature range of 15-35°C (59-95°F)

QUIK-COMBO electrodes are pre-gelled, self-adhesive electrodes that allow hands-free defibrillation. They are designed for use with devices equipped with a QUIK-COMBO connector or therapy cable. For more information about these electrodes, refer to the electrode operating instructions.

AED Operation

To prepare for ECG analysis and defibrillation:

1. Verify that the patient is in cardiac arrest (unconscious, no respiration, no pulse).
2. Press ON/OFF to turn on the AED (the green LED will light). The CONNECT ELECTRODES message and voice prompt will occur until the patient is connected to the AED.
3. Prepare the patient for electrode placement:
   - If possible, place the patient on a hard surface away from standing water or conductive material.
   - Remove clothing from the patient’s upper torso.
   - Remove excessive hair from the electrode sites. If shaving is necessary, avoid cutting the skin.
   - Clean the skin and dry it briskly with a towel or gauze.
   - Do not apply alcohol, fomentation of benzoin, or antiperspirant to the skin.
4. Apply the electrodes to the patient’s chest:
   - Place the electrode lateral to the patient’s left nipple with the center of the electrode in the midaxillary line, if possible.
   - Place the other electrode on the patient’s upper right torso, lateral to the sternum and below the clavicle.
   - Starting from one end, press the electrodes firmly onto the patient’s skin.

![Electrode Placement](image)

5. Connect the electrode connector to the AED (if it is not already connected).
6. Follow the screen messages and voice prompts provided by the AED.
Special Situations for Electrode Placement

When placing electrodes on the patient, be aware of the following special situations.

Obese Patients or Patients with Large Breasts  Apply the electrodes to a flat area on the chest, if possible. If skin folds or breast tissue prevent good adhesion, spread skin folds apart to create a flat surface.

Thin Patients  Follow the contour of the ribs and spaces when pressing the electrodes onto the torso. This limits air space or gaps under the electrodes and promotes good skin contact.

Patients with Implanted Pacemakers  If possible, place QUICK-COMBO electrodes away from the internal pacemaker generator. Treat this patient like any other patient requiring patient care. Pacemaker pulses may prevent advisement of an appropriate shock, regardless of the patient's underlying rhythm.

Patients with Implanted Defibrillators  Apply the electrodes in the anterior-lateral position. Treat this patient like any other patient requiring emergency care.

AED Prompts

The following paragraphs describe typical scenarios that might occur during AED operation. Topics include:

- First analysis cycle
- Shock advised
- Subsequent analysis cycles
- No shock advised
- 10-sec Time
- Shock counter
- Motion detection
- Continuous Patient Surveillance System: Check Patient Alert
- Electrodes off, detection

For a more detailed description of how the AED analyzes the patient ECG, refer to page A-2.

Note: Accent marks are not included in message prompts for international languages.
First Analysis Cycle

When you first apply electrodes to the patient and turn on the power, the AED will prompt you to press ANALYZE:

09:27

PUSH ANALYZE

You will hear the PUSH ANALYZE voice prompt and see the ANALYZE LED flash.

If you press ANALYZE, the AED will begin to analyze the patient's ECG. The AED alternately displays two messages:

09:27

ANALYZING NOW

09:27

STAND CLEAR

You will hear the ANALYZING NOW, STAND CLEAR voice prompt. The ECG analysis requires about 6 to 9 seconds. The ANALYZE LED is on during analysis.

Shock Advised

If the AED detects a shockable ECG rhythm, it displays this message:

09:28

SHOCK ADVISED

You will hear the SHOCK ADVISED voice prompt. The AED begins charging to 200 joules for Shock #1. A rising tone indicates that the AED is charging.

When charging is complete, the AED alternately displays two messages:

09:28

STAND CLEAR

09:28

PUSH TO SHOCK

You will hear the STAND CLEAR, PUSH TO SHOCK voice prompt followed by the "shock ready" tone (a loud, high-pitched, two-tone sound). The SHOCK LED flashes.

• Press SHOCK to discharge the AED.
• If you do not press SHOCK within 15 seconds, the AED disarms the SHOCK button, and the CHARGE REMOVED message appears.
Subsequent Analysis Cycles

If the AUTO ANALYZE option is on, the AED automatically analyzes the patient's ECG rhythm after Shock #1 is delivered. If the AUTO ANALYZE option is off, the AED displays PUSH ANALYZE after Shock #1. (You will also hear the PUSH ANALYZE voice prompt and see the ANALYZE LED flash.) You must press ANALYZE to begin the analysis.

The second analysis and shock sequence is the same as that described for Shock #1. However, the energy level for Shock #2 is 200 or 300 joules, depending on the value selected for the ENERGY SEQUENCE option. (Refer to page 2-7 to check or redefine the selected value.) The energy level is 360 joules for Shock #3 and subsequent shocks.

No Shock Advised

If the AED detects a nonshockable ECG rhythm, it displays this message:

09:28

NO SHOCK ADVISED

You will hear the NO SHOCK ADVISED voice prompt. The AED will not charge, and no shock can be delivered.

After NO SHOCK ADVISED, the AED enters CPR TIME if CPR TIME is set to 15 seconds or more. If CPR TIME is set to 0, the AED displays this message:

09:28

CHECK FOR PULSE

You will hear the CHECK FOR PULSE voice prompt. After 5 seconds, the AED displays two messages:

09:28

IF NO PULSE

09:28

PUSH ANALYZE

You will hear the IF NO PULSE, PUSH ANALYZE voice prompt.

CPR Time

At the beginning of CPR TIME, the AED first displays this message:

10:52

CHECK FOR PULSE

You will hear the CHECK FOR PULSE voice prompt.

After 5 seconds, the AED alternately displays two messages:

10:52

IF NO PULSE

10:52

START CPR
You will hear the **IF NO PULSE, START CPR** voice prompt. The messages alternate for the remaining CPR TIME. You can press ANALYZE to stop CPR TIME and start an analysis cycle.

After CPR TIME, the AED displays this message:

![CHECK FOR PULSE](image)

You will hear the **CHECK FOR PULSE** voice prompt. After 5 seconds, the AED displays two messages:

![IF NO PULSE](image)  ![PUSH ANALYZE](image)

You will hear the **IF NO PULSE, PUSH ANALYZE** voice prompt:

**Shock Counter**

The AED displays the shock counter in the upper-left corner of the LCD:

![Shock Counter](image)

The shock counter indicates how many shocks have been delivered to the patient. The shock counter resets to zero whenever the AED is turned off for at least 60 seconds.

**Motion Detection**

If the AED detects motion during the ECG analysis, the AED alternately displays two messages:

![Motion Detected](image)  ![Stop Motion](image)

You will hear the **MOTION DETECTED, STOP MOTION** voice prompt, followed by a warning tone. If the motion ceases within 20 seconds, analysis will continue. If the motion does not cease within 20 seconds, analysis will stop. You must then push ANALYZE to restart analysis. Refer to troubleshooting on page 6-2 for possible causes and suggested solutions.
Continuous Patient Surveillance System - Check Patient Alert

If the Continuous Patient Surveillance System (CPSS) detects a potentially shockable rhythm, the AED displays this message:

09:53

PUSH ANALYZE

You will hear the PUSH ANALYZE voice prompt accompanied by a warning tone. You should:

- Stop all patient and vehicle movement.
- Confirm that the patient is in cardiac arrest.
- Press ANALYZE.
- Follow the screen messages and voice prompts provided by the AED.

Electrodes Off Detection

If the AED detects that the electrodes are not properly connected to the AED or the patient, the AED displays this message:

09:21

CONNECT ELECTRODES

You will hear the CONNECT ELECTRODES voice prompt followed by three warning beeps. Refer to troubleshooting on page 6-2 for possible causes and suggested actions.

Transferring a Patient to a Different Device

The QUIK-COMBO electrodes allow rapid transfer of care to other devices that also use QUIK-COMBO electrodes. To transfer the patient from the LIFEPAK 500 AED to another device:

1. Turn off the LIFEPAK 500 AED power.
2. Disconnect the QUIK-COMBO electrodes from the LIFEPAK 500 AED. Leave the electrodes on the patient.
3. Connect the QUIK-COMBO electrodes to the QUIK-COMBO therapy cable on the next device.
4. Follow the operating instructions for the second device to deliver the desired therapy.

Troubleshooting During Patient Care

For troubleshooting during patient care, refer to Table 6-1, page 6-2.
DATA MANAGEMENT

This section describes how to store and transfer LIFEPAK 500 automated external defibrillator (AED) data to a computer or a printer. Topics include:

- Overview of Life Support and Emergency Care
- Storing Data Using the Data Modem
- Sending Data to a Computer by Direct Connection
- Overview of Life Support and Emergency Care
Overview of Data Storage and Retrieval

Every time you use the LIFEPAK 500 AED on a patient, data is stored digitally inside the AED. This data allows post-incident review for quality control, training, and research purposes. Print or transfer this data as soon as possible to save the information.

The following paragraphs describe how the LIFEPAK 500 AED stores and retrieves data.

Overview of Data Storage

Whenever power is on, the LIFEPAK 500 AED automatically stores the data illustrated in Figure 4-1.

| Event Log Data | CODE SUMMARY Data | Continuous ECG Data | Audio Recording |

Figure 4-1 Data stored by the LIFEPAK 500 AED

- Event Log Data - A chronological log of all events. An event is a specific action by the operator or AED, such as:
  - Power on
  - Patient connected
  - Analysis started
  - Shock advised
  - Shock delivered
  - Refer to page 6-6 for a list of all the event types.
- CODE SUMMARY Data - A summary of critical resuscitation events and the ECG rhythm segments associated with those events.
- Continuous ECG Data - Approximately 20 minutes of the patient ECG rhythm from the time of power on to power-off.
- Audio Recording - Approximately 20 minutes of audio data recorded at the scene, such as operator remarks and AED voice prompts or tones. (The audio recording option must be installed and enabled.)
**Patient Records** A patient record is created when the AED is connected to a patient and begins to store data. The AED stores data from the time that you turn the AED on until you turn the AED off. The LIFEPAK 500 AED can store a maximum of two patient records:

- Current Patient - The most recent patient record stored
- Previous Patient - The patient record stored prior to the Current Patient

The data stored for the Current Patient and Previous Patient is illustrated in Figure 4-2.

![Figure 4-2 Comparison of data stored for the Current Patient and Previous Patient](image)

The AED stores all data for the Current Patient (B). However, the AED only retains the Event Log and CODE SUMMARY data for the Previous Patient (A).

**Information Stored When Creating a New Patient Record** When the AED creates a new patient record, the following occurs:

- The AED stores all data for the newest patient record, Patient C (refer to Figure 4-3). Patient C is now the Current Patient.
- The AED deletes the ECG and audio recording data for Patient B. The AED retains only the Event Log and CODE SUMMARY data. Patient B is now the Previous Patient.
- The AED deletes all data for the oldest patient record, Patient A.

![Figure 4-3 Data stored when the AED stores a new patient record](image)
Conditions for Creating a New Patient Record  To begin a new patient record, the following conditions must occur:

- The AED must be turned off for at least 60 seconds, then turned on.
- Electrodes must be connected to the patient.

You can turn off the AED briefly without affecting the Current Patient. For example, you can change the battery. If you restore power in less than 60 seconds, the AED resumes storing data for the Current Patient.

If you do not connect electrodes to a patient or a simulator, you can turn on the AED and not affect the Current Patient. For example, you can turn on the AED to test it with the external test lead or to transfer data. As long as you do not connect the electrodes to a new patient or an ECG simulator, the AED does not create a new patient record.

As soon as you turn on the AED, the AED begins storing data for a new patient record. However, if you do not connect electrodes to a patient within 3 minutes, the AED stops storing data.

- If you then connect electrodes, the AED resumes storing data and creates a new Current Patient.
- If, however, you turn off the AED without ever connecting the electrodes, the AED does not create a new Current Patient. The AED will delete the initial 3 minutes of data, and all previously stored data will remain unchanged. This prevents erasing data each time you turn on the AED to transfer data or perform maintenance.

Test Log  The LIFEPAK 500 AED also stores a Test Log, a list of the 30 most recent auto-tests and manual tests. The Test Log lists the test results and any fault codes detected. The Test Log is printed automatically when data is sent to a printer. As an option, the Test Log may be printed from a computer.

Overview of Data Retrieval

There are three ways you can retrieve data from the LIFEPAK 500 AED:

- Send the data to a computer by modem
- Send the data to a computer by direct connection
- Send the data to a printer

The AED does not delete data after it is transferred. Data is only deleted when new patient records are created. Table 4-1 describes the stored data and how you can retrieve it.

<table>
<thead>
<tr>
<th>Type of Data</th>
<th>Retrieval</th>
<th>Modem</th>
<th>Direct Connect</th>
<th>Printer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Log Data</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CODE SUMMARY data</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Continuous ECG</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Audio Recording</td>
<td>Yes²</td>
<td>Yes²</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Test Log</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

² Available for the Current Patient only.
²² To play the audio recordings, a sound card, sound card software, and the QUICK-VIEW 500 data review program must be installed in the computer.
Sending Data to a Computer by Modem

These paragraphs describe the resources, equipment connections, and procedures required to send LIFEPAK 500 AED data to a computer by modem.

Required Resources

Table 4-2 summarizes the resources required to send data to a computer by modem.

<table>
<thead>
<tr>
<th>Description</th>
<th>Required Resources at Local Site</th>
<th>Required Resources at Destination Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern Cable (for use with LIFEPAK 500 AED)</td>
<td>Modern that supports the TIA/EIA-602 command set</td>
<td>Modem that supports the Hayes AT command set</td>
</tr>
<tr>
<td>Modem that supports the TIA/EIA-602 command set</td>
<td>Modern power cord or power adapter (if required)</td>
<td>Personal Computer:  – DOS-compatible</td>
</tr>
<tr>
<td>Telephone cord (with RJ11 connectors)</td>
<td></td>
<td>– QUIK-VIEW™ 500 data review program or CODE-STAT™ data management system program 2.0 or greater</td>
</tr>
<tr>
<td>Analog telephone line¹</td>
<td></td>
<td>– Microsoft Windows 3.1 or greater for CODE-STAT, Data Transfer 500, and for QUIK-VIEW 500 if audio review is not needed. Microsoft Windows 95 for QUIK-VIEW 500 if audio review is needed</td>
</tr>
<tr>
<td>Most internal telephone lines for integrated office telephone systems are digital lines. Make sure that you connect the modem to an external analog telephone line like the type used for fax machines.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Setup Options

Make sure that the AED setup options are properly defined for the modem initialization string and destination phone number. Refer to page 2-7 for information about the modem setup options.

Note: Remember to include in the dial string any special characters that are required to dial the destination (such as "9" or a pause).

Procedure for Sending Data

Perform these steps to send the data:

1. Make sure that the equipment at the destination site is properly connected.
2. Make sure that the destination computer power is on and that the QUIK-VIEW 500 data review program or CODE-STAT program is ready to receive data.
3. Make sure that the modem and the AED are turned off.
4. At the local site, connect the equipment as shown in Figure 4-4.
   - Connect the Modem Cable to the AED and the modem.
   - Connect the telephone cord to the modem and the analog telephone line.
   - Connect the modem power cord or power adapter to a power source (if required).
5 Turn on the modem.
6 Press ON/OFF to turn on the AED. You will see:
   BATTERY status message
   SELF-TEST message
7 After a few seconds, you will see the message:
   SEND PUSH
   • Press to send the Current Patient.
   • Press to send the Previous Patient.
   • Press both and to send the Current and Previous Patients.

While the data is being transferred, the AED displays the following message to indicate progress:
   SENDING
   XX% COMPLETE

After the AED successfully completes the data transfer, it displays the SEND COMPLETE message.

If you do not perform any other AED operations, the AED automatically turns off 15 minutes after completing the data transfer. If the AED automatically turns off, it will display either the SEND COMPLETE or CANNOT SEND message the next time you turn on the AED, without connecting electrodes.

Troubleshooting During Data Transfer

If you cannot transfer data, refer to Table 6.2 on page 6.3 for troubleshooting tips.
Sending Data to a Computer by Direct Connection

These paragraphs describe the resources, equipment connections, and procedures required to send AED data to a computer by direct connection.

Required Resources

Table 4-3 summarizes the resources required to send data to a computer by direct connection.

Table 4-3  Required resources for sending data to a computer by direct connection

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Cable (for use with the LIFEPAK 500 AED)</td>
<td></td>
</tr>
</tbody>
</table>

Personal Computer:
- DOS-compatible
- QUIK-VIEW 500 data review program or CODE-STAT data management system program 2.0 or greater
- Microsoft Windows 3.1 or later for CODE-STAT, Data Transfer 500, and for QUIK-VIEW 500 if audio review is not needed. Microsoft Windows 95 for QUIK-VIEW 500 if audio review is needed.

Procedure for Sending Data

Perform these steps to send the data:

1. Make sure that the AED is turned off.
2. Connect the equipment as shown in Figure 4-5.
3. Make sure that the computer power is on and that the application program is open.
4. Press ON/OFF to turn on the AED. The CONNECT ELECTRODES message will appear and remain until data transfer begins.

The computer controls the data transfer. Refer to the application program operating instructions for information about data transfer commands. The AED will not display any status messages during the data transfer.

![Diagram](image)

Figure 4-5  Equipment connections for data transfer by direct connection to a computer

Troubleshooting During Data Transfer

If you cannot transfer data, refer to the application program operating instructions for troubleshooting information.
Sending Data to a Printer

These paragraphs describe the resources, equipment connections, and procedures required to print AED data on a printer.

Required Resources

Table 4-4 summarizes the resources required to print AED data.

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printer Cable (for use with the LIFEPAK 500 AED)</td>
</tr>
<tr>
<td>Printer (EPSON LX-300-compatible):</td>
</tr>
<tr>
<td>- EPSON ESC/P protocol for 9-pin printheads</td>
</tr>
<tr>
<td>- 25-pin D style connector</td>
</tr>
</tbody>
</table>

Procedure for Printing

Perform these steps to print AED data.

1. Make sure that the AED is turned off.
2. Connect the equipment as shown in Figure 4-6.
   - Connect the Printer Cable to the AED and the printer.

![Figure 4-6: Connecting the AED to a printer](image)

3. Make sure that the printer is turned on.
4. While holding down the button, press ON/OFF to turn on the AED. Do not release the button until the AED displays:
   - BATTERY status message
   - SELF-TEST xxx message
5. After a few seconds, you will see the message:
   - TO PRINT PUSH
     - Press to print the Current Patient.
     - Press to print the Previous Patient.
     - Press both and to print the Current and Previous Patients.
   While the data is being transferred, the AED displays the following message to indicate progress:
   - SENDING
   After the AED successfully completes the data transfer, it displays the SEND COMPLETE message.

Troubleshooting During Printing

If the data does not print, refer to Table 6-3 on page 6-3 for troubleshooting tips.
Examples of Printed Reports

The following pages present examples of printed reports:

- Figure 4-7, page 4-10  Event Log Report and Event Log Summary
- Figure 4-8, page 4-11  CODE SUMMARY Report
- Figure 4-9, page 4-14  Test Log Report

You cannot modify the format of the reports that the AED sends directly to the printer.

Event Log Report  This report lists all of the events that occurred during a patient use. The clock time and elapsed time are listed for each event. The box at the top of the report includes device and patient information. Some of the entries, such as the patient ID and name, are always blank for reports printed directly from the AED. (If you send AED data to a computer, the Data Transfer 500 program or QUIK-VIEW 500 data review program allows you to fill in the blank spaces with information.)

Event Log Summary  This report summarizes important events for a particular patient record.

CODE SUMMARY Report  This report includes the ECG segments associated with key events such as analysis or shock.

Test Log Report  This report lists the time and results of the Auto Tests (AUTO TEST) and Test Load Tests (MANUAL TEST). If a test fails, the report lists fault codes that can help authorized service personnel troubleshoot and repair the AED.
Event Log Report

Incident ID No: 15MAY96
Operator ID No:
Device Type: LIFEPAK 500
Device Serial No: 00001203
Device ID: RFD#6

Patient ID No: 
Patient Name: 
Sex: 
Race: 
Software REV: 3005360-000 REV. 0.35
Configuration: 00000000

00:00 09:47:00 POWER ON
01:07 09:48:15 PATIENT CONNECTED
01:07 09:48:16 "PUSH ANALYZE"
01:10 09:48:18 ANALYSIS 1
01:16 09:48:24 SHOCK ADVISED
01:25 09:48:33 "PUSH TO SHOCK"
01:25 09:48:38 SHOCK 1 - 200J
01:30 09:48:38 ANALYSIS 2
01:36 09:48:44 NO SHOCK ADVISED
01:39 09:48:47 CPR PROMPT
02:39 09:49:47 "PUSH ANALYZE"
03:03 09:50:11 CHECK PATIENT
03:03 09:50:11 "PUSH ANALYZE"
03:05 09:50:13 ANALYSIS 3
03:11 09:50:19 SHOCK ADVISED
03:21 09:50:29 "PUSH TO SHOCK"
03:36 09:50:44 CHARGE REMOVED
03:40 09:50:48 ANALYSIS 4
03:48 09:50:54 NO SHOCK ADVISED
03:47 09:50:55 CPR PROMPT
03:52 09:51:00 LOW BATTERY
04:10 09:51:13 BATTERY REMOVED
04:43 09:51:51 POWER ON
04:43 09:51:51 BATTERY REPLACED
04:47 09:51:55 "PUSH ANALYZE"
04:50 09:51:58 ANALYSIS 5
04:52 09:52:00 POWER OFF

Event Log Summary
01:10 09:48:18 FIRST ANALYSIS
01:25 09:48:33 FIRST SHOCK
1 SHOCK DELIVERED

Comments:


END OF REPORT
09:48:15  PATIENT CONNECTED
09:48:18  ANALYSIS 1
09:48:24  SHOCK ADVISED
09:48:33  SHOCK 1 - 200J
09:48:36  POSTSHOCK
CODE SUMMARY Report

Incident ID No: 15MAY96
Incident Date: 15MAY96
Patient ID No:
Patient Name:

09:48:38  ANALYSIS 2
\[\text{SEGMENT 1 \text{ NONSHOCKABLE}}\]
\[\text{SEGMENT 2 \text{ NONSHOCKABLE}}\]

09:48:44  NO SHOCK ADVISED

09:50:11  CHECK PATIENT
\[\text{CHECK PATIENT}\]

09:50:13  ANALYSIS 3
\[\text{SEGMENT 1 \text{ SHOCKABLE}}\]
\[\text{SEGMENT 2 \text{ SHOCKABLE}}\]

09:50:19  SHOCK ADVISED

09:50:44  CHARGE REMOVED

Figure 4-8  Example of CODE SUMMARY Report (cont.)
Test Log Report

<table>
<thead>
<tr>
<th>Device Type: LIFEPAK 500</th>
<th>Software REV: 300360-000 REV. 0.35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Serial No: 00001203</td>
<td>Configuration: 000000</td>
</tr>
<tr>
<td>Device ID: RFD#6</td>
<td></td>
</tr>
</tbody>
</table>

Test Log History:
03 JAN 96  03:00:00  AUTO TEST: PASS
14 JAN 96  03:00:00  AUTO TEST: FAIL

Major Fault Log:
No entries found

Minor Fault Log:
14 JAN 96  03:00:00  FAULT CODES: 4704, 0711, 6302

END OF REPORT

Figure 4.9  Example of Test Log Report
Maintenance
This section describes how to perform operator-level maintenance and testing on the LIFEPAK 500 automated external defibrillator (AED). For troubleshooting information, refer to page 6-1. Topics in this section include:

- Maintenance and Service Scheduling
- Replacement of the Battery
- Electrode Maintenance
- Cleaning the LIFEPAK 500
- Accessories and Field Service
- Warranty
- Defibrillator Accessibility Add-on Kit
- External Accessory Interface
Maintenance and Testing Scheduling

The LIFEPAK 500 AED performs an automatic self-test every 24 hours. If service is required, the AED activates an alarm. The AED also performs a self test every time you turn on the AED.

These self-tests do not eliminate the need for regular maintenance. You should do the following on a regular basis and after each time the AED is used:

- Inspect the AED as described in Table 5-1.
- Clean the AED as described in Table 5-2.
- Check to make sure that all necessary supplies and accessories (such as properly-maintained batteries and QUICK-COMBO electrodes) are readily accessible.

When establishing your local operator maintenance schedule, consider how often the AED is used and how familiar the operators are with AED operation. For example:

- If the AED is used on a weekly basis, daily inspections may be appropriate.
- If the AED is used on a monthly basis, weekly inspections may be appropriate.
- If the AED is used very infrequently, such as once a year, monthly inspections may be appropriate.

Authorized service personnel should regularly perform additional periodic preventive maintenance and testing such as electrical safety tests, performance maintenance, and required calibration. Contact a local Physio-Control representative for more information.
**Inspection**

Follow the instructions in Table 5-1 to inspect the LIFEPAK 500 AED, accessories, and cables.

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Inspect for</th>
<th>Recommended Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examine the AED case, connector, battery well, battery pins, and accessories.</td>
<td>Foreign substances, Damage or cracks. Battery pins bent or discolored. Expired batteries or QUIK-COMBO electrodes.</td>
<td>Clean the device as described in Table 5-2. Contact authorized service personnel to troubleshoot and repair parts. Contact authorized service personnel to replace or repair parts. Replace.</td>
</tr>
<tr>
<td>With the battery installed, press ON/OFF to turn on the AED.</td>
<td>BATTERY OK SELF-TEST xxx message. Illumination of each LED and all LCD segments. BATTERY LOW or REPLACE BATTERY SELF-TEST xxx message. Service indicator or CALL SERVICE message.</td>
<td>None needed. Contact authorized service personnel to repair or replace parts. Replace the battery immediately. Contact authorized service personnel to troubleshoot and repair the device.</td>
</tr>
<tr>
<td>Examine accessory cables.</td>
<td>Foreign substances. Bend and flex the cable and inspect for cracks; damage, extreme wear, broken or bent connectors and pins. Confirm that connectors engage securely.</td>
<td>Clean the cables as described in Table 5-2. Replace damaged or broken parts. Replace damaged or broken parts.</td>
</tr>
</tbody>
</table>
Cleaning

Clean the LIFEPAK 500 AED and accessories as described in Table 5-2. Use only the cleaning agents listed in the table.

**CAUTION**

Be sure to keep any cleaning solutions away from any electrical components. Do not immerse the LIFEPAK 500 AED in water.

Table 5-2 Recommended cleaning methods

<table>
<thead>
<tr>
<th>Items</th>
<th>Cleaning Practice</th>
<th>Recommended Cleaning Agent</th>
</tr>
</thead>
</table>
| LIFEPAK 500 AED case, display| Clean with damp sponge or cloth. | • Quaternary ammonium compounds  
• Rubbing (isopropyl) alcohol  
• Peroxide (peracetic acid) solutions |
| accessories and accessories  |                   |                                             |

Testing

This section describes the AED automatic self tests and the test load test. If testing indicates a problem, refer to Troubleshooting on page 6-1. If you cannot correct the problem, remove the AED from active service and contact authorized service personnel.

The AED stores the results of auto tests and the external test load test in a Test Log. For information about retrieving Test Log data, refer to page 4-4.

Service Indicator and Message

The service indicator appears above the LCD if the AED detects a problem that requires service, but does not prevent AED use (such as an audio recording problem).

Service indicator is on

( LCD )

If the service indicator is on (but not flashing), you can still use the AED if it is needed for patient therapy. However, you should contact authorized service personnel to correct the problem as soon as possible. The service indicator will remain on until the problem is corrected.
If the AED detects a problem that requires immediate service (such as a malfunctioning charging circuit), the service indicator flashes and the CALL SERVICE message appears.

Service indicator flashes

CALL SERVICE

Turn the AED off and on. If the CALL SERVICE message disappears, you can still use the AED if it is needed for patient therapy. However, you should contact authorized service personnel to correct the problem as soon as possible. If the CALL SERVICE message reappears, the service indicator will continue to flash and the message will remain on. Contact authorized service personnel immediately to correct the problem. You should not use the AED until the problem is corrected.

Power-On Self Test

Whenever the AED is turned off for at least 60 seconds and then turned on, the AED performs a "cold start." During a cold start, the AED performs internal self-tests to check that internal electrical components and circuits work properly. During the self-test, the AED displays the following messages:

PHYSIO-CONTROL CORP

BATTERY OK SELF-TEST xxx

The xxx is the software version installed.

If the AED requires service, the service indicator appears. Contact authorized service personnel to perform service.

Note: If the battery has been properly maintained, the BATTERY OK message indicates that the battery will provide approximately 11 or more shocks with a nonrechargeable battery pack or six or more shocks with a rechargeable battery pack. If less than 11 shocks are available, the AED displays the LOW BATTERY or REPLACE BATTERY message.

Auto Tests

The AED periodically performs auto tests.

If the AED detects a problem during an auto test that requires service but does not prevent AED use, it displays the service indicator the next time you turn on the AED.

If the AED detects a problem during an auto test that requires immediate service, it activates an intermittent, audible alarm.

Note: It is important that the AED is stored at the operating temperature range (0-50°C) when the battery is installed. If the AED is stored outside this temperature range, the auto tests may erroneously detect a problem.
**Daily Auto Test**  Every day at 0300 (3:00 am) the AED automatically performs the following tasks:
- Turns itself on
- Performs self-test
- Stores the results in the Test Log
- Turns itself off

The Daily Auto Test is not performed if the AED is already turned on at 0300 or if the battery is not installed. If the AED is turned on while the Daily Auto Test is in progress, the test is halted; the AED will turn on normally.

**Extended Auto Test**  The AED automatically turns on and performs the Extended Auto Test on a regular basis at 0300. In the Extended Auto Test, the AED performs the following tasks:
- Turns itself on
- Performs self-test
- Charges to about 50J and discharges internally (this energy is not accessible at the cable connector)
- Stores the results in the Test Log
- Turns itself off

To use the AED when the Extended Auto Test is in progress, push ON or connect the electrodes to the patient. The test will be halted and the AED will operate normally. The Extended Auto Test is not performed if the AED is already turned on at 0300 or if the battery is not installed.

**External Test Load Test**

The external test load test checks the AED charging circuits and the operator's response during a typical ECG analysis and charging cycle. During this test, the AED charges for a low energy test shock. The usual messages and audio prompts are provided.

To perform the test load test:
1. Make sure that the AED is turned off.
2. Connect the Physio-Control test load to the cable connector on the AED.

![Cable connector and test load](image)

**Figure 5-1**  Test load connection

3. Press ON/OFF and observe that the TEST MODE message appears. (The TEST MODE message is displayed throughout the test). If the TEST MODE message does not display, reconnect the test load and try again. After a few seconds you will see and hear:
   - PUSH ANALYZE message
   - PUSH ANALYZE voice prompt
4. Press ANALYZE. You will see and hear:
   - ANALYZING NOW and STAND CLEAR messages
   - ANALYZING NOW, STAND CLEAR voice prompts
After a few seconds you will see and hear:
   - SHOCK ADVISED message
   - SHOCK ADVISED voice prompt
   - A rising charging tone that simulates a typical charge time
5. When the AED is fully charged, you will see and hear:
   - STAND CLEAR and PUSH TO SHOCK messages
   - STAND CLEAR and PUSH TO SHOCK voice prompts
6. Press SHOCK to discharge the energy into the test load.
7. Confirm that the AED displays the TEST OK message.
8. Disconnect the test load.
9. Press ON/OFF to turn off the AED.
10. Prepare the AED for the next patient use.

After the test is complete, the AED records the results in the Test Log. If the AED detects a problem during the test, the service indicator and CALL SERVICE message appear. Contact authorized service personnel to perform service. To repeat the test, turn off the AED and then turn it on again.

Battery Maintenance

The LIFEPAK 500 AED can be powered by two types of batteries:
- LIFEPAK 500 nonrechargeable lithium battery pak
- LIFEPAK 500 rechargeable SLA (Sealed Lead-Acid) battery pak

Either type of battery may be installed. Follow the guidelines described in this section to help maximize battery life and performance. Use only these Physio-Control Battery Pak batteries with the LIFEPAK 500 AED.

**WARNING**

Possible AED Shutdown
When the LIFEPAK 500 AED displays OFFLINE, THE BATTERY OF THE DEVICE IS LOW, the battery must be replaced immediately.

Possible loss of power during patient care
Using an improperly maintained battery may result in AED malfunctions during power tests.

Nonrechargeable Battery Pak

The nonrechargeable lithium battery pak requires less maintenance than the rechargeable SLA battery pak since it never requires recharging. With the lithium battery pak installed, the LIFEPAK 500 AED automatically turns on to test it as part of the Extended Auto Test. The AED performs the battery test during each charge/discharge cycle and the first time the AED is turned on after a new battery has been installed.

To check the battery level, turn on the AED for at least 10 seconds and look for the BATTERY status message during the self-test. If there is no message, turn off the AED for at least one minute and...
then turn it on again. The battery status message should display following the self-test. Do not check the status of more than two lithium or three SLA batteries within a 15-minute period. The AED may not accommodate more frequent battery checks.

A new lithium battery pack has a shelf life of 5 years if stored at the proper temperature. At room temperature (+20°C or +68°F), a new lithium battery pack can typically deliver 312 discharges at 360 joules, with a minimum of 230 discharges at 360 joules.

To properly maintain nonrechargeable lithium battery packs:
• Do not attempt to recharge (lithium battery packs cannot be connected to the battery charger used to recharge the rechargeable SLA battery packs).
• Do not use beyond the expiration date marked on the battery label.
• Do not expose to temperatures greater than +50°C (+122°F).
• Do not allow electrical connection between the battery contacts.

⚠️ WARNING ⚠️ Explosive lithium battery
Electrolyte solution between battery contacts can cause an internal explosion and permanently disable the battery.

⚠️ CAUTION ⚠️ Explosive lithium battery
Electrolyte solution between battery contacts can cause an internal explosion and permanently disable the battery.

Discharging Nonrechargeable Batteries: Before disposing of lithium battery packs, make sure that they are fully discharged. To discharge a lithium battery pack, follow this procedure:
1. Place the battery pack with the label side up on a firm, flat surface such as a table top or floor.
2. Locate the small slot on the corner marked by the arrow:

   ![Diagram of battery pack with slot highlighted]

   Slot

   Nonrechargeable lithium battery pack label

3. Place the tip of a flat-tipped screwdriver on the slot.
4. Using a hammer, strike a moderate blow straight down on the tip of the screwdriver handle. Make sure that the tip of the screwdriver breaks the label and penetrates approximately 3mm (1/8 inch). This will strike on internal pin, initiate full discharge, and permanently disable the battery.
5. Set the battery pack aside. Wait for at least 1 week to make sure that the battery pack is fully discharged before disposing.
**Disposing of Nonrechargeable Batteries**

After fully discharging a lithium battery pak as described previously, dispose of the battery pak. Follow your national, regional, and local regulations for disposal. Contact a local Physio-Control representative for more information.

In the US, Environmental Protection Agency and Department of Transportation regulations allow disposal of lithium batteries with ordinary household waste provided that they are fully discharged. Be sure to comply with any other local or regional regulations before disposal. For more information or assistance, contact your local Physio-Control representative or call 1-800-442-1142.

**Rechargeable Battery Pak**

The rechargeable SLA battery pak requires more maintenance than a lithium battery pak since it must be recharged periodically. The SLA battery pak should be recharged monthly or after each use. SLA battery paks are most appropriate when the LIFEPAK 500 AED is used on a frequent basis and for those who use the AED with a simulator for training. With an SLA battery pak installed, the LIFEPAK 500 AED automatically turns on to test it as part of the Extended Auto Test. To check the battery level, turn on the AED and look for the BATTERY OK message during the self-test.

SLA battery paks should be replaced every two years or after 200 charge cycles. At room temperature (+20°C or +68°F), a new, fully-charged SLA battery pak can deliver approximately 58 discharges at 360 joules, with a minimum of approximately 43 discharges at 360 joules.

To properly maintain SLA battery paks:

1. Recharge after each use or once a month, whichever comes first. Maintain a battery recharge record.
2. Use only the Physio-Control battery charger designed for use with the LIFEPAK 500 AED. Do not use any other chargers.
3. Recharge until the battery charger charge LED is green. This indicates that the battery charger has completed the fast-charge cycle. Undercharging can cause battery damage.
4. Recharge only at temperatures between +15°C and +35°C (59°F and 95°F).
5. Do not expose battery paks to temperatures greater than +50°C (+122°F).
6. Do not allow electrical connection between the battery contacts.
Recharging a Rechargeable Battery Pak

The battery charger fully charges a connected SLA battery in about 10 hours. The battery charger applies a high-level, fast charge for the first 10 hours that the battery is connected. If the battery remains connected, the battery charger applies a low-level trickle charge to maintain a full charge. Agency approval markings are provided on the bottom of the battery charger.

to charge a battery:
1. Connect the battery charger to an appropriate ac power source (100 to 240 Vac, 50 or 60 Hz). The green LED (marked by the symbol) appears when the power is connected.
2. Connect the battery to the battery charger.
3. Confirm that the charge LED (marked by the symbol) is amber. This indicates that the battery charger is applying a fast charge.
4. Wait at least 10 hours. Then, confirm that the charge LED is green. The green LED indicates that the fast-charge cycle is complete and the battery is receiving a trickle charge to maintain full charge.
5. Disconnect the battery.

A fully-charged battery is not harmed if it remains connected to the battery charger. However, if a battery is disconnected and then reconnected, the battery charger begins the 10-hours of fast charge again. Additional battery charge cycles without discharging can reduce battery life.

Recycling Rechargeable Batteries

Recycle SLA battery packs locally according to national, regional, and local governmental regulations. If recycling is not possible, contact a Physio-Control representative for information or assistance. In the US, call 1-800-442-1140.

To promote awareness of battery recycling, SLA battery packs are marked with this label:
Storage

When the LIFEPAK 500 AED is not in service, follow these recommendations for storage:

- AED with lithium battery pak:
  - Store AED with battery pak installed in temperatures between 0°C and +35°C (32°F and +95°F)
  - Store AED with battery pak not installed in temperatures between -30°C and +65°C (-22°F and +149°F)

- AED with SLA battery pak:
  - Store AED with battery pak installed in temperatures between 0°C and +35°C (32°F and +95°F)
  - Store AED with battery pak not installed in temperatures between -30°C and +65°C (-22°F and +149°F)
  - Recharge any stored SLA battery pak once a month

For information about QUIK-COMBO electrode storage, refer to the operating instructions for the QUIK-COMBO electrodes.

Service and Repair

**WARNING**

Do not attempt to repair the instrument or to service or repair this device. Always contact authorized service personnel for service or repair.

If the LIFEPAK 500 AED requires service as indicated by testing, troubleshooting, or the service indicator, contact authorized service personnel. In the US, call Physio-Control Technical Support at 1-800-442-1142. When you call Physio-Control to request service, provide the following information:

- Model number and part number
- Serial number
- Observation of the problem that led to the call

If the device must be shipped to a service center or the factory, pack the device in the original shipping container. If this is not possible, ship the device in protective packing to prevent shipping damage.

The LIFEPAK 500 AED Service Manual provides detailed technical information to support service and repair by authorized service personnel.

Warranty

Refer to the product warranty statement included in the accessory kit shipped with the product. For duplicate copies, contact your local Physio-Control representative. In the US, call 1-800-442-1142.
## Supplies, Accessories, and Training Tools

Table 5-3 lists supplies, accessories, and training tools for the LIFEPAK 500 AED. For information about ordering, contact your local Physio-Control representative. In the US, call 1-800-442-1142.

### Table 5-3 Supplies, accessories, and training tools

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIFEPAK 500 nonrechargeable lithium battery pack</td>
<td>3005380</td>
</tr>
<tr>
<td>LIFEPAK 500 rechargeable SLA battery pack</td>
<td>3005378</td>
</tr>
<tr>
<td>QUIK-COMBO pacing/defibrillation/ECG electrodes with LIFEPAK pre-connect system</td>
<td>3006497</td>
</tr>
<tr>
<td>QUIK-COMBO pacing/defibrillation/ECG electrodes LLW (3.5 ft) (1.07m)</td>
<td>3006626</td>
</tr>
<tr>
<td>LIFEPAK 500 battery charger</td>
<td>3006535</td>
</tr>
<tr>
<td>Physio-Control Test Load</td>
<td>3005366</td>
</tr>
<tr>
<td>QUIK-COMBO Patient Simulator</td>
<td>603469-09</td>
</tr>
<tr>
<td>QUIK-COMBO extension cable (For use with QUIK-COMBO simulator. Not for patient use.)</td>
<td>3006964</td>
</tr>
<tr>
<td>Physio-Control Patient Simulator (requires use of the QUIK-COMBO test post adapter)</td>
<td>603466-00</td>
</tr>
<tr>
<td>QUIK-COMBO test post adapter Lanyard Kit (includes QUIK-COMBO test post adapter)</td>
<td>3005302</td>
</tr>
<tr>
<td>Data Transfer 500 Information management program</td>
<td>3005352</td>
</tr>
<tr>
<td>QUIK-VIEW 500 data review program</td>
<td>3005355</td>
</tr>
<tr>
<td>LIFEPAK 500 Carrying Case</td>
<td>3006343</td>
</tr>
<tr>
<td>LIFEPAK 500 Electrode Storage Tray</td>
<td>3008874</td>
</tr>
<tr>
<td>LIFEPAK AED TRAINER</td>
<td>3006576</td>
</tr>
<tr>
<td>AED TRAINER training electrodes</td>
<td>3009697</td>
</tr>
<tr>
<td>Wall mount bracket</td>
<td>3009767</td>
</tr>
<tr>
<td>Spare-battery pouch</td>
<td>3006983</td>
</tr>
</tbody>
</table>

### Cables:

- LIFEPAK 500 Printer Cable                                                | 3005381-002 |
- LIFEPAK 500 Modem Cable                                                  | 3005381-001 |
- LIFEPAK 500 PC Cable                                                     | 3005381-000 |

### Literature:

- LIFEPAK 500 AED Operating Instructions                                   | 3005338     |
- LIFEPAK 500 AED Service Manual                                           | 3005339     |
- Defibrillation: What You Should Know                                     | 8056662     |
### Specifications

Table 5-4 lists the specifications for the LIFEPAK 500 AFD.
Table 5-5 lists the specifications for the LIFEPAK 500 AED Battery Charger.

### Table 5-6: LIFEPAK 500 AED Specifications

<table>
<thead>
<tr>
<th>Input</th>
<th>ECG via QUIK-COMBO disposable electrodes. Standard placement (anterior-lateral).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrode Cable Length</td>
<td>1.1m (3.5ft)</td>
</tr>
<tr>
<td>Electrical Protection</td>
<td>Input protected against high voltage defibrillator pulses per IEC 601</td>
</tr>
<tr>
<td>Safety Classification</td>
<td>Internally powered equipment IEC 601-1, 5.1</td>
</tr>
<tr>
<td>Waveform</td>
<td>Monophasic pulse (Edmar) per AAMI DF2-1989, 3.2.1.5.1</td>
</tr>
<tr>
<td>Output Energy</td>
<td>200, 200, 360 joules (360 joules thereafter) or 200, 300, 360 joules (360 joules thereafter)</td>
</tr>
<tr>
<td>Sequence</td>
<td></td>
</tr>
<tr>
<td>Charge Time</td>
<td>With a new, nonrechargeable battery pack, or a new, fully-charged rechargeable battery pack:</td>
</tr>
<tr>
<td></td>
<td>200 joules in less than 9 seconds</td>
</tr>
<tr>
<td></td>
<td>360 joules in less than 15 seconds</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
</tr>
<tr>
<td>ON/OFF</td>
<td>Turns device power on or off.</td>
</tr>
<tr>
<td>ANALYZE</td>
<td>Starts ECG analysis.</td>
</tr>
<tr>
<td>SHOCK</td>
<td>Delivers defibrillation energy. Active only when Shock Advisory System advises defibrillation.</td>
</tr>
<tr>
<td>Clock Set</td>
<td>Two switches (A and B) are provided to set the clock.</td>
</tr>
<tr>
<td>Display</td>
<td>Two-line, 20-character per line dot matrix Liquid Crystal Display</td>
</tr>
<tr>
<td>Low Battery Indicator</td>
<td>Low battery icon</td>
</tr>
<tr>
<td>Service Indicator</td>
<td>Service icon</td>
</tr>
<tr>
<td>Displayed Messages</td>
<td>Messages prompt user through complete operating sequence.</td>
</tr>
<tr>
<td>Audible Tones</td>
<td>Context tones assist user through device operation and alert operator of display messages.</td>
</tr>
<tr>
<td>Voice Prompts</td>
<td>Prompt user through complete operating sequence:</td>
</tr>
<tr>
<td></td>
<td>PUSH ANALYZE</td>
</tr>
<tr>
<td></td>
<td>SHOCK ADVISED</td>
</tr>
<tr>
<td></td>
<td>NO SHOCK ADVISED</td>
</tr>
<tr>
<td></td>
<td>MOTION DETECTED, STOP MOTION</td>
</tr>
<tr>
<td></td>
<td>STAND CLEAR, PUSH TO SHOCK</td>
</tr>
<tr>
<td></td>
<td>CHECK FOR PULSE</td>
</tr>
<tr>
<td></td>
<td>IF NO PULSE, START CPR</td>
</tr>
<tr>
<td></td>
<td>IF NO PULSE, PUSH ANALYZE</td>
</tr>
<tr>
<td></td>
<td>ANALYZING NOW, STAND CLEAR</td>
</tr>
<tr>
<td></td>
<td>CONNECT ELECTRODES</td>
</tr>
<tr>
<td></td>
<td>REPLACE BATTERY</td>
</tr>
</tbody>
</table>

### EVENT DOCUMENTATION

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal digital memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Capacity</td>
<td>20 minutes audio recording (optional)</td>
</tr>
<tr>
<td>At least 20 minutes ECG and event log of operator/device actions</td>
<td></td>
</tr>
<tr>
<td>Report Types</td>
<td>CODE SUMMARY report, Event Log report, Test Log report</td>
</tr>
<tr>
<td>Capacity</td>
<td>300 Event Log events</td>
</tr>
<tr>
<td>Report Types</td>
<td>30 Test Log device tests (assuming no fault codes)</td>
</tr>
<tr>
<td>Playback Device</td>
<td>IBM-compatible personal computer with sound card (for audio playback) and QUIK-VIEW software</td>
</tr>
<tr>
<td>Communications</td>
<td>500 Data Review software</td>
</tr>
<tr>
<td>Serial port support for:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal Computer operating Microsoft® Windows™</td>
</tr>
<tr>
<td></td>
<td>TIA/EIA-602 compatible modem (at least 9600 baud)</td>
</tr>
<tr>
<td></td>
<td>EPSON® ESC/P protocol for printers with 8-pin printheads</td>
</tr>
</tbody>
</table>
Table 5-4  LIFEPAK 500 AED Specifications

**ENVIRONMENTAL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0°C to +50°C (+32°F to +122°F)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-30°C to +85°C (-22°F to +149°F) without battery and electrodes</td>
</tr>
<tr>
<td></td>
<td>-30°C to +85°C (-22°F to +149°F) with battery and electrodes, maximum exposure time limited to one week</td>
</tr>
<tr>
<td>Atmospheric Pressure</td>
<td>760 to 429 mmHg (0 to +15,000 ft above sea level)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>10 to 95% (non-condensing)</td>
</tr>
<tr>
<td>Water Resistance</td>
<td>IEC 529 IPX4 &quot;Splash-proof&quot; with electrodes or connector cover installed</td>
</tr>
<tr>
<td>Shock</td>
<td>MIL-STD-810E, Method 516.4, Procedure 1 (40G, 6-9ms pulse, 1/2 sine each axis)</td>
</tr>
<tr>
<td>Vibration</td>
<td>MIL-STD-810E, Method 514.4, Category 10</td>
</tr>
</tbody>
</table>

**GENERAL**

- **Rechargeable SLA battery pack**
  - Type: Sealed lead-acid, 8V, 2.5 amp hours
  - Capacity: Typical: 59 full discharges with a new, fully-charged battery at +20°C (+68°F).
  - Minimum: 43 full discharges with a new, fully-charged battery at +20°C (+68°F).
  - Battery Charge Time: 10 ±1 hours. Battery charging limited to +15°C to +35°C (+59°F to +95°F).
  - Weight: 0.9kg (1.95lb)

- **Nonrechargeable lithium battery pack**
  - Type: Lithium, 12V, 7.5 amp hours
  - Capacity: Typical: 312 full discharges with a new battery at +20°C (+68°F).
  - Minimum: 230 full discharges with a new battery at +20°C (+68°F).
  - Weight: 0.5kg (1.2lb)

**Physical Characteristics**

- Height: 10.2cm (4.0in)
- Width: 26.7cm (10.5in)
- Depth: 25.5cm (10.0in) including handle
- Weight: 2.76kg (6.1lb) without battery or electrodes

---

**DEFIBRILLATOR**

**Waveform**

Monophasic pulse (Edmark) per AAMI DF2-1989

![Waveform Diagram](image)

---

1 All specifications at 20°C (68°F) unless otherwise stated. All performance specifications assume the device has been stored (two hours minimum) at the operating temperature prior to operation.
<table>
<thead>
<tr>
<th>Table 5-5  LIFEPAK 500 AED Battery Charger Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL</strong></td>
</tr>
<tr>
<td>Safety Classification: Class II, IEC 601-1, 5.1</td>
</tr>
<tr>
<td>Input: 100-240V 0.7-0.4A 50/60 Hz</td>
</tr>
<tr>
<td>Output: 9.9V/9.2V dc</td>
</tr>
<tr>
<td>Output Protection: Current limited, short circuit protected</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL</strong></td>
</tr>
<tr>
<td>Operating Temperature: 15° -35°C (50° - 95°F)</td>
</tr>
<tr>
<td>Water Resistance: IEC 620 IPX0 (Indoor Use Only)</td>
</tr>
</tbody>
</table>
Troubleshooting
To place unit in Service Mode
Press ↑, → 6 Shock → Turn on Pass Word
↑ - Analyze → → Shock - Analyze

TROUBLESHOOTING

This section describes how to troubleshoot LIFEPAK 500 automated external defibrillator (AED) operating problems. This section also describes screen messages, voice prompts, and event types.

If you cannot correct the problem, follow these steps:
- Remove the AED from active service.
- Contact authorized service personnel for service and repair.
<table>
<thead>
<tr>
<th>Observation</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CONNECT ELECTRODES message appears.</td>
<td>Inadequate connection to AED. Electrode does not adhere properly to the patient. Electrodes are dry, damaged, or out-of-date.</td>
<td>• Check for complete insertion of connector to AED. • Press electrodes firmly on patient's skin. • Clean, shave, and dry the patient's skin as recommended. • Replace the electrodes.</td>
</tr>
<tr>
<td>2 MOTION DETECTED and STOP MOTION messages appear during analysis.</td>
<td>Patient movement. Patient movement because of agonal respirations. Electrical/radio frequency interference. Vehicle motion.</td>
<td>• Stop CPR during analysis. • When patient is being manually ventilated, press ANALYZE after complete exhalation. • Press ANALYZE immediately after exhalation or wait until agonal respirations are slower or absent. • Move hand-held communication devices or other suspected devices away from the AED when possible. • Stop vehicle during analysis. • Move patient to stable location when possible.</td>
</tr>
<tr>
<td>3 REPLACE BATTERY or LOW BATTERY message or indicator appears.</td>
<td>Low battery.</td>
<td>• Replace the battery immediately.</td>
</tr>
<tr>
<td>4 Service indicator appears, (CALL SERVICE message not displayed).</td>
<td>A fault requiring service.</td>
<td>• Continue to use the AED if it is needed. Contact authorized service personnel as soon as possible to repair the AED.</td>
</tr>
<tr>
<td>5 Service indicator flashing and CALL-SERVICE message appears.</td>
<td>A fault requiring immediate service.</td>
<td>• Turn AED off and on again. If the CALL-SERVICE message appears again, remove the AED from active service. Immediately contact authorized service personnel to repair the AED.</td>
</tr>
<tr>
<td>6 AED displays no messages after you repeatedly press ON/OFF.</td>
<td>Depleted battery. AED needs service.</td>
<td>• Replace the battery immediately. • Contact authorized service personnel.</td>
</tr>
<tr>
<td>7 CHARGE REMOVED message appears.</td>
<td>Electrode disconnects from patient or AED. SHOCK button not pressed within 15 seconds.</td>
<td>• Replace electrode and press ANALYZE. • Press SHOCK within 15 seconds after the PUSH TO SHOCK message appears.</td>
</tr>
<tr>
<td>8 Displayed time is incorrect.</td>
<td>Time is incorrectly set in the AED.</td>
<td>• Change the AED time setting.</td>
</tr>
<tr>
<td>9 Date printed on report is incorrect.</td>
<td>Date is incorrectly set in the AED.</td>
<td>• Change the AED date setting.</td>
</tr>
<tr>
<td>10 Displayed messages are faint or flicker.</td>
<td>Low battery power. Out of temperature range.</td>
<td>• Replace the battery immediately.</td>
</tr>
<tr>
<td>11 Voice prompts sound faint or distorted.</td>
<td>Low battery power.</td>
<td>• Replace the battery immediately.</td>
</tr>
<tr>
<td>12 AED operates but LCD is blank.</td>
<td>Operating temperature is too low or too high. LCD not operating properly.</td>
<td>• Operate the AED between 0° and 50°C (32° to 122°F). • Contact authorized service personnel.</td>
</tr>
<tr>
<td>13 AED turns off or will not turn on.</td>
<td>Depleted battery. Disconnected battery.</td>
<td>• Replace the battery immediately. • Install battery.</td>
</tr>
</tbody>
</table>
### Table 6.2 Troubleshooting during modem data transfer

<table>
<thead>
<tr>
<th>Observation</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| 1. BUSY and WILL RE-DIAL IN XX SECONDS messages | Destination number is busy, the AED is preparing to retry. | • Wait for the AED to retry the data transfer.  
• AED will retry up to three times. |
| 2. TRY AGAIN, TO SEND PUSH or CANNOT SEND messages | Wrong phone number.  
Cable is not properly connected.  
Modem is not connected to an analog telephone line.  
Incorrect modem selected in Setup menu.  
Custom Modem Init String is incorrect.  
Dial string for destination site is incorrect.  
Computer power at destination is not on.  
Computer application program is not ready.  
Connection is busy. AED has tried to send data three times. | • Check the destination phone number and MODEM PHONE NUMBER setup option.  
• Check connections.  
• Confirm that the telephone line is analog (not digital).  
• Check modem selected in SETUP OPTIONS menu  
• Check MODEM INIT STRING.  
• Check the AED MODEM PHONE NUMBER setup option.  
• Make sure the computer power is on.  
• Make sure the program is ready to receive data.  
• Resend the data. |

### Table 6.3 Troubleshooting during printing

<table>
<thead>
<tr>
<th>Observation</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| 1. Printer does not print | No printer power  
No printer paper  
Printer cable not connected  
Wrong type of printer | • Make sure the printer cord is connected.  
• Make sure the printer switch is on.  
• Check the printer paper.  
• Check the printer cable connections.  
• Check the printer to make sure that it is EPSON ESC/P-compatible. |
<p>| 2. CONNECT ELECTRODES message | The ► button was not held down when the AED was turned on. | • Hold down the ► button while turning on the AED. |</p>
<table>
<thead>
<tr>
<th>Screen Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYZING NOW</td>
<td>The AED is analyzing the patient ECG rhythm.</td>
</tr>
<tr>
<td>AUDIO RECORDING</td>
<td>Setup mode message for the audio recording option.</td>
</tr>
<tr>
<td>AUTO ANALYZE</td>
<td>Setup mode message for the auto analyze option.</td>
</tr>
<tr>
<td>BATTERY OK</td>
<td>The battery voltage is ok.</td>
</tr>
<tr>
<td>BUSY</td>
<td>While attempting to transfer data by modem, the AED detected that the destination phone number was busy.</td>
</tr>
<tr>
<td>CALL SERVICE</td>
<td>The AED detected a fault requiring immediate service during self-tests.</td>
</tr>
<tr>
<td>CANNOT SEND</td>
<td>The AED could not print a report or transfer data through a modem.</td>
</tr>
<tr>
<td>CHARGE REMOVED</td>
<td>The SHOCK button has been disarmed.</td>
</tr>
<tr>
<td>CHECK FOR PULSE</td>
<td>AED prompt after each standard three-shock sequence or NO SHOCK ADVISED message.</td>
</tr>
<tr>
<td>CONNECT ELECTRODES</td>
<td>The AED has detected that the electrodes are disconnected.</td>
</tr>
<tr>
<td>CPR TIME xx SEC</td>
<td>Setup mode message for the CPR timer option.</td>
</tr>
<tr>
<td>DEVICE ID xxxxxxxxx</td>
<td>Setup mode message for device ID option.</td>
</tr>
<tr>
<td>ENERGY SEQUENCE #2-xx</td>
<td>Setup mode message for energy sequence option.</td>
</tr>
<tr>
<td>IF NO PULSE</td>
<td>AED prompt that follows the CHECK FOR PULSE message.</td>
</tr>
<tr>
<td>LOW BATTERY</td>
<td>The battery voltage is low.</td>
</tr>
<tr>
<td>MODEM INIT STRING</td>
<td>Setup mode message for the modem initialization string option.</td>
</tr>
<tr>
<td>MODEM PHONE NUMBER</td>
<td>Setup mode message for the modem phone number option:</td>
</tr>
<tr>
<td>MODEM SELECTION #xx</td>
<td>Setup mode message. You may select the configuration for one of nine Hayes compatible modems.</td>
</tr>
<tr>
<td>MOTION DETECTED</td>
<td>The AED detects motion during ECG analysis, thereby inhibiting analysis.</td>
</tr>
<tr>
<td>NO SHOCK ADVISED</td>
<td>The AED has analyzed the patient ECG and detected a non-shockable ECG rhythm.</td>
</tr>
<tr>
<td>PUSH ANALYZE</td>
<td>Press ANALYZE to begin ECG analysis.</td>
</tr>
<tr>
<td>PUSH SHOCK</td>
<td>The AED has analyzed the patient ECG and determined that shockable therapy is possible to deliver. Press SHOCK to discharge.</td>
</tr>
<tr>
<td>REPLACE BATTERY</td>
<td>The battery voltage is very low.</td>
</tr>
<tr>
<td>SELF-TEST xx xx</td>
<td>The self-test is being performed and software version xxxxx is installed.</td>
</tr>
<tr>
<td>SEND COMPLETE</td>
<td>The AED successfully transferred data to a printer or by modem.</td>
</tr>
<tr>
<td>SENDING xx% COMPLETE</td>
<td>The AED is transferring data by modem or to a printer. The transfer is xx% complete.</td>
</tr>
<tr>
<td>SETUP MODE mmnnnnnnn</td>
<td>The AED is in the setup mode. The mmnnnnn is the Device Configuration code.</td>
</tr>
<tr>
<td>SHOCK ADVISED</td>
<td>The AED has analyzed the patient ECG rhythm and detected a shockable ECG rhythm.</td>
</tr>
<tr>
<td>STAND CLEAR</td>
<td>The AED prompt to move everyone away from the patient.</td>
</tr>
<tr>
<td>START CPR</td>
<td>The AED prompt that follows the IF NO PULSE message.</td>
</tr>
<tr>
<td>STOP MOTION</td>
<td>See MOTION DETECTED.</td>
</tr>
<tr>
<td>TEST MODE</td>
<td>The AED has entered the test mode.</td>
</tr>
<tr>
<td>TEST OK</td>
<td>The external test load test has been successfully completed.</td>
</tr>
<tr>
<td>TO PRINT PUSH</td>
<td>The AED is connected to a printer and ready to print a report.</td>
</tr>
<tr>
<td>TO SEND PUSH</td>
<td>The AED is connected to a modem and ready to transfer data.</td>
</tr>
<tr>
<td>TRY AGAIN</td>
<td>The AED is ready for you to retry transferring data by modem.</td>
</tr>
<tr>
<td>WILL RE-DIAL IN xx SECONDS</td>
<td>While attempting to transfer data by modem, the AED detected that the destination phone number was busy. The AED will try again in xx seconds.</td>
</tr>
</tbody>
</table>
### Table 6-5: LIFEPAK 500 AED voice prompts

<table>
<thead>
<tr>
<th>Voice Prompt</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYZING NOW, STAND CLEAR</td>
<td>The AED is analyzing the patient ECG rhythm.</td>
</tr>
<tr>
<td>CHECK FOR PULSE</td>
<td>Check the patient for a pulse.</td>
</tr>
<tr>
<td>CONNECT ELECTRODES</td>
<td>The AED detects that the electrodes are disconnected.</td>
</tr>
<tr>
<td>IF NO PULSE, START CPR</td>
<td>If patient pulse is not present, start CPR.</td>
</tr>
<tr>
<td>IF NO PULSE, PUSH ANALYZE</td>
<td>If patient pulse is not present, press ANALYZE.</td>
</tr>
<tr>
<td>MOTION DETECTED, STOP MOTION</td>
<td>The AED detects motion during ECG analysis.</td>
</tr>
<tr>
<td>NO SHOCK ADVISED</td>
<td>The AED has analyzed the patient ECG and detected a non-shockable ECG rhythm.</td>
</tr>
<tr>
<td>PUSH ANALYZE</td>
<td>Press ANALYZE to begin ECG analysis.</td>
</tr>
<tr>
<td>REPLACE BATTERY</td>
<td>The battery voltage is low and must be replaced immediately.</td>
</tr>
<tr>
<td>SHOCK ADVISED</td>
<td>The AED has analyzed the patient ECG and detected a shockable ECG rhythm.</td>
</tr>
<tr>
<td>STAND CLEAR, PUSH TO SHOCK</td>
<td>The AED is fully charged and ready to provide therapy. This is the AED prompt to move everyone away from the patient, then press SHOCK to discharge.</td>
</tr>
</tbody>
</table>

### Table 6-6: LIFEPAK 500 AED event types

<table>
<thead>
<tr>
<th>Event Log Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER ON</td>
</tr>
<tr>
<td>PATIENT CONNECTED</td>
</tr>
<tr>
<td>ANALYSIS X</td>
</tr>
<tr>
<td>SHOCK X - XXXX</td>
</tr>
<tr>
<td>CPR PROMPT</td>
</tr>
<tr>
<td>CHECK PATIENT</td>
</tr>
<tr>
<td>CHARGE REMOVED</td>
</tr>
<tr>
<td>BATTERY REMOVED</td>
</tr>
<tr>
<td>BATTERY REPLACED</td>
</tr>
<tr>
<td>MOTION DETECTED</td>
</tr>
<tr>
<td>ANALYSIS STopped</td>
</tr>
<tr>
<td>OUT OF EVENT MEMORY</td>
</tr>
<tr>
<td>OUT OF ECG MEMORY</td>
</tr>
<tr>
<td>OUT OF SCENE AUDIO MEMORY</td>
</tr>
<tr>
<td>POWER OFF</td>
</tr>
</tbody>
</table>

**Event Log Summary**

- FIRST ANALYSIS
- FIRST SHOCK
- IF SHOCK(S) DELIVERED

1. These events and all voice prompts may appear in the Event Log Report.
Appendix
SHOCK ADVISORY SYSTEM

This section describes the basic function of the Shock Advisory System (SAS).
Overview of the Shock Advisory System

The Shock Advisory System (SAS) is an ECG analysis system built into the LIFEPAK 500 AED that advises the operator if it detects a shockable or non-shockable rhythm. This system makes it possible for individuals not trained to interpret ECG rhythms to provide potentially-lifesaving therapy to victims of ventricular fibrillation or pulseless ventricular tachycardia. The Shock Advisory System contains the following features:

- Electrode contact determination
- Automated interpretation of the ECG
- Operator control of shock therapy
- Continuous Patient Surveillance System
- Motion detection

Electrode Contact Determination

The patient's transthoracic impedance is measured through the QUIK-COMBO electrodes. If the baseline impedance is higher than a maximum limit, it is determined that the electrodes are not in sufficient contact with the patient or not properly connected to the AED. ECG analysis and shock delivery are inhibited. The operator is advised to connect electrodes to ensure adequate contact.

Automated Interpretation of the ECG

The Shock Advisory System is designed to recommend a shock if it detects the following:

- Ventricular fibrillation - with a peak-to-peak amplitude of at least 0.08mV.
- Ventricular tachycardia - defined as having a heart rate of at least 120 beats per minute, QRS width of at least 0.16 seconds, and no apparent P-waves.

The Shock Advisory System is designed to recommend no shock for all other ECG rhythms including asystole, pulseless electrical activity, idioventricular rhythms, bradycardia, supraventricular tachycardias, and normal sinus rhythms.

ECG analysis is performed on consecutive 2.7-second segments of ECG. The analysis of two out of three consecutive segments must agree before a decision (SHOCK ADVISED or NO SHOCK ADVISED) is made.

Operator Control of Shock Therapy

The Shock Advisory System causes the AED to charge automatically when it detects the presence of a shockable rhythm. When a shock is advised, the operator remains in control of when the shock is delivered.

Continuous Patient Surveillance System

The Continuous Patient Surveillance System (CPSS) automatically monitors the patient's ECG rhythm for a potentially shockable rhythm while the electrodes are attached and the AED is turned on. CPSS is not active during ECG analysis or when the operator is in a CPR cycle.

Motion detection is not active during the CPSS. Therefore, there is a chance that motion distortion in the ECG rhythm may be interpreted by CPSS as a potentially shockable rhythm.
Motion Detection

The Shock Advisory System detects patient motion independent of ECG analysis. A motion
detector is designed into the LIFEPAK 500 AED.

Motion can be caused by CPR, rescuer movement, patient movement, vehicle movement, or other
causes. If variations in the transcutaneous impedance signal exceed a maximum limit, it is
determined that patient motion of some kind is present. ECG analysis is inhibited until the motion
ceases. The operator is advised any time motion is detected during an analysis by a displayed
message, a voice prompt, and an audible alert. If the motion does not cease within 20 seconds,
analysis attempts will stop until the operator presses the ANALYZE button again. If the motion does
cease within 20 seconds, ECG analysis proceeds automatically.

There are two reasons why ECG analysis is inhibited when motion is detected:

1. Such motion may cause artifact in the ECG signal. This artifact can cause a nonshockable ECG
   rhythm to look like a shockable rhythm. For example, chest compressions during asystole can look
   like shockable ventricular tachycardia. Artifact can also cause a shockable ECG rhythm to look like
   a nonshockable rhythm. For example, chest compressions during ventricular fibrillation can look
   like an organized and, therefore, nonshockable rhythm.

2. The motion may be caused by a rescuer's interventions. To reduce the risk of inadvertently
   shocking a rescuer, the motion alert prompts the rescuer to move away from the patient. This will
   stop the motion and ECG analysis will proceed.
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