

# INSTRUCTION MANUAL

## DELTA 1500

Automatic Defibrillator Analyzer



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[www.Netech.org](http://www.Netech.org)

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## **Quality Assurance**

Netech is ISO 9001-2000 Certified. This instrument was thoroughly tested and inspected according to Netech's ISO 9001-2000 quality standards and test procedures and found to meet those specifications when it was shipped from the factory.

## **Warranty**

Netech warrants the DELTA 1500 against defects in materials and workmanship for one year from the date of original purchase. The standard warranty is extended for a second year if the instrument is returned to Netech for its recommended yearly recalibration.

During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you return the product shipping prepaid to Netech Corporation. This warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification by other than Netech Corporation, or if its serial number is defaced or removed.

Netech reserves the right to discontinue the DELTA 1500 at any time, and change its specifications, price, or design without notice and without incurring any obligation. Netech guarantees availability of service parts for 5 years after the manufacture of the unit is discontinued.

The warranty is void if the instrument is serviced and / or calibrated by someone other than Netech.

***The purchaser assumes all liability for any damages or bodily injury which may result from the use or misuse of the unit by the purchaser, his employees, agents, or customers.***

In no event shall Netech Corporation be liable for consequential damages

### **Trademarks**

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## ***Safety Considerations***

***Defibrillators deliver high voltage shocks to a patient in order to stop a heart attack. The Defibrillator discharge pulse is potentially dangerous. Before attempting to use the DELTA 1500 become thoroughly familiar with the defibrillator under test and follow the manufacturer's safety protocols.***

# GENERAL INFORMATON

## Introduction

The DELTA 1500 is designed for use by qualified technical personnel. Before attempting to operate the DELTA 1500, observe the safety precautions listed below. To avoid a potential shock hazard, the operator must be familiar with both the DELTA 1500 and the defibrillator being tested. Refer to the operating manual of the defibrillator for additional safety considerations.

***Defibrillators deliver high voltage shocks to a patient in order to stop a heart attack. The defibrillator pulse is potentially dangerous.***

## Safety Considerations

If any fluid is spilled on the DELTA 1500 or it is dropped, do not use it until it is thoroughly tested.

Do not touch the input connectors of the DELTA 1500.

Use only the interface cables provided with the DELTA 1500 or cables recommended for use with the Delta 1500.

Replace the battery when the low battery indicator is ON.

# PRODUCT DESCRIPTION

## Introduction

The DELTA 1500 is a compact, state of the art defibrillator analyzer designed for testing the performance of semi-automatic and Automatic External Defibrillators (AED).

## Features

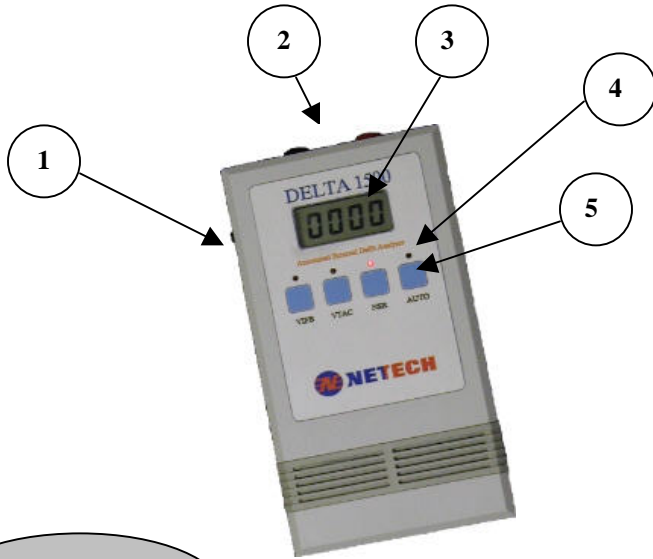
Automatic and semi-automatic defibrillators recognize patient waveforms and provide a discharge energy pulse.

The DELTA 1500 tests both of these parameters. It simulates Ventricular Fibrillation (VIFB), Ventricular Tachycardia (VTAC), and Normal Sinus Rhythm (NSR) waveforms; and it measures the discharged energy of the defibrillator.

An internal 50 Ohm load simulates the human body.

The simulated waveforms, VIFB, VTAC and NSR are output through the internal load resistance. When the AUTO function of the DELTA 1500 is selected, the dis-arrhythmia waveform automatically changes to Normal Sinus Rhythm following the energy discharge. This prevents unnecessary discharges of the AED in order to preserve the battery life.

## Instrument Familiarity



1. Power ON/ OFF Switch
2. AED Input Jacks.
3. LCD Display
4. LED Indicator
5. Function Switch

# OPERATING INSTRUCTIONS

## Setup

The DELTA 1500 is simple to operate and requires minimum setup, however, the user must read the manual thoroughly for safe and proper operation.

One 9-volt alkaline battery powers the DELTA 1500. The instrument is shipped with a fresh battery. To replace the battery open the battery compartment located below the ECG leads in the rear of the unit.

The DELTA 1500 utilizes a large four-digit LCD display to indicate the discharge energy.

The three waveforms and the 'AUTO' function are selected by push buttons. An LED above each button lights to indicate the selected test waveform and function selected.

## Testing Semi - Automatic and Automatic Defibrillators

Refer to the service manual of the defibrillator manufacturer for specific device inspection requirements.

***Observe all safety precautions. For Fully automatic defibrillators use the correct paddle adapter for the defibrillator under test.***

***Defibrillator discharge voltages are potentially dangerous. To avoid potential shock hazards, observe all safety procedures for the safe handling of the instrument before attempting to test the defibrillator***



## Instructions

1. Connect the DELTA 1500 to the AED using the correct interface cable.
2. Turn the DELTA 1500 on by moving the ON/OFF switch on the side of the instrument to the ON position. The LCD display will show four flashing zeros and the LED above the FVIB button will be lit.
3. Select a waveform by pushing a button:  
VFIB – ventricular fibrillation – default waveform  
VTAC – ventricular tachycardia at 140 bpm.  
NSR – normal sinus rhythm at 90 bpm  
The LED above the selected waveform will light.
4. Follow the instructions of the AED. The AED will analyze the waveform. If a shock is advised the AED will indicate that its SHOCK button should be pressed.
5. When a shock is delivered, the energy of the shock will be displayed in Joules on the LCD of the DELTA 1500.
6. If the AUTO function is selected along with a waveform, the selected waveform will automatically change to NSR after a shock is delivered. The AED will then recognize the Normal Sinus Rhythm waveform and no additional shock will be advised.

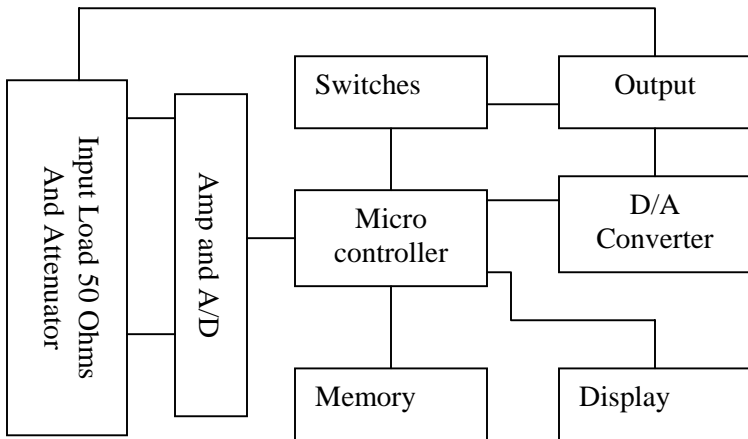
### Note:

*To preserve the battery life of the AED it is recommended that the AUTO function be used. It may be advisable to have a spare battery available.*

# THEORY OF OPERATION

## Introduction

The DELTA 1500 is a precision micro controller based device that performs tests on automatic and semi-automatic defibrillators. This instrument utilizes modern analog to digital converter techniques to capture the defibrillator discharge waveform.



*DELTA 1500 Circuit Block Diagram*

## Description

DELTA 1500 circuitry is divided into eight functional blocks. The input load and attenuator block consist of the precision 50 Ohm high watt resistor and attenuation resistors. The discharged waveform is attenuated and buffered and fed to a 13 Bit (12 Bit + sign bit) A/D converter interfaced with an 8 bit Microcontroller, Philips P80C52. The waveform is sensed by the A/D and sampled at a rate of 1000

times per second and saved in the memory. The captured waveform is time scaled to 1:200 and dumped into a 12-bit D/A converter. The micro controller computes the energy content of the waveform and displays the result on the LCD display.

The accuracy of the DELTA 1500 is maintained by a precision calibrated voltage source, a crystal oscillator running at 11.0592 MHz and a set of 0.1% load resistors and attenuation resistors. The unit is factory calibrated with N. I. S. T. traceable standards. In order to ensure the specified accuracy, factory recalibration is recommended on an annual basis.

## SPECIFICATIONS

Internal Test load: 50 Ohms  $\pm$  1%

Pulse Width: 1- 65 ms

### Energy

Range: 0 – 500 Joules

Resolution: 1 Joule

Accuracy:  $\pm$  2% Reading  $\pm$  2 Joules

### Waveform Simulation:

VFIB - ventricular fibrillation

VTAC - ventricular tachycardia @ 140 bpm

NSR - normal sinus rhythm @ 90 BPM

Display: 4 Digit 0.5 inch LCD display

Power: 9 Volt alkaline battery  
or AC adapter.

Weight: 1.5 lb (0.6 Kg)

Dimensions: 8 x 4 x 2.5 inches  
(20.4 x 10.2 x 6.4 cm)

Optional Adapters: Interface cables are available for most AEDs.

Contact Netech Customer Service Department for specific part numbers 800-547-6557.

# TEST AND CALIBRATION

## Introduction

Before attempting to test a defibrillator with the DELTA 1500 and to avoid a potential shock hazard, please observe the safety precautions for the DELTA 1500 and the defibrillator.

## Performance Check

This check is recommended upon initial receipt of the instrument. Before proceeding with the test, inspect the instrument thoroughly to ensure that no visual damage occurred during shipping.

The DELTA 1500 is shipped with a 9 Volt Alkaline battery. Turn the unit on by moving the Power Switch to 'ON'. If the battery voltage is below 6.8 Volts, the display will indicate 'LOP'. Turn the DELTA 1500 off and replace the battery.

If the battery is good, the LCD will flash '000'. Connect the DELTA 1500 to the AED using the recommended interface cable. If the defibrillator being tested has a display, the waveform selected will appear.

## **Calibration**

The DELTA 1500 is factory calibrated, thoroughly tested, and meets Netech's ISO 9001-2000 quality standards. Calibration measurement standards are traceable to the National Institute of Standards and Technology (NIST). Calibration should be performed only by qualified personnel. Any attempt to tamper with the calibration seal will void the warranty.

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**1-800-547-6557**

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