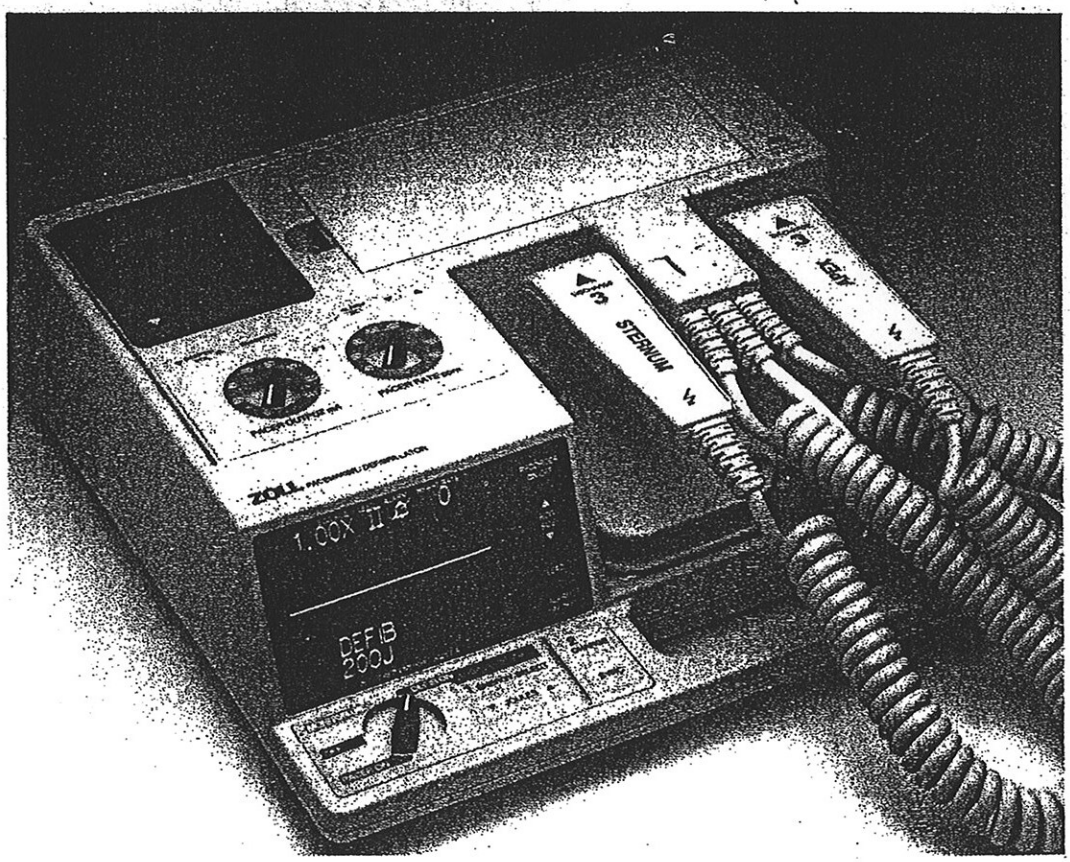
Operator's Manual



ZOLL
PD™ 1400 Pacemaker/Defibrillator
D 1400 Defibrillator

CONTENTS

PREFACE

This manual provides information necessary for the use and care of the ZOLL PD 1400 Pacemaker/Defibrillators and D 1400 Defibrillators. The D 1400 does not include the external pacing capability.

Persons using the ZOLL PD 1400/D 1400 should be appropriately trained, skilled personnel familiar with the use of this device. Training appropriateness, such as Advanced Cardiac Life Support (ACLS) and Basic Life Support (BLS), should be the determination of the prescribing physician.

ZOLL Medical Corporation manufactures a comprehensive and compatible line of cardiac resuscitation equipment. The ZOLL D 900 Defibrillator, PD 1200 Pacemaker/Defibrillator, PD 1400 Pacemaker/Defibrillator, D 1400 Defibrillator and PD 2000 Pacemaker/Defibrillator and D 2000 Defibrillator have been designed so use of each model is complementary. The operator will find that each model is similar in look and operation. Controls and switches have been designed to operate in a similar manner, and therapies are applied in the same sequence. The PD 1200, PD 1400, and PD 2000 use the same Noninvasive Temporary Pacing electrodes, and all ZOLL models can be configured to use ZOLL Multi-Function Pacing/Defibrillation Electrodes and ZOLL Stat Padz Multi-Function Pacing/Defibrillation Electrodes.

This manual should be kept with the PD 1400/D 1400 at all times.

SECTION DESCRIPTIONS

Section 1 General Information

Provides cautions and warnings and a general product overview. Describes basic pacemaker (as used on the PD 1400), defibrillator, monitor, and recorder functions as well as battery packs, battery charger, diagnostics and Multi-Function Electrode/paddle options. Includes detailed product specifications, important ZOLL service information, and ZOLL's warranty statement.

Section 2 Operating Controls and Indicators

Locates and describes the function of all switches, controls, and indicator lights. Describes Summary Report operation and recorder configuration.

Section 3 Multi-Function Electrodes

Introduces the ZOLL Multi-Function Electrodes. Describes general application and use of the Multi-Function Cable and ZOLL Multi-Function Electrodes.

PACKING LIST

- ZOLL PD 1400 Pacemaker/Defibrillator or ZOLL D 1400 Defibrillator
- 1 Rechargeable battery pack
- External Apex/Sternum defibrillator paddles with built-in pediatric electrodes
- 1 ECG cable
- 2 rolls recorder paper
- 2 Operator's manuals
- Service Manual (not included in shipment - supplied on request)

SECTION 1

GENERAL INFORMATION

SAFETY CONSIDERATIONS

The ZOLL PD 1400/D 1400 are high energy devices capable of delivering up to 360 joules. To completely deactivate these devices, you must turn the **SELECTOR SWITCH** to the **OFF** position.

In order to disarm a charged defibrillator:

- Turn the **SELECTOR SWITCH** to **MONITOR ON** (or **PACER ON** on PD 1400 only),

  or

- Change the defibrillator energy selected value,

  or

- If using paddles, place them in their holders, depress and hold both **DISCHARGE** buttons simultaneously.

As a safety feature, the ZOLL PD 1400/D 1400 will automatically discharge internally if left charged for more than 60 seconds.

WARNINGS

- Federal (U.S.A.) law restricts this device to use by or on the order of a physician.
- Emergency defibrillation should be attempted only by appropriately trained, skilled personnel that are familiar with equipment operation. Training appropriateness, such as Advanced Cardiac Life Support certification, should be the determination of the prescribing physician.
- These operating instructions describe the functions and proper operation of the ZOLL PD 1400/D 1400. They are not intended as a substitute for a formal training course. Operators should attend a formal training course conducted by an appropriate authority.

WARNINGS

- Internal implanted pacemakers may cause the heart rate meter to count the pacemaker rate during incidences of cardiac arrest or other arrhythmias. Pacemaker patients should be carefully observed. Check the patient's pulse; do not rely solely on heart rate meters. Dedicated pacemaker detection circuitry may not detect and display all implanted pacemaker spikes; patient history and physical exam are important in the determination of the presence of an implanted pacemaker.
- Do not discharge with paddles or electrodes shorted together or in open air. Stand clear of patient when defibrillating.
- Do not discharge into Multi-Function Electrodes that are not properly placed on a patient.
- Always carry a fully charged spare PD 4410 battery pack with the unit. Replace the battery immediately when a "LOW BATTERY" message is displayed.
- Using the device near or within puddles of water is a shock hazard to the operator, patient, and nearby personnel.
- Do not touch the bed, patient, or any equipment connected to the patient during defibrillation. A severe shock can result.
- Warn all persons in attendance of the patient to STAND CLEAR prior to defibrillator discharge.
- To avoid risk of electrical shock to the operator, do not allow electrolyte gel to accumulate on hands.
- Avoid touching the gelled area of the electrodes while pacing (PD 1400 only) or defibrillating. Touching the gelled area of the electrodes presents an electrical shock hazard.

CAUTIONS

- Do not sterilize the PD 1400/D 1400.
- Do not immerse any part of the PD 1400/D 1400 in water.
- Do not use alcohol or ketones (MEK, acetone, etc.) on the PD 1400/D 1400.
- Avoid using abrasives (e.g., paper towels) on the monitor window.

Symbols Used on the Equipment

Any or all of the following symbols may be used in this manual or on this equipment:


Type BF patient connection.


Type CF patient connection.


Defibrillation protected Type BF patient connection.


Defibrillation protected Type CF patient connection.


DANGER High voltage present.


ATTENTION Refer to manual for more information.


Fusible link.


Protective (earth) ground terminal.

1. **Resuscitation from standstill or bradycardia of any etiology**
   Noninvasive pacing has been used for resuscitation from standstill or temporary acceleration of bradycardia in Stokes-Adams disease, sick-sinus syndrome, reflex vagal standstill and drug-induced standstill (due to procainamide, quinidine, digitalis, b-blockers, verapamil, etc.), and unexpected circulatory arrest (due to anesthesia, surgery, angiography, and other therapeutic or diagnostic procedures). It is safer, more reliable, and more rapidly applied in an emergency than endocardial or other temporary electrodes.

2. **As a standby when standstill or bradycardia might be expected**
   As a stand-by when arrest or symptomatic bradycardia might be expected, the external pacer is used especially in pacemaker procedures (e.g., acute myocardial infarction, drug toxicity, anesthesia, or surgery, especially when disturbances of rhythmicity or conduction are present). Prophylactic placement of endocardial electrode, which carries risks of displacement, infection, hemorrhage, embolization, perforation, phlebitis, and mechanical or electrical stimulation of ventricular tachycardia and fibrillation, can be avoided.

3. **Suppression of tachycardia**

   An increase in heart rate from external pacing often suppresses ventricular ectopic activity and may prevent tachycardia.

Pacemaker Complications

Ventricular fibrillation will not respond to pacing and requires immediate defibrillation. (See Section 4 for Emergency Defibrillation Procedure.) The patient's dysryhthmia must therefore be determined immediately, so that appropriate therapy can be employed. If the patient is in ventricular fibrillation and defibrillation is successful, but cardiac standstill ensues (asystole), the pacemaker should be used.

Ventricular or supraventricular tachycardias may be interrupted with pacing but in emergency or circulatory collapse, synchronized cardioversion is faster and more certain. (See Section 5 for Synchronized Cardioversion Procedure.)

Electromechanical dissociation may occur following prolonged cardiac arrest or in other disease states with myocardial depression. Pacing may then produce ECG responses without effective mechanical contractions, and other treatment is required.

Intended Use — Defibrillator

This product is to be used only by qualified medical personnel for converting ventricular fibrillation (VF), a cardiac rhythm incompatible with life, to sinus rhythm or other cardiac rhythms capable of producing hemodynamically significant heart beats.

In addition, this product may be used in the synchronized mode to terminate certain atrial and ventricular tachycardias and other arrhythmias resistant to drug therapy. A qualified physician must decide when synchronized cardioversion is appropriate.

Defibrillator Complications

Inappropriate defibrillation or cardioversion on a patient (e.g., with no malignant arrhythmia) may precipitate ventricular fibrillation, asystole, or other dangerous arrhythmias. Defibrillation without proper application of paddle electrolyte gel may be ineffective and cause burns, particularly when repeated shocks are necessary. Erythema or hyperemia of the skin under the paddles or electrodes often occurs; this effect is usually enhanced along the perimeter of the paddle or electrode. This reddening should substantially diminish within 72 hours.

Defibrillator Output Energy

The ZOLL PD 1400/D 1400 deliver up to 360 joules into a 50 ohm impedance. The energy delivered through the chest wall, however, is controlled by skin impedances. An adequate amount of electrolyte gel must be applied to the paddles and a force of 10-12 kilograms must be applied to each paddle in order to minimize skin impedance. If Multi-Function Electrodes are used, make sure that they are properly applied. (See Section 3)

MONITOR FUNCTION

These products contain a non-fade monitor for observation of the patient's cardiac rhythm. The monitor displays the ECG in moving trace mode at 25 mm/sec for a period of 3.4 seconds.

Also displayed on the monitor are:

- heart rate, derived from measuring R to R intervals
- lead selections - I, II, III, PADDLES, or ELECTRODES
- ECG size - .5, 1.0, 1.5, 2.0, 3.0 cm/mV
- defibrillator output in joules
- pacemaker output in milliamps (PD 1400 only)
- other operational prompts, messages, and diagnostic codes

detect a fault. During operation, a "STATUS XX" message will indicate if a fault has been detected. If this occurs, contact authorized service personnel. In the U.S.A., contact ZOLL Medical's Technical Service Department, telephone 1-800-348-9011.

RESTARTING DEVICE

A number of events may occur that require the PD 1400 to be restarted after it has shut down or become inoperative (for example, when the battery has run out of capacity and the unit automatically shuts down). The **SELECTOR SWITCH** should always be turned to the **OFF** position before taking action. The **SELECTOR SWITCH** may then be turned to the desired operating mode to resume operation. This sequence is recommended for restarting the device, and can also be used to clear some **"STATUS XX"** messages, if immediate use is required. Note that some settings (for example, alarm settings, lead selection, ECG size) may need to be restored from their default values when operation is resumed.

SERVICE

The ZOLL PD 1400 Pacemaker/Defibrillator and D 1400 Defibrillator should provide trouble-free operation without periodic recalibration or adjustment. Appropriately trained and qualified personnel should perform periodic routine tests of the device to verify proper operation. (See Section 8.)

U.S.A. Customers

Should the ZOLL PD 1400/D 1400 require service, it should be returned, in its original container, to:

ZOLL Medical Corporation
32 Second Avenue,
Burlington, Massachusetts 01803-4420,
Attn: Technical Service Department

Loaner instruments are available for use while repairs are being completed. To request loan equipment, contact ZOLL Medical at 1-800-348-9011 (in Massachusetts: 1-617-229-0020). Please have the following information available to expedite service:

- The device's serial number
- A description of the problem
- Department where equipment is in use
- Sample ECG strips documenting problem (if available)
- A Purchase Order to allow tracking of loan equipment

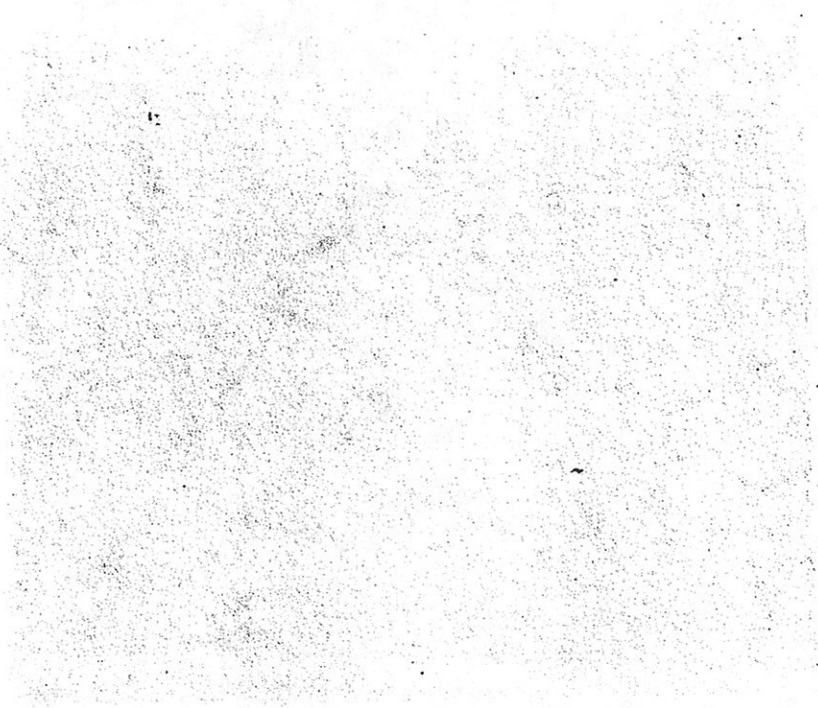
Power	Sealed lead acid battery; 2V/cell, 5 cells, wired in series.
Design Standards	Meets or exceeds all AAMI specifications for for defibrillators. Meets or exceeds UL 544 and CSA standards for medical equipment and MIL-STD-810E, Method 507.3 MIL-STD 810D Method 514.3, Section I-3.2.3, Category 3 MIL-STD-810E, Method 501.3 MIL-STD-810-D, Method 500.2 MIL-STD-202F, Method 213, Condition C MIL-STD-810E, minimum integrity test for helicopters
Patient Safety	All patient connections are electrically isolated.
Environmental	Temperature: 0°C to 55°C (operating). -40°C to 75°C (storage and shipping). Humidity: 5% to 95% relative humidity, non-condensing.

Pacemaker (PD 1400 only)

Type	VVI demand; asynchronous (fixed rate) when used without ECG leads.
Pulse Type	Rectilinear, constant current.
Pulse Duration	40 milliseconds.
Pulse Amplitude	Variable to 140 mA.
Pacing Rate	Variable from 30 to 180 ppm.
Output Protection	Fully defibrillator protected and isolated.
Pacer On	Message display on monitor.
Pacer Electrodes	Specifically designed adult anterior/posterior pre-gelled ZOLL pacing, Multi-Function pacing/ defibrillation electrodes, or Multi-Function Stat Padz, packaged in pairs. ZOLL pediatric pacing, Multi-Function pacing/defibrillation electrodes, or Multi-Function Stat Padz are also available.

Implanted Pacemaker Spike Display	Dedicated circuitry detects most implanted pacemaker spikes and provides standard display marker of spike on ECG trace.
Electrical Isolation and Shielding	Input protected against high-voltage defibrillator pulses and radio frequency interference.
Bandwidth	0.5-35 Hz (-3dB) standard - .05-35 Hz Diagnostic (optional).
Display Format	Non-fade, moving trace.
Monitor On	Message display on monitor.
Screen Type	High resolution CRT display.
Screen Size	4.5 inches diagonally (56 mm x 86 mm, viewing area).
Sweep Speed	25 mm/sec.
Viewing Time	3.4 seconds.
Heart Rate	Digital display 0-300 bpm.
Pacer Output Current	Digital display 0-140 mA. (PD 1400 only.)
Lead Selection	Displayed on monitor.
ECG Size	.5, 1.0, 1.5, 2.0, 3.0 cm/mV - display on monitor.
Alarm On/Off Status	Display on monitor. User selectable, High 60-280 bpm, Low 20-100 bpm.
ECG Lead Off	Message display on monitor.
Pacer Lead Off	Message display on monitor. (PD 1400 only.)
Paddle Fault	Message display on monitor.
Electrode Pads Off	Message display on monitor.
Paper Out	Message display on monitor.
Low Battery	Message display on monitor.
Check Patient	Message display on monitor.
Select Defib	Message display on monitor.
Sel. Electrodes	Message display on monitor.

Low Battery Indicator	Message displayed on monitor and 2-beep low battery tone sounds once a minute until just before shutdown, when it will beep twice every 2 seconds. Replace the battery with a fully-charged battery immediately after the "LOW BATTERY" message. The time from display of the "LOW BATTERY" message until the instrument shuts down will vary depending upon the battery age and condition. For a new battery in good condition (fully charged prior to initiating battery operation), the message display-to-shut down will be approximately 40 minutes in monitor mode. For a new battery pack in good condition, the PD 1400/ D 1400 will beep twice every 2 seconds for the last 20 seconds before shut-off due to a low battery. Defibrillator charge time may be extended and "LOW BATTERY" message display-to-shutdown interval may be as short as one minute when older batteries are used.
Operating Time	For a new, fully charged battery pack: 35 defibrillator discharges at maximum energy (360J), or 3.5 hours typical (2.5 hours minimum) of continuous monitoring, or 2.5 hours of continuous monitoring/pacing (PD 1400 only) at 60 mA, 80 beats/min.
Charger	Use ZOLL PD 4420 Battery Support System for recharging battery packs. See Battery Support System Operator's Guide for detailed information about battery charging and capacity evaluation.



SECTION 2

OPERATING CONTROLS AND INDICATORS

1. SELECTOR SWITCH

The **SELECTOR SWITCH** allows selection of any of the operating modes:

MONITOR ON, DEFIB ON, (and PACER ON PD 1400 only)

It also turns the power off. The monitor is always on except in the **OFF** position.

2. DEFIB ENERGY SELECTOR BUTTONS

Two sets of up-down arrow buttons - one set located on the front panel and the other located on the sternum paddle - control the defibrillator energy level. Press and hold the appropriate up ▲ or down ▼ arrow button until the desired energy level is displayed on the monitor.

3. CHARGE

Press the **CHARGE** button on the front panel or, if using paddles, on the apex paddle handle, to charge the defibrillator to the energy level selected with the defib energy selector buttons. When the **CHARGE** button is pressed, the defibrillator charges to the selected energy level in 10 seconds or less, when using fully charged batteries.

To change the selected energy level after the **CHARGE** button has been pressed, simply select a different energy level using the appropriate defib energy selector button and press **CHARGE** again.

If both **DISCHARGE** buttons are pressed before the charge cycle, the PD 1400/ D 1400 will not charge and a "CANNOT CHARGE" message will appear on the monitor.

4. DISCHARGE

The Multi-Function Cable has two **DISCHARGE** buttons mounted in the instrument connector. Both must be pressed and held simultaneously until discharge of the defibrillator occurs.

Each paddle has a **DISCHARGE** button located near the forward end of the handle. Press and hold both buttons simultaneously until discharge of the defibrillator occurs.

Lead II is automatically selected when the instrument powers up in PACER ON (PD 1400 only). ECG monitoring through Multi-Function Electrodes is accomplished by selecting "ELECTRODES." ECG monitoring through the paddles is accomplished by selecting "PADDLES." Paddles monitoring is not available in PACER ON mode in the PD 1400.

11. ALARM ON-OFF

The ALARM ON-OFF button is used to activate and deactivate the heart rate alarm. A bell symbol (🔔) appears in the top center of the monitor. When the alarms are on, a bell appears. When the alarms are off, a line crosses through the bell symbol (🔕). When the alarms are on and an alarm condition is detected, an audible alarm sounds and the bell symbol flashes. To avoid possible confusion with the defibrillator charged tone, the heart rate alarm tone sounds different (different frequency) when the SELECTOR SWITCH is set to DEFIB ON.

12. ECG SIZE

This control allows you to change the display size of the ECG signal. Size options are 0.5, 1.0, 1.5, 2.0, 3.0 cm/mV and are indicated on the monitor in the upper left center of the display.

13. RECORDER ON-OFF

Two buttons—one located on the front panel and the other located on the sternum paddle—start and stop the strip recorder.

14. BEEPER VOLUME (ECG)

The volume control allows manual adjustment of the systole beeper tone from maximum volume to inaudible. (The heart rate alarm and charge ready volumes are not adjustable.)

15. PAPER COMPARTMENT

Opens strip recorder paper storage compartment.

16. ALARM SET

This control allows the user to change the high heart rate alarm setting (pre-set at 150) and low heart rate alarm setting (pre-set at 30). The ▲ button increments the displayed value. The ▼ button decrements the displayed value.

SUMMARY REPORT

Summary Report allows you to store and later retrieve critical ECG event information. PD 1400/D 1400 internal memory automatically records defibrillation and cardioversion segments, PACER ON mode (PD 1400 only), heart rate alarm and ECG segments upon activation of the strip chart recorder. Summary Report records all associated event information including device control settings, patient ECG, time and date.

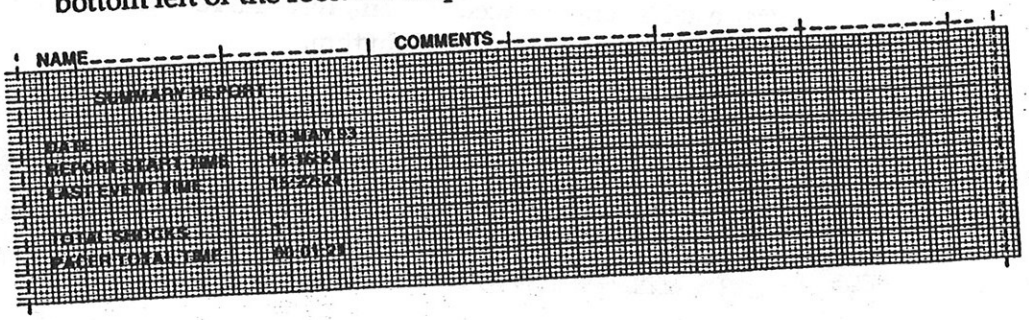
Four events are stored and recorded automatically:

- Defibrillator Discharge
- Selecting PACER-ON mode (PD 1400 only)
- Heart Rate Alarm triggered
- Turning Strip Recorder on (or on and then off in rapid sequence)

Summary Report records each event in chronological order and will store up to 33 defibrillation or 70 recorder activated ECG events. All event data will remain in memory and be accessible until the PD 1400/D 1400 has been off for 5 minutes or if data is manually erased. If the memory is full, a "REPORT FULL" message will appear on the monitor and no further events will be recorded until the current memory is erased.

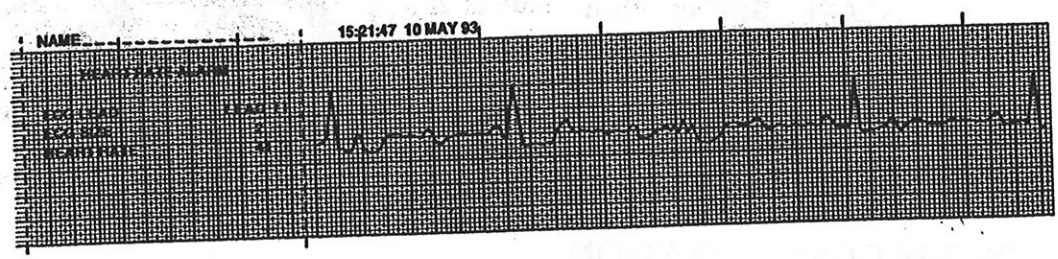
SUMMARY REPORT FORMATS

Summary Report first prints an overview of all the events currently stored in memory including total number of defibrillation shocks delivered, cumulative total pacing time (on PD 1400 only), time the device is turned on (or if you have just manually erased a report, the time of the start of the next report), time of last event as well as the date and space for patient name and comments. All segments have vertical dashed cut lines every 8.5 inches to facilitate easy mounting on 8.5" x 11" paper. On the last event recorded "SUMMARY COMPLETE" will be printed at the bottom left of the recorder strip.



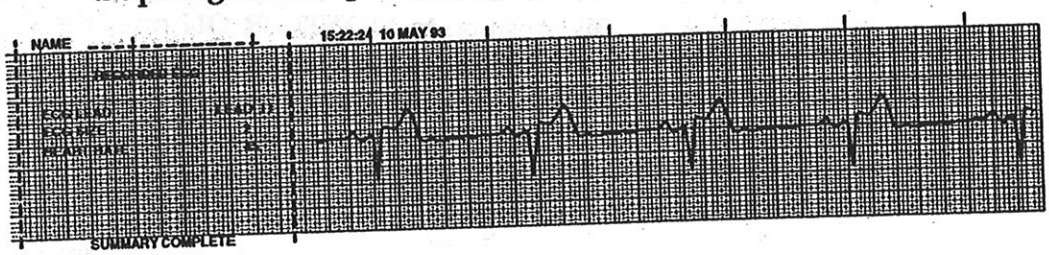
Heart Rate Alarm Activated Format

Summary Report records 6 seconds of pre-alarm patient ECG. Also recorded is the ECG lead, ECG size, patient's heart rate, time, and date. On PD 1400 only, if the pacer is on during this event the pacing rate and pacing current is also recorded.

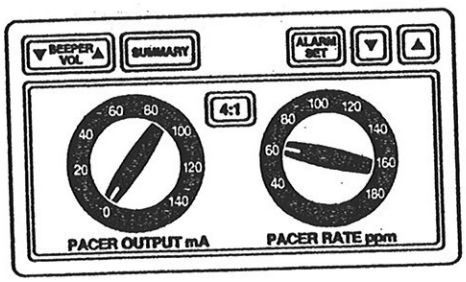


Recorder On Format

Summary Report records 6 seconds of patient ECG prior to turning on the recorder. Also recorded is the ECG lead, ECG size, patient's heart rate, time, and date. On PD 1400 only, if the pacer is on during this event the pacing rate and pacing current is also recorded.



PRINTING A REPORT



To retrieve recorded event reports, press the **SUMMARY** button on the top of the PD 1400/ D 1400. The recorder will print all events currently in the PD 1400's memory in chronological order. If the strip recorder is on or the defibrillator is charging, the **SUMMARY** button is inactive. To stop printing a report, press the **SUMMARY** button again or turn the unit off. You may print an unlimited number of copies of the report simply by pressing the **SUMMARY** button again.

The PD 1400/ D 1400 will interrupt printing a report if the heart rate alarm activates, the defibrillator **CHARGE** button is pressed, or the strip recorder turns on. If report printing is interrupted, press the **SUMMARY** button again.

SECTION 3

MULTI-FUNCTION ELECTRODES

Multi-Function Electrodes are a defibrillation protected Type BF patient connection.

INTRODUCTION

ZOLL Multi-Function Electrodes allow you to perform "hands-off" defibrillation, cardioversion, pacing, and monitoring with a single pair of electrodes.

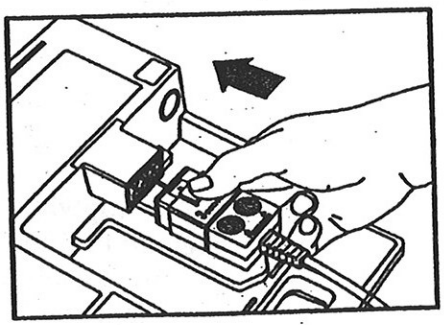
The PD 1400/D 1400 are designed to operate using standard paddles (and ZOLL NTP 2000 pacing electrodes on the PD 1400) or using Multi-Function Electrodes without standard paddles. To switch between standard paddle-electrode and Multi-Function Electrodes, you must remove either the standard paddles and pacing cable or the Multi-Function Cable and attach the other. (See photos at the end of Section 1.)

MULTI-FUNCTION ELECTRODES

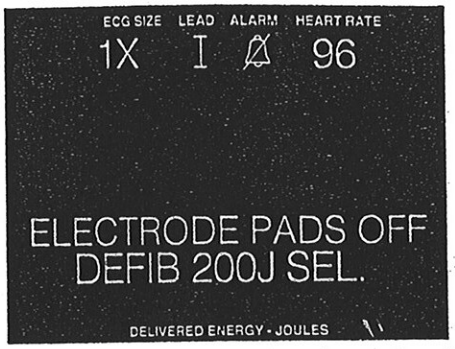
ZOLL Multi-Function Pacing/Defibrillation Electrodes are anterior/ posterior, pre-gelled, disposable electrodes. They are applied to the patient in the same manner and location as standard pacing electrodes. The Multi-Function Electrodes can only be used with a Multi-Function Cable. (ZOLL NTP 2000 pacing electrodes can only be used with a standard pacing cable, and should not be used with the D 1400.)

MULTI-FUNCTION CABLE

The ZOLL PD 4400 Multi-Function Cable connects to the unit in the same manner as the paddles cable. To remove either cable, press the two locking tabs - one on top of the connector and one on the bottom - together and pull the connector out from the PD 1400/D 1400. To install either cable, plug it into the connector. You should ensure the connector is fully seated and the "locking tabs" fully engaged.



"ELECTRODE PADS OFF" MESSAGE



If you attempt to defibrillate with Multi-Function Electrodes and the electrodes are not properly connected or applied to the patient, an "ELECTRODE PADS OFF" message will appear on the monitor after the defibrillator reaches ready. Check to see that all connections have been correctly made before continuing. The PD 1400/D 1400 will maintain its charge for 60 seconds. If the cause of the electrode fault has been fixed within 60 seconds, the operator can discharge the defibrillator without recharging it. If the charge ready tone stops, you must recharge the defibrillator.

SECTION 4

DEFIBRILLATION

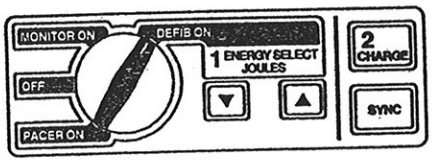
Paddles are a defibrillation protected Type BF patient connection.

ECG leads are a defibrillation protected Type CF patient connection.

EMERGENCY DEFIBRILLATION PROCEDURE WITH PADDLES

Select DEFIB ON

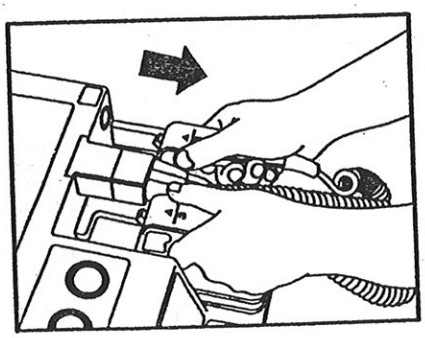
Turn the **SELECTOR SWITCH** to **DEFIB ON.** This turns the power on and automatically selects the energy level of 200 joules. (PD 1400 shown.)



Note Defibrillator "PADDLES" is selected as the ECG source when the instrument is turned to **MONITOR ON** or **DEFIB ON.** You may then select any of the other ECG lead sources - lead I, II, III or PADDLES. (ECG cable and electrodes must already be attached to the patient to use lead I, II or III.)

Prepare Paddles

Remove the paddles from their holders by grasping the handles and pulling the paddles straight out of the PD 1400/D 1400. Apply a liberal amount of electrolyte gel to the electrode surface of each paddle. (Use of electrode gel patches can be substituted for gel applied to paddle surfaces.)



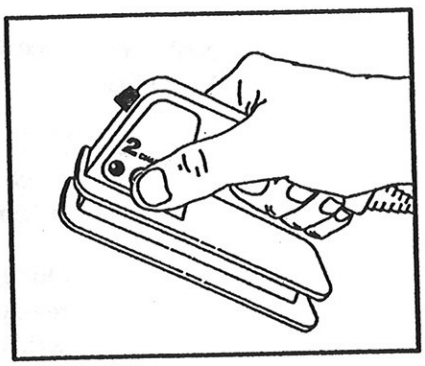
WARNING

- Do not permit gel to accumulate between the paddle electrodes on the chest wall. This could cause burns and reduce the amount of energy delivered to the heart.

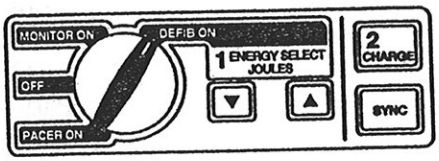
The paddles may be used for ECG monitoring. Use of paddles for ECG monitoring is intended for emergency situations when time does not allow connection of standard monitoring electrodes. The unit automatically pre-selects "PADDLES" when it is initially turned on. Pressing the **LEAD** button (ECG cable and electrodes must already be attached to the patient.) will allow selection of the desired ECG source - lead I, II, III or PADDLES. Paddles monitoring is NOT available in **PACER ON** mode of the PD 1400.

Charge Defibrillator

Press the **CHARGE** button on the front panel or on the apex paddle handle.



To increase or decrease the selected energy after the **CHARGE** button has been pressed, use either the sternum paddle or front panel defib energy select buttons to select the new energy level. (Changing the joules selected value while the unit is charging or charged will cause the unit to discharge the defibrillator internally.) Press the **CHARGE** button again to charge the unit.



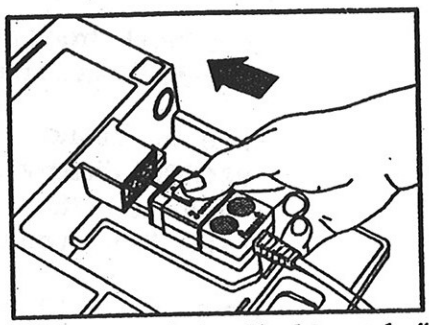
After 6-10 seconds of charging to the selected level, the charge indicator on the apex paddle will light. A distinctive charge ready (continuous) tone sounds and the energy ready "DEFIB XXX J RDY." message displays on the monitor. The defibrillator is now ready.

EMERGENCY DEFIBRILLATION PROCEDURE WITH MULTI-FUNCTION ELECTRODES

Multi-Function Electrodes are a defibrillation protected Type BF patient connection.

ECG leads are a defibrillation protected Type CF patient connection.

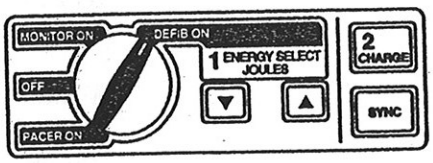
Attach the Multi-Function Cable and Electrodes



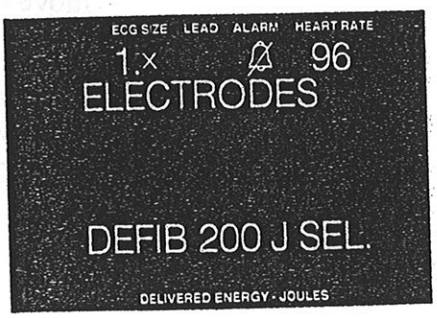
The ZOLL PD 4400 Multi-Function Cable connects to the unit in the same manner as the paddles cable. To remove either cable, press the two locking tabs - one on top of the connector and one on the bottom - together and pull the connector out from the PD 1400/D 1400. To install either cable, plug it into the connector. You should ensure the connector is fully seated and the "locking tabs" fully engaged.

When using the Multi-Function Cable, you must check the electrode packaging labels. Only **"Pacing/Defibrillation Electrodes"** will operate with the Multi-Function Cable. The labels on the electrodes must have the words **"PACE"** printed in green and **"DEFIB"** printed in red.

Select DEFIB ON



Turn the **SELECTOR SWITCH** to **DEFIB ON**. This turns the power on and automatically selects the energy level of 200 joules.



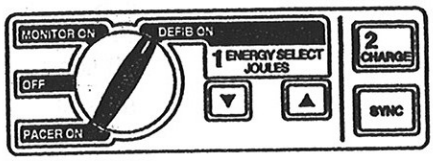
Note Defibrillator "ELECTRODES" is selected as the ECG source when the instrument is turned to **MONITOR ON** or **DEFIB ON**. You may then select any of the other ECG lead sources - lead I, II, III or ELECTRODES. (ECG cable and electrodes must already be attached to the patient to use lead I, II or III.)

Multi-Function Electrodes may be used for ECG monitoring. Use of Multi-Function Electrodes for ECG monitoring is for emergency situations when time does not allow connection of standard monitoring electrodes. The unit automatically pre-selects "ELECTRODES" when it is initially turned on. If the ECG electrodes and cable are already attached to the patient, pressing the **LEAD** button will allow selection of the desired ECG source - lead I, II, III or ELECTRODES.

If the Multi-Function Cable is not properly attached, a "PADDLE FAULT" message will appear on the monitor and the defibrillator will disarm itself.

Charge Defibrillator

Press the **CHARGE** button on the front panel.



To increase or decrease the selected energy after the **CHARGE** button has been pressed, use the defib energy select arrow buttons to select the new energy level. (Changing the joules selected value while the unit is charging or charged will cause the unit to discharge the defibrillator internally.) Press the **CHARGE** button again to charge the unit.

After 6-10 seconds of charging to the selected level, a distinctive charge ready (continuous) tone will go on and the energy ready message "DEFIB XXX J RDY." displays on the monitor. The defibrillator is now ready.

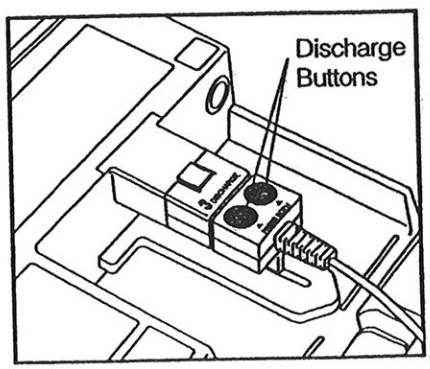
WARNING

- All persons in proximity to patient should be warned to "STAND CLEAR."

Discharge Defibrillator

Verify that no one is in contact with the patient, monitoring cable or leads, bed rails, or any other potential current pathway.

Simultaneously press and firmly hold both **DISCHARGE** buttons located on the Multi-Function Cable until discharge occurs to deliver energy to the patient.



SECTION 5

SYNCHRONIZED CARDIOVERSION

WARNINGS

- Synchronized cardioversion should only be attempted by skilled personnel trained in ACLS (Advanced Cardiac Life Support) and familiar with equipment operation. The precise cardiac arrhythmia must be determined before attempting defibrillation.
- Prior to attempting to perform a synchronized cardioversion, ensure that the ECG signal quality is good to minimize risk of synchronizing on artifact.

Paddles are a defibrillation protected Type BF patient connection.

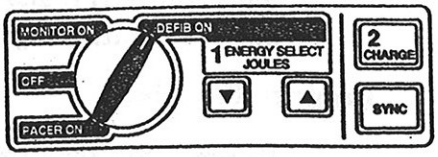
ECG leads are a defibrillation protected Type CF patient connection.

GENERAL INFORMATION

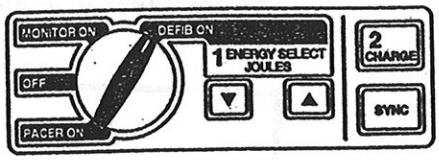
Certain arrhythmias, such as Ventricular Tachycardia (VT), atrial fibrillation, and atrial flutter, require synchronizing the defibrillator discharge with the ECG R-wave to prevent the induction of ventricular fibrillation. In this case, a synchronizing (SYNC) circuit within the instrument detects the patient's R-waves. When the **DISCHARGE** buttons are pressed and held, the unit will discharge with the next detected R-wave, thus avoiding the vulnerable T-wave segment of the cardiac cycle.

During SYNC, the ZOLL PD 1400/D 1400 places a marker pulse on the ECG displayed on the monitor to indicate the point in the cardiac cycle where discharge will occur. This marker pulse appears as an intensified "dot" or "line" on the ECG waveform. For documentation, a (↓) marker also designates this discharge point above the waveform on the ECG recorder strip.

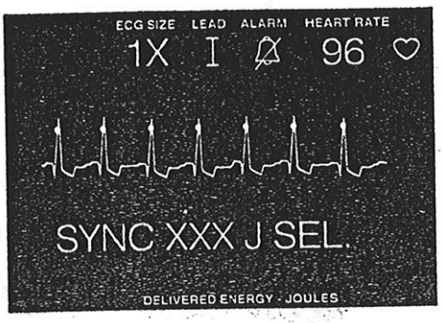
Select DEFIB ON



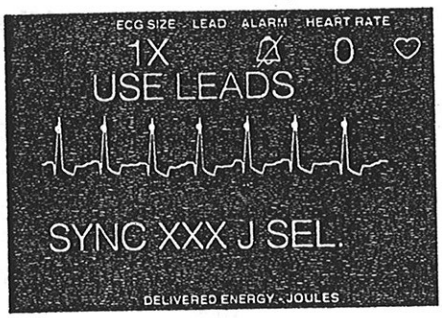
Turn the **SELECTOR SWITCH** to **DEFIB ON**. The PD 1400/D 1400 automatically sets the energy level to 200 joules. If necessary, change the defib energy level using the up-down arrow buttons. One pair is located on the front panel, the other pair, if using paddles is located on the sternum paddle. The selected energy level is displayed digitally on the monitor, "SYNC XXXJ SEL.".



- A "SYNC XXX J SEL." message will appear on the monitor. If "DEFIB XXX J SEL." appears, press the **SYNC** button.



- A "USE LEADS" message will briefly appear if "PADDLES" has been selected as the ECG source.



Synchronized discharge with "PADDLES" as ECG source is discouraged since artifacts induced by moving the paddles may resemble an R-wave and trigger defibrillator discharge at the wrong time.

An "ECG LEAD OFF" condition (if standard leads are selected as ECG source) will prevent synchronized discharge.

Note This does not prevent the use of the defibrillator. It simply prevents use in a synchronized manner.

The unit automatically goes out of sync mode after:

- each discharge
- the **SELECTOR SWITCH** has been moved to **PACER ON** (PD 1400 only).

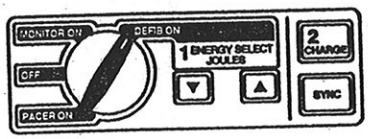
WARNING

- Do not permit gel to accumulate between the paddles (gel bridge) on the chest wall — this could cause burns and reduce the amount of energy delivered to the heart.

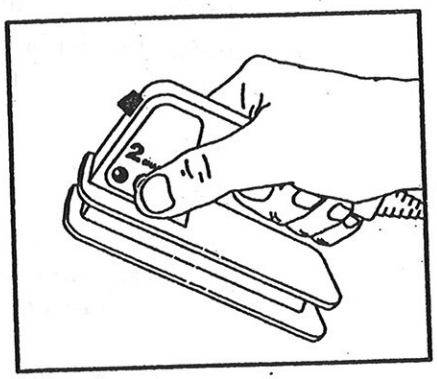
If using Multi-Function Electrodes, follow instructions for use, apply to the patient as shown on the electrode package, connect to the Multi-Function Cable, and review instructions in Section 4.

Charge Defibrillator

Press the **CHARGE** button on the front panel, or if using paddles, on the apex paddle handle.



To increase or decrease the selected energy after the **CHARGE** button has been pressed, press the up-down arrows until the desired energy level is displayed. (Changing the joules selected value while the unit is charging or charged will cause the unit to discharge the defibrillator internally.) Press the **CHARGE** button again to charge the unit.



After 6-10 seconds of charging to the selected energy level, the charge indicator on the apex paddle will light. A distinctive audible tone will sound and the energy ready "SYNC XXXJ RDY." will be displayed on the monitor. The defibrillator is now ready.

A "PADDLE FAULT" message will appear on the monitor whenever the paddles or Multi-Function Electrodes are not connected or are improperly seated in the unit. The unit will disarm itself if such a fault occurs.

Paddle Cleaning
Paddle electrodes and handles must be thoroughly cleaned after each use. See Section 8 for the correct cleaning procedure.

SECTION 6

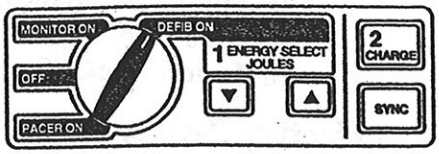
NONINVASIVE TEMPORARY PACING (PD 1400)

WARNINGS

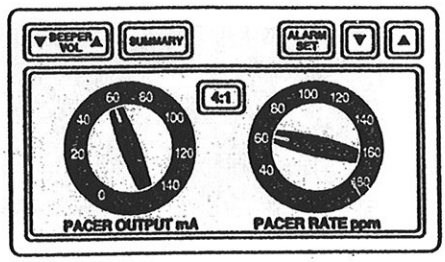
Before proceeding, **CAREFULLY** read the following:

- To pace with NTP 2000 pacing electrodes, the paddles must be plugged into the unit. The pacing connector is part of the paddles cable assembly. Multi-Function Electrodes will not operate with the paddles installed.
- To pace with Multi-Function Electrodes, the Multi-Function Cable must be plugged into the unit. NTP 2000 electrodes will not operate with the Multi-Function Cable installed.
- Avoid touching the gelled area of the electrode while pacing. A minor electrical shock hazard exists.
- Multi-Function Electrodes should be used no longer than eight (8) hours for continuous pacing.
- The ZOLL PD 1400 and NTP 2000 or Multi-Function Electrodes are intended for use as a system. Do not connect any other devices or cables to the output connector.
- Pacer output current (mA) must be set to "0 mA" when connecting and disconnecting a patient from the PD 1400.
- Prolonged pacing (in excess of 30 minutes), particularly in neonates, could cause burns. Caution and periodic inspection of the underlying skin are recommended.

Select PACER ON

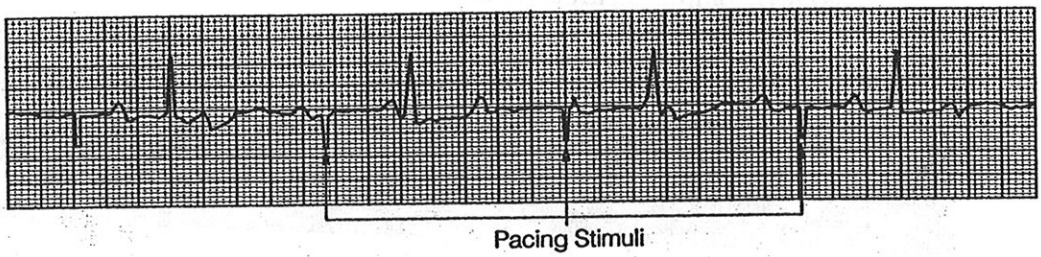


Set **PACER RATE** to a value 10-20 ppm higher than patient's intrinsic rate. If no intrinsic rate exists, use 60 ppm.

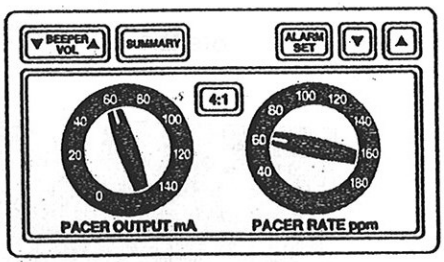


Observe the pacing artifact (stimulus markers ⊔) and verify that it is well positioned in diastole.

Pacing Below Threshold

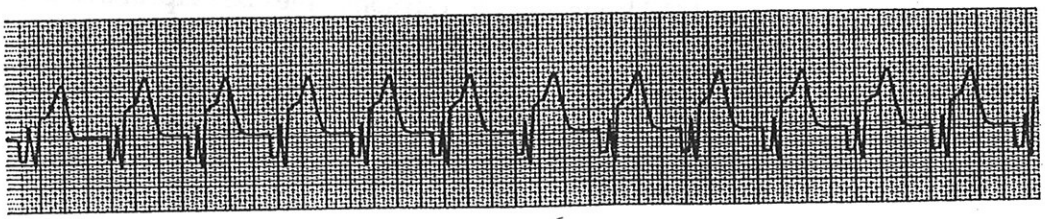


Increase **PACER OUTPUT mA** until stimulation is effective (capture). Output mA value is displayed digitally on the lower right of the monitor.



Effective Pacing

Pacing above threshold:



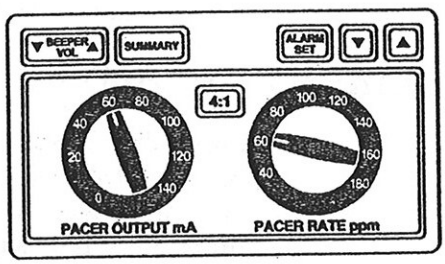
Determining Optimum Threshold

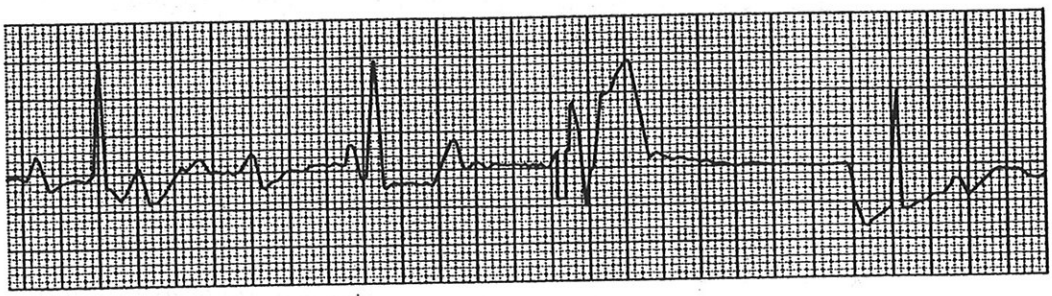
The ideal output current is the lowest value that will maintain capture. This is usually about 10% above threshold. Typical threshold currents are usually between 40 and 80 mA. The electrode placement that offers the most direct current pathway to the heart while avoiding large chest muscles will usually produce the lowest threshold. Low stimulation currents produce less skeletal muscle contraction and are better tolerated. Placement of the electrodes will affect the current required to obtain ventricular capture.

Testing for optimum electrode location may be done with electrodes with a two-part protective cap (NTP 2000 only). Remove the center cap from the front electrode to expose the gelled area while keeping the adhesive covered. Once the best location has been determined, the electrode should be removed and the area cleansed of salt or other conductive materials (such as defibrillator gel). The electrode may then be secured after removing the adhesive backing.

4:1 Test Mode

The 4:1 test mode can be used optionally to test for threshold. In this mode a stimulus is delivered to the patient approximately every fourth pace beat. (The stimulus is demand-synchronized to the patient's intrinsic beat.) Releasing the control causes the instrument to resume normal operation.





Pacer Lead Fault

The message "PACER LEAD OFF" appears on the monitor (in **PACER ON** mode) whenever:

- the pacer cable is not connected
- there is a defect in the cable
- the pacer electrodes do not make good skin contact

Pediatric Pacing

Noninvasive pacing on pediatric patients is done in an identical manner to adult pacing. Smaller size pediatric pacing electrodes (Part No. NTP 2100) are available for patients less than 15 kg. Continuous pacing of neonates can cause burns. If it is necessary to pace for more than 30 minutes, caution and periodic inspection of the underlying skin is strongly advised. Carefully follow all instructions contained on electrode labeling.

SECTION 7

ECG MONITORING

ECG leads are a defibrillation protected Type CF patient connection.

The ZOLL PD 1400/D 1400 Pacemaker/Defibrillator can be used for either short-term or long-term cardiac monitoring.

The ZOLL PD 1400/D 1400 has built-in protection circuitry to allow patient monitoring to continue during a defibrillation attempt. Monitoring electrodes may become polarized during defibrillation discharge, causing the ECG waveform to briefly go off-scale. High quality silver/silver chloride (Ag/AgCl) electrodes minimize this effect, and circuitry in the instrument will return the trace to the monitor display within a few seconds. ECG monitoring may be accomplished through Multi-Function Electrodes or through standard defibrillation paddles. However, this is typically done only for emergency evaluation of patient condition, when ECG leads are not attached to the patient.

PREPARATIONS

Proper application and placement, and the use of a high-quality electrode is essential for quality ECG monitoring. Good contact between the electrode and skin minimizes the negative effects of motion artifacts and signal interference.

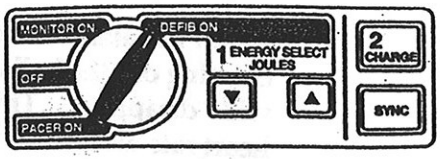
ELECTRODE PLACEMENT

Depending upon local usage, the ECG leads are marked either LA, RA, LL, or L, R, F. Markings and color codes for the leads are listed below:

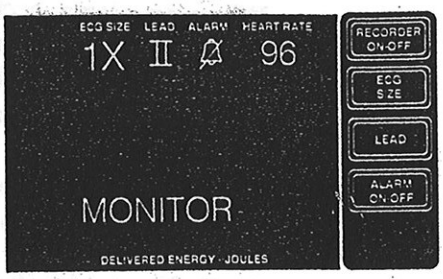
RA/White Electrode	Place near right mid-clavicular line, directly below clavicle.
LA/Black Electrode	Place near left mid-clavicular line, directly below clavicle.
LL/Red Electrode	Place between 6th and 7th intercostal space on left mid-clavicular line.

SET THE CONTROLS

Set **SELECTOR SWITCH** to the **MONITOR ON** position.



Press the **LEAD** button until the desired lead is selected (selected lead is indicated at upper left monitor).



If heart rate alarms are enabled with paddles selected, the unit displays the message "USE LEADS". If you see this message, select Lead I, II, or III.

If the "ECG LEAD OFF" or "ELECTRODE PADS OFF" message appears on the monitor, inspect the electrodes, patient cable, lead wires, and associated connections.

Press the **ECG SIZE** button until the desired waveform size is displayed.

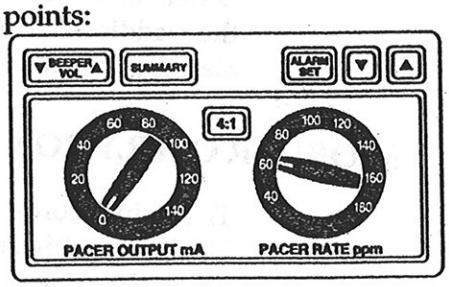
Adjust systole beeper tone volume to suitable level.

HEART RATE ALARMS

Setting Alarms

Heart rate alarms have been preset at 30 (low) and 150 (high).

To change the lower or upper alarm set points:

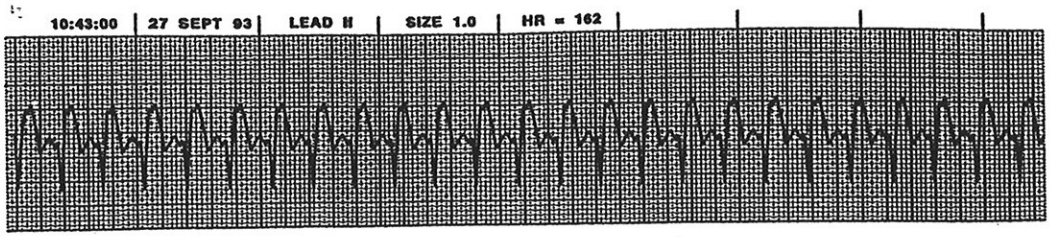


1. Push **ALARM SET** button. Low alarm limit value displayed in the Heart Rate field flashes. To change value, push ▲ to raise, push ▼ to lower.

2. Push **ALARM SET** button again. High alarm limit value flashes. To change value, push ▲ to raise, push ▼ to lower.

3. Push **ALARM SET** button again to return to alarm monitoring mode.

Recording shows annotations during monitoring:



RECORDER CONFIGURATION

The PD 1400/D 1400's strip recorder is programmed to run automatically for 15 seconds whenever a defibrillator discharge has occurred or a heart rate alarm has been triggered. You may reconfigure the PD 1400/D 1400 not to print during these events by pressing and holding the **ALARM SET** down arrow ▼ button and simultaneously turning the **SELECTOR SWITCH** from the **OFF** position to **MONITOR ON** until the PD 1400/D 1400 beeps six times (4 beeps for normal start up, a long pause of several seconds, and 2 beeps for recorder configuration) to indicate that the configuration is complete. To switch back to automatic recorder mode repeat this sequence. All event information will be stored by Summary Report regardless of this configuration.

Note that this configuration setting is maintained when the PD 1400/D 1400 is turned off. The configuration can be changed back to its default setting by repeating the above procedure.

Notes The paper supply should be checked at the beginning of each shift and the end of each use to ensure adequate recording capability. A red stripe on the paper means that the paper supply is low and should be replaced.

A "NO PAPER" message appears on the monitor when the strip recorder is activated without paper. The strip recorder automatically shuts off when there is no paper.

Press the **RECORDER ON-OFF** button to start the strip recorder again after loading new paper.

SECTION 8

GENERAL MAINTENANCE

Resuscitation equipment must be maintained at peak performance. The Operator's Shift Checklist should be performed at the beginning of each shift. The remaining operational checks should be performed periodically (once a day to once a week) to ensure proper equipment operation.

INSPECTION

Assure that the unit is clean (with no fluid spills) and nothing is stored on the unit.

Check that paddle surfaces are clean.

Inspect all cables, cords, and connectors for good condition.

Verify presence and proper condition of all disposable supplies (electrode gel, monitor electrodes, recorder paper, alcohol swabs, razors, antiperspirant).

Assure that two sets of pacing (PD 1400 only) or Multi-Function Electrodes are available in **sealed packages.** Check expiration dates on all electrode packages.

CLEANING

Clean the PD 1400/D 1400, paddles, and cables with a soft cloth, mild soap and water. The recorder parts should be cleaned with a damp, soft cloth only.

Do not immerse any part of the device (including paddles) in water. Do not use ketones (MEK, acetone, etc.). Avoid using abrasives (e.g., paper towels) on the monitor window. Do not sterilize the PD 1400/D 1400.

Special care should be taken to clean the defibrillation paddles after each use. Build up of gel will interfere with paddle ECG "first look" and may produce a shock hazard to the operator. Keep paddle holding area and handles clean.

DELIVERED ENERGY AND DISCHARGE BUTTONS CHECK

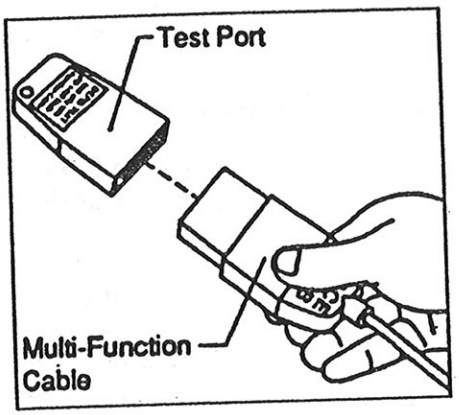
WARNING

- When performing this check using paddles, use your thumbs to operate the **DISCHARGE** buttons. No portion of the hand should be near the paddle plates.

Perform this check once a week.

Turn the SELECTOR SWITCH to DEFIB ON. Set the defib energy level to 100 joules .

MULTI-FUNCTION CABLE TEST



To test the Multi-Function Cable (MFC) and defibrillator energy output, connect the Test Port (1004-0053) to the electrode connector at the end of the MFC. Set the defibrillator energy level to **100J** and charge the device. When the charge ready tone sounds, press and hold both **DISCHARGE** buttons until discharge occurs on the MFC and verify that the monitor displays "TEST OK". If the display shows any other message, repeat the test a second time. If "TEST FAIL" or any other numeric coded message appears, the device should be removed from clinical use and inspected by qualified technical personnel. After a "TEST OK" message is displayed, indicating the device has passed the discharge test, it can be returned to service.

NOTE: To perform this test with paddles the paddles should be pushed all the way into their holders and the paddles connector plugged to the unit. Repeat **CHARGE/ DISCHARGE** sequence as above.

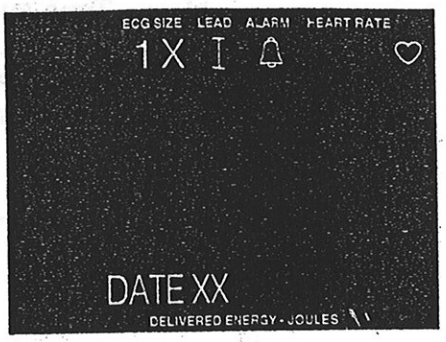
RECORDER CHECK

Press the **RECORDER ON-OFF** button. The strip recorder will run until you press the button again.

While the strip recorder is running, press and hold the up and down arrows located next to the **ALARM SET** button. This will generate calibration pulses.

SETTING TIME AND DATE

Check the time and date on the recorder annotation. If it is not correct, set as follows:



Turn the **SELECTOR SWITCH** to **OFF.**

Press and hold the **ALARM SET** button on the top of the PD 1400/ D 1400. With the **ALARM SET** button pushed, turn the **SELECTOR SWITCH** to the **MONITOR ON** position. When the date display appears on the monitor, release the **ALARM SET** button. Observe the "DATE" message on the lower portion of the screen with the current day flashing.

Use the **ALARM SET** up (▲) arrow to increase the value and use the down (▼) arrow to decrease the value. Observe that holding the ▲ arrow will increment repeatedly while holding the ▼ arrow will decrement repeatedly.

The range of acceptable values is 1 through 31. Set the value to the current day.

Press the **ALARM SET** button again and observe that the month is now flashing. Repeat above steps to set the correct month.

Press the **ALARM SET** button again and observe that the current year now flashes. Repeat above steps to set the correct year.

Press the **ALARM SET** button again. The "DATE" message is replaced by a "TIME" message indicating the current hour and minute in 24 hour format.

The displayed hour now flashes. Repeat above steps. Set the value to the current hour.

Press the **ALARM SET** button again. The displayed minute now flashes. Repeat above steps.

Press the **ALARM SET** button again. The lower portion of the screen returns to the normal "MONITOR" display.

Verify that the time and date are set correctly by generating a strip chart recording. Press the **RECORDER ON-OFF** button and check that the strip chart is correctly annotated with the current time and date, selected ECG size, source, and heart rate.

prolonged or repeated use of the device may be required, such as long transport situations.

5. Develop backup procedures.

   Procedures to maintain appropriate life support (such as cardiopulmonary resuscitation) should be pre-planned in the event of a device failure and another battery or device must be sought.

6. Test batteries regularly.

   Develop a testing schedule as part of your organization's battery management. The appropriate frequency of testing depends on the age of the battery pack and the frequency and type of use. As the battery ages, testing should be more frequent since failure will occur rapidly at the battery's end-of-life. At a minimum, ZOLL recommends testing every three months.

PD 4410 BATTERY PACK

The ZOLL PD 4410 Battery Pack is a five-cell assembly of sealed lead-acid batteries specifically designed for use with the ZOLL PD 1400 series devices.

Lead acid battery packs require full recharging after use. Continuous partial recharging will result in reduced capacity and early battery pack failure.

Battery Life Expectancy

Frequency of use, number of batteries used for PD 1400/D 1400 operation, and the pattern of discharging and recharging batteries contribute to the loss of battery charge capacity. Because of this ZOLL recommends operators replace and discard used batteries on a preventive, scheduled basis. The most effective preventive replacement interval should be based on anticipated use patterns, battery pack testing results and experience with the device in actual operation. ZOLL recommends battery replacement every eighteen months or sooner.

For more information about such a schedule, contact your ZOLL Technical Service Representative.

Low Battery Message

As individual battery capacity diminishes, the amount of charge remaining after a PD 1400/D 1400 "LOW BATTERY" message also diminishes. For newer or lesser-used batteries, the charge remaining after this warning will be significantly longer than the charge remaining on batteries having seen more use. In either case, this warning will ultimately lead to defibrillator shut-off, and consequently, the low battery should be replaced with a fully-charged battery as soon as possible.

2. Do not leave batteries uncharged. Once a battery is removed from the PD 1400/D 1400 it should be immediately placed in a charge or test well. Idle batteries will lose some of their charge and may suffer damage to charge capacity if left in a discharged state.

3. Do not discharge batteries completely. Battery life will be improved if batteries are recharged before complete discharge of capacity.

4. Understand "LOW BATTERY" implications. As individual battery capacity diminishes, the amount of charge remaining after a PD 1400/D 1400 "LOW BATTERY" message also diminishes. For newer or lesser-used batteries, the charge remaining after this warning will be significantly longer than the charge remaining on batteries having seen more use. In either case, this warning will ultimately lead to defibrillator shut-off, and consequently, the low battery should be replaced with a fully-charged battery as soon as possible.

5. Test batteries periodically. Your organization must determine an appropriate testing schedule. Adherence to this schedule is critical in achieving satisfactory results from your PD 1400/D 1400 and batteries.

6. Complete a shift check of the device. Your PD 1400/D 1400 should be tested at the beginning of every shift. This procedure tests the readiness of the unit itself. If the PD 1400/D 1400 shows a "LOW BATTERY" message during testing at the beginning of a shift, the battery currently in use is close to depletion and should be replaced and charged. The shift test does not test the battery for adequate charge to support extended use of the unit, which can only be determined by testing the battery in the PD 4420 Battery Support System.

7. Implement a means of indicating the charge status of battery packs. An effective battery management program includes a method of visually determining whether a battery pack is charged and ready for use or is in need of charging.

PD 4420 BATTERY SUPPORT SYSTEM

Battery pack charging and charge capacity evaluation is easily performed with the ZOLL PD 4420 Battery Support System. Up to four battery packs can be charged simultaneously and testing is a simple one step operation.

A battery pack left uncharged for excessive periods (4 to 6 months) may become damaged and require replacement.

This concludes the basic PD 1400/D 1400 functional checkout.

SECTION 9

TROUBLESHOOTING GUIDES

The troubleshooting guides provided on the following pages are intended for use by non-technical medical personnel during PD 1400/D 1400 operations. This section answers many of the common problems or questions that arise during operation.

If trouble persists after consulting this guide, contact the appropriate technical personnel or ZOLL Service Operations. A more detailed troubleshooting guide is found in the PD 1400/D 1400 Service Manual.

MONITOR

	Symptom	Recommended Action
1	Unit does not turn on. (No 4 audible beeps).	• Check that battery pack is properly installed. • Replace battery pack with a fully charged battery pack.
2	Unit turns on with 4 beeps, but no display on monitor.	• Replace battery pack with a fully charged battery pack.
3	If a "STATUS XX" message appears on monitor display.	• Some **"STATUS XX"** messages, caused by transient conditions, can be reset if immediate use is required. To attempt to clear the **"STATUS XX"** message, turn the **SELECTOR SWITCH** to the **OFF** position and then back to the desired operating mode. Note that some settings (for example, alarm settings, lead selection, and ECG size) may need to be restored from their default values when operation is resumed. If the **"STATUS XX"** message reappears, the instrument should be removed from use and serviced. • Call for service.
4	"SET CLOCK" message appears on the monitor display.	• Reset time and date information. (See Section 8.)

RECORDER

Symptom	Recommended Action
10 "NO PAPER" message appears on monitor.	• Recorder out of paper. • Remove paper, check paper type, check recorder for paper jam, reload paper. • Recorder needs adjustment.
11 Recorder makes a stuttering sound when activated.	• Check paper path of recorder for paper jam.
12 "SYNC" marker (↓) not annotating at top of paper.	• Ensure "SYNC" is displayed on the monitor. • Ensure high intensity dot or line is displayed on ECG signal on monitor. • Change ECG size. • Change ECG lead selection. • Change electrode placement. • Paper too narrow. It should be 50mm wide.
13 Light or poor quality tracings/annotations on paper.	• Ensure correct paper is in use. • Ensure paper is installed grid side against recorder printer. • Recorder print head requires cleaning (trained personnel only).

Symptom	Recommended Action
16 No ventricular capture beat after stimulus marker on ECG monitor display.	• Check for pulse of patient. • Increase output current level. • Change ECG Lead select. • Review pacing electrode placement. • Verify that pacemaker is delivering the proper current using the ZOLL NTP 4450 Pace Check, or have appropriate technical staff check output.
17 Patient on "Standby" pacing gets paced intermittently.	• If ECG lead wire comes off, pacer will automatically pace asynchronously. • Ensure ECG electrode connection and placement. • Check ECG cable for damage. • Patient R wave-to-R wave interval varying. Pace rate close to patient rate.
18 Heart rate is 0 with proper pacing capture displayed on ECG trace.	• Check patient's pulse. • Change ECG Lead Selection. • Change ECG size.
19 Bedside/Central Station monitor display becomes erratic when pacing.	• Patients cannot be "double patch" ECG monitored while pacing. Use ZOLL adapter cable NTP-3007.

Symptom	Recommended Action
25 Energy will not discharge when both **DISCHARGE** buttons are pressed.	• Sixty (60) seconds had elapsed after initial charge. Energy was internally discharged. • Device is in "SYNC" mode and no QRS complex is detected. • Energy internally discharged because energy selector arrows were moved to another energy selection. • Unit not completely charged when **DISCHARGE** buttons were pressed. Wait for "READY" message and ready tone. • Press and hold both **DISCHARGE** buttons simultaneously until discharge occurs.
26 Unable to "SYNC" cardioversion discharge.	• Ensure "SYNC" is displayed on monitor. • Check for "SYNC" marker (high intensity dot or line on R wave). If not present, change ECG size and/or lead selection. • Alter ECG lead wire placement.
27 No apparent energy delivery to patient.	• Check for "ELECTRODE PADS OFF" or "PADDLE FAULT" message on monitor. • If Multi-Function Electrodes are used, ensure proper placement and contact. • Perform defibrillator self test as described in Section 8. • If test fails, have the unit serviced promptly. • Under certain circumstances, some patients will not "twitch" when energy is delivered.

Operator's Shift Checklist for ZOLL PD [illegible] and D 1400 Defibrillators

Recommended checks and procedures to be performed at the start of each shift. For more detailed information, see the PD 1400/D 1400 Operator's Guide.

Date ____________________

Location ____________________

Unit Serial Number ____________________

	1st Shift	2nd Shift	3rd Shift	Remarks
1. PD 1400/D 1400 Condition				
Unit clean, no spills, clear of objects on top, case intact				
2. Paddles				
Paddles clean, not pitted				
Release from housing easily				
3. Inspect cables for cracks, broken wires, connector				
A ECG electrode cable, connector				
B Defibrillator paddle cables				
C Pacing electrode cable, connector (PD 1400 only)				
D Multi-function cable, connector				
4. Batteries				
A Fully charged battery in unit				
B Fully charged battery available				
5. Disposable Supplies				
A Electrode gel or gel patches				
B Pacing electrodes in sealed pouches - 2 sets (PD 1400 only)				
C Multi-function electrodes in sealed pouches - 2 sets				
D ECG electrodes				
E Recorder paper				
F Alcohol wipes				
G Razors				
H Antiperspirant				
6. Operational Checks				
A Power On Sequence				
Turn unit to MONITOR ON, 4 -beep tone heard				
"READY" message then "MONITOR ON" message on monitor				
ECG size 1x				
"PADDLES" or "ELECTRODES" as lead selected				
B Pacer Operation (PD 1400 only)				
Multi-function cable not connected to Test Port				
Turn to PACER ON, set pacer rate to 150 ppm, press RECORDER ON-OFF				
Pace pulses occur every 10 small divisions				
Press 4:1 button, pulses occur every 8 large divisions				
Set PACER OUTPUT to 0 mA, no "PACER LEAD OFF" message				
Turn PACER OUTPUT to 15 mA, "PACER LEAD OFF" message on monitor				
C Defibrillator				
Paddles in holder or Multi-function cable connected to test connector set defib energy level to 100 joules, press both defib discharge buttons				
"TEST OK" message on monitor				
Set defib energy level to 2 joules, Multi-function cable not connected to test Port, press both defib discharge buttons, "ELECTRODES OFF" message on monitor				
D Recorder				
Press RECORDER ON-OFF, Recorder will run, press again, recorder stops				
Inspect for recorder printing				

7. Please check the appropriate box after each use of this checklist.			
No Action Required			
Minor problem(s) corrected			
Disposable supplies replaced			
Major problem(s) identified - UNIT OUT OF SERVICE			

Signatures

1st ____________________

2nd ____________________

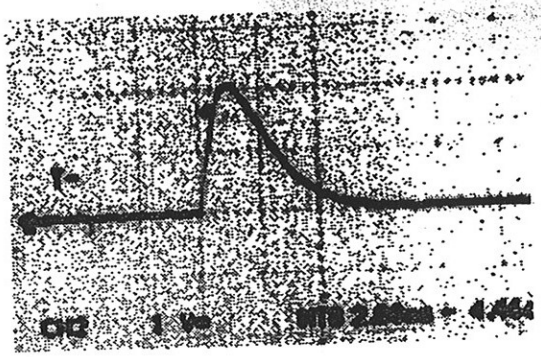
3rd ____________________

APPENDIX A
WAVEFORM INFORMATION

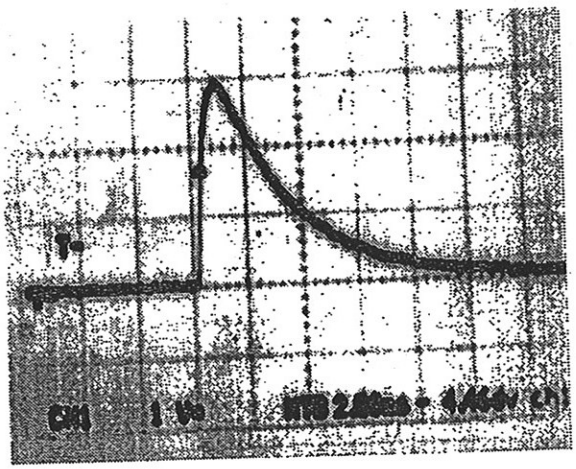
GENERAL

The ZOLL PD 1400/D 1400 produces the following defibrillation waveforms when discharged into 25, 50 and 100 ohm loads at maximum energy. Each major vertical division equals 1000 volts; each major horizontal division equals 2 milliseconds.

Discharge into a 25 ohm load



Discharge into a 50 ohm load



PD 1400/D 1400 QUICK REFERENCE GUIDE

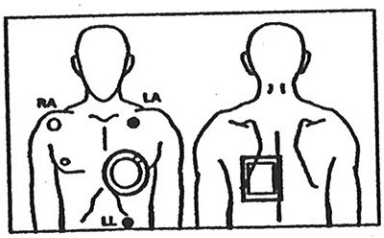
MANUAL DEFIB WITH MFE

Apply Multi-Function Electrodes (MFE) to patient.

Press MFE firmly to skin. Move any air pockets to outer edges.

Connect MFE to Multi-Function Cable.

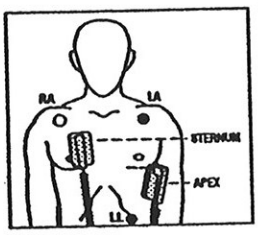
1. Select **DEFIB ON.**
   Set Energy Level.
2. **CHARGE**
   Push **CHARGE** button on front panel. Wait for ready tone.
3. **DISCHARGE**
   Stand clear of patient.
   Press and hold both **DISCHARGE** buttons.



MANUAL DEFIB WITH MFE

MANUAL DEFIB WITH PADDLES

1. Select **DEFIB ON.**
   Set Energy Level.
   Apply Conductive Gel to paddles. Place paddles on chest, apply firm pressure.
   (Do not place paddles above pacer electrodes.) Pacer electrodes may be left on the patient during defibrillation.
2. **CHARGE**
   Push **CHARGE** button on Apex paddles or front panel. Wait for ready tone.
3. **DISCHARGE**
   Stand clear of patient.
   Press and hold both **DISCHARGE** buttons.

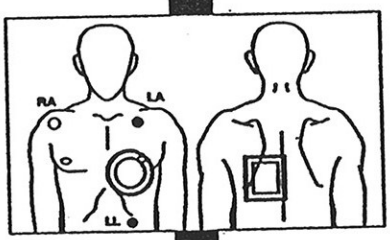


MANUAL DEFIB WITH PADDLES

NONINVASIVE PACING (PD 1400 ONLY)

Pacer operation is identical for NTP-2000 and Multi-Function Electrodes.

1. Select **MONITOR ON.**
   Set pacer output current to 0 mA.
2. Apply ECG electrodes to patient. Connect patient cable
   Apply pacing electrodes to patient: press electrodes firmly to skin, moving any air pockets to outer edges.
   Connect pacing electrodes to pacer output cable.
3. Select **PACER ON.**
   Set pacing rate and increase output until stimulation is effective.



NONINVASIVE PACING

MONITORING

1. Select **MONITOR ON.**
2. Apply ECG electrodes. Connect patient cable
3. Select **LEAD** and **ECG SIZE.**
4. Set Heart Rate Alarms.
   Press the **ALARM SET** button. Press the Alarm up or down arrows to set the upper alarm limit.
   Press the **ALARM SET** button. Press the Alarm up or down arrows to set the lower alarm limit.
   Press the **ALARM SET** button.
5. Press the **ALARM ON/OFF** button to enable the alarm. A bell symbol appears on the monitor without a line through it.

MONITORING