

**PHYSIO
CONTROL**

LIFEPAK® 5

Defibrillator / Monitor

Operating Instructions



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CAUTION

- This instrument is to be used by authorized personnel only.
- Operator should be thoroughly familiar with information in this manual before using.
- The LIFEPAK 5 should not be used in the presence of flammable agents or anesthetics.
- Do not discharge defibrillator with paddles shorted together.
- Do not discharge defibrillator into open air.
- Turn defibrillator off to dump unwanted charge.
- Stay clear of patient when defibrillating. Contact with patient presents a potential shock hazard during defibrillation.
- Keep defibrillator paddles clean. Paddle handles covered with gel (wet or dry) present a hazardous electrical pathway between the paddle electrodes and the user during defibrillation.
- For patient safety, do not connect accessory equipment to the "ECG OUT" jack unless accessory equipment in combination with LIFEPAK 5 has been evaluated for fire and shock hazard.

INTRODUCTION

The LIFEPAK® 5 is a combination non-fade cardioscope, recorder*, and DC defibrillator. This lightweight combination provides the ultimate in portability and versatility. The LIFEPAK 5 consists of two modules: a cardioscope/recorder module and a defibrillator module. When joined, the two units operate as one, providing instant patient ECG information through the Quik-Look® paddles. When separated, the units operate independently, each having its own removable Battery/Pak.

Because of the cardioscope/recorder's small size and weight it may be placed right on a patient's stretcher for continuous monitoring during transport. The LIFEPAK 5 cardioscope provides a continuous non-fade trace at 25mm/sec for real time monitoring. The recorder provides documentation at 25mm/sec that is delayed by 2.4 seconds. In effect, this provides the user with a 2.4 second memory and allows him to get a hard copy of any information that is displayed on the cardioscope.

The patient cable input is completely protected from high voltage levels as may be obtained from the defibrillator. A QRS beeper with adjustable volume level is provided for audible monitoring when the cardioscope cannot be watched.

Other features of the cardioscope/recorder module are a low battery indicator, momentary freeze control, a calibrator (1mV), and an ECG output for connection to a telephone modulator or radio telemetry transmitter.

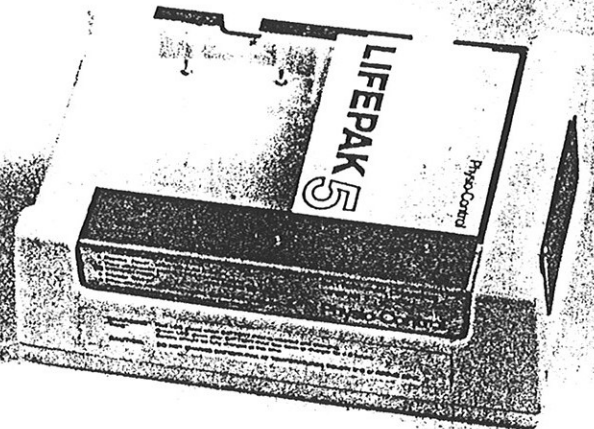
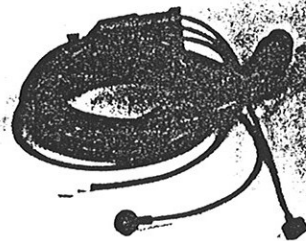
The defibrillator module relieves the operator of dependency on other personnel since all controls are in the operator's hands. The "STERNUM" paddle contains the defibrillator power switch and power indicator and one of the two discharge pushbuttons. The "APEX" paddle contains the energy level selector, the Quik-Charge® control and charge indicator, and the second discharge pushbutton. The discharge pushbuttons on both paddles must be pressed simultaneously to discharge the defibrillator. The LIFEPAK 5 is capable of synchronized cardioversion.

The LIFEPAK 5 is never connected to AC line power. Instead, the rechargeable Battery/Paks are exchanged with fresh Battery/Paks from the Battery/Pak Charger. An accidentally drained Battery/Pak can be replaced in a matter of seconds. The Battery/Paks are interchangeable between the defibrillator module and the cardioscope/recorder module. The Battery/Pak Charger also contains the test load for regular testing of the defibrillator.

*available without recorder.

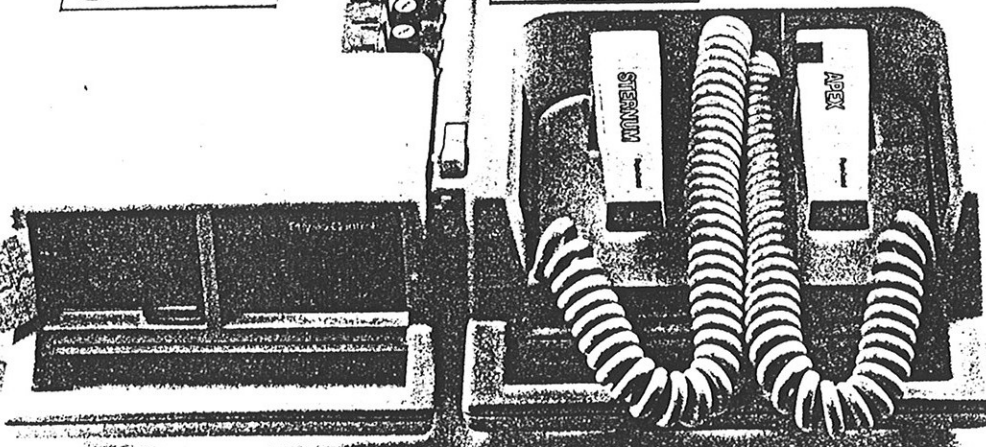
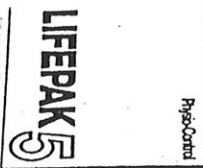
LIFEPAK 5
PhysiControl

PATIENT CABLE

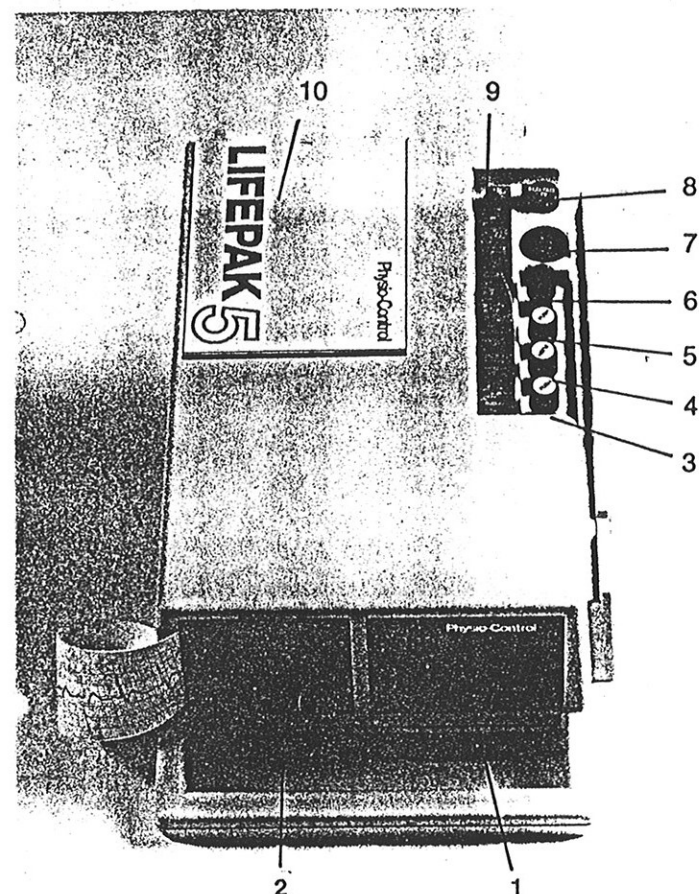


BATTERY/PAK CHARGER


BATTERY/PAK



CONTROLS AND INDICATORS



Cardioscope and Recorder

- | | |
|--|--|
| 1. Cardioscope | Displays ECG on 36 mm x 60 mm green non-fade CRT. Trace moves from right to left. |
| 2. Recorder | Records ECG on heat sensitive paper. Recording is delayed by 2.4 seconds, signal is same as that seen at left edge of cardioscope. |
| 3. FREEZE (Push) | Momentary pushbutton switch for freezing cardioscope trace. |
| ECG SIZE  | Knob controls vertical gain of ECG complex on scope and recorder. Turn clockwise to increase amplitude. |

4. RECORD (Push)

HEAT 

Pushbutton switch for power to recorder. Power/Mode Selector must also be in "on" position.

Knob adjusts temperature of writing stylus. Stylus is automatically heated to temperature when "RECORD (PUSH)" is depressed.

(Above controls are non-functional if LIFEPAK 5 is ordered without recorder.)

5. CAL (Push)

Momentary pushbutton switch gives 1mV calibrating pulse to monitor, recorder, and ECG output when pushed. To standardize recorder adjust "ECG  SIZE" until 10 mm square wave is obtained. A stable baseline may be obtained by monitoring in "PADDLES" mode and shorting paddles together. Signal is delayed 2.4 seconds to recorder.

Knob controls volume of systole beeper. Rotate knob clockwise to increase.

SYST VOL 

6. Power/Mode Selector PWR OFF

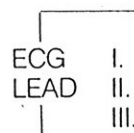
Switch for main power to monitor. Also selects input mode.

PADDLES

Switch position allows monitoring of ECG with paddles. Patient cable no longer acts as active ECG pickup.

Switch position allows monitoring of ECG with patient cable. With switch in this position paddles are no longer ECG pickup, but may be used to defibrillate. The cable may be left connected during defibrillation.

See **Patient Cable and Electrodes**, pg. 5.



7. 3-LEAD PATIENT CABLE 09-10418-02 ONLY

6 pin patient cable connector. Use patient cable 09-10418-02 only.

8. ECG OUT 1V

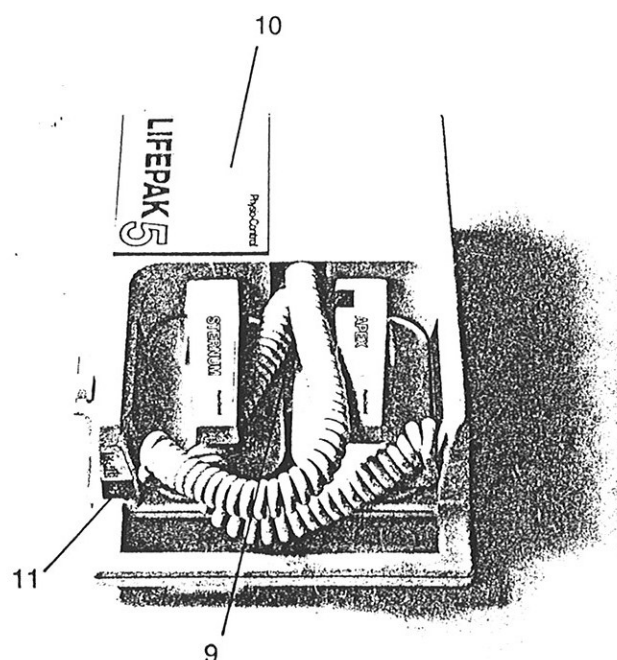
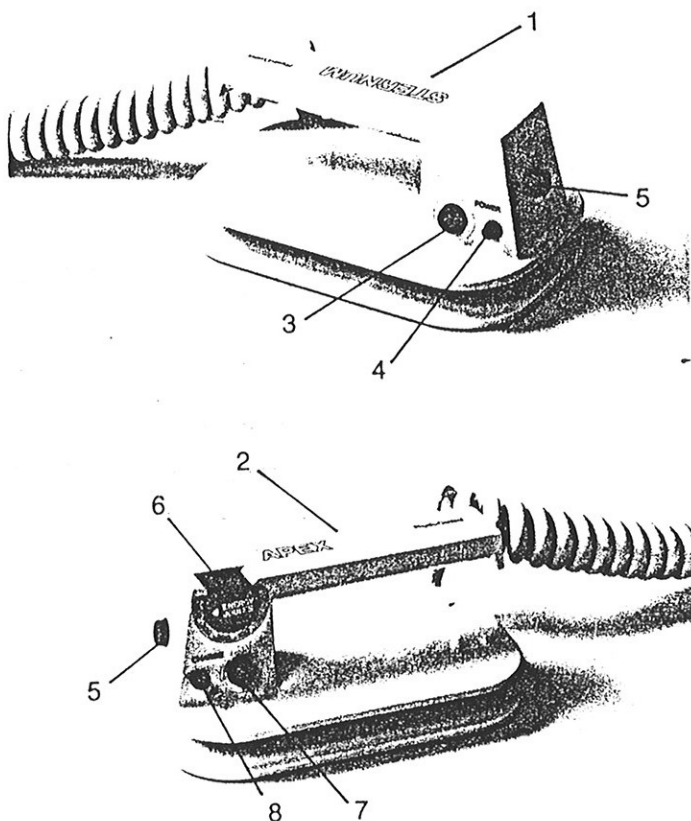
1 volt ECG output jack for modulator or radio/modulator.

9. Low Battery Indicator (CHANGE BATTERY WHEN FLASHING)

Flashing red light indicates very low battery. Battery/Pak should be replaced with charged Battery/Pak as soon as possible.

10. Battery/Pak

Battery/Pak is replaceable for recharging in charger. All Battery/Paks are interchangeable.



Defibrillator

- | | | | |
|-------------------------|---|---------------------|--|
| 1. STERNUM paddle | Sternum defibrillating electrode with defibrillator "POWER" control and one discharge pushbutton. | 7. CHARGE | Pushbutton to charge defibrillator. Depress and release. Defibrillator will charge to level set on energy selector. |
| 2. APEX paddle | Apex defibrillating electrode with energy selector, charge control, and 2nd discharge pushbutton. | 8. Charge Indicator | Light flashes during charge cycle, glows steadily when ready, flashes again when unit has bled down to 90% of desired energy level. Continuous flashing indicates low battery. |
| 3. POWER | Pushbutton control for power to defibrillator. | 9. Interlock Switch | Switch prevents unit from being ON while paddles are stored. If paddles are stored while power is ON, power will be turned off and any charge dumped. |
| 4. Power Indicator | Green light indicates power ON to defibrillator. Flashing light indicates low battery. See section on battery care. | 10. Battery/Pak | Replaceable, rechargeable power supply. All Battery/Paks are interchangeable. |
| 5. Discharge Pushbutton | Discharge pushbuttons on both paddles must be depressed simultaneously to discharge defibrillator. Defibrillator will not fire unless fully charged to desired level. | 11. SYNC | Pushbutton switches defibrillator to synchronous mode. Push again to return to defibrillate mode. Monitor and defibrillator must be connected. |
| 6. ENERGY JOULES | Defibrillator energy selector. Six discrete energy levels available: 20, 50, 100, 200, 300, 360 joules (watt-seconds) delivered energy. | | |

OPERATION

Paddle Monitoring

(Cardioscope/Recorder module must be joined to defibrillator module.)

- Apply conductive gel to paddles (or use saline pads).
- Turn Power/Mode Selector to "PADDLES". (Defibrillator "POWER" does not need to be on.)
- Place paddles **firmly** on bare chest with paddle marked "STERNUM" on patient's right chest near sternum (negative pickup), and paddle marked "APEX" on patient's lower left side (positive pickup) - see diagram.
- Adjust "ECG SIZE" to desired height.
- Observe scope and determine patient's condition.

Patient Cable Monitoring

- Prepare skin where electrodes are to be applied.
- Attach electrodes to patient cable snaps.
- If using non pre-gelled electrodes, apply 1/4"-1/2" gel in mound over screen. If using pre-gelled electrodes, insure gel has not dried.
- Attach electrodes to patient.

Color Code: white —right arm or upper right chest
red —left leg or lower left chest
black —left arm or upper left chest

- Support patient cable to prevent pull on electrodes.
 - Plug cable into "3-LEAD PATIENT CABLE 09-10418-02 ONLY" connector. Use only cable 09-10418-02. See "Patient Cable and Electrodes", pg. 5.
 - Set Power/Mode Selector to "ECG LEAD" and desired lead designation.
- | | | | |
|-----------|-------------|-------------|-----------|
| Lead I: | White (—) | Black (+) | Red (ref) |
| Lead II: | White (—) | Black (ref) | Red (+) |
| Lead III: | White (ref) | Black (—) | Red (+) |
- Adjust "ECG SIZE" to desired height.
 - Adjust "SYST VOL" to desired volume.

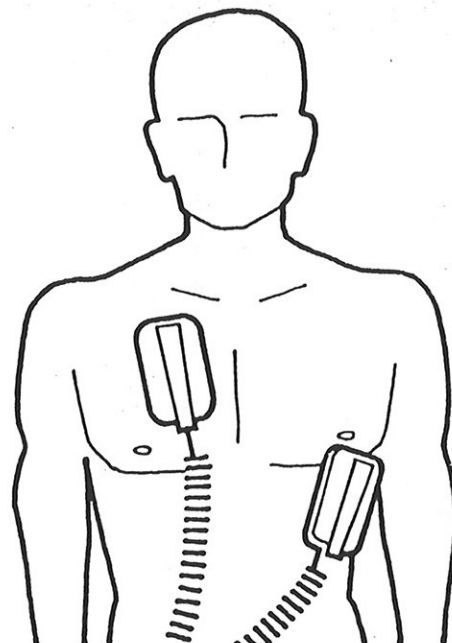
Recording

- Depress "RECORD (PUSH)".
- Adjust stylus "HEAT" control if necessary.
- Adjust "ECG SIZE" as necessary.

The recorder displays a signal that is delayed by approximately 2.4 seconds. As the signal spills off left edge of the cardioscope it is displayed on the recorder. Exception: When the "FREEZE" button is depressed the recording switches to real time until "FREEZE" is released; frozen information is then recorded. Recorder then returns to 2.4 second delay. The ECG paper roll is 15 meters long (50 ft.) giving 10 minutes recording time. When using Physio-Control ECG paper, a dark strip will appear during the last 3 feet.

Defibrillating

- Apply conductive gel to paddles (or use saline pads).



- Depress "POWER" button on "STERNUM" paddle. Release.
- Depress "CHARGE" button. Release.
- Place paddles **firmly** on chest (20-25 lbs pressure recommended).
- Defibrillator is ready to fire when Charge Indicator light stops flashing and glows steadily. Defibrillator will not fire unless fully charged to preset level. For countershock of ventricular fibrillation, defibrillator must **not** be in "SYNC" mode.
- Depress **both** paddle discharge pushbuttons **simultaneously** for countershock.
- If repeat countershock is indicated, depress "CHARGE" and repeat as above.
- To dump charge and turn off defibrillator, again depress "POWER" button on "STERNUM" paddle — power light will go out.

Once the defibrillator has charged to the desired level and the Charge Indicator stops flashing, the unit is ready to fire. If not fired, the charge will slowly bleed down. Once the charge has bled to 90% of the desired level, the Charge Indicator will flash two or three times and the defibrillator will automatically recharge to the desired level. If a charged defibrillator is not fired, this automatic recharge sequence will continue for about one-half minute. The last time the defibrillator bleeds down to 90% of the desired level, the Charge Indicator will begin flashing and continue to flash until the defibrillator is recharged by the operator or turned off.

THE DEFIBRILLATOR WILL NOT FIRE WHILE THE CHARGE INDICATOR IS FLASHING.

If the "ENERGY JOULES" selector position is inadvertently or intentionally changed while the defibrillator is charged, the charge is automatically dumped. It is necessary to recharge the unit to defibrillate at a different setting.

Synchronized Cardioversion

(Cardioscope/Recorder module must be joined to defibrillator module)

- Place disposable ECG electrodes on patient's chest and connect patient cable.
- Turn Power/Mode Selector to "ECG LEAD" position. Select a lead with a large upright QRS.

(CAUTION: DO NOT use defibrillator paddles as ECG pickup for elective cardioversions. Once discharge pushbuttons are depressed, artifact from poor paddle contact or movement of paddles could cause synchronizer to fire defibrillator prematurely.)

- Push "POWER" button on "STERNUM" paddle (paddles must be removed from storage area).
- Set "ENERGY JOULES" selector to desired level.
- Push "SYNC" pushbutton switch. Red switch button will light.
- Adjust "ECG SIZE" until marker occurs on "R" wave on cardioscope. "SYNC" button light will flash and systole beeper will occur with marker. (It may be necessary to move the electrodes to get a signal with sufficient amplitude.)
- Push defibrillator "CHARGE". To discharge, depress BOTH discharge buttons and **hold** until defibrillator fires on next "R" wave. Defibrillator will fire within 20 milliseconds of marker. If repeat synchronized cardioversion is indicated, place defibrillator in "SYNC" mode again by pressing "SYNC" pushbutton. **Defibrillator automatically returns to defibrillate mode after each discharge, when turned off, or when energy level is changed.** Synchronizer may be turned ON and OFF by pressing "SYNC" button. When button is lighted, synchronizer is ON.

NOTE: Earlier models of the LIFEPAK 5 were not equipped with synchronizers. **If a synchronized cardioscope/recorder module and a non-synchronized defibrillator module (or vice-versa) are connected, the synchronizer will not function.** Otherwise, the system will operate normally.

PATIENT CABLE AND ELECTRODES

The LIFEPAK 5 uses a special 6 pin connector and 3 lead patient cable. The use of this cable has resulted in a tremendous reduction in cable related artifact. Part of the improvement results from running the cable shielding down to the cable snaps. This cable, therefore, has heavier leads which do not easily tangle and are not replaceable.

Proper electrode application is the key to eliminating electrode artifact. Electrode artifact comes from poor contact between the electrode and the patient's skin. Supporting the patient cable to prevent tugging on the electrodes will eliminate one source of this artifact. However, preparation of the skin at the electrode site is by far the most important consideration. The skin should be roughed, cleaned with alcohol, then fanned dry. Non-pre-gelled electrodes should be connected to the cable snaps, have 1/4"-1/2" of gel

applied in a mound over the screen, then be attached to the patient. Pre-gelled electrodes should be attached to the cable snaps, inspected to insure that the gel has not dried out, then attached to the patient.

Muscle artifact often presents itself when the patient moves. Much of this artifact can be eliminated by locating the electrodes away from muscle masses.

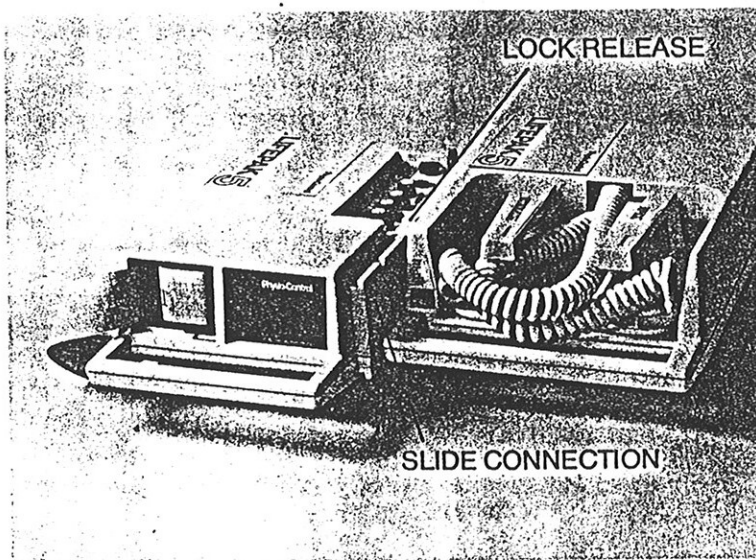
NOTE: Use only Physio-Control patient cable 09-10418-02 with the 3-LEAD MODEL LIFEPAK 5.

Other Physio-Control cables will work only when the Power/Mode Selector is in the Lead II position. Selection of Lead I or III with an incorrect cable will result in an incorrect display and/or artifact.

SLIDE CONNECTOR

The cardioscope/recorder module is connected to the defibrillator module through a special slide connector. They may be separated by pressing the lock release button on the slide and pulling the monitor forward until completely free of defibrillator module. The slide connector makes both the mechanical and the electrical connections between the two units.

When the modules are separated, the electrical slide contacts are exposed. These exposed contacts DO NOT represent a safety hazard and are used only to transfer the paddle pickup of the ECG signal from the defibrillator to the monitor and to transfer other low level synchronizing signals. No dangerous voltages are present at these contacts.



TESTING THE LIFEPAK 5

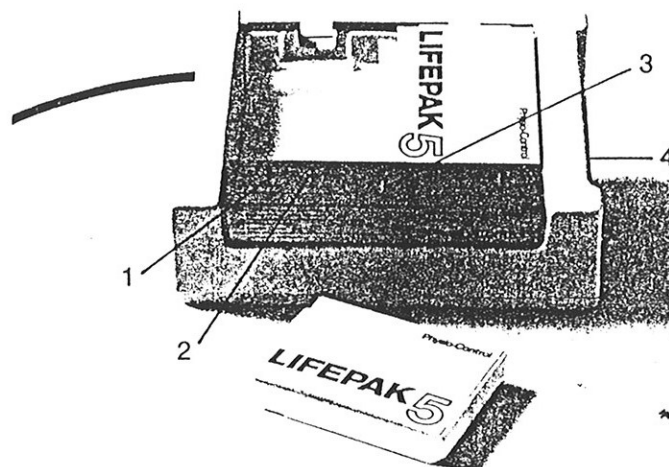
The LIFEPAK 5 and its Battery/Paks should be tested regularly according to the following directions.

- Turn Power/Mode Selector to "PADDLES" position. Trace will appear on cardioscope.
- Make sure defibrillator "POWER" is OFF—green light should be off.
- With cardioscope/recorder joined to defibrillator, touch one paddle face—interference should appear on cardioscope and systole beeper should sound. Repeat with other paddle. ("ECG SIZE" and "SYST VOL" may need adjustment.)
- Place paddles together—interference should disappear on cardioscope.
- Depress "RECORD (PUSH)"—recorder should start running and trace should appear on paper. Repeat interference test by touching paddles.
- Shut off "RECORD (PUSH)".
- Connect patient cable to "USE ONLY PATIENT CABLE 09-10418-02 (3-LEAD)" connector.
- Turn Power/Mode Selector to "ECG LEAD" I.
- Repeat above tests using RA (white) and LA (black) leads of the patient cable instead of the paddles.
- Advance "ECG LEAD" to II. Test using RA (white) and LL (red) leads.
- Advance "ECG LEAD" to III. Test using LA (black) and LL (red) leads.
- Depress "POWER" button on "STERNUM" defibrillator paddle.
- Set "ENERGY JOULES" selector to 200 joules or more.
- Place paddles **firmly** on Test Load plates on Battery/Pak charger. (NOTE: do not apply gel to paddles.)
- Depress "CHARGE" button—light should flash until selected energy level is reached, then glow steadily. This charge cycle should take less than 12.5 seconds.
- Depress both discharge buttons simultaneously—Test Load Indicator should flash.
- To test synchronizer:
Connect patient cable to patient or ECG simulator. Depress "SYNC" for synchronous mode—synchronizer marker should appear on "R" wave. Place paddles **firmly** on test load plates on Battery/Pak Charger. Charge defibrillator. Depress **both** discharge pushbuttons and **hold** until defibrillator fires on next "R" wave—Test Load Indicator should flash.
- Turn Power/Mode Selector to "PWR OFF" position and push "POWER" on defibrillator to OFF.

Use firm contact at time of discharge on test load plates to prevent arcing, pitting of paddles, and to insure delivery of energy. Because of heat created at time of discharge into Test Load, do not repeat testing of defibrillator more often than 10/hour.

BATTERY/PAK CHARGER

Controls And Indicators



1. CHARGING

Red LED glows when Battery/Pak is installed. Indicates that the Battery/Pak is charging.

2. TIME

Green LED glows after Battery/Pak has been charged for 4½ hours.

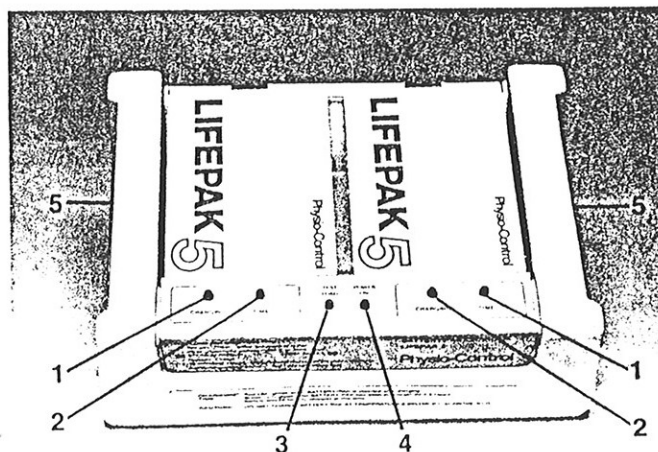
3. TEST LOAD Indicator

Light flashes when 200 or more joules are delivered into test load.

4. Test Load Plates

Electrodes for receiving test defibrillation pulse from paddles.

220 VAC CHARGER

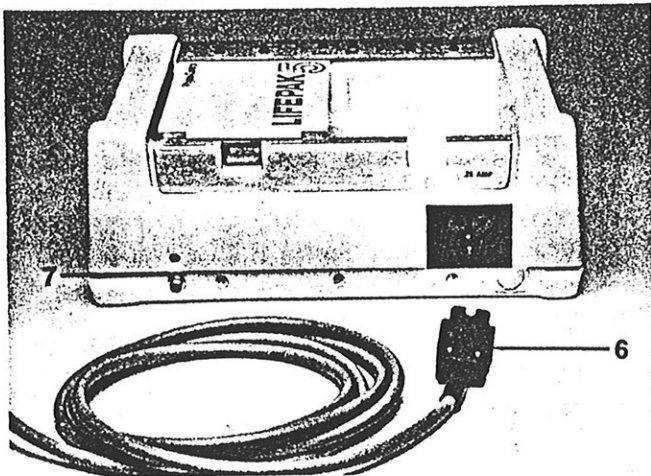


Top

1. CHARGING

Amber LED glows when Battery/Pak is installed. Indicates Battery/Pak is charging.

2. TIME: Green LED glows after Battery/Pak has been charged for 4½ hours.
3. TEST LOAD Indicator: Amber LED flashes when 200 joules or more are delivered into Test Load.
4. POWER ON: Green LED glows when power is on.
5. Test Load Plates: Electrodes for receiving test defibrillation pulse from paddles.



Back

6. Mains Power Cord: Cable for mains power operation.
7. 12 VDC Power Input: Connector for jack from 12 VDC source.

Operation

The Battery/Pak Charger is designed to operate from 115/230 VAC or 12 VDC. The AC voltage selector is internal and preset at the factory. Check the tag on the power cord to be sure that the voltage setting corresponds to the line voltage. A jack is provided for 12 VDC operation. (See Service Manual.) If both the AC and DC power inputs are connected at the same time, the AC supply will override the DC supply. No damage will occur.

All Battery/Paks are interchangeable and may be installed in the LIFEPAK 5 or the charger as follows:

- Align the Battery/Pak with the Battery/Pak space so that the clip on the Battery/Pak is towards the rear.
- Lower the front end of the Battery/Pak into the space.
- Lower the rear end of the Battery/Pak into the space and press until a "click" is heard.

To remove the Battery/Pak, press button at rear of Battery/Pak and lift.

Each Battery/Pak recharges independently in the charger so either one or two Battery/Paks may be inserted. A depleted Battery/Pak can be charged to full charge in 4½ hours. After the "TIME" indicator lights, the Battery/Pak should be fully charged and the charge rate is automatically reduced. Insertion of any Battery/Pak (depleted or fully charged) or interruption of the charger's line power will automatically reset the charger to the rapid charge rate for a full 4½ hours. **Repeated rapid charging of a fully charged battery will significantly reduce battery lifetime.**

Nickel-Cadmium Battery Care and Maintenance

Part of the difficulty in discussing nickel-cadmium battery care and maintenance is the terminology. The following terms are defined to assist in the proper maintenance of nickel cadmium batteries.

1. Reconditioning: or discharge cycle refers to discharging the battery via a battery discharger to a certain cutoff voltage. Afterwards it is recharged via the Battery/Pak Charger. Occasionally, several reconditioning cycles are performed.
2. Memory: refers to a slight reduction in battery capacity, generally found in batteries which receive little use and are being charged continuously.
3. Self-discharge: is the rate a battery depletes without actual use. This rate of self-depletion in a new battery is about 1% per day. The self-discharge rate increases as the battery ages or if it is stored in high ambient temperatures.
4. Charging and discharging the battery: In this paper, charge and discharge refers to the battery itself and not to charge and discharge of the defibrillator capacitor.
5. Totally or fully depleted battery: A fully depleted battery will mean a battery which is discharged to a state well beyond that point where it does not operate the equipment. This may occur when the monitor/defibrillator is inadvertently left on after the battery "goes dead."

Discussion

Nickel-cadmium batteries have been chosen for use in LIFEPAK 5 Defibrillator/Monitor because of their reliability, long life and the fact that they can withstand several thousand charging and discharging cycles. With proper care, they should provide adequate performance for up to two years. New batteries may be stored in the discharged state for several years without being damaged as long as they undergo several reconditioning cycles prior to use. Nickel-cadmium batteries require exercise (or use) and do best when they are regularly used to operate the equipment for moderate periods of time. Just as your leg muscles would atrophy if you did not perform any leg exercises, the nickel-cadmium battery voltage will become slightly depressed without use and may then require "reconditioning."

Nominal operating time includes 2 hours of monitoring or 45 minutes of continuous recording. The defibrillator will provide (32) 400 joule discharges at 25°C.

A fully charged battery which has been removed from the charger will self-discharge at a rate of about 30% per month so that within approximately 3 months the battery would provide only minimal operation time. This rate of self-discharge will accelerate as the battery ages. The self-discharge rate will also increase if the battery is being stored at high room temperatures.

Temperatures within the specified operating range at the time of battery operation (when energy is being removed from the battery) will have minimal effect on its performance. During the time that the battery is being charged, however, the ambient (room) temperature will be extremely important. A high ambient temperature will temporarily reduce battery performance. Batteries should be charged at or very close to 25°C (77°F). Batteries being charged, therefore, should not be located in direct sunlight, over a radiator, in cold storage, etc. Batteries charged at other temperatures will not reach full capacity. It is not possible to overcome the drawbacks of improper temperature by increasing the charging time.

Used batteries are susceptible to permanent damage when left in a fully depleted state. Depleted batteries should be recharged as soon as possible since this will help overcome the possibility of damage.

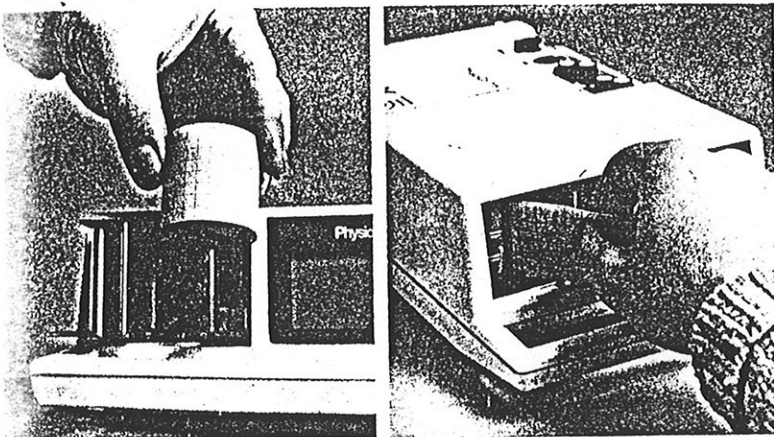
Occasionally nickel-cadmium batteries develop a condition known as "memory." Memory refers to a slight reduction in battery capacity and is most commonly found in batteries which receive little use and which are being charged nearly continuously. The user becomes aware of this condition when he notices the low battery indicator light after less than the normal operating time. This condition can be overcome by one or more of the reconditioning cycles previously mentioned.

RECOMMENDATIONS FOR LIFEPAK® 5 DEFIBRILLATOR MONITOR BATTERIES WHEN USED WITH -08 AND -09 BATTERY PAK CHARGER*:

1. Use your batteries regularly. If the batteries receive little use, it will be necessary to perform a reconditioning cycle.
2. Charge the batteries as follows:
 - a. Place a depleted battery into the charger. The red "CHARGING" light glows indicating the charge cycle is in process at the high charge rate.
 - b. After approximately 4.5 hours, the green "TIME" light glows indicating the battery is fully recharged and the charger has reverted to a trickle charge. Batteries may be left in the charger indefinitely without damage.
 - c. Momentarily removing the battery or discontinuing the power supply will reset the timer and reinitiate the high rate of charge. Frequently subjecting a battery to high charge rate for prolonged periods will reduce overall battery performance.
3. Charge batteries in an area with an ambient temperature of approximately 25°C. Locate the Battery/Pak Charger away from direct sunlight, radiators, air conditioners, etc.
4. Carry a spare Battery/Pak or two Paks if the unit is to be used for prolonged periods of time away from the charger. Batteries should be rotated when the low battery indicator light flashes.
5. Label your Battery/Paks so that you can easily distinguish one from another. This will help you identify any Battery/Paks which are not performing appropriately and will eliminate confusion regarding which Battery Pak is charged and which is not.
6. Battery/Paks may be reconditioned as required or every 3 months. Decrease the time period between reconditioning cycles if this regimen does not suffice.
7. Recharge batteries which have been inadvertently fully depleted as soon as possible. Follow-up with a reconditioning cycle.
8. Be aware that the rate of self-discharge of a stored battery will accelerate as the battery ages or if it is stored at high room temperatures. Make allowance for these factors.
9. Do not locate the Battery/Pak Charger in any EMS vehicle where the power to it is interrupted. Power interruption will automatically reset the timer. The high rate of charge will occur when power is again supplied to the charger. If the charger is to be left in the vehicle it should be operated from the vehicle's 12 volt system.
10. Check the monitor/defibrillator operation on a regularly scheduled basis.

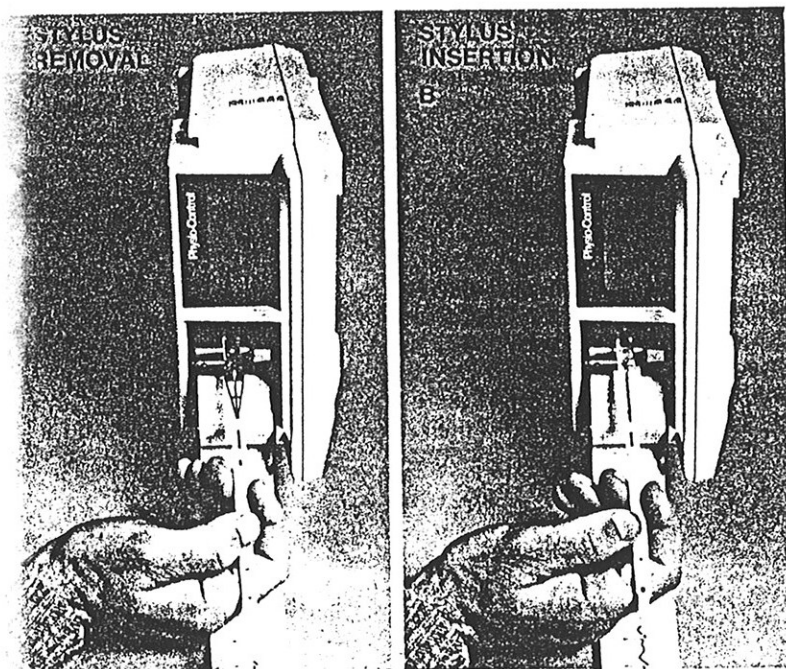
*Contact a Physio-Control Field Representative for

MAINTENANCE



Recorder Paper Replacement

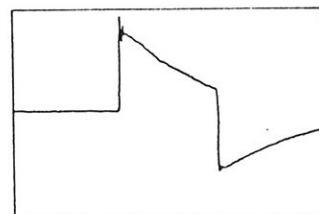
- Pull out paper carrier.
- Remove old paper roll.
- Replace with new paper roll.
- Pull out a short length of paper.
- Close paper carrier.
- Depress "RECORD (PUSH)", and while motor is running guide paper over all metal rollers and under the rubber roller. Paper should be pulled through by rubber roller.
- Adjust stylus "HEAT" for desired line width and darkness.



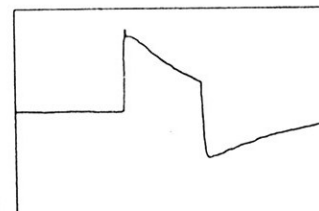
Recorder Stylus Replacement and Adjustment

- Obtain stylus replacement tool from stylus replacement kit.
- Pull out paper carrier and remove paper roll.
- Push stylus tool onto the tip of the stylus until stylus is hooked (Figure A).
- Pull gently on tool until stylus loosens from its mounting and extract. Remove stylus from tool.
- Install new stylus on tool (Figure B). Insert new stylus so that pins line up with holes on mounting block. Push gently until stylus is seated.
- Replace paper roll and adjust stylus "HEAT" for desired line darkness and width.
- Depress "CAL (PUSH)" and adjust "ECG SIZE" for 1 mV calibration pulse. Observe pulse shapes below. The pulse should have a small amount of overshoot.

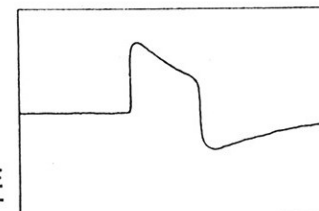
INSUFFICIENT PRESSURE OR HIGH HEAT



OPTIMUM



EXCESSIVE PRESSURE OR LOW HEAT



- If stylus needs adjustment, use wrench provided with replacement kit to add stylus pressure (counterclockwise) or decrease pressure (clockwise).
- In case of difficulty, refer to instructions in stylus replacement kit.

The overall frequency response of the recorder is affected by both the stylus pressure and heat. The stylus heat should be adjusted to the desired setting before the stylus pressure is changed. Styli are preadjusted at the factory

and should need very little adjustment, if any. As a stylus ages, residue may build up on the stylus where it contacts the paper. This will make the trace appear fuzzy. The residue can be removed with a penknife.




Cleaning the Lifepak 5

The LIFEPAK 5 case, paddles, cables, metal plates, cardioscope face, and Battery/Pak Charger should be cleaned with mild soap and water using a damp sponge or towel. Do not immerse any portion of the LIFEPAK 5 in water. Do not use alcohol or other solvents. It is especially important that gel not be allowed to build up on the defibrillator paddles. This buildup can cause an unstable trace during Quik-Look ECG monitoring and, if the user is in contact with the gel, presents a potential shock hazard during defibrillation.

TROUBLESHOOTING GUIDE

This brief checklist is intended for non-technical personnel. If trouble persists after consulting this guide, call your area service technician. A complete troubleshooting guide can be found in the Service Manual.

Cardioscope/Recorder Module

TROUBLE	PROBABLE CAUSE
1. Unit does not function when power is applied	a. Battery discharged below operating level b. Defective fuse
2. No luminous trace on cardioscope	a. Battery discharged below operating level
3. Interference on Cardioscope when using patient cable as ECG pickup	a. Poor electrode contact or placement b. Defective or incorrect patient cable c. Improper skin preparation
4. Excessive 60 Hz interference on Cardioscope when using paddles as ECG pick-up	a. Defective or dirty paddles b. Defective slide contacts—check for damage.
5. No ECG signal on cardioscope when using patient cable, but calibration display is available	a. Defective patient cable b. Power/Mode Selector in "PADDLES" position c. Incorrect patient cable
6. No ECG signal on cardioscope when using paddles as ECG pick-up, but calibration display is available	a. Defective paddles b. Power/Mode Selector turned to "ECG LEAD" position c. Defective slide contacts
7. Recorder does not run	a. Defective fuse b. Battery discharged below operating level c. Defective paper drive motor
8. Recorder motor runs but no trace on paper	a. Stylus "HEAT"  too low b. Stylus bent or maladjusted
9. No deflection when "CAL (PUSH)" switch depressed, but normal trace on Cardioscope	a. Defective switch
10. No signal on Cardioscope or recorder when signal is applied or "CAL (PUSH)" switch is depressed. Straight line only	a. "ECG SIZE" turned fully counterclockwise
11. No "SYNC" marker	a. "ECG SIZE" set too small for detection of "R" WAVE b. Poor connection in slide connector

Defibrillator Module

TROUBLE	PROBABLE CAUSE
1. Unit does not function when "POWER" pushbutton is depressed	a. Battery discharged below operating level b. Defective fuse
2. Stored energy is not delivered to patient when both paddle pushbuttons are depressed	a. Unit not fully charged to selected energy b. Unit in sync mode—no "R" waves detected
3. Charge Indicator shows no response or fails to reach desired stored energy level	a. Low Battery/Pak
4. Charge time exceeds 10 seconds to reach 300 joule level	a. Low Battery/Pak

Battery/Pak Charger

TROUBLE	PROBABLE CAUSE
1. Charger does not operate with AC power applied	a. Defective fuse b. Defective power cord c. Blown fuse or tripped circuit breaker in building
2. Unit does not operate with DC power supplied	a. Defective fuse b. Defective DC to DC converter
3. Only one "CHARGING" indicator lights when two Battery/Paks are installed or the applicable side does not function with a Battery/Pak installed	a. Defective indicator
4. "TIME" indicator does not light when Battery/Pak is charged	a. Defective indicator
5. Battery/Pak will not charge to full capacity	a. Defective Battery/Pak b. Battery/Pak charged at excessively high or low ambient temperature

SPECIFICATIONS

Cardioscope/Recorder Module

- ECG signal input:
Quik-Look paddles serve as both monitoring electrodes and defibrillator paddles. Low noise 3-lead patient cable eliminates motion artifact while monitoring under adverse conditions.
- Patient cable length: 3.96m (13 ft); cable 3.05m (10 ft) and leads .91m (3 ft).
- ECG size and momentary freeze control.
- ECG Lead Selection: Paddles I, II, III.
- Built-in QRS beeper with adjustable volume.
- 1mV calibrator.
- Differential ECG amplifier provides interference free traces. Common mode rejection 80 dB or greater.
- Electronically isolated input for maximum safety while monitoring.
- Input protected from high voltage defibrillator pulses.
- Shielding against radio frequency interference.
- Scope size: 60mm x 36mm, non-fade.
- Built-in 40mm chart recorder with heated stylus.
- Paper size: 42mm wide, 15m (50 ft) long, roll 4.5cm (1³/₄") in diameter.
- "ECG SIZE" control is also synchronizer sensitivity control. Marker appears on cardioscope display where defibrillator discharge occurs.
- Frequency Response, Cardioscope: .5 to 40 Hz
Recorder: .5 to 40Hz
- Sweep speed: 25mm/sec for both cardioscope and recorder.
- ECG output level: 1V/mV,
- Size: 9.7cmH x 19.1cmW x 33.8cmD (3.8" x 7.5" x 13.3").
- Weight: 3.7kg (8.25 lbs), including Battery/Pak.

DC Defibrillator Module

- All controls located in paddle handles giving user complete control.
- Delivered output energy (joules): 20, 50, 100, 200, 300, 360.

- Waveform: Edmark monophasic pulse, 3.5ms duration at half-power points, 12ms full duration.
- Automatic internal discharge when:
Defibrillator power turned off
Paddles stored
Energy selector changed
Battery/Pak removed
- Pushbutton discharge controls on both paddles in series to prevent accidental discharge.
- Charge time to 300 joules delivered energy less than 10 seconds. (360 joules in less than 12.5 seconds.)
- Defibrillator automatically switches from "SYNC" mode to "defibrillate" mode after synchronized discharge. Defibrillator fires within 20 milliseconds of marker.
- Paddle electrodes: 82cm²
- Size: 9.7cmH x 23.4cmW x 33.8cmD (3.8" x 9.2" x 13.3").
- Weight: 4.7kg (10.5 lbs), including Battery/Pak.

Power Source-Battery/Pak

- High quality rechargeable nickel-cadmium Battery/Pak.
- Separate, removable and interchangeable Battery/Paks in both cardioscope/recorder and defibrillator modules.
- Fully charged Battery/Pak will provide:
Defibrillator module: Minimum of (12) 360 joule discharges at -10°C. Nominally, (32) 360 joule discharges at 25°C.
- Cardioscope/Recorder module: Minimum of 1.7 hours ECG monitoring, or 30 minutes of recorder use, or any linear combination at -10°C. Nominally 2.5 hours of ECG monitoring, or 45 minutes of recorder use, or any linear combination at 25°C.
- Battery is not adversely affected by frequency of discharges.
- Low battery indicators on cardioscope/recorder module and defibrillator module.
- Size: 2.8cmH x 9.4cm W x 13.7cmD (1.1" x 3.7" x 5.4").
- Weight: .6kg (1.3 lbs).

Battery/Pak Charger

- Recharges Battery/Pak in 4.5 hours
- Will charge two Battery/Paks simultaneously.
- Operating voltage available: 110 VAC, 220 VAC, 12 VDC.
- Maximum power input: 30 watts.
- Charge Indicators:
Red—"CHARGING:" Battery/Pak in charger and charging.
Green—"TIME:" Battery/Pak charged for at least 4½ (± ½) hours.
- Test Load: 50 ohms
- Test Load Lamp: Flashes when 200 joules or more delivered to test load.
- Size: 10.9cm x 28.7cm x 21.1cm (4.3" x 11.3" x 8.3").
- Weight: 2.4kg (5.25 lbs).

Environmental (excluding Battery/Pak Charger)

- Temperature, Operating: -10°C to +55°C
Storage: -35°C to +65°C
- Humidity: 0 to 95% R.H., noncondensing.
- Altitude: 4570 meters (15,000 ft.)
- Molded cases of high impact plastic to take shock and vibration.
- Completely sealed cases and controls.
- This equipment should not be used in the presence of flammable agents or anesthetics.

WARRANTY POLICY (USA Only)

LIFEPAK 5 is warranted against all defects in parts and workmanship for a period of one year from the date of delivery; patient cables and stylus, 90 days. Physio-Control will repair or replace any products which prove to be defective during the warranty period, provided the proper use and maintenance procedures are followed as prescribed in the operating and service manual.

All defective products or components must be returned to Physio-Control, or its authorized service center, with a detailed explanation of the failure. Transportation charges must be prepaid.

Service performed, other than stylus replacement, by other than Physio-Control or its authorized agents may, at the discretion of Physio-Control, be cause to void this warranty.

No other party is authorized to make any other warranty, or to assume any liability for Physio-Control products. No other warranty, either implied or in writing will be recognized.

SERVICE

Should your LIFEPAK 5 require service, contact your area Physio-Control representative or your area service manager. When calling to request service, please identify model and serial number and describe problem. If the instrument must be shipped to the service center or factory, special packing is necessary to prevent shipping damage. All accessories should accompany the instrument and transportation cost must be prepaid.

OPTIONAL ACCESSORIES AND REPLACEMENT ITEMS

Emergency Cart
Battery Support System
ECG/Voice Recorder
Battery Charger Wall Mounting Kit
Accessory Bag
3 lead-wire patient cable (09-10418-02 only)
ECG paper, 3 rolls/box
ECG paper, 50 boxes/case
LIFE•PATCH® pre-gelled electrodes (disposable), 75/box
LIFE•PATCH pre-gelled electrodes (disposable), case (4 boxes)
External clip-on pediatric paddles (15.4 cm²)
Stylus, replacement (includes stylus insertion tool)
Battery Discharger
Battery/Pak (rechargeable nickel-cadmium)
ECG Modulator
ECG Demodulator