CardioCare 2000

OPERATION

MANUAL

Bionet America, Inc.

Operation Manual for CardioCare 2000 version 1.0

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Terms of Warranty

- This product is manufactured using strict quality control.

- CardioCare 2000 is warranted by Bionet America, Inc. to be free from defects in material and workmanship for three years from the date of purchase.

- Bionet America, Inc or an Authorized Dealer Service Center will make warranty repair or replacement at no charge during the warranty period if properly used under normal conditions in accordance with the instructions for use.

- In the event of a malfunction or failure during the warranty period, the customer should inform Bionet America, Inc. of the model name, serial number, date of purchase, and an explanation of the defect.

How to reach us …

Service Calls	The following telephone number should be used to contact Bionet America, Inc.
Product and Purchase Inquiries	By dialing one number you can place service calls, purchase products or make inquiries, or get technical support.
Supply products and other accessories	In the event of a malfunction or failure, contact the Service Dept. of Bionet America, Inc. and provide the model name, serial number, date of purchase, and an explanation of the failure.
Technical Support	**Main office toll free 1-877-924-6638**

Definitions of Warnings, Cautions, and Notes

These terms are defined as listed below. Users should operate the equipment according to all of the Warning and Caution labels.

The manufacturer, Bionet America, Inc., and Authorized Dealers are not responsible for any damage or breakdown that is caused by misuse or failure to maintain the equipment.

Warning
Indicates that serious injury or death to the patient, property damage, or material losses could occur.

Caution
Indicates that this is not life threatening but could lead to injury.

Note
Indicates that there is no danger, but is important for proper installation, operation, and maintenance of the equipment.

Service Requirements

Refer servicing of the equipment to Bionet America, Inc. authorized service personnel. Any attempt to repair the equipment while under warranty will void that warranty.

It is the responsibility of users requiring service to report the need for service to Bionet America, Inc. or to one of their Authorized Dealers.

Failure to implement a satisfactory maintenance schedule may cause equipment failure and possible health hazards.

If there are any problems with the equipment, please follow the steps below:

Contact Bionet America, Inc. immediately and furnish the model name, serial number, date of purchase, and description of the problem.

Try to solve the problem over the phone with the service department personnel. If the problem cannot be solved over the phone, the machine can be returned for replacement.

Bionet America, Inc. or its Authorized Dealer will make available, on request, circuit diagrams, component part lists, descriptions, calibration instructions or other information which will assist appropriately qualified technical personnel to repair those parts of equipment which are designated by Bionet America, Inc. as repairable.

General Precautions

Do not keep or operate the equipment in the environments listed below.

	Avoid placing in an area exposed to moisture. Do not touch the equipment with wet hand s.		Avoid exposure to direct sunlight
	Avoid placing in an area where there is a high variation of temperature. Operating temperature ranges from 50°F to 104°F. Operating humidity ranges from 30% to 85%.		Avoid placing near an electric heater
	Avoid placing in an area where there is an excessive humidity rise or ventilation problem.		Avoid placing in an area where there is an excessive shock or vibration.
	Avoid placing in an area where chemicals are stored or where there is danger of gas leakage.		Avoid contamination of dust and especially metal material into the equipment.
	Do not disassemble the equipment as this will void the warranty.		Turn the power off when the equipment is not being used.
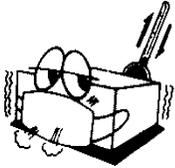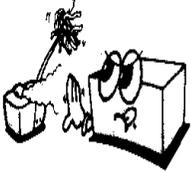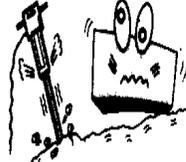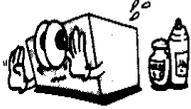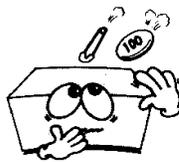
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General Precautions on Electric Safety

Check the items listed below before operating the equipment.

Be sure that the AC power supply line is appropriate to use (100 - 240V AC).

Be sure that the patient connection cable of the system is properly attached.

Be sure to use only the power cable supplied.

Note
The equipment should not be placed in the vicinity of electric generators or broadcasting apparatus to eliminate electric noise. Otherwise, it may cause an incorrect interpretation. Using the same power source with other electric instruments may cause an incorrect interpretation.

Note

The CardioCare 2000 is classified as listed below:
    This equipment conforms to Class I, Type-BF. The equipment should be grounded to protect the patient from electrical shock.
    Do not use the equipment near flammable anesthetics or solvents.
    The equipment conforms to Class I according to IEC/EN 60601-1 (Safety of Electric Medical Equipment)
    This equipment conforms to Class A according to IEC/EN 60601-1-2 (Electromagnetic Compatibility Requirements)

Note
Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC 950 for data processing equipment and IEC 601-1 for medical equipment). Furthermore, all configurations shall comply with the system standard EN 60601-1-1:1993. Anyone who connects additional equipment to the signal input or signal output configures a medical system and is therefore responsible that the system complies with the requirements of the system standard IEC 601-1-1:1993. If in doubt, consult the technical service department or your local representative.

Safety Symbols

The International Electro-technical Commission (IEC) has established a set of symbols for medical electronic equipment, which classify a connection or warn of any potential hazards. The classifications and symbols are shown below.

Save these instructions.

Symbols	Contents
	Isolated patient connection. (IEC 601-1-Type BF)
	Device switched off.
	Device switched on.
	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Control function is described in the appropriate operation manual.
	Conductor provides a connection between equipment and the potential equalization busbar of the electrical installation
	External Signal IN/OUT Port
	EKG Signal Input Port
The following symbol is used inside the system:	
	Identifies the point where the system safety ground is fastened to the chassis. Protective earth is connected to conductive parts of Class 1 equipment for safety purposes.

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General Information

Introduction

The CardioCare 2000 is a multi channel, interpretive ECG machine that acquires and records a patient's ECG.

CardioCare 2000 provides users with a record of the patient ECG, measurement parameters for diagnosis, and auto analysis. Patient information and site identification is printed with the ECG on the output report and is effective for patient chart control.

For convenient operation, the ECG can be measured and recorded by pressing a short key (described below). Then, after applying the filter, calculating the measurement parameters, and auto analysis, the ECG is printed in a letter sized report form.

In addition to AC power, it can be continuously operated with a built-in rechargeable battery. This enables convenient portability of the CardioCare 2000.

Features of the Equipment

The CardioCare 2000 ECG can be printed in various channel form of three channel and 1rhythm, six channel and 1rhythm, 12 channel rhythm, or for 60 seconds and 1rhythm in a letter sized report.

The single channel rhythm is recorded for 60 seconds and printed in a letter-sized report.

In Monitor Mode, 12 channel rhythms are printed simultaneously and continuously in real time.

After calculating the measurement parameters such as heart rate, PR interval, QRS duration, QT/QTc, and P-R-T axes required for diagnosis the ECG report is printed.

Auto analysis assists diagnosis.

For convenient diagnosis, the ECG can be printed after changing system settings such as filter, signal level, printing speed, channel form, or rhythm channel of the recorded ECG data.

Equipment Description

Check to insure that all of the listed components are present and that the main unit and any accessories are not damaged.

The CardioCare 2000 is composed of the following items:

Standard components (Some items might be changed without notice)

CardioCare 2000 Main unit
Patient cable (1 EA)
AC power cable (1 EA)
Disposable Electrodes (1 Pack)
Recording paper (1 roll)
ECG Clips (1 Set)
Rechargeable Battery (1 EA)
Diagnosis Guide Book (1EA)
Operation manual (1EA)
Quick Reference Guide (1 EA)
Warranty Card
Test Report
Instructional CD (1 EA)

Options

Cart

Carrying Bag

Hanger

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Main Unit

Top View
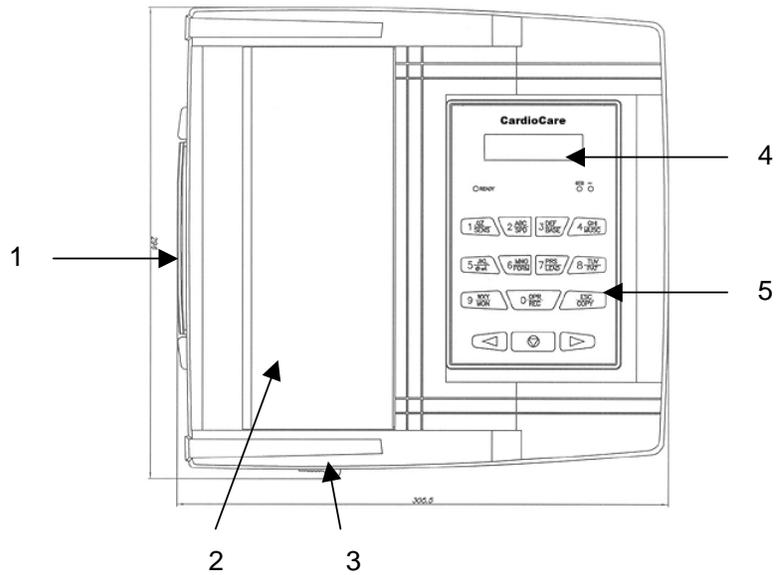
Carrying handle

Printer door

Printer door release button

LCD

Control panel

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Rear View
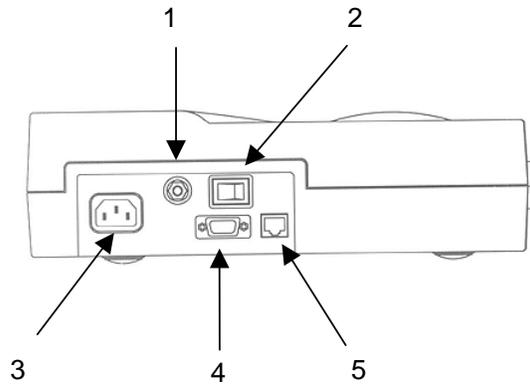
Potential equalization stud

Main power switch

AC power socket

RS-232C SERIAL port

RS45 LAN port

Left Side View
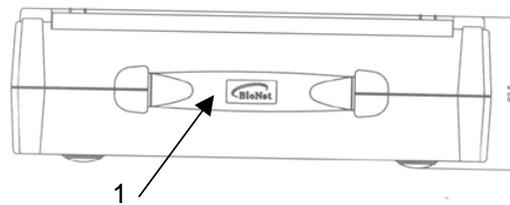
Carrying handle

Right Side View
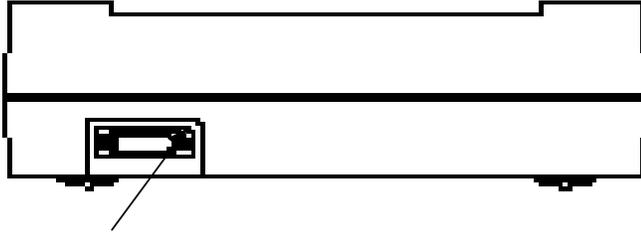
1

Patient cable connector port

Warning
To avoid electric shock, DO NOT open the case of the equipment. Refer servicing to Bionet America, qualified personnel or your local authorized dealer.

LCD Panel

When the power switch is activated, the LCD panel displays the version of the system software and manufacturer name for two seconds and then the system status.

Displayed items on the LCD are as follows:
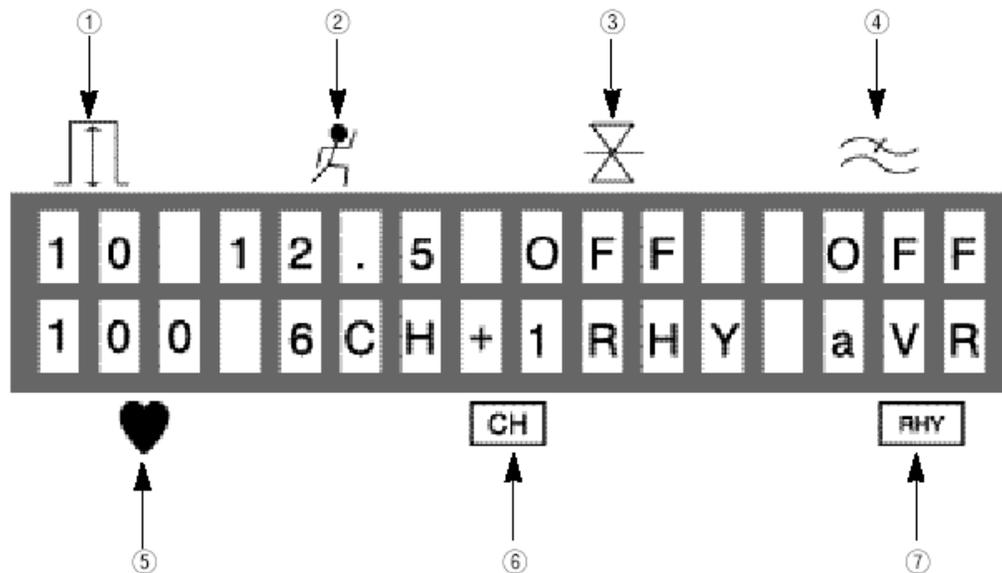
Displays the ECG signal level of 5, 10, 20, or aut (Auto Gain)
Displays the printing speed of 12.5, 25, or 50
Displays if the base line filter setting is on or off
Displays if the EMG filter setting is on or off
Displays the heart rate
Displays the channel form of the output report of 3ch+1rhy, 6ch+1rhy, 12ch rhy, 60s 1rhy
Displays the rhythm channel setting out of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6

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Control Panel

Indicator lamps

READY   When power is applied, this lights for a short time, goes out, and then lights again. This indicates that the system self test is complete and the system is ready to be used.

Indicates the level of battery charge in green or amber. When the battery charge indicator lamp is illuminated amber, turn the system power off and connect the AC power source. Then turn the system power on again.

Indicates that AC power is applied.

Short keys
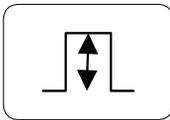
Selects signal level (mm/mV) of 5, 10, 20, or aut (Auto) (I-aVF: 10, V1-V6: 5)

Selects the printing speed (mm/sec) of 12.5, 25, or 50
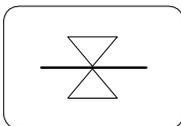
Selects whether or not to activate the filter that eliminates base line drift (on/off)

Selects whether or not to activate the filter that eliminates EMG (on/off). The ECG signal can be distorted by applying this filter.
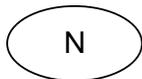
N   This key is reserved for use when network functions will be added.

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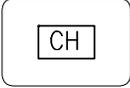
CH	Selects the channel form of the output report of 3ch+1rhy, 6ch+1rhy, 12ch rhy, 60s 1rhy
RHY	Selects the rhythm channel
	Shows the menu to enter patient ID, name, age, sex, height, and weight
	Monitor mode. Continuously prints the real-time ECG from the patient
	Records the ECG data for 10 seconds and prints a letter sized report after calculating the measurement parameters of the recorded ECG
	Prints the same report as previously printed in record mode or prints after changing system settings such as filter, signal level, output speed, channel form, or rhythm channel. Also, allows exit from the set-up menu
	The Command Key. Exit during printing or recording of ECG data. In addition, displays the set-up screen and allows selection of menu or select items to change.
	Moves to the next left item in the set-up menu
	Moves to the next right item in the set-up menu
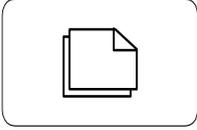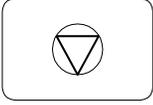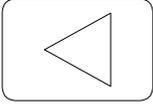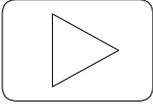
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AC Power

When AC power is supplied to the equipment, the AC power indicator lamp on the front panel is illuminated and the battery is being charged automatically.

 AC power indicator lamp

Battery charge indicator lamp
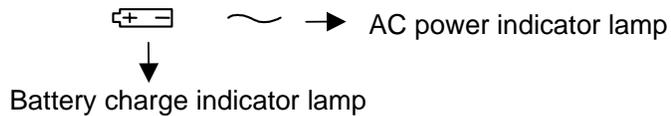
When not connected to AC power, the machine is operated from battery power. When the battery is used, the battery charge indicator lamp is illuminated green. When the battery power is low, a beep tone sounds three times in series and the battery charge indicator lamp shows amber. In this case, turn the system power off and connect the AC power source. Then, turn the system power on again. If the battery falls to no charge, the machine sounds a rapid beeping tone, the battery and ready indicator lights flash, and the machine turns itself off.

- Required time for charging – approximately four hours

- Continuous battery operating time - one hour

Caution
For the protection of the environment, DO NOT discard a battery. Please inquire as to the proper procedure and dispose accordingly.

System Installation

Installation Precautions

When installing the CardioCare 2000, take the following precautions:
- The equipment should be operated within a temperature range of 50-104 ° F and 30-85 humidity.
- Handle the power cord connection and patient cable with care.
- Do not plug several power cords in one electric outlet.
- Main unit should be used on a level space.
- Check that the equipment is properly grounded to avoid interference.
- The entire system settings are stored on the internal memory even when system power is turned off and on again
- Avoid excessive shock or vibration that could result in equipment damage.
- Avoid using in areas of dust and flammable material.

Power Cable Connection

The equipment should function normally when connected to power using the supplied power cord. If the power does not come on when connected to AC and the battery is charged, contact the service department of Bionet America, Inc.

Patient Cable Connection

Connect the patient cable into the connection port at the side of the equipment.
Connect the ECG clips to the RA, LA, RL, LL, and V1 – V6 wires on the patient cable.
Connect the patient cable to the electrodes on the patient.

Recording Paper Installation

The printer door will open if the printer release button at the side of CardioCare 2000 is pushed to the right. Place the recording paper with the signal-recording side up and push down on the door to close.

Menu Structure

The CardioCare 2000 provides three basic modes of operation: preparation mode, output mode, and menu mode.

Preparation mode is an initial condition when the system starts. The LCD displays the system settings and heart rate. This mode also allows system configuration settings to be changed and for completing the initial setup.
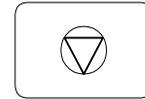
The key that looks like the one to the right is the Command Key.

The system settings can be changed by pressing each of the short keys SENS (1), SPD (2), BASE (3), MUSC (4), FORM (6), LEAD (7), PAT (8), MON (9), REC (0), or ESC/COPY on the control panel. The Command Key calls up the menu mode.

Output mode is to activate the print operation by pressing one of the short keys: MON, REC, COPY. Only the MON, REC, and COPY keys of the control panel will stop printing in the output mode.

Menu mode is activated by pressing the Command Key and using the window displays on the LCD.

```
 PAT  FLT  PRN  SYS

     < PATient Info >
```
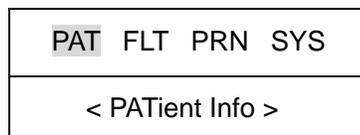
The top line shows a blinking menu item that is selected and the bottom line shows the meaning of the abbreviation on the top row of the menu screen.

Press the left arrow   key to move to the selection to the left. Press the right arrow key   to move to the next selection to the right.

Press the Command Key to select the menu items.

Press the ESC/COPY key of the control panel to step back through the menu selections.

The Menu structure is as follows:

PAT	< PATient Info > Enter the patient information including patient ID, name, age, sex, height, and weight
FLT	< FiLTer setup > Select and adjust the filter settings of a base line drift filter, EMG filter, AC filter, or LPF (low pass filter).
PRN	< PRiNter setup > Select and adjust the signal level, printing speed, grid on/off, number of channels, rhythm channel select, test print
SYS	< SYStem setup > Enter system the settings including date, time, and hospital or clinic name.

System Settings

Initial Settings

The CardioCare 2000 is initialized at the factory as follows:

Date (DATE)	2000-03-01
Time (TIME)	00-00-00
Signal level (SENS)	10mm/mV
Display speed (SPD)	25mm/s
Grid (GRID)	Off
Channel form (FORM)	6ch+1rhy
Rhythm lead (LEAD)	II
Base line filter (BASE)	On
EMG filer (MUSC)	Off
AC noise filter AC)	60hz
Low pass filter (LPF)	150hz

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Date and Time

To set the date on the CardioCare 2000, press the Command Key once and move to the right until SYS begins to blink. Press the Command Key again to select SYS and DATE will begin to blink. Press the Command Key again and enter the current date.

```
┌─────────────────────────┐
│  PAT  FLT  PRN  SYS      │
├─────────────────────────┤
│    < SYStem setup >      │
└─────────────────────────┘
              ┌─────────────────────────┐
              │  DATE  TIME  HOSP  >>    │
              ├─────────────────────────┤
              │       2000-03-01         │
              └─────────────────────────┘
                        ┌─────────────────────────┐
                        │    * DATE SETUP *        │
                        ├─────────────────────────┤
                        │       2000-03-01         │
                        └─────────────────────────┘
```
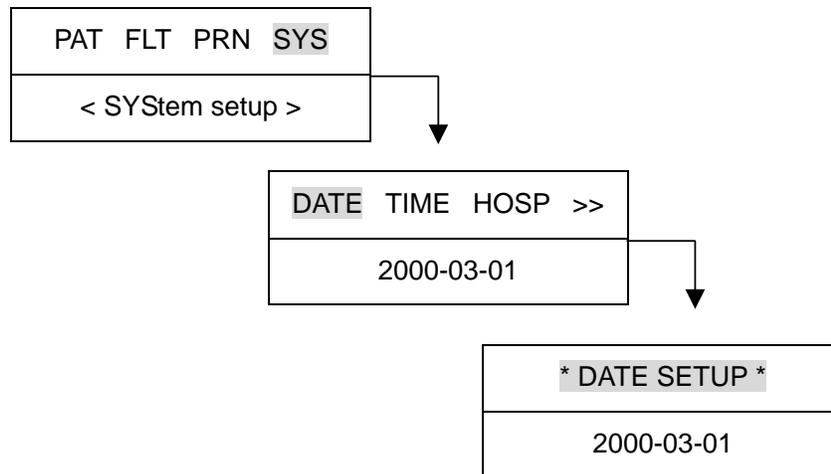
The numbers are entered by pressing 0 through 9 on the numeric keypad in the current cursor position and the cursor automatically moves to the right after each entry. To exit the date setting, press the Command Key to return to the previous menu or the ESC/COPY key to return to the initial screen.

To set the current time on the CardioCare 2000, follow the steps above and move to TIME SETUP. Enter the time in the same way the date was entered.

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Site Identification

Site identification is to identify the name of the site that uses the system. To enter the site name on the CardioCare 2000, press the Command Key once and use the right arrow key   move to the right until SYS begins to blink. Press the Command Key again and DATE will begin to blink. Use the right arrow key   to move to HOSP, press the Command Key again, and enter the site name.

```
PAT  FLT  PRN  SYS

< SYStem setup >


                    DATE  TIME  HOSP >>>



                                    *  Enter Hosp.  *

                                    _
```
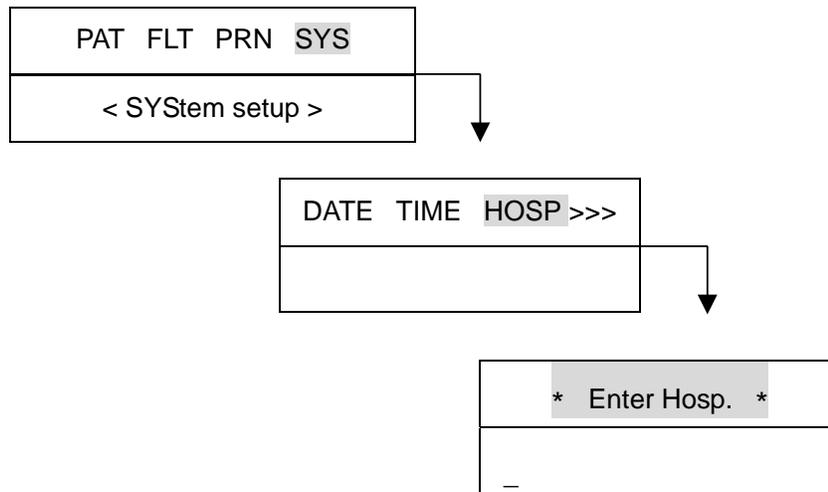
The site name can be entered using 16 characters or less. To enter the name, select the characters for the current cursor position. For example, using the "2" key, you can enter the letters A, B, or C or the number 2. Press the key once and the letter A appears, press it twice, the letter B appears and so on.

To enter the next character, press the right arrow key   and enter the next character in the name as above. Continue this process until the name is complete. To exit the site identification setting, press the Command Key or the ESC/COPY key to return to the previous menu and the ESC/COPY key to return to the initial screen.

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Preparation for Acquiring the ECG

Electrode Positions

To record a 12 lead ECG, connect the electrodes to the patient as follows:
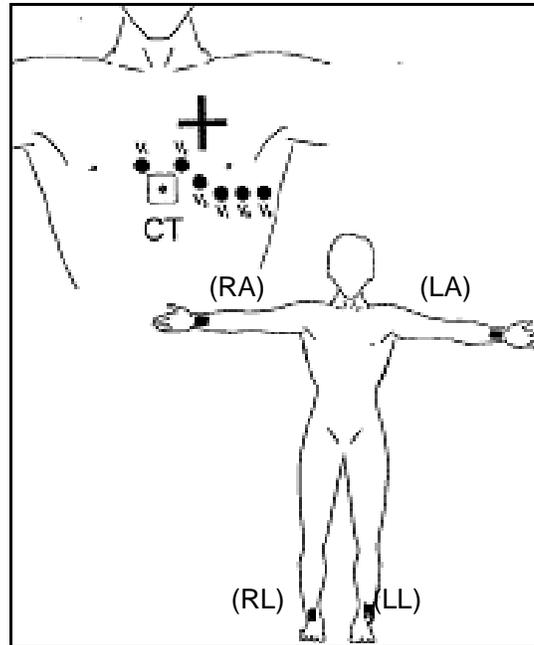
The electrode positions are as follows:

(RL)   Right leg

(LL)   Left leg

(RA)   Right arm

(LA)   Left arm

V1   Fourth intercostal space at the right border of the sternum

V2   Fourth intercostal space at the left border of sternum

V3   Midway between location V2 and V4

V4   At the mid-clavicular line in the fifth intercostal space

V5   At the frontal axillary line on the same horizontal level as V4

V6   At the central axillary line on the same horizontal level as V4 and V5

Electrode Connections

Check Connections

Check the system connections before acquiring the patient's ECG.
- Check that there are no mechanical hazards.
- Check the connection of the external cables.
- Check the machine to insure that the parameters are set correctly.

Connecting the Electrodes

Have the patient lie comfortably on their back and connect the electrodes as described in "Electrode Positions" on page 22.

Connecting the Patient Cable

Connect the patient cable to the electrodes and then connect it to the CardioCare 2000. Defibrillation protection is provided only if used with the original Bionet patient cable.

Warning
Use only electrodes and patient cables provided from Bionet America, Inc.

Lead-Off Troubleshooting

You can determine that the leads are connected properly by using the Monitor mode output of real time printing (explained later in this manual). A lead off condition can occur in two ways.

First, the lead comes off the patient. In this case, re-connect the lead.

Second, conductivity between the patient and electrodes is poor. In this case, apply a new electrode to the patient.

Under very exceptional circumstances, if there continues to be a poor ECG signal, there could be a problem with the patient cable. Contact service at Bionet America, Inc.

Acquiring the ECG

Introduction

After connecting the leads to the patient, as described on page 22, turn the power switch on.

Set the filter, signal level, display speed, channel form, and rhythm lead as described later in this section.

Enter the patient information as described later in this section.

Press the OPR/REC (0) key to record the patient's ECG. If the results are not as expected, press the WXY/MON key to view the ECG signal in real time. If you are still troubled with poor signal, take the necessary steps as described in "Lead-Off Troubleshooting" on page 24.

If you would like another copy of the ECG, press the ESC/COPY key. You can also press this key to exit during printing or recording of the ECG.

Memorizing the short keys described below makes use of the CardioCare 2000 easier.

	MONITOR: Prints a real time ECG for direct or long term monitoring of the patient.
	RECORD: Records ECG data for 10 seconds and prints a letter sized report with interpretation, after calculating the measurement parameters of the recorded ECG.
	COPY: Prints the same report as previously printed one in record mode or prints after changing system setting such as filter, signal level, output speed, channel form, rhythm cannel of previously recorded ECG data in record mode
	COMMAND: Exit during printing or recording of ECG data
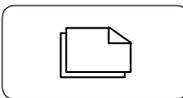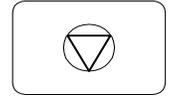
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Basic settings

General Information

When the system is turned on and completes its self test, the LCD displays the current system settings in the following order: signal level, printing speed, base line filter, EMG filter, heart rate, channel form, and rhythm channel. These settings can be changed using two methods: the Short Keys or the Menu. Pressing the Command Key once will enter menu mode and the LCD displays the various selections that can be made. PAT is used to enter patient information, FLT is used to select the filter, PRN is used to configure the print settings, and SYS is used to for the initial system configuration settings or to modify the system settings.

Signal Level Setting

The signal level should be adjusted so that the signal does not overlap with neighboring traces or the amplitude of the pulse is too small to interpret.

The signal level setting is adjustable in four ways. The entire 12 channel ECG is set to 5mm/mV, 10mm/mV, 20mm/mV and aut (Auto gain control), which sets I, II, III, aVR, aVL, aVF to 10mm/mV, and V1, V2, V3, V4, V5, V6 to 5mm/mV. The 5mm/mV setting indicates that the amplitude of 1mV pulse is amplified into 5mm.

To change the signal level, press the QZ/SENS (1) key and each time it is pressed, it scrolls to the next available level. The selected setting is shown on the bottom line of the output report.

Print Speed Setting

The print speed setting is to adjust the speed of the printed output. The adjustable values are 12.5 mm/s, 25 mm/s, or 50 mm/s. For a wider range of signal display, set a larger value.

To change the printing speed, press the ABC/SPD key and select the desired speed. The ABC/SPD key toggles among the values 12.5, 25, or 50. The selected setting is shown on the bottom line of the output form.

Filter Setting

Any AC power noise, base line drift caused by breathing, or EMG signal can be recorded along with the output ECG signal. To set the AC noise filter, press the Command Key once and move to the right to select FLT. Move through the BASE, MUSC, AC, and LPF and use the Command Key to scroll or toggle through the filter settings. The AC filter scrolls among off, 50hz, and 60hz. When the off is selected, the filter is not applied and the machine does not suppress AC interference. When either 50Hz or 60Hz is selected, the machine suppresses 50Hz or 60Hz AC power noise. If using battery power, the ECG signal is clear only with the off selection because there is no AC noise. The selection is 50Hz for most of Europe and 60Hz for the USA and other countries. The selected setting is shown on the bottom line of the output form.

Base line drift is caused by patient breathing. The Base Line Drift filter can be set by pressing the DEF/BASE key, which toggles the values on or off. The selected setting is shown on the bottom line of the output form.

The EMG signal is induced from the muscle and internal organs of the patient. For a clear ECG signal, it is necessary to eliminate this EMG signal interference. The EMG filter can be set by pressing the GHI/MUSC key, which toggles the value on or off. The selected setting is shown on the bottom line of the output form.

The Low Pass Filter (LPF) can be selected to optimize the ECG signal after applying the above three filters and if the ECG signal continues to have interference. To set the Low Pass Filter, press the Command key once and move to the right to select FLT. Press the Command Key again and move to the right to select LPF. Use the Command Key to scroll through the values off, 40hz, 100hz, or 150hz. This filter suppresses frequencies higher than the selected value. For example, if the 40Hz filter is selected, it indicates that the filter suppresses higher frequencies than 40Hz. The selected setting is shown on the bottom line of the output form.

Applying this filter could result in some ECG distortion. This filter should only be applied to reduce the fluctuation of the ECG when there is substantial interference

For your reference, the Base Line and AC filters should always be active and the EMG filter can be applied appropriately. It is recommended to set the LPF to 150Hz during diagnosis.

Channel Form Setting

The Channel form setting is to adjust the number of channels of the output form. This system provides four channel forms: 3ch+1rhy, 6ch+1rhy, 12ch rhy, and 60s 1rhy.

When the 3ch+1rhy is selected, 10 seconds of ECG data are recorded in four consecutive segments of 2.5 seconds each. For example, the I, II, and III is collected during the first 2.5 seconds, aVR, aVL, and aVF during the second 2.5 seconds, V1, V2, and V3 for the third 2.5 seconds, and V4, V5, V6 for last 2.5 seconds. In addition, a single channel rhythm is recorded for 10 seconds in the lower part of the output form.

When the 6ch+1rhy is selected, 10 seconds of ECG data are recorded such as I, II, III, aVR, aVL, aVF for the first 5 seconds and V1, V2, V3, V4, V5, V6 for the next 5 seconds. In addition, a single channel rhythm is recorded for 10 seconds in the lower part of the output form.

When the 12ch rhy is selected, 12 channel rhythms are simultaneously recorded in the order of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6.

When the 60s 1rhy is selected, one channel rhythm is recorded using six lines, 10 seconds to every line, for 60 seconds.

To set the Channel Form, press the MNO/FORM key. This scrolls among 3ch+1rhy, 6ch+1rhy, 12ch rhy, and 60s 1rhy. The selected setting is shown on the top line of the output form.

Rhythm Channel Setting

The Rhythm channel setting is to select the lead of the output form. To set the rhythm lead, press the PRS/LEAD key. This key scrolls among I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6. The selected rhythm lead is recorded in lower part of the output form.

Diagnosis Setting

The diagnosis setting is used to determine if the data will be interpreted using the Minnesota Tables and printed on the report. The choices for this setting are either on or off and can be set using the Menu Mode. Press the Command Key once and use the right arrow key to move to the PRN choice. Press the Command Key again and use the right arrow key to move to the DIAG choice. Use the Command Key to toggle between the two choices.

PAT   FLT   PRN   SYS
< PRiNter setup >

<<   M-CH   DIAG
on
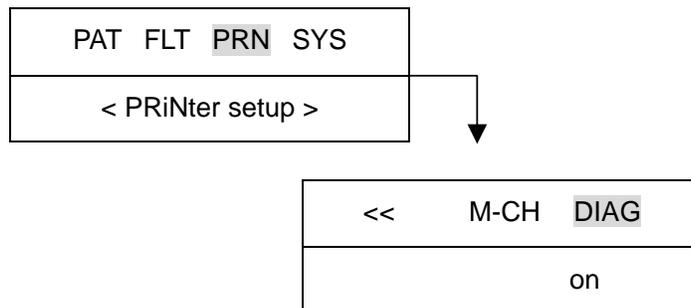
Grid Setting

The Grid Setting is needed if regular thermal fax paper is used as recording paper. The Grid is marked with solid lines of 5mm by 5mm and with a dot of 1mm by 1mm position.

When using standard ECG recording paper, the Grid Setting should be off.

To set the grid, press the Command Key once to use the Menu Mode and use the right arrow key to move to PRN. Press the Command Key again and use the right arrow key to move to GRID. Press the Command Key and it will toggle between the on or off values.

PAT   FLT   PRN   SYS
< PRiNter setup >

SENS   SPD   GRID   >>
on
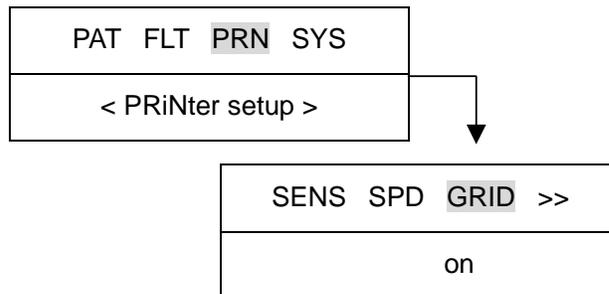
As mentioned, the Command Key switches between the on or off values. This simply determines if the grid will be printed.

Enter Patient Data

Patient information including patient ID, name, age, sex, height, and weight can be entered. There are two methods to enter patient data but the easiest is to use the Short Key, TUV/PAT. The Command Key can also be used. Use the right arrow keys to move to the patient data to enter and press the Command Key to select that item as follows:

```
 PAT  FLT  PRN  SYS
 < PATient info. >
```

```
 ID  NAME  AGE  SEX
```
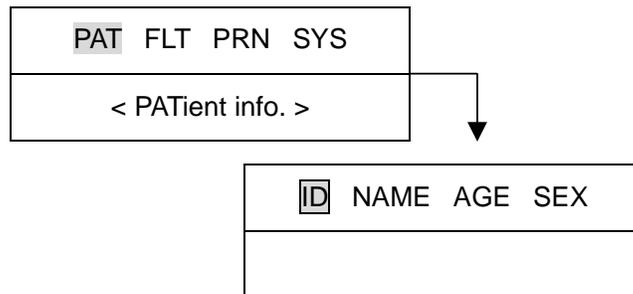
When there is previous patient data, the following appears on the LCD to choose a new patient or use the data of the current patient.

```
 New   Patient?
     yes   no
```

```
 ID  NAME  AGE  SEX
```

```
 *   Enter   ID   *
```
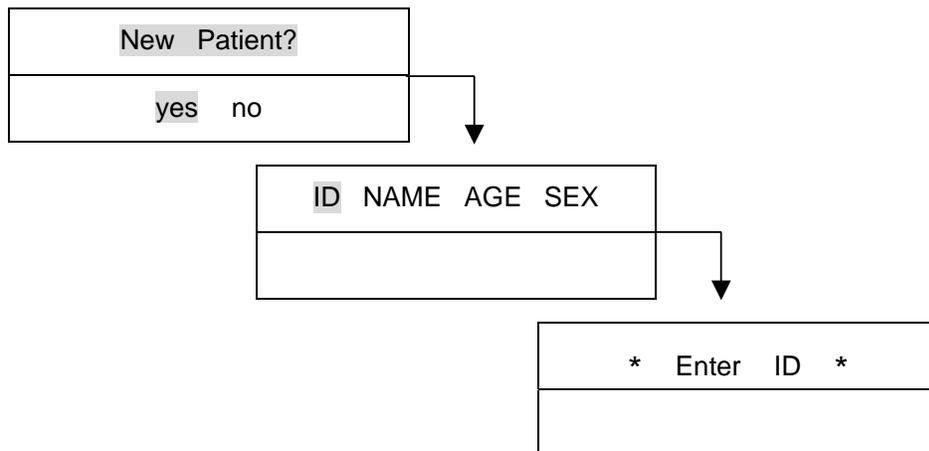
All the other patient data is deleted when selecting yes and the menu to ENTER ID is displayed for new patient data entry.

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When selecting no, the previous patient data is displayed as follows:

```
┌─────────────────────────┐
│      New   Patient?     │
├─────────────────────────┤
│        yes    no        │──────┐
└─────────────────────────┘      │
                                 ▼
              ┌─────────────────────────┐
              │    ID  NAME  AGE  SEX    │
              ├─────────────────────────┤
              │   123-45678             │──────┐
              └─────────────────────────┘      │
                                               ▼
                         ┌─────────────────────────┐
                         │      *   Enter  ID  *    │
                         ├─────────────────────────┤
                         │     123-45678           │
                         └─────────────────────────┘
```
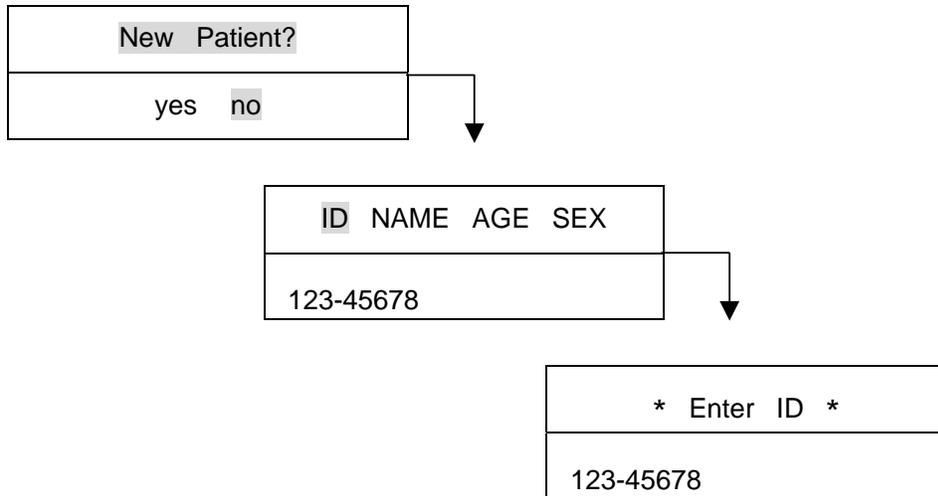
To enter a new patient ID, use the right arrow keys to move to the patient data to enter and press the Command Key to select that item as follows:

```
┌─────────────────────────┐
│   PAT   FLT   PRN   SYS  │
├─────────────────────────┤
│     < PATient info. >   │──────┐
└─────────────────────────┘      │
                                 ▼
              ┌─────────────────────────┐
              │    ID  NAME  AGE  SEX    │
              ├─────────────────────────┤
              │                         │──────┐
              └─────────────────────────┘      │
                                               ▼
                         ┌─────────────────────────┐
                         │      *   Enter   ID  *   │
                         ├─────────────────────────┤
                         │       123-45678         │
                         └─────────────────────────┘
```
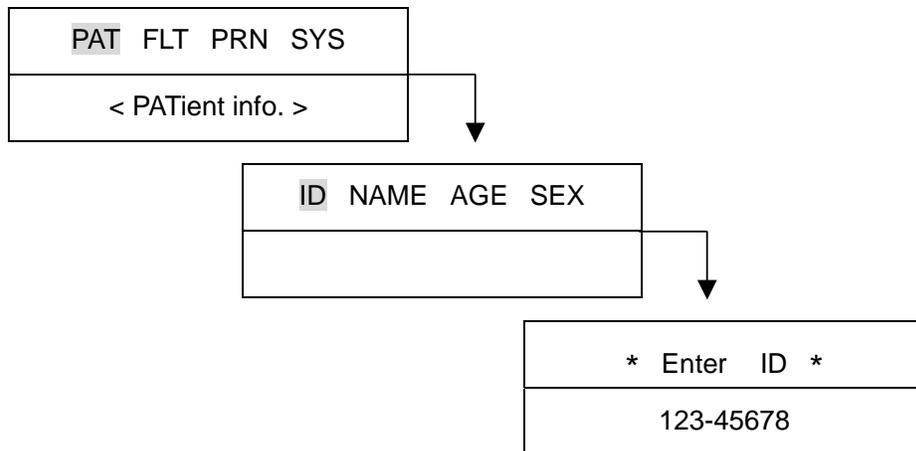
The patient ID can be entered using 15 characters or less. The ID number is entered by using 0 through 9 numeric keys in the selected cursor position. If a number must be deleted, use the left arrow key. Use the right arrow key to enter a hyphen.   When finished, use the Command Key or the ESC/COPY key to exit and move back to the previous menu.

Bionet

To enter the patient name, use the right arrow keys to move to the patient data to enter and press the Command Key to select that item as follows:

```
┌─────────────────────────┐
│  PAT  FLT  PRN  SYS      │
├─────────────────────────┤
│     < PATient info. >    │──────┐
└─────────────────────────┘      │
                                  ▼
            ┌─────────────────────────┐
            │  ID  NAME  AGE  SEX      │
            ├─────────────────────────┤
            │                         │──────┐
            └─────────────────────────┘      │
                                              ▼
                        ┌─────────────────────────┐
                        │   *  Enter   Name  *     │
                        ├─────────────────────────┤
                        │                         │
                        └─────────────────────────┘
```
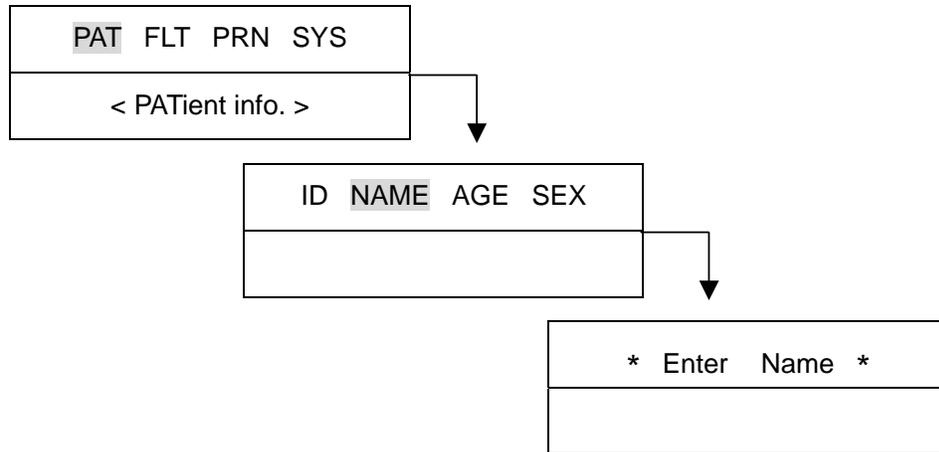
The patient name can be entered using 16 characters or less. To enter the name, select the characters for the current cursor position. For example, using the "2" key, you can enter the letters A, B, or C or the number 2. Press the key once and the letter A appears, press it twice, the letter B appears and so on.

To enter the next character, press the right arrow key   and enter the next character in the name as above. Continue this process until the name is complete. To exit this function, press key or ESC/COPY key or the Command Key to return to the previous menu.

To enter the age, use the Command Key and the right arrow key as has been described. The steps are as follows:

```
┌─────────────────────────┐
│  PAT  FLT  PRN  SYS      │
├─────────────────────────┤
│    < PATient info. >     │──────┐
└─────────────────────────┘      │
                                 ▼
              ┌─────────────────────────┐
              │  ID  NAME  AGE  SEX      │
              ├─────────────────────────┤
              │                         │──────┐
              └─────────────────────────┘      │
                                               ▼
                          ┌─────────────────────────┐
                          │    *  Enter   Age  *     │
                          ├─────────────────────────┤
                          │  _    years              │
                          └─────────────────────────┘
```
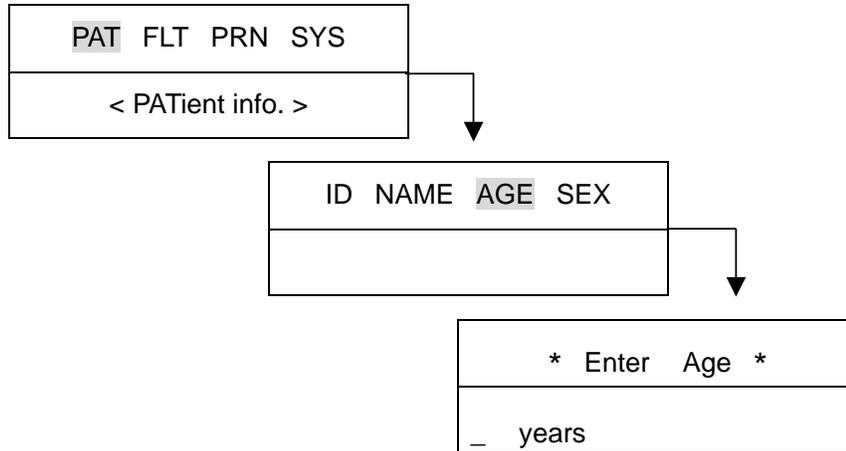
Age can be entered using three numbers or less. Age is entered in years by using the 0 through 9 numeric keys in the current cursor position and the cursor will automatically move to the right after each number is entered. To exit the age entry, press the Command Key or ESC/COPY key and return to the previous menu.

To enter the sex, use the Command Key and the arrow keys as has been described. The steps are as follows:

```
┌─────────────────────────┐
│  PAT  FLT  PRN  SYS      │
├─────────────────────────┤
│    < PATient info. >     │──────┐
└─────────────────────────┘      │
                                 ▼
              ┌─────────────────────────┐
              │  ID   NAME   AGE   SEX   │
              ├─────────────────────────┤
              │                         │──────┐
              └─────────────────────────┘      │
                                               ▼
                          ┌─────────────────────────┐
                          │    *   Enter   Sex  *    │
                          ├─────────────────────────┤
                          │     Male    Female       │
                          └─────────────────────────┘
```
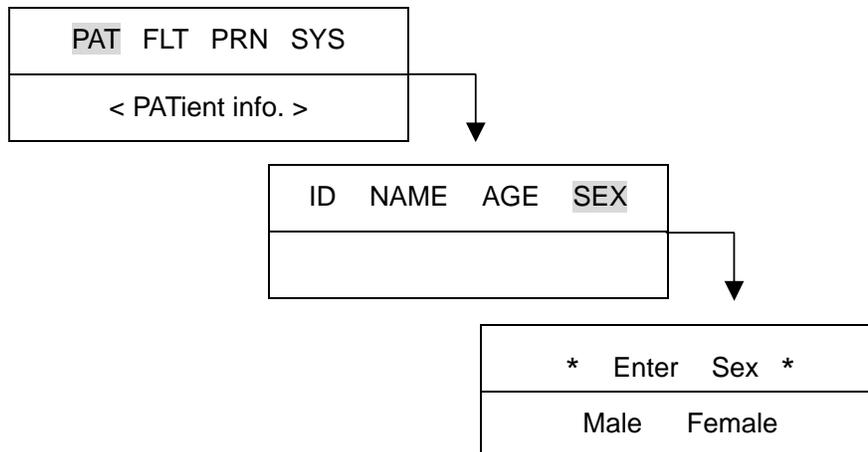
Sex can be selected between male or female using the arrow keys. To exit, press the Command Key or ESC/COPY key that returns to the previous menu.

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To enter the height, use the Command Key and the arrow keys as has been described. The steps are as follows:

```
.
┌──────────────────────────────┐
│  PAT  FLT  PRN  SYS          │
├──────────────────────────────┤
│       < PATient info. >      │
└──────────────────────────────┘
          ┌──────────────────────────────┐
          │  HEI  WEI                     │
          ├──────────────────────────────┤
          │                               │
          └──────────────────────────────┘
                    ┌──────────────────────────────┐
                    │     *  Enter  Height  *       │
                    ├──────────────────────────────┤
                    │         ft          in        │
                    └──────────────────────────────┘
```

Height can be entered using one numeric digit for feet and two or less for inches. Height is entered by using the 0 through 9 numeric keys in the current cursor position and the cursor will automatically move from feet to inches after a number is placed in the feet field. To delete a number, use the left arrow key. To exit the height entry, press the Command Key or ESC/COPY key and return to the previous menu.

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To enter the weight, use the Command Key and the arrow keys as has been described. The steps are as follows:

```
PAT  FLT  PRN  SYS
```
```
< PATient info. >
```

```
HEI  WEI
```
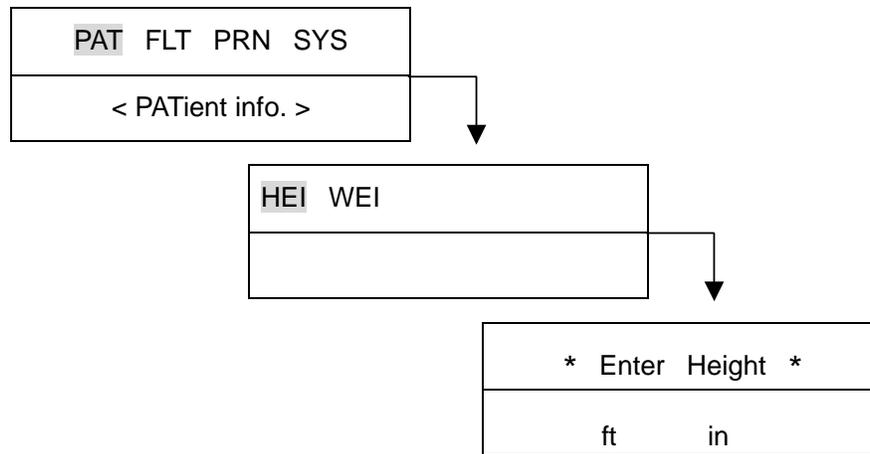
```
*  Enter  Weight  *
```
```
lb
```
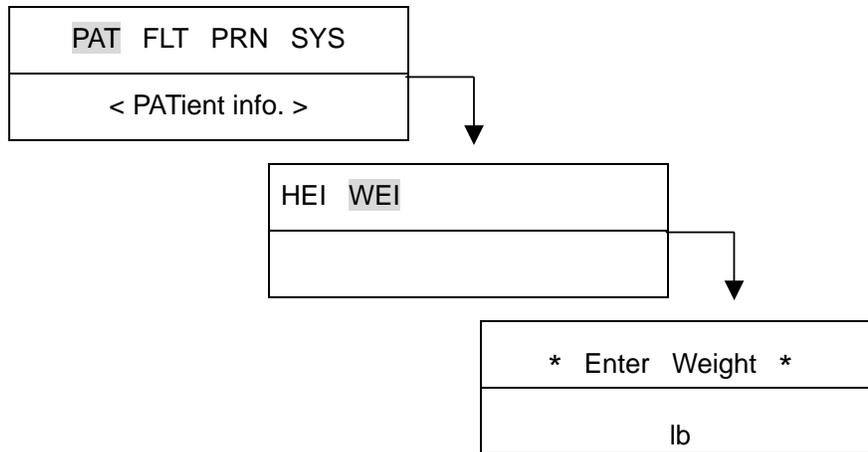
Weight can be entered using three numbers or less. Weight is entered in pounds by using the 0 through 9 numeric keys in the current cursor position and the cursor will automatically move to the right after each number is entered. To exit the age entry, press the Command Key or ESC/COPY key and return to the previous menu.

Monitor Mode

In Monitor Mode, the ECG is printed in real-time. This mode can be used to determine that the entire channel signal is active before recording the ECG and for monitoring the patient's ECG over long time intervals.

In this mode, the filter settings are fixed as follows:

Base Line	On
EMG	Off
AC Filter	60hz
LPF	40hz

The printing speed can be set to 12.5 mm/s, 25mm/s, or 50mm/s and the signal level can be set to 5mm/mV, 10mm/mV, 20mm/mV, or aut.

Output Method

The filter settings are fixed. Set the required printing speed and signal level and press the WXY/MON key. The system starts printing at the selected speed and the following is displayed on the LCD.

* MONITOR *
Printing

Press the Command Key or the WXY/MON key to stop printing. The system stops printing and returns to the normal system settings display.

Output Form

In Monitor Mode, 12 channel rhythms are printed simultaneously and continuously until the operator exits this mode as above. The indicated heart rate is the average of the previous eight beats.

Record Mode

In Record Mode, the ECG is acquired in memory and then printed according to the selected signal level, output display speed, and channel form after applying the selected filter, and calculating the measurement parameters including heart rate, PR interval, QRS duration, QT/QTc, and P-R-T axes.

10 Second ECG Recording

Press the OPR/REC key when the channel form is set to 3ch+1rhy, 6ch+1rhy, or 12ch rhy. The system begins recording the data in memory for 10 seconds and the following message indicates the recording time on the LCD.

*   RECORD (10s)   *
preparing

After recording data for 10 seconds, the system applies the selected filter and calculates the measurement parameters of the recorded ECG and the following message is displayed on the LCD.

*   RECORD (10s)   *
processing

After processing the data, the system prints the ECG and the following message is displayed on the LCD.

*   RECORD (10s)   *
printing

Bionet

Press the Command Key to exit during recording or printing data. The system stops recording or printing and displays the system settings after the following message is displayed for one second on the LCD.

```
*  RECORD (10s)  *
      aborted!
```

60 Second ECG recording

Press the OPR/REC key when the channel form is set to 60s 1rhy. The system begins recording data in memory for 60 seconds and the following message indicates the recording time on the LCD.

```
*  RECORD (60s)  *
    V1    60 sec
```

After recording data for 60 seconds, the system applies the selected filter, calculates the heart rate of the recorded ECG, and displays the following message on the LCD.

```
*  RECORD (60s)  *
     processing
```

After processing the data, the system prints the ECG and the following message is displayed on the LCD.

```
*  RECORD (60s)  *
      printing
```

Bionet

Press the Command Key to exit during recording or printing data. The system stops recording or printing and displays the system settings after the following message is displayed for one second on the LCD.

```
┌─────────────────────────────┐
│    *   RECORD (60s)   *      │
├─────────────────────────────┤
│          aborted!           │
└─────────────────────────────┘
```

Copy Mode

The Copy Mode is for printing another copy of the same report as the previous one or print another after changing settings such as filter, signal level, output display speed, channel form, or rhythm cannel of the previously recorded ECG.

After a report has been printed in Record Mode, press the ESC/COPY key and the system starts printing the same report as the previous and the following message is displayed on the LCD.

```
┌─────────────────────────────┐
│        *   COPY   *         │
├─────────────────────────────┤
│          printing           │
└─────────────────────────────┘
```

If an attempt is made to print a copy without first acquiring data, the following message appears for one second on the LCD.

```
┌─────────────────────────────┐
│        *   COPY   *         │
├─────────────────────────────┤
│       !! no record data     │
└─────────────────────────────┘
```

Bionet

If the filter setting for the previously acquired ECG is changed, the system applies the new filter and the following message is displayed on the LCD.

```
┌─────────────────────┐
│     *  COPY  *      │
├─────────────────────┤
│     processing      │
└─────────────────────┘
```

After processing the data with the new filter, the system prints the ECG and the following message is displayed on the LCD.

```
┌─────────────────────┐
│     *  COPY  *      │
├─────────────────────┤
│      printing       │
└─────────────────────┘
```

When the copy is printed, the system settings are displayed after the following message appears for one second on the LCD.

```
┌─────────────────────┐
│     *  COPY  *      │
├─────────────────────┤
│      Finished!      │
└─────────────────────┘
```

Press the Command Key to exit during recording or printing data. The system stops recording or printing and displays the system settings after the following message is displayed for one second on the LCD.

```
┌─────────────────────┐
│     *  COPY  *      │
├─────────────────────┤
│      Aborted!       │
└─────────────────────┘
```

Bionet

Warning
When a defibrillator is used, do not touch the patient, table, or apparatus.

Warning
When you are connecting the electrodes or the patient cable, make sure that the connectors never come into contact with other conductive parts or with the ground.

Warning
Use only the provided ECG cable when using the machine in an operating room. The patient cable cannot be used for measuring respiration.

Caution
Do not use the CardioCare 2000 in combination with any Electro-Surgical (ES) equipment.

Caution
Use only those electrodes that comply with International Standards.

Caution
This device must only be used by health care professionals.

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Taking Care of the System

Maintenance and Cleaning

The CardioCare 2000 is easily maintained using various methods. Avoid damage by following these simple instructions.

The CardioCare 2000 Main Unit and electrodes should be wiped with a soft cloth dampened with warm water. Wipe with absorbent cotton soaked with alcohol once a month. Do not use lacquer, ethylene, or acidic liquids.

The patient cable should be kept clean by using a soft cloth dampened with warm water (104 F). Wipe with absorbent cotton soaked with alcohol once a month

Never immerse the CardioCare 2000 or the patient cable in cleaning liquids or detergents. Do not ever allow any liquid to enter any part of the machine.

The warranty does not cover damage resulting from using unauthorized materials that might cause damage to the product.

Caution
Check the main unit and patient cable thoroughly after cleaning. Do not use damaged equipment.

Regular Inspection

It is recommended that the CardioCare 2000 be checked regularly to insure that there are no problems with the machine, e.g., worn cables, etc. Contact Bionet America, Inc. if there are any questions.

Troubleshooting

If an alarm tone sounds for one second while printing and the following message appears on the LCD, it means that the paper roll is empty. Replace the paper and begin printing again.

* RECORD *
paper empty!

In the event that nothing is printing or if the printed page fades, the cover of the printer is not closed completely. Close the cover and begin printing again.

If an alarm sounds three times in rapid succession and repeats several times, the battery is getting low on power. The following message appears on the LCD:

* Low Battery *
Power off

When there is no more power in the battery, the LCD goes blank. Turn the system power off and connect the AC power source. Turn the system power on and use in this mode until the battery recharges.

If it seems that there is noise interference, check the system and verify that AC is set to 60Hz. If the noise continues after the AC filter is set to 60Hz, connect the potential equalization connector with the common ground conductor on the back of the machine. Do not connect the potential equalization conductor to the AC power system ground. The metallic frame of the patient's bed or another metallic object can be used for grounding.

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Technical Data

- Input circuit: Isolated and defibrillation protected
- ECG leads: Standard 12 leads
- Sensitivity selection: 5,10, 20 mm/mV $\pm$ 5 %
- Calibration voltage: 1mV $\pm$ 2 %
- Electrode offset tolerance: $\geq \pm$ 250mV
- Resolution: 2 μV, 500 SpS
- Frequency response: 0.05 ~ 150Hz
- Common mode rejection: > 100 dB
- Input impedance: 10 MΩ
- Patient leakage: < 50 μA
- Communication: PC connection with RS-232 interface and LAN
- Display: 2 x 16 char LCD Display
- Registration Resolution:
    - Vertical: 8 points/mm; Horizontal: 25 μm at 25 mm/S
    - Paper type: Thermal, roll paper
    - Paper width: 8.5"
- Keyboard: Membrane keyboard
- Electrical:
    - Power supply: AC or built-in Battery
    - Voltage rating: 100 - 240Vac (50/60 Hz)
- Environment:
    - Operating humidity: 30 ~ 85 %
    - Temperature: 50° F ~ 104° F
- RS232C Interface
    - Protocol: asynchronous
    - Baud rate: 19200
    - Byte format: 8 data bits, 1 stop bit, no parity bit
    - Connection socket: 9 pole female, wired as DTE (Data Terminal Equipment)
    - Pin connection: 3 = TXD (out), 2 = RXD (in), 6 = DSR, 4 = DTR, 5 = GND

Bionet

Thank you for purchasing the CardioCare 2000. This product is manufactured using strict quality control procedures and thorough inspections.

Each system is carefully tested before it is shipped to our Authorized Dealers. Should there be any questions, concerns, or comments please contact Bionet America, Inc.

Bionet America, Inc.

1-877-924-6638

www.bionetus.com