

DM Software

CardioVision Manual

English

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Hardware Requirements

The CardioVision system was designed to work with most modern computer hardware and wireless access points available on the market today. Here is a list of the minimum hardware requirements:

CardioVision Server PC

- Microsoft Windows XP/Vista/7, 32Bit
- Dual-core Intel or AMD processor
- 2 GB+ RAM
- 100 GB+ hard drive
- ATI or nVidia Discrete Graphics card with dual monitor output (DVI or VGA)
 - Make sure desktop mode is set to "extend", not "clone".
 - A dual monitor setup is required to prevent display stack-up issues which prevent smooth operation of the software features.
- Two LCD monitors 17" or larger, running at least 1280x1024 resolution
- Hardwired to the access point or router via RJ45 Ethernet cable.

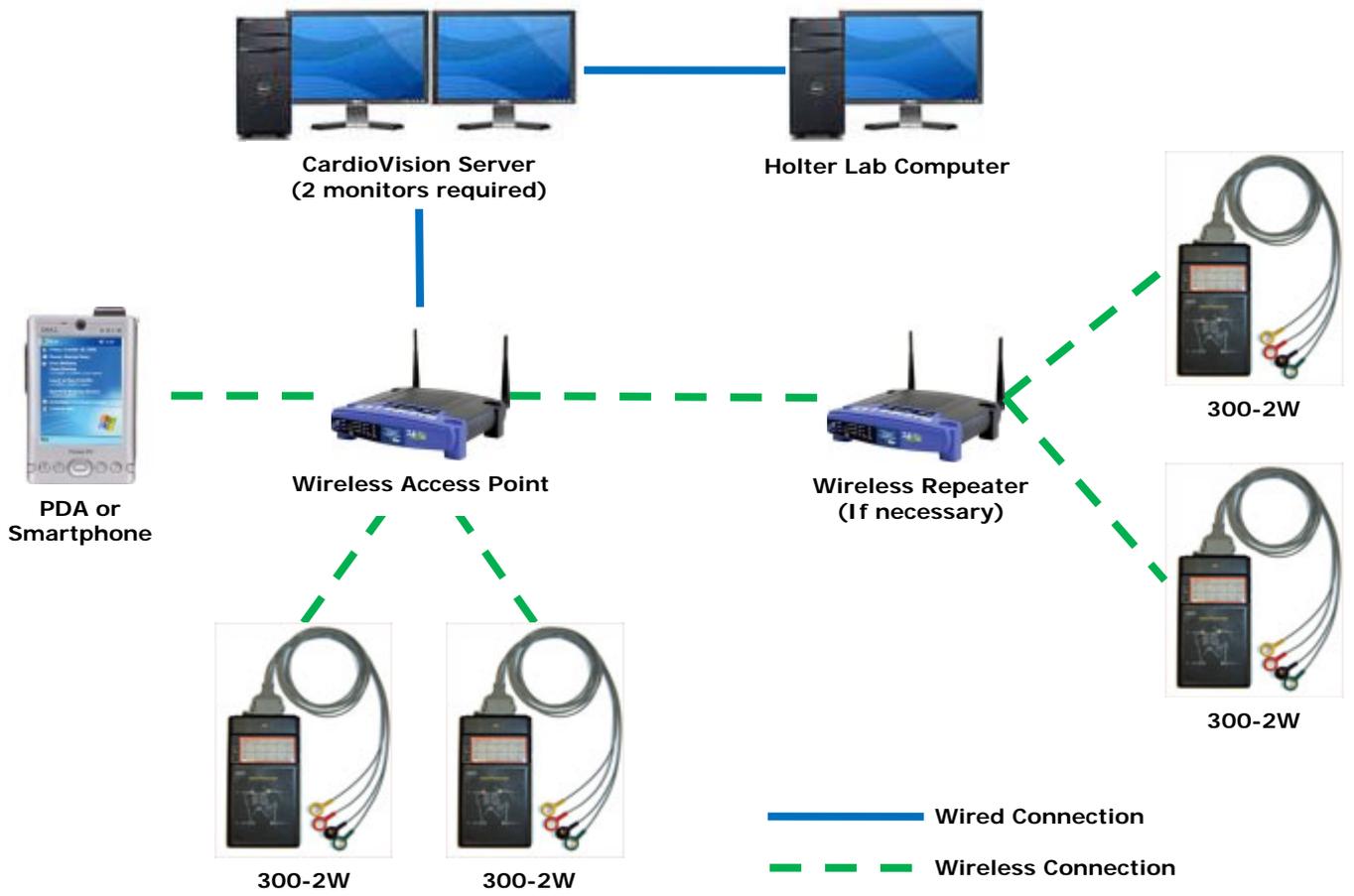
Wireless Access Point / Router

- IEEE 802.11b/g
- Supports WEP 64/128-bit encryption
- Tested devices: Router: Linksys WRT54G, WRT54GL
AP: Cisco 2100 Controller with 1131AG access point

PDA or Smartphone

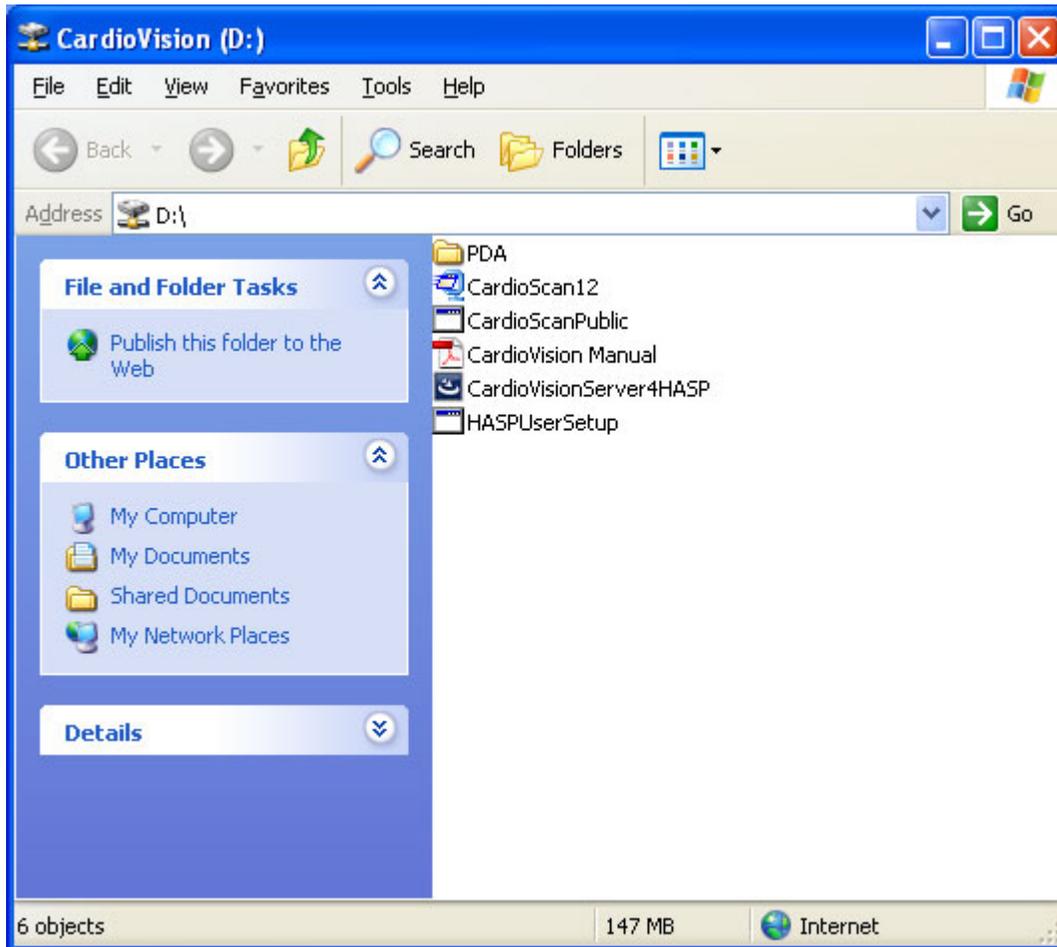
- Microsoft Windows Mobile 2003 or newer
- IEEE 802.11b/g
- Tested devices: HP IPAQ 214

Sample Setup Diagram



1. Installation

- 1.1 Insert the CardioVision CD and locate the contents in Windows. All the necessary software are included on the CD.



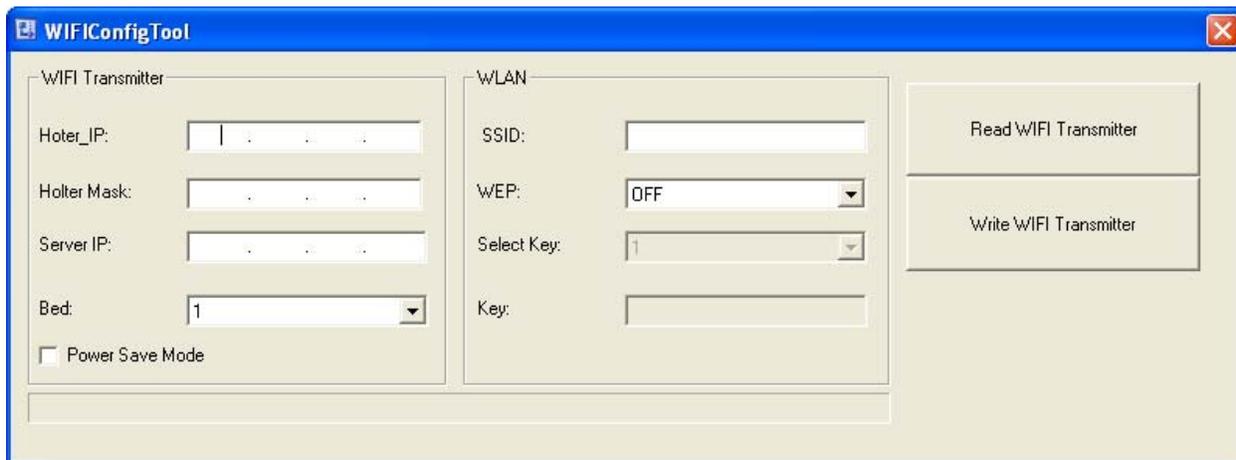
- 1.1 Double-click on **CardioVisionServer4HASP** to begin installing the CardioVision Server. This will also place the **WiFiConfigTools** icon on the desktop.
- 1.2 Once installation is complete, double-click on **CardioScanPublic** to begin installing CardioScan. Once it is finished, double-click **CardioScan12** to install the latest patch.
- 1.3 After both programs are installed, double-click on **HASPUserSetup** to install the drivers for the security keys. After installation is complete, insert the security key labeled "CV" and "CS12" into the computer's USB ports.

2. Configuring the 300-2W recorders

2.1 Make sure there are no batteries in the 300-2W recorder.

2.2 Connect the USB download cable to the 300-2W recorder and to the computer. The green "RUN" LED should light up.

2.3 Double-click on **WiFiConfigTools** on the desktop, or from CardioVision Server, click on the "Help" icon and select "Transmitter Setup".



2.4 Click on **Read WiFi Transmitter**. The recorder will beep twice, and the progress bar will start moving. When finished, the recorder will beep once.

2.5 You will now be able to enter the settings for the recorder:

Holter_IP: The IP address you are assigning to this 300-2W Wi-Fi recorder.

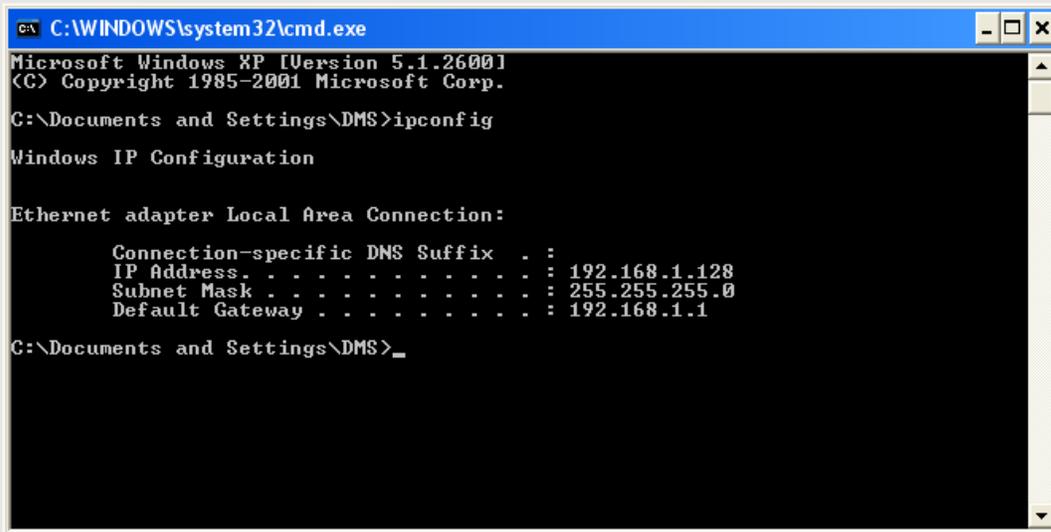
Holter Mask: Typically 255.255.255.0

Server IP: The IP address of the CardioVision Server computer.

Bed: The bed number you want this recorder to show up as in CardioVision. It is recommended that a physical label is also attached to the recorder for easier reference in the future.

Power Save Mode: Check this box to set the recorder on lower power, which results in weaker signal but longer recording duration (40 hours instead of the standard 10-12 hours).

To determine the **Server IP**, **Holter Mask**, and possible **Holter_IP** addresses, on the CardioVision Server computer, click on Start > Run > type in: cmd > OK > type in: ipconfig > Enter. You will see a screen similar to this:



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\DMS>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IP Address. . . . .                : 192.168.1.128
    Subnet Mask . . . . .              : 255.255.255.0
    Default Gateway . . . . .          : 192.168.1.1

C:\Documents and Settings\DMS>_
```

You can now enter these values into WiFiConfigTool:

Server IP = IP Address

Holter Mask = Subnet Mask

Holter_IP = Any IP address that has the same first 3 sets of numbers as the IP Address and Default Gateway but a different fourth set of numbers (192.168.1.XXX in our example), and does not conflict with another device or computer on the network (eg. 192.168.1.155). Please consult your router settings to make sure it does not fall in the range of the automatically assigned IP addresses (DHCP range).

SSID: The name of your Wi-Fi network.

WEP: The security protocol used to connect to the Wi-Fi network.

Select Key: The key number of the password.

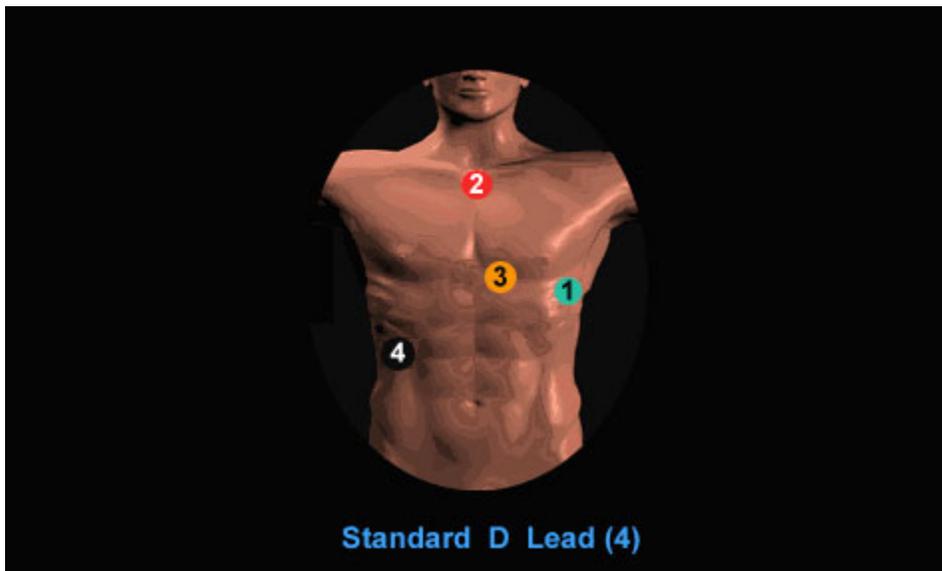
Key: The password for the Wi-Fi network.

These settings can be found on the router. Please consult your router's manual or website for instructions on setting up wireless internet security settings. If WEP authentication doesn't work, try turning it "OFF" and try connecting using an open unprotected network.



The above image shows an example of what the settings may look like.

- 2.6 Click on **Write WiFi Transmitter** when finished to save the settings onto the recorder. The progress bar will start moving, and the recorder will beep when it is finished.
- 2.7 Remove the USB download cable from the 300-2W recorder, and insert 4 new 1.5V AA alkaline batteries into the recorder (recommended 1500 mAh or higher Duracell Ultra or Varta Max Tech).
- 2.8 Connect the electrodes to the patient, using the following diagram. For the best quality signal analysis, it is important to perform a good patient electrode hookup.



1 = Green (V5) 2 = Red (RA) 3 = Yellow (V1) 4 = Black (RL)

To ensure a good patient electrode hookup, perform the "Tap Test":

1. After applying the four electrodes, gently tap each electrode with your fingers.
2. If artifacts occur, remove the electrode, clean the skin, and then re-apply the electrode.

- 2.9** Connect the lead wires to the 300-2W recorder. The green "RUN" LED should be solid, and the blue "LINK" LED will flash until it detects the CardioVision Server (if it is not already running, see Step 3.1).

Note: The Event button on the 300-2W recorder is not currently used in this CardioVision system.

2.10 Troubleshooting Tips

If the 300-2W recorder cannot connect to the CardioVision Server, or is having trouble maintaining a clean signal, here are a few things to check:

1. Remove the batteries in the recorder, connect it to the PC, and click on **Read WIFI Transmitter**. It will beep when the data finishes loading, then verify the settings are correct.
2. If there is too much interference, try changing the broadcast channel of the Wi-Fi network. The default channel on most routers/access points is set to 6, please consult the device's manual on how to change it.
3. The distance between recorder and router/access point could be too far, either move them closer together or set up a wireless repeater in between.
4. Try unchecking the **Power Save Mode** box in Step 2.5 and see if you get a clearer signal.

2.11 Replacing a defective 300-2W recorder

If you need to replace a 300-2W recorder in the system for whatever reason, simply set up the new recorder using WiFiConfigTools following the instructions in step **2.5**. All the settings should remain the same; you can reuse the same **Holter_IP** as the monitor being replaced, or assign it a new one. Remember to assign the new recorder with the same **Bed** number as the old one.

3. Using CardioVision Server

3.1 Double-click on **CardioVision Server 4** on the desktop to start the CardioVision Server.



New: Begin recording a new patient.

Stop: Stops recording the current patient.

Print: Prints the ECG report for the current patient.

Holler: Runs the CardioVision Client software.

System: Modify system settings.

Patient List: Access current and past patient database.

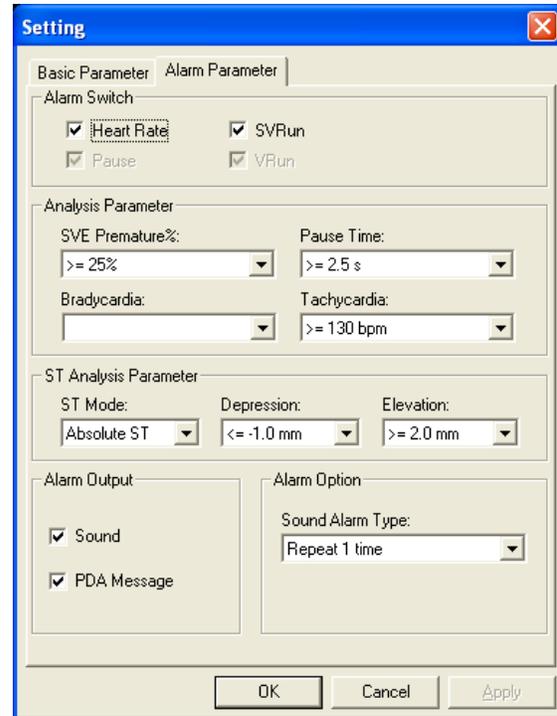
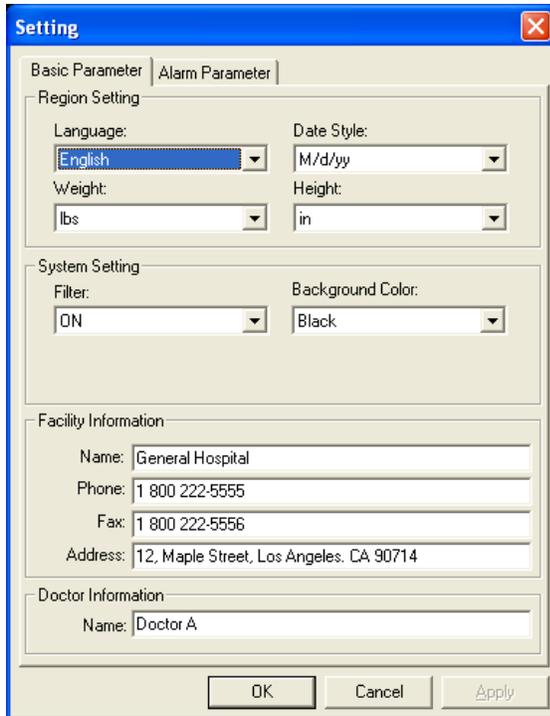
View: Changes the current view (all 8, first 4, last 4)

Help: System information, CE information, Transmitter setup.

Close: Exit and shut down the CardioVision Server.

The password for this program is: **dms**

- 3.2 Verify all the settings are correct by clicking on **System**. You will be prompted for the password. When finished, click **OK**.

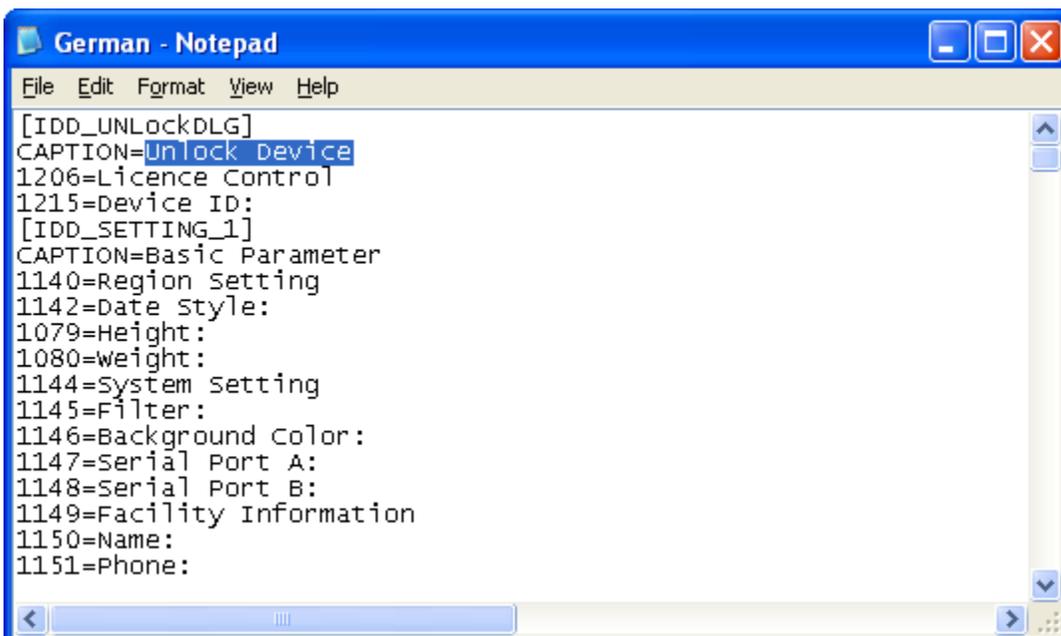
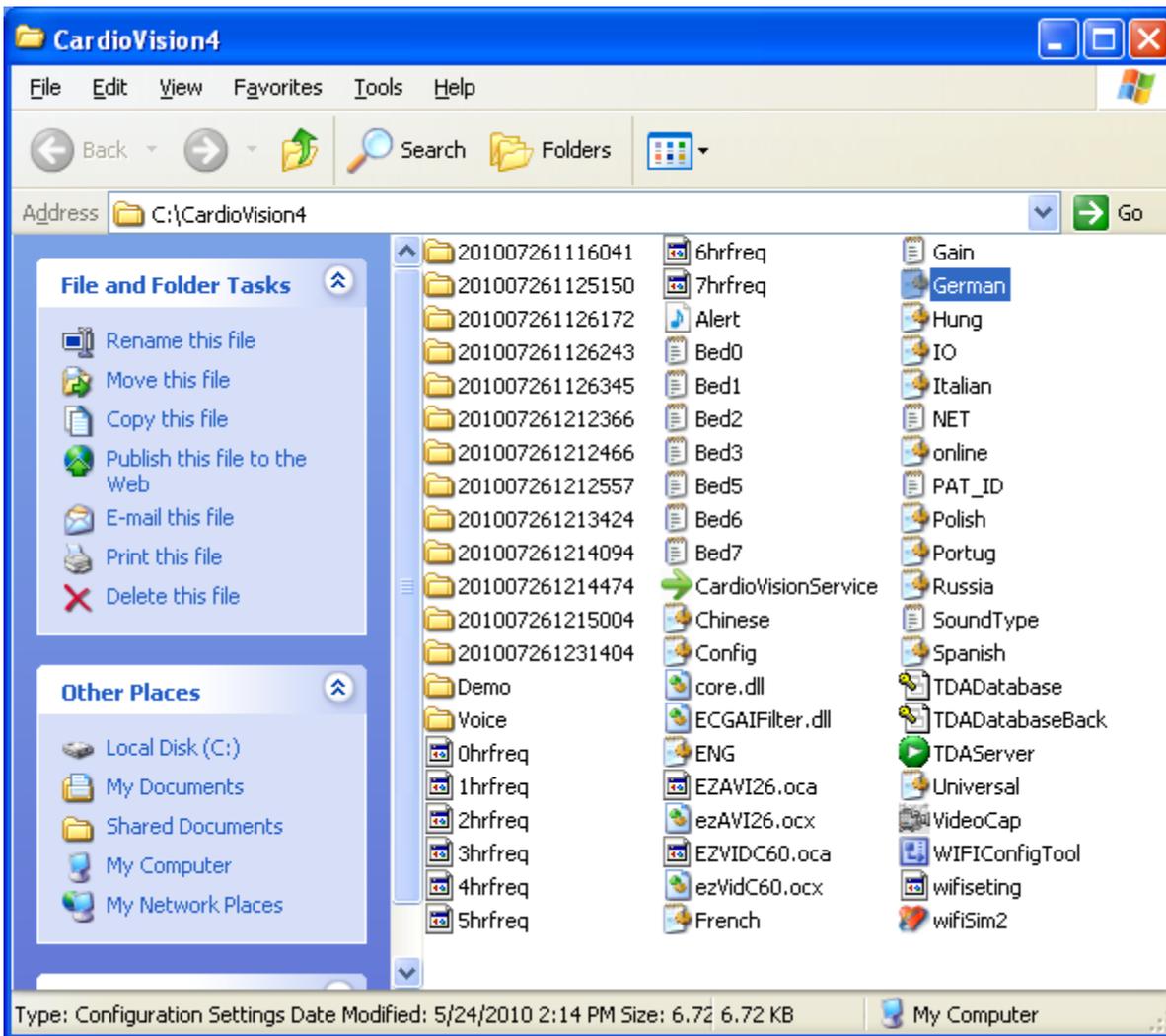


Under Basic Parameter, you can set the Region Setting, System Setting, Facility Information, and Doctor Information.

Under Alarm Parameter, you can set the Alarm Switch, Analysis Parameter, ST Analysis Parameter, Alarm Output, and Alarm Option.

3.3 Language Translation for CardioVision Server

1. To translate CardioVision into another language, first locate the .ini file for your desired language (eg. German.ini) inside the C:\CardioVision4 directory (see the first image on the next page).
2. Double-click the file to open it. If prompted, select Notepad, then click OK.
3. Translate the English words in this file after the equal signs (=) to the desired language (see the second image on the next page), then Save the file and Close it.
4. Select the Language from the Setting menu shown above (Step 3.2), click OK, and then restart the program. CardioVision will now be translated into your desired language.



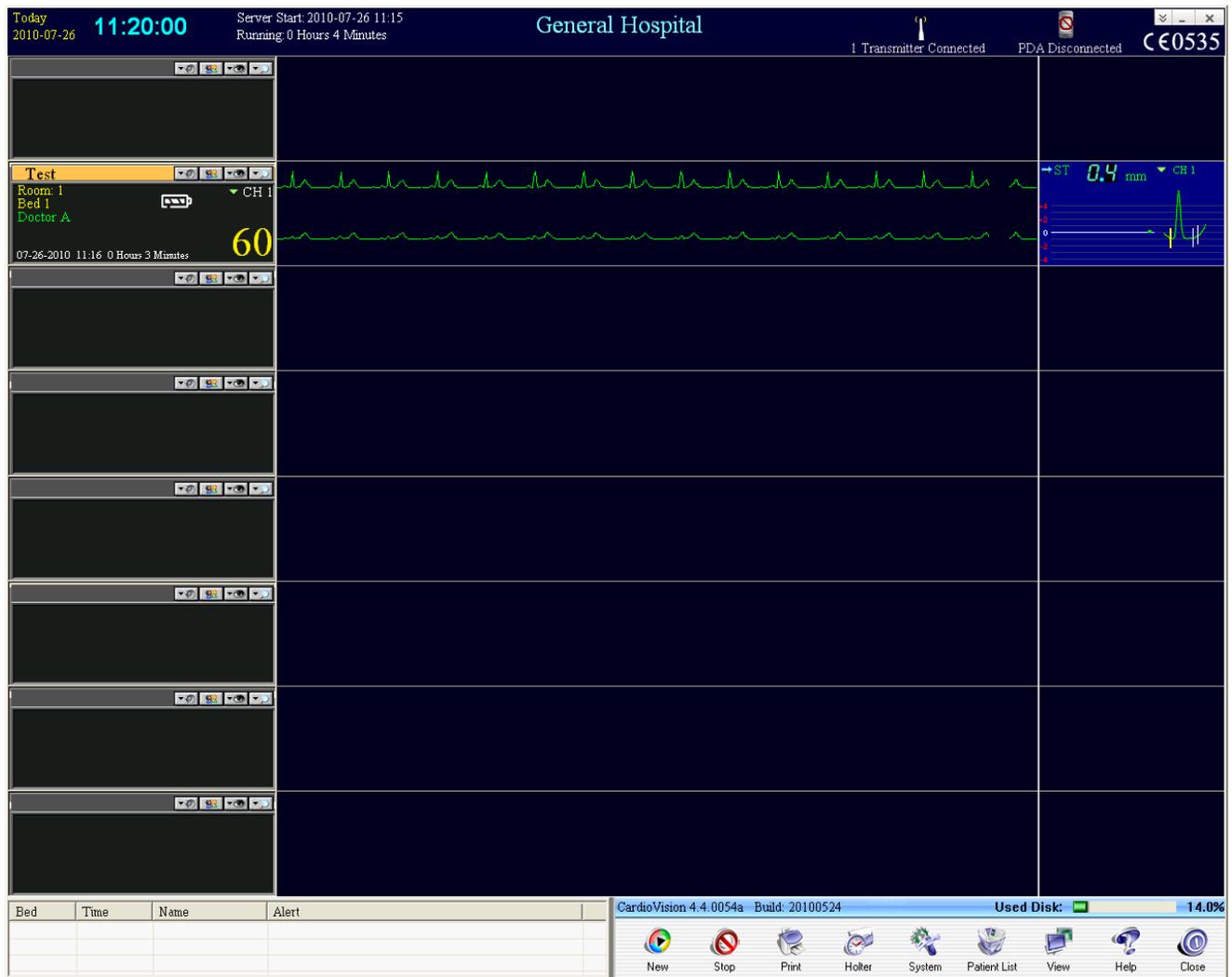
3.4 Click on **New** on the main screen to begin recording a new patient.

The screenshot shows a 'New Patient' dialog box with two tabs: 'Basic Information' and 'Alarm Information'. Under 'Channel', there are radio buttons for CH1 through CH8, with CH1 selected. To the right are an 'Unlock Device' button and a 'WIFI Transmitter' dropdown menu. The 'Patient' section contains fields for Last name, First name, M (checkbox), Sex, Age, Height (in), and Weight (lbs). The 'Doctor Information' section has a 'Name' field containing 'Doctor A'. At the bottom are 'OK', 'Cancel', and 'Apply' buttons.

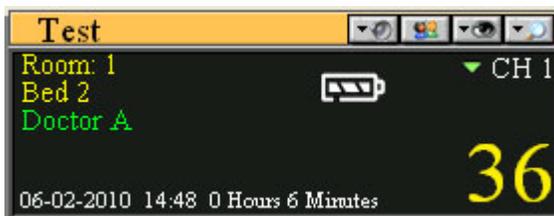
3.5 Select the Channel for the patient based on the **Bed** setting saved to the recorder in **Step 2.4**. For example, if the **Bed** number was **2**, then select **CH2**. Enter the rest of the information, including the name of the doctor or physician responsible for this patient, and click **OK**.

Note: To set up a demo patient, click on the arrow next to **WIFI Transmitter** and select **Demo**.

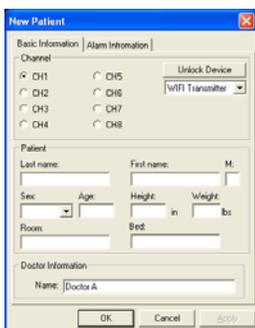
This screenshot is identical to the previous one, but the 'WIFI Transmitter' dropdown menu is open, showing 'WIFI Transmitter' and 'Demo' as options, with 'Demo' selected.



- 3.6 If the recorder was set up properly, you should begin to see the real-time ECG in the row corresponding to the Bed/Channel specified earlier. If not, see Step 2.10 for troubleshooting tips.
- 3.7 The boxes in the left column contains patient information and 4 buttons:

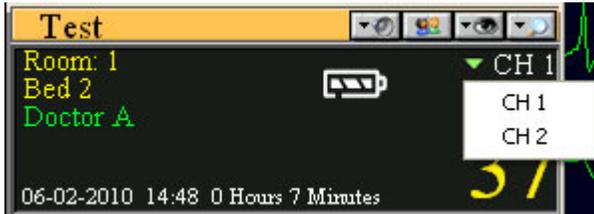


From top to bottom, you can see the patient's last name, room number, bed number, doctor's name, and start time of the recording. You can also see the battery indicator and heart rate.



(See 3.5)

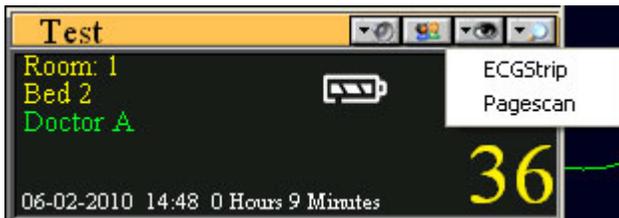
Clicking on the  button will display the patient information screen, which will allow you to edit the patient's demographic information as well as alarm options.



Clicking on the arrow next to "CH 1" will allow you to view the ECG on CH 2.



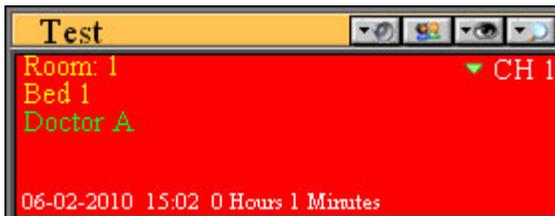
Clicking on the  button will allow you to toggle the alarm on/off.



Clicking on the  button will allow you to bring up the patient's ECG Strips saved from the Alerts, or view the complete Page Scan (See 3.8).



Clicking on the  button will allow you to change the amplitude of the real-time ECG.

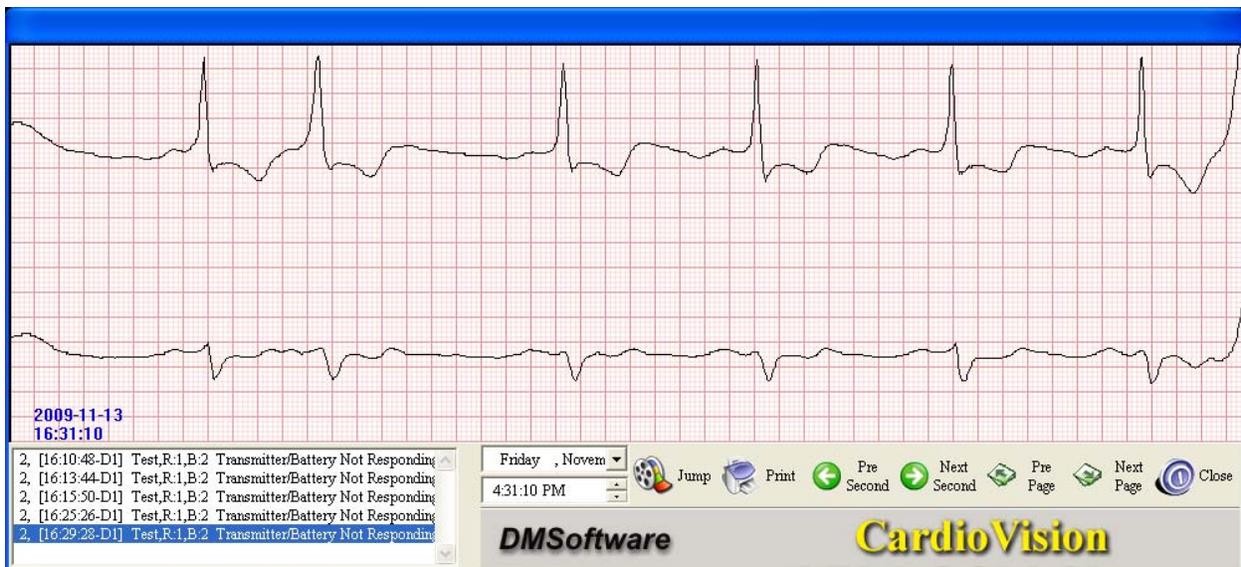


When there is an Alert, the box will flash red. Left-click the mouse anywhere in the box to turn off the alarm.

- 3.8** To increase or decrease the horizontal size of the patient data box, place the mouse cursor on the right edge of the box so that it changes to a resize cursor, and then drag it left or right. The re-size will always be done four at a time. In the example below, the size of the first four boxes was increased.



- 3.9** The ECG Strip display allows you to view the ECG strips corresponding to an alert for the selected patient. To change the strip, double-click on a different alert in the bottom left corner.



Jump: Brings you to the event that is selected in the box to the left.

Print: Prints the selected ECG strip.

Pre Second: Moves the ECG strip back 1 second at a time.

Next Second: Moves the ECG strip forward 1 second at a time.

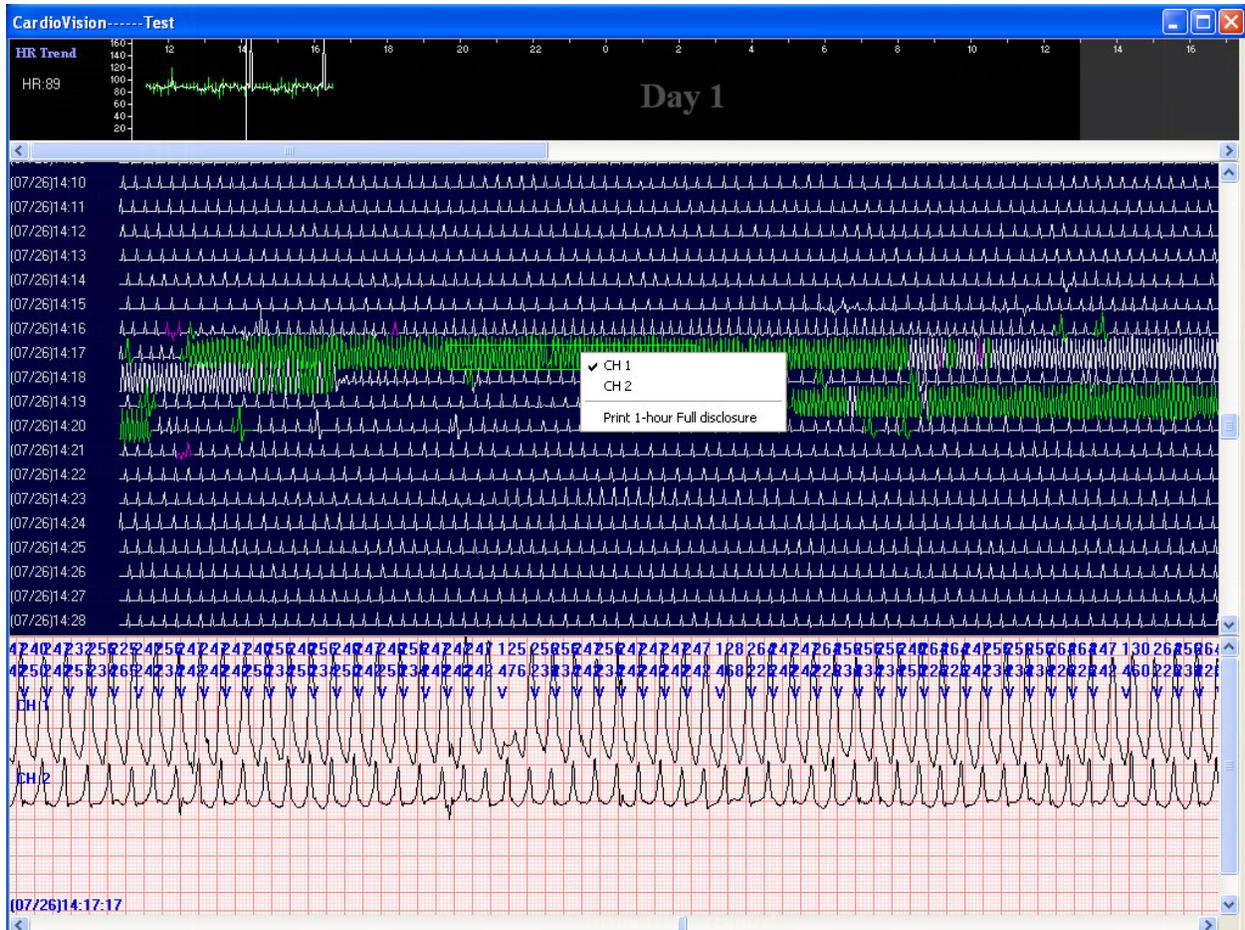
Pre Page: Moves the ECG strip back 8 seconds at a time.

Next Page: Moves the ECG strip forward 8 seconds at a time.

The Page Scan option gives you an overview of the entire full disclosure ECG. The side-scrolling HR Trend box at the top allows quick review of all full disclosure ECG data. You can double-click a strip to zoom-in, which brings up the window above.

You can also left click on the desired ECG strip in the Full Disclosure area, followed by a right-click, to bring up another menu, where you can select CH1, CH2, or Print 1-hour Full disclosure.

Left-clicking anywhere in the HR Trend timeline in the top box will display the full disclosure for that time period below.



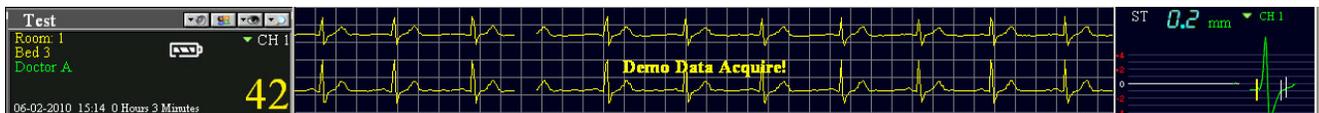
3.10 By right-clicking in the ECG area, you can change the ECG display for the corresponding patient:



The above image is an example of the five different ECG display options:

- CH1 only**
- CH2 only**
- CH1 and CH2**
- CH1 and Full Disclosure 1**
- CH2 and Full Disclosure 2**

Selecting **Grid** will toggle the ECG strip grid for all patients:



3.11 The boxes in the right column can be used to display various types of data. By default, it is set to Trend. By left-clicking on the blue arrow in the top-left corner of each box, you can change it to Two Box or Combo View. There are also green arrows you can click on in the top, center, or right area, to change the channel or scroll the ST baseline markers left/right. Use the Tab key to select the highlighted ST marker, and then use the keyboard arrow keys to place the ST baseline markers.



In the example above, the first five beds are displaying Trend views, and the bottom three beds are displaying Two Box views. By right-clicking anywhere in the boxes, whether it is the Trend box or the left/right box in a Two Box view, you can select which type of data is being displayed. The **Video Monitor** option will bring up a live feed from the webcam, if there is one connected to the computer.

Selecting Combo View for a patient will open a pop-up window displaying many pieces of information for the selected patient. This window can be moved around as needed. Only one Combo View window may be open at any time.

3.12 For Alarm Options and Trend Display, click on the  button in the upper right corner.

3.13 Trend Display (To be shown on the 2nd (right-side) monitor)



Compare HR, VE, V-Run, ST, and Pause data.

Double-click on areas of interest to bring up page scan and ECG strips.

Lower portions of each box area can be scrolled by minute, hour or day to scan the data.

For each corresponding patient on the 1st (left-side) monitor, the Trend Display shows Heart Rate, V-Tach, ST, and Pause trends for up to 3 days.

The purpose is to provide a quick and user-friendly method for immediate access to serious ECG abnormalities.

A-Fib will usually display on HR Trend as an increase in Heart Rate with long green lines that indicate significant min and max HR changes for each minute.

ST events will show the ST-level on a minute-to-minute trend basis for ST Elevations or ST depressions.

V-Tach events will display as a yellow box in the HR Trend for the hour of the detected V-Tach.

Pause events will display as a yellow box in the ST Trend for the hour of the detected Pause.

Point the arrow and do a double left-click to display the desired Page Scan (Full Disclosure) data. For HR Trend and ST Trend, click on the desired section of the timeline. For VE, V-Run, and Pauses, click on the colored boxes below the timeline of the indicated episodes.

You may need to scroll the full disclosure data up and down in order to see the desired ECG data for the selected hours.

3.14 Alarm Alert Display

From the main screen, move the mouse to the lower-left Alarm Alert area to expand it. Double-click on the desired alarm to bring up the ECG strip menu and the alarm history list which you can scroll through for other ECG strips.

The screenshot displays a medical monitoring interface for 'General Hospital'. At the top, it shows the date 'Today 2010-07-26' at '11:32:28', server start time '2010-07-26 11:15', and 'Running: 0 Hours 16 Minutes'. The interface includes a status bar with '5 Transmitter Connected' and 'PDA Disconnected'. The main area shows six ECG strips for 'Room 1' beds 1, 3, 4, and 6, each with a heart rate (89, 60, 41, 41, 36) and ST segment values (0.0, 0.4, -0.2, -0.5, 0.8 mm). Some strips are labeled 'Demo Data Acquire!' or 'no Data Acquire!'. At the bottom left, an alarm alert table is visible:

| Bed | Time | Name | Alert |
|-------|-------------|--------------|-------------------------------------|
| Bed 2 | 11:31:16-D1 | Test,R,1,B:1 | Transmitter/Battery Not Responding. |
| Bed 2 | 11:30:25-D1 | Test,R,1,B:1 | Transmitter/Battery Not Responding. |

Below the table, there are controls for 'Bed' (set to 'ALL'), 'Delete', and 'Delete All' buttons. The bottom right corner shows system information: '0054a Build: 20100524', 'Used Disk: 14.0%', and a row of icons for Stop, Print, Holler, System, Patient List, View, Help, and Close.

To delete individual alarms, left-click on the desired alarm and click the **Delete** button. To delete all alarms in the alarm menu, click the **Delete All** button.

Next to **Bed:** is a drop-down menu where you can filter the alarms by bed number and only view alarms for a particular bed.

3.15 From the main screen, click on the **Patient List** icon to bring up the current and past patient database. You can select a past patient (one without the monitor icon to the left) and click on **Access Patient**, then **Page Scan** to bring up the page scan of a prior patient (See 3.9).

The screenshot displays the 'General Hospital' software interface. A 'Patient List' dialog box is open, showing a table of patient records. A 'PageScan' dialog is also visible, overlaid on the Patient List table.

| No. | Name | Sex | Room | Bed | ID | Test Date | Total Time |
|-----|--------------|-----|------|-----|-----------------|------------------|------------|
| 1 | Test Patient | | 1 | 5 | 201006021514524 | 06-02-2010 15:14 | 00:08:40 |
| 2 | Test Patient | | 1 | 4 | 201006021514443 | 06-02-2010 15:14 | 00:08:48 |
| 3 | Test Patient | | 1 | 3 | 201006021514352 | 06-02-2010 15:14 | 00:08:58 |
| 4 | Test Patient | | 1 | 1 | 201006021514200 | 06-02-2010 15:14 | 00:09:12 |
| 5 | Test Patient | | 1 | 1 | 201006021502370 | 06-02-2010 15:02 | 00:02:31 |
| 6 | Test Patient | | 1 | 2 | 201002021448551 | 06-02-2010 14:48 | 00:34:37 |
| 7 | 11111 | | 8 | 8 | 201002241515197 | 02-24-2010 15:15 | 00:30:42 |
| 8 | 11111111 | | 1 | 1 | 201002241514110 | 02-24-2010 15:14 | 00:32:03 |
| 9 | Test 8 | | 1 | | | | |
| 10 | Test 7 | | 1 | | | | |
| 11 | Test 6 | | 1 | | | | |
| 12 | Test 5 | | 1 | | | | |
| 13 | Test 4 | | 1 | | | | |
| 14 | Test 3 | | 1 | | | | |
| 15 | Test 1 | | 1 | | | | |
| 16 | Test 6 | | 1 | | | | |
| 17 | Test 5 | | 1 | | | | |
| 18 | Test 4 | | 1 | 4 | 200911131612163 | 11-13-2009 16:12 | 00:17:54 |
| 19 | Test 3 | | 1 | 3 | 200911131610562 | 11-13-2009 16:10 | 00:19:16 |
| 20 | Test 1 | | 1 | 1 | 200911131610460 | 11-13-2009 16:10 | 00:19:34 |
| 21 | Test | | 1 | 2 | 200911131608481 | 11-13-2009 16:08 | 66:39:00 |
| 22 | Test | | 1 | 2 | 200910061532051 | 10-06-2009 15:32 | 00:00:00 |
| 23 | Test | | 1 | 1 | 200910061159380 | 10-06-2009 11:59 | 02:42:33 |
| 24 | Test Patient | | 1 | 2 | 200910061145491 | 10-06-2009 11:45 | 00:03:38 |
| 25 | Test Patient | | 1 | 2 | 200909301530571 | 09-30-2009 15:30 | 00:00:00 |

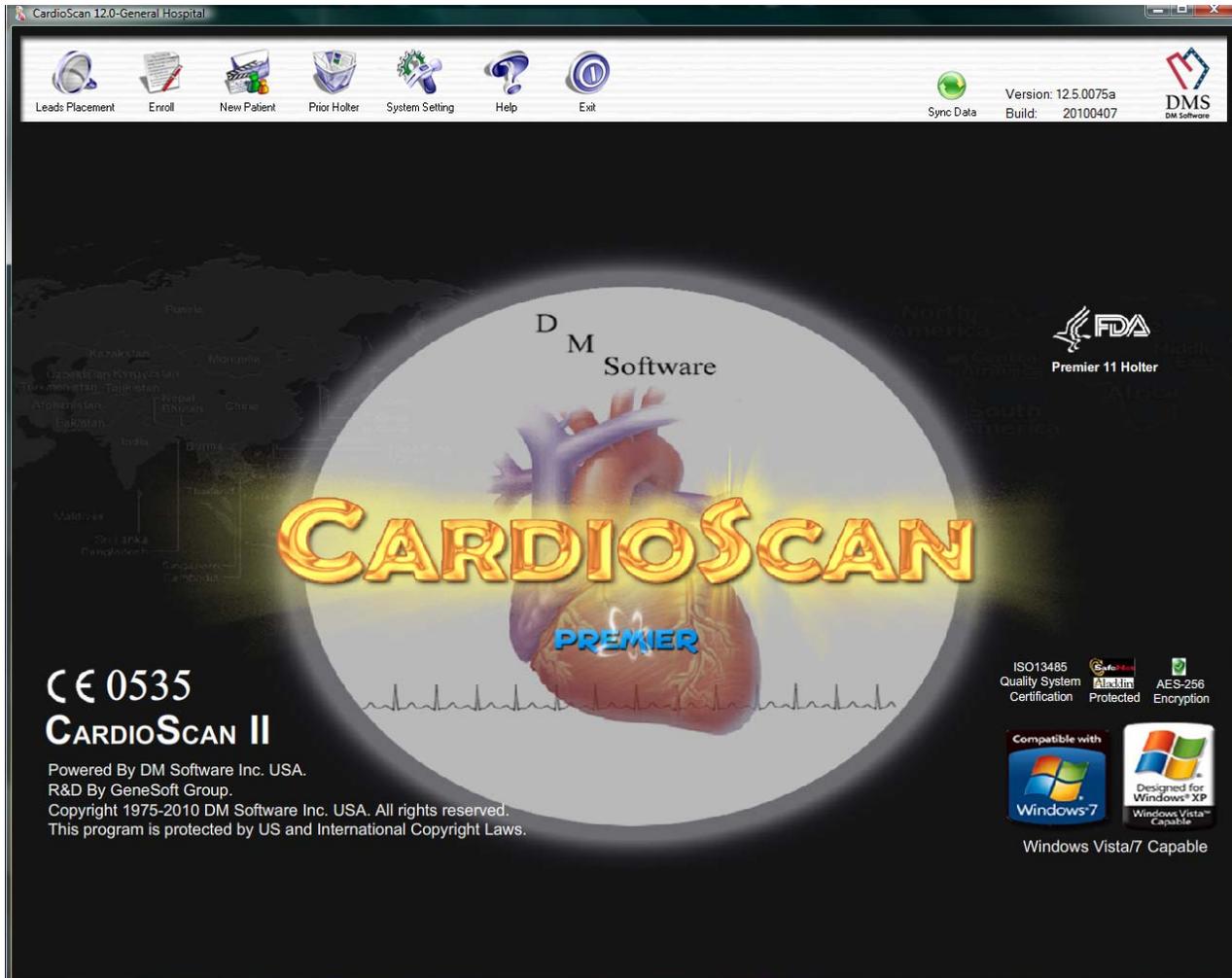
The 'PageScan' dialog shows a film strip icon and the text 'PageScan'.

At the bottom of the Patient List dialog, there are buttons for 'Access Patient', 'Sync Database', 'Delete', and 'Close'.

If you notice any errors in the patient list, click the **Sync Database** button to synchronize the patient list database.

4. Using CardioScan for Holter analysis of CardioVision patients

- 4.1 To run CardioScan while the CardioVision Server is running, click on the **Holter** icon. If the CardioScan window does not appear, it is still running in the background. Simply minimize CardioVision Server and it will appear. If the CardioVision Server is not running, you can double-click on the **CardioScan** icon on the desktop.



Lead Placement: View lead placement diagrams.

Enroll: This function is for Holter only.

New Patient: This function is for Holter only.

Prior Holter: Opens up the patient database.

System Setting: Modify system settings.

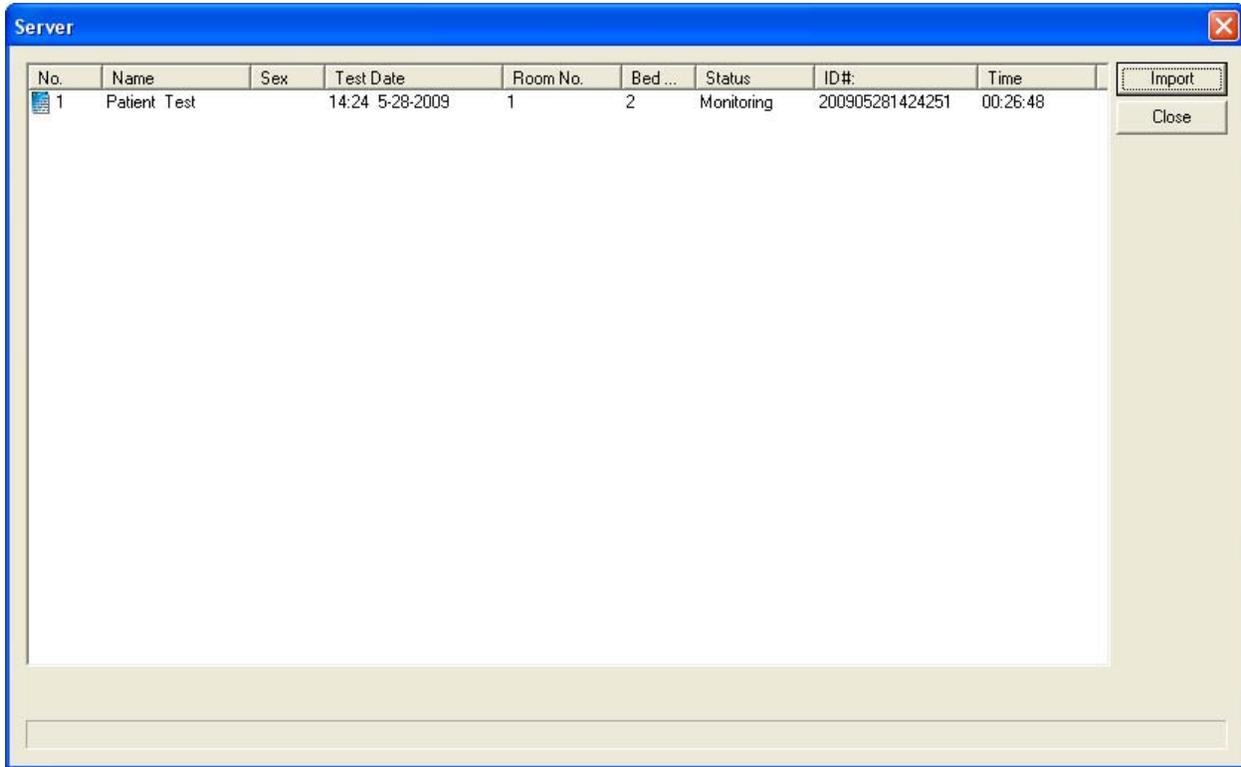
Help: System information, Learning center, CE information.

Exit: Closes the Holter program.

Sync Data: Synchronizes the patient data for file maintenance purposes.

- 4.2 To view previous and current patients or to import a patient currently being monitored in CardioVision Server, click on **Prior Holter**.

- 4.3 To import a patient into the Holter CardioScan function from CardioVision Server, click on **Online Holter** in the bottom right corner. A new window will appear.



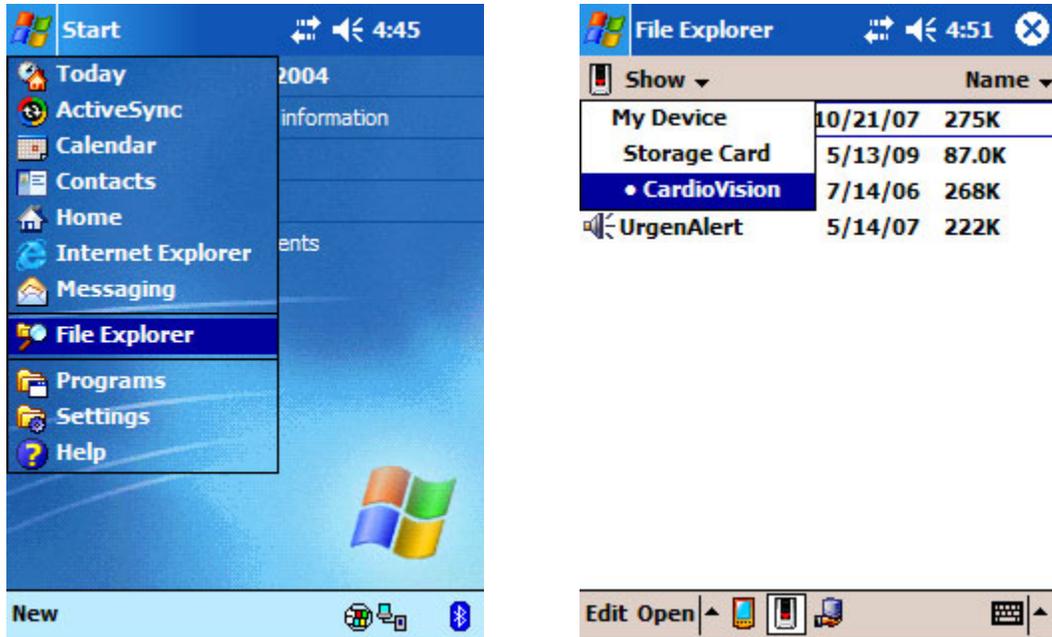
- 4.4 You will see a list of all the patients being monitored that have not been imported into CardioScan yet. Any finished recordings that have not been imported during the recording will also show up here. Select the patient you wish you import by left-clicking it, and click **Import**. To import a group of patients, left-click on the first patient, hold down the Ctrl key on the keyboard, and select the additional patients, then click **Import**. When finished, click **Close**. These patients will now appear in your Prior Holter menu.
- 4.5 To update a patient currently being monitored with the ECG data since the last review, simply open that patient file and you will be prompted to update the patient data.



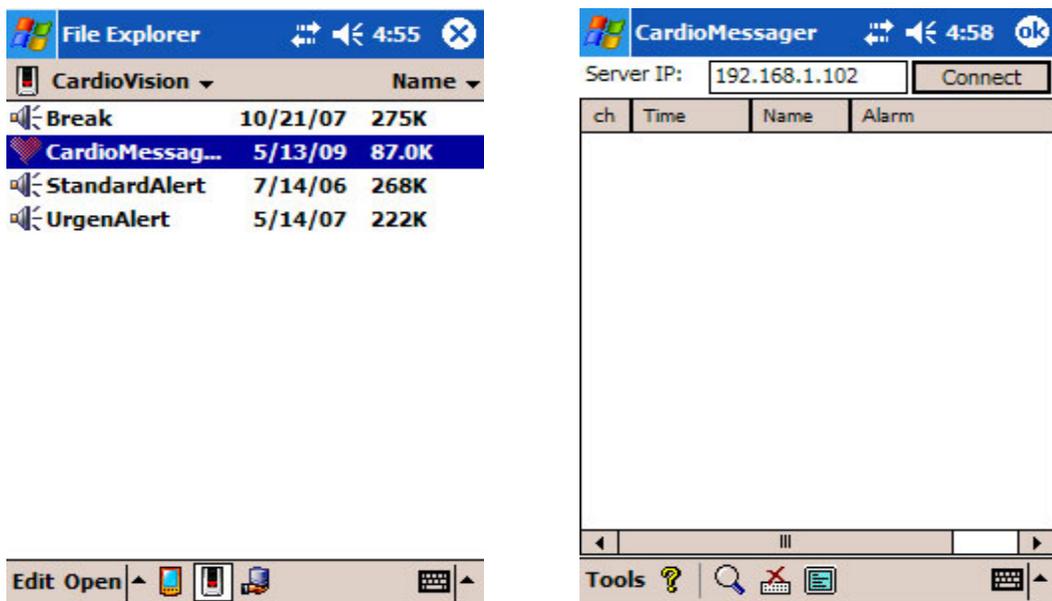
Note: Please see the CardioScan Premier manual for further operation instructions.

5. CardioVision PDA Software

- 5.1 To use the CardioVision PDA software, copy the contents of the "PDA" folder on the CardioVision CD (see 1.1) to an SD card.
- 5.2 Insert the SD card into the PDA, click on **Start**, then **File Explorer**. Locate the files which were copied in step 6.1.



- 5.3 Double click on **CardioMessenger.exe** to start the program. Enter the IP address of the CardioVision Server into the box (this is the same as the Server IP in Step 2.5), and click **Connect**.



5.4 The Event Log:

The screenshot shows the CardioMessenger application window. At the top, there is a title bar with the application name and system icons. Below the title bar, a status bar displays the Server IP (192.168.1.102) and a Disconnect button. The main area contains a table with columns for channel (ch), Time, Name, and Alarm. The table lists three events for PatientTest, all with the alarm 'Transmitter/Battery No Connected.'. Below the table is a list of patients being monitored, with a search icon and a list icon. At the bottom, there is a Tools menu with various icons.

| ch | Time | Name | Alarm |
|----|-------------|-------------|-----------------------------------|
| 2 | 16:41:45-D1 | PatientTest | Transmitter/Battery No Connected. |
| 2 | 16:40:43-D1 | PatientTest | Transmitter/Battery No Connected. |
| 2 | 16:39:40-D1 | PatientTest | Transmitter/Battery No Connected. |

Annotations:

- Connect / Disconnect button
- Event log
- View the ECG strip of the selected event
- Clear the event log
- List of patients being **Monitored**

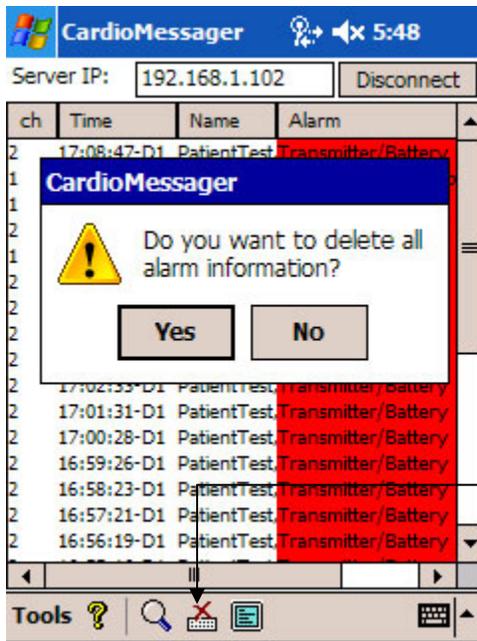
View Mode:

The screenshot shows the CardioMessenger application window in View Mode. The title bar and status bar are visible. The main area displays an ECG strip for two channels, CH1 and CH2. The ECG strip is overlaid on a grid. The patient data is displayed at the top of the ECG strip: 2 | 16:58:23-D1 | PatientTest, R:1, B:2 | Transmitter/Battery Not Responding. The interface includes a search icon, a zoom out button, and a scroll bar for the ECG strip.

Annotations:

- Back to the Event Log
- Zoom out
- Patient data: Recorder CH#, Time, Name, Room, Bed, Event
- Scroll the ECG strip

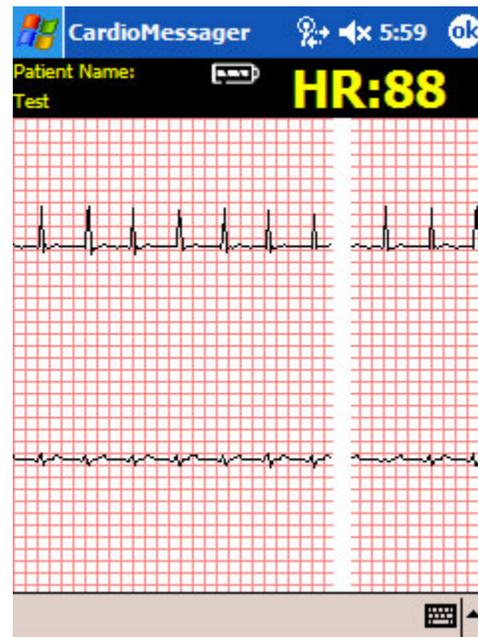
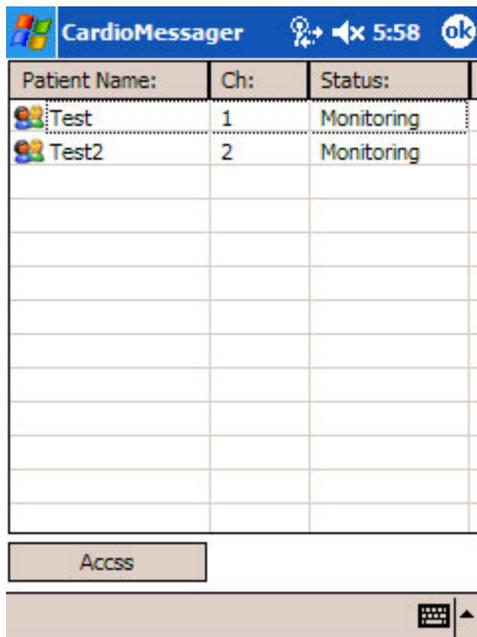
 Clearing the Event Log:



To clear the Event Log, click on the **Clear** button, and then confirm by clicking **Yes**.

 Monitoring Mode:

Select a patient being monitored from the list and click on **Accss**. This will bring up the real-time ECG of the selected patient. Click **ok** to return to the previous screen.

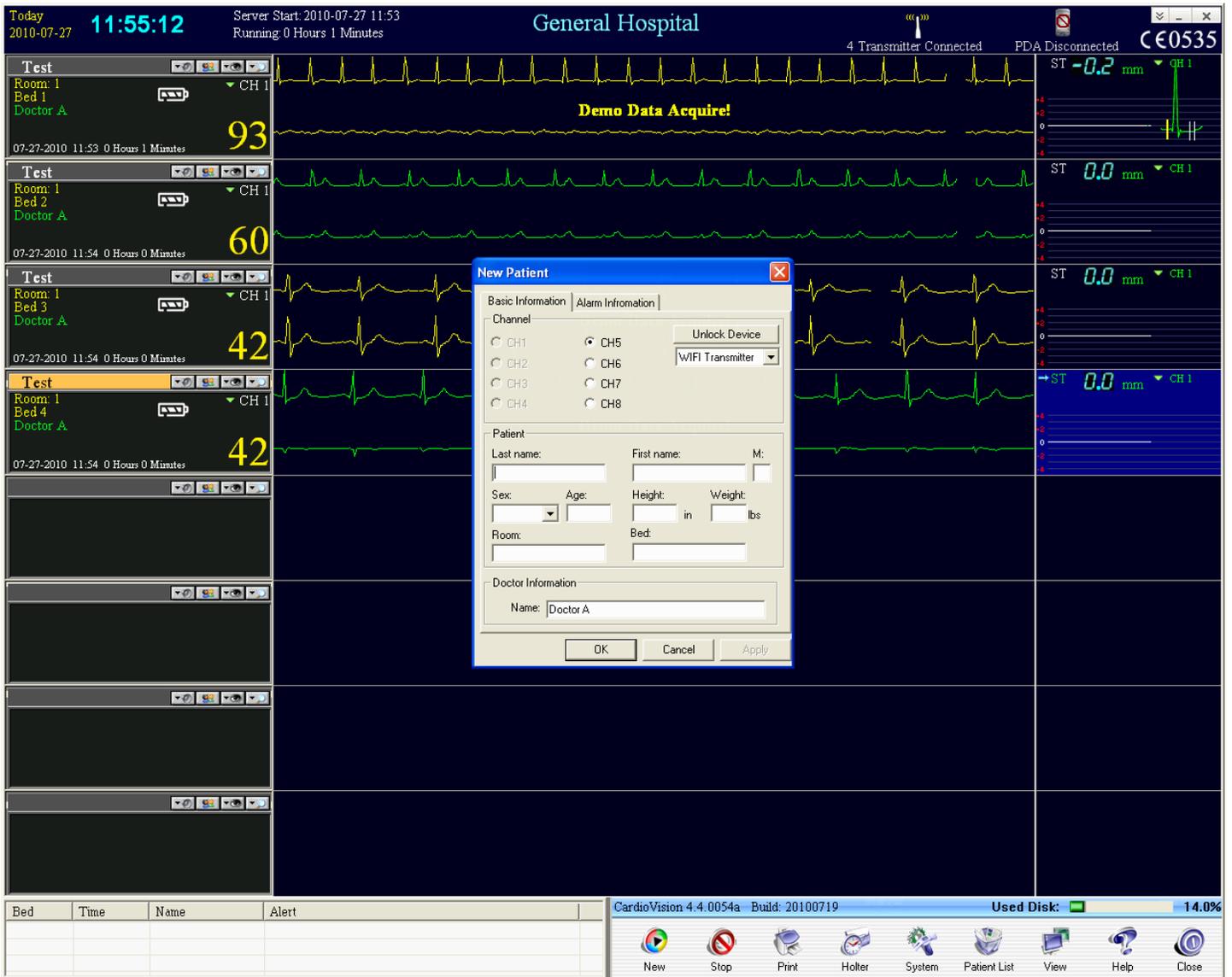


6.0 Detailed Operational Features of CardioVision



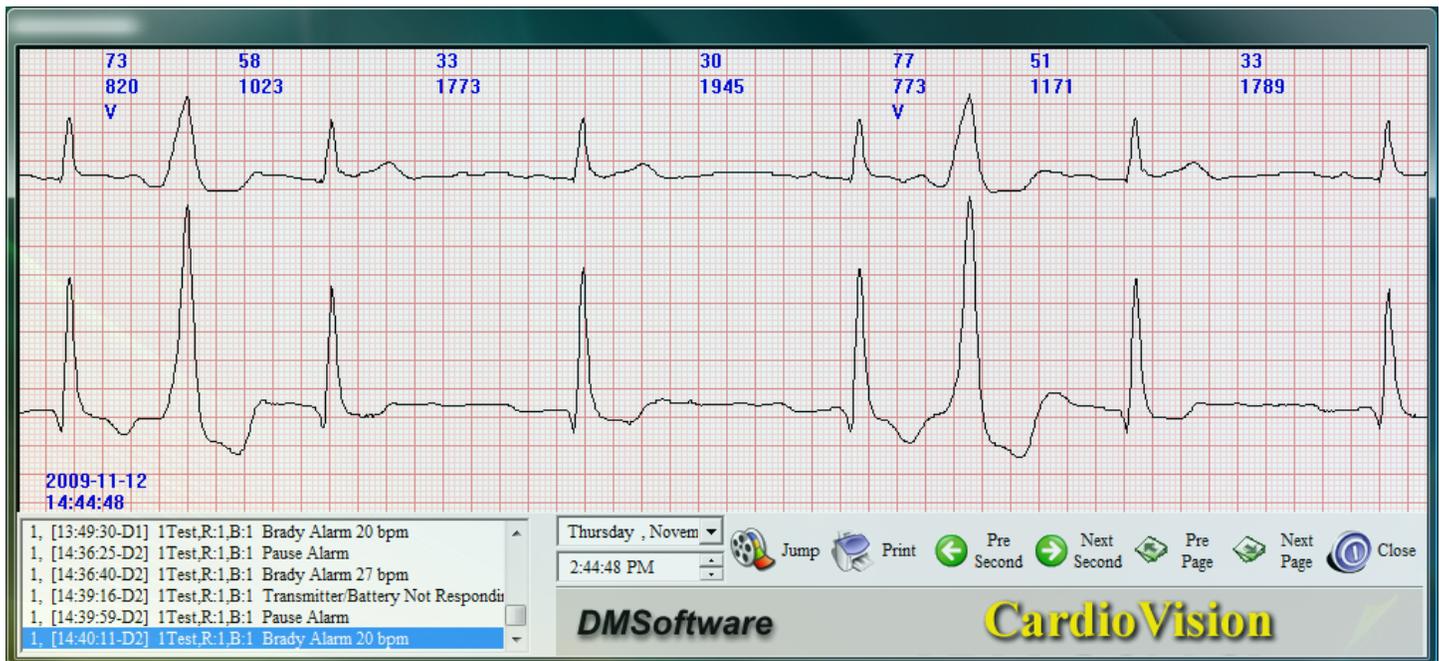
6.1 CardioVision 8-Patient Display:

1. Use two (2) separate monitors with each CardioVision (CV) system.
2. Screen Display # 1 (left side) is for Real-Time ECG monitoring, and Screen Display # 2 (right side) is for Holter ECG, large ECG strips, Full Disclosure, Trend Display, etc.
3. Holter ECG editing can be done at either the CV central station, or remotely from the Holter lab in another section of the hospital.
4. Cardiologists can access the patient data from their office or home.
5. The CV computer automatically sends Alarm and Real-Time ECG to PDAs so that the nurses or doctors can see the data without being at the central station.
6. Each minute the ECG data for all patients is formatted for Holter ECG analysis and processing.
7. Simultaneously the CV system is a Holter system and a Wireless ECG patient monitoring system.



6.2 Data Layout of Main Display of CardioVision:

1. The ECG display can be a 1-Lead display, a 2-Lead display, or a combination of 1-Lead with a Full Disclosure. Place the arrow on the ECG display area for any patient, and right mouse-click.
2. Patient and Physician information is at the far left. Patient name is "Test". Click on the icon to the right of patient name in order to enter Patient and Physician data. After typing in the Patient and Physician data, click on the OK icon at the bottom of the pop-up window.
3. The Heart Rate is continuously displayed to the right of the Patient data.
4. Above the Heart Rate, you can select the dominant ECG lead for assisting analysis.
5. You can adjust the horizontal length of this Patient data box by a point and drag on the right side border (just to the right of the Heart Rate number).
6. The red color in the Patient data box is when the patient has an Alert or electrode disconnect.
7. The right side of the ECG display is for real-time analysis of ST Segment, QTc, Pauses, Tachy, etc.
8. The lower left of the screen display is for the display of the Alerts for the patients monitored.



6.3 Viewing ECG Strips of Interest:

1. This is the screen display for a real-time ECG. You can do a single click on one of the Alerts at the bottom left of the screen display, and get an immediate real-time ECG that is displayed on Screen Display # 2, so that it does not interfere with the on-going real-time ECG display of all 8-patients.
2. In the above ECG strip example, the ECG from the Alerts section is shown with the blue shading.
3. This ECG can be scrolled backwards and forwards to find the exact ECG that you want to print.
4. Each individual ECG beat has already been analyzed for a normal, arrhythmia, or ST category.
5. You can see the "V" markings at the top of the ECG strip that show that these two beats were Ventricular (V) ectopic beats. The "N" is for Normal beat.
6. For each R-R interval, you see the Heart Rate and the millisecond from beat to beat.
7. You can also access ECG strips by clicking on the icon that is the third icon past the patient name. A left mouse click will ask you to select "ECG Strip" or PageScan (Full Disclosure).
8. It is recommended that you first select the PageScan mode (see next page), and from PageScan go to the selection of the desired ECG Strip.
9. The bottom of the ECG strip display allows you to move to various time locations that are pre and post the displayed ECG.
10. There is a print icon at the bottom of this display that will allow you to get an immediate ECG print.
11. You can exit the ECG strip display by a left mouse click on the "Close" icon.
12. Note: All ECG data can be later reviewed in the Holter mode in this same CardioVision system. Simultaneously, Screen Display #1 is Wireless Patient Monitoring, and #2 is full-function Holter.



6.4 Advanced-Auto-Analyzed Full Disclosure:

1. The above is the PageScan display. It is the instantaneous Full Disclosure display of all of the patient's ECG data. This could be multiple days of monitoring, and it is all right here.
2. At the top of the display is the Heart Rate Trend for the minutes, hours, and days of monitoring.
3. The Full Disclosure ECG is in the middle section, and the enlarged ECG is at the bottom.
4. If you want to see the Full Disclosure ECG for the current minute of data, it is here. The ECG beats are transferred to this Full Disclosure mode on a single beat-to-beat basis.
5. At the top of the ECG display you see a large sine-wave display. It is displayed if there is a technical malfunction; such as an electrode disconnected, battery failure, etc.
6. Each horizontal line in Full Disclosure is one-minute of ECG data.
7. You can see a green rectangular box in the lower right section of Full Disclosure. That ECG data in the green box is what is displayed in the enlarged ECG strip at the bottom of this display.
8. If you place the mouse arrow in a different area of interest in Full Disclosure, a single left click will display ECG in the enlarged ECG, and a double left click will bring you to the ECG print menu.



VE Beat Analysis

Ventricular Runs (Tachy)

SVE Beat Analysis

Supraventricular Runs (Tachy)

Pauses

QT and QTc Analysis

R-R Histogram

Poincare Plots

Normal to VE Histogram

Normal to SVE Histogram

HRV Total Power

HRV VLF Power

HRV Low/High Freq. Ratio

HRV SDNN Time Domain

HRV pNN50

HRV rMSSD

6.5 AUTO-ECG Analysis for each Patient

1. To the right side of each patient's real-time ECG are ECG analysis boxes.
2. As shown above, you have sixteen (16) different types of analysis to view.
3. This 16-analysis view can be seen for any patient at any time.
4. You access this data by clicking on the word "Combo".
5. See other part of manual for accessing and selecting a one or two box display of selected analysis at the right side of each patient's display of real-time ECG.



6.6 ECG ANALYSIS at far right of screen display: This screen display shows the viewing of the sixteen (16) analysis functions that occur each minute during the real-time Wireless monitoring.

1. ST Segment Analysis or Heart Rate Trends are available on an on-going basis for each patient.
2. You can select two boxes or one box for analysis display in the normal monitoring display.
3. The bottom two patients are showing the ST Analysis display. At all times the amount of ST Depression or Elevation is numerically displayed. Each minute gets a green or red vertical line. The red vertical lines are the ST Depressions exceeding ST Level limit. For each patient in this ST box analysis display, you can set the markers for PR baseline, J-point, and ST-point. You can also select either Delta ST Analysis or Absolute ST Analysis.
4. No real-time ECG monitoring system has anything close to the ECG analysis capability of this Wi-Fi Wireless ECG monitoring system. And then you get the on-going full-functioning CardioScan Holter ECG system and reporting for each patient. At the end of each minute, the ECG data is formatted for the Holter ECG capability. In an emergency, the cardiologist from his/her home PC can immediately access the Holter for the past 1 or 2 hours, and make a good decision for patient treatment.



6.7 PDA for Remote Alerts and Bedside Monitoring

- Alerts for patients are stored in the lower left section of this display.
- If the nurse is not at the central station, her PDA will be automatically and instantly activated by the central CV PC, and the ECG Alert strip will be seen on her PDA display.
- The PDA display can also be used as a bedside monitor for any patient by the nurse or doctor.
- Multiple PDAs can be operating simultaneously.
- From this lower left display, you can access the real time ECG of any Alert by doing a double left-click on the desired ECG.
- You can delete a single patient Alert or all patient Alerts by clicking on the appropriate icons to the right of the Alert data section.
- Pause and V-Tach Alerts cannot be de-activated. All other Alerts are optional.
- Brady and Tachy Alerts are set at any desired heart rates for each patient individually.



6.8 Dual Screen Displays for CardioVision

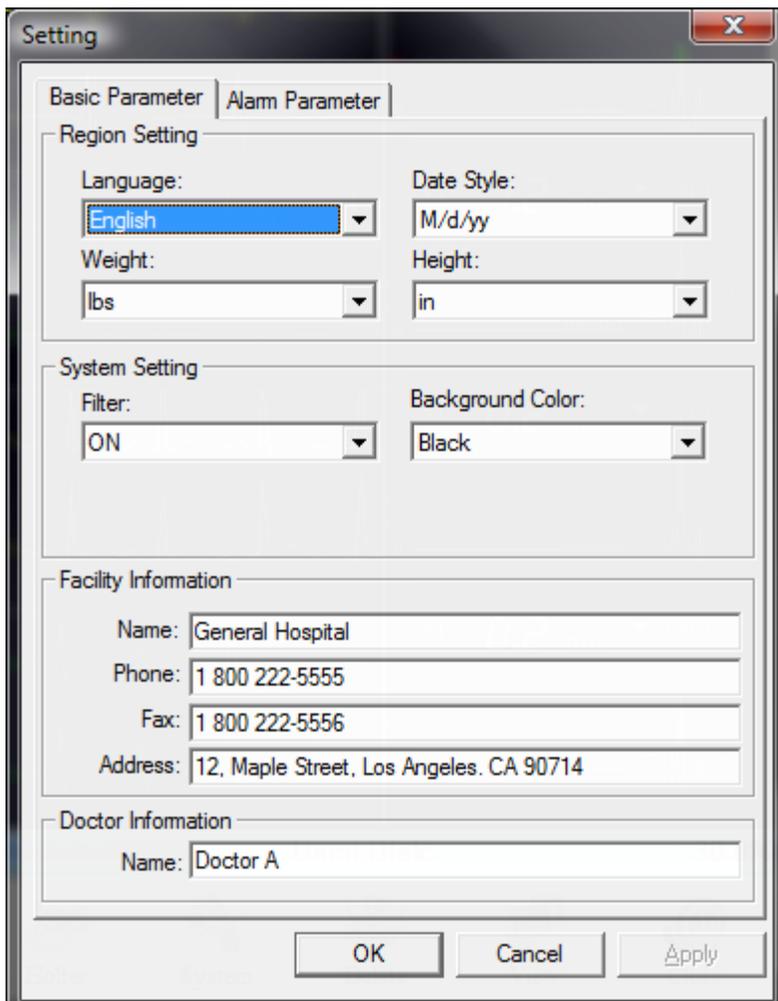
1. The above shows two (2) independent display monitors.
2. The Wi-Fi Wireless Real-Time ECG is shown for each patient on the left side monitor,
3. Other real-time displays (such as enlarged ECG strips, Full Disclosure, etc) are shown on right side monitor.
4. The Holter is performed on the right side monitor.
5. No screen display data is to block out the patient's real-time ECG data.
6. The Wi-Fi transmitter keeps track of its battery power, and there is a continuous display in the left side Patient data box that shows the battery status.
7. The Wi-Fi transmitter also acts as a Holter recorder. If desired, the patient's stored ECG data can be transferred from the Wi-Fi transmitter to the Holter PC in the same manner as a regular Holter monitoring.
8. The purpose of this is to provide an insurance back-up; for example, when the patient is removed to another building for a special procedure, or if there was a power failure in the CV system, etc.
9. With our CV-Holter network, the Holter data can be remotely edited by Holter experts in the Holter lab that may be on the opposite side of the hospital.
10. All of the Holter functions that are in our CardioScan software are included in the Holter portion of the CV system.
11. It is now OBSOLETE to do traditional Holter ECG monitoring inside the hospital. Why wait for one or two days to see the result of the Holter monitoring. The Wi-Fi CV system is the BEST mode for performing Holter testing. While you are doing the Holter, all of the same data is available in the most sophisticated real-time ECG central station system. If the Sustained V-Tach or 5-second Pause occurred 5-hours into the Holter monitoring, everyone is alerted at that time and the Sustained V-Tach, etc. is known at that time. Why waste everyone's time, energy, and money by waiting a couple of days to find out what happened.

6.8a Use of second display monitor for Trends of Real-Time ECG patients

1. Trends can be seen and accessed for 3-days of monitoring for each patient.
2. The Trends are specific to Heart Rate, A-Fib, V-Tachs, VE Beats, ST Depression, and Pauses.
3. The trends for each patient are adjacent to the patient real-time ECG data on the left side monitor.
4. To display Trends, click on Trends at the top right of the main display monitor.
5. Each patient in Trends has a slide-bar to move the trend data through the 3-day time period.
6. A visual quick-look at the Heart Rate trend will usually reveal if an A-Fib episode occurred. You would see a jump in the HR trend along with the vertical lines be longer, indicating that the min and max heart rate range was significantly increased.
7. During 1-hour periods of V-Tach or multiple VE beats, a colored box will be displayed below the Heart Rate trend for each patient.
8. During ST Depression, the ST trend on the right side will show the amount of ST Depression. You can select either Delta ST or Absolute ST as the method for detecting ST changes.
9. Below the ST trend are the colored boxes showing Pause beats.
10. Use the mouse to click on the trend time periods of interest.
11. Upon clicking on the trend time period, the Page Scan Full Disclosure will appear. You can use the slide bar on the right side to quickly view the entire 1-hour time period. Upon viewing the ECG of interest, point the mouse area at the ECG event, and do a double left click to view the enlarged ECG.

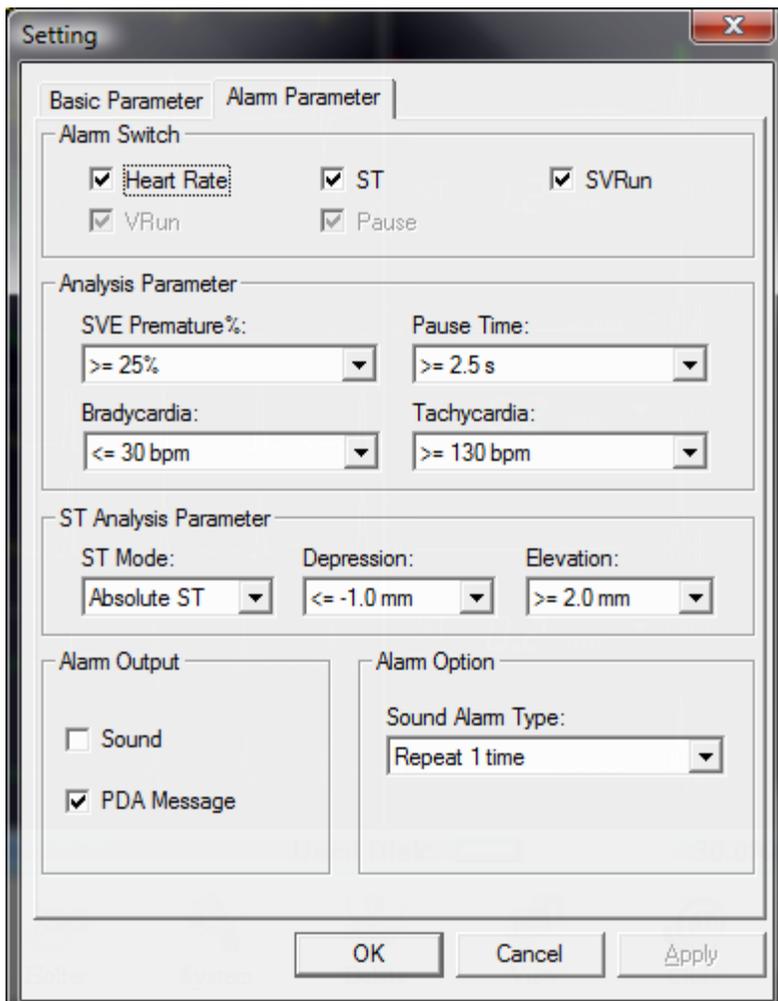
6.8b Use of the second monitor for Holter ECG

1. At any time the second display monitor can be used for the Holter viewing and editing of the ECG data.
2. When you click on the On-Line Holter function, the second monitor becomes an independent Holter ECG system for the same patients that you are viewing on the real-time ECG display on the left side.
3. At the end of each minute of the real-time ECG monitoring, the 100% ECG data for each patient is transferred into that patient's Holter ECG file. Thus, the single Wi-Fi ECG transmitter is fulfilling the functions of both the real-time ECG and the Holter ECG.
4. The Holter data is processed in the same manner as the CardioScan Holter ECG system.
5. As a practical manner for most hospitals, the Holter ECG data can be remotely accessed from the Holter lab in the Cardiology Department; thus allowing the Holter to be edited by Holter ECG experts.



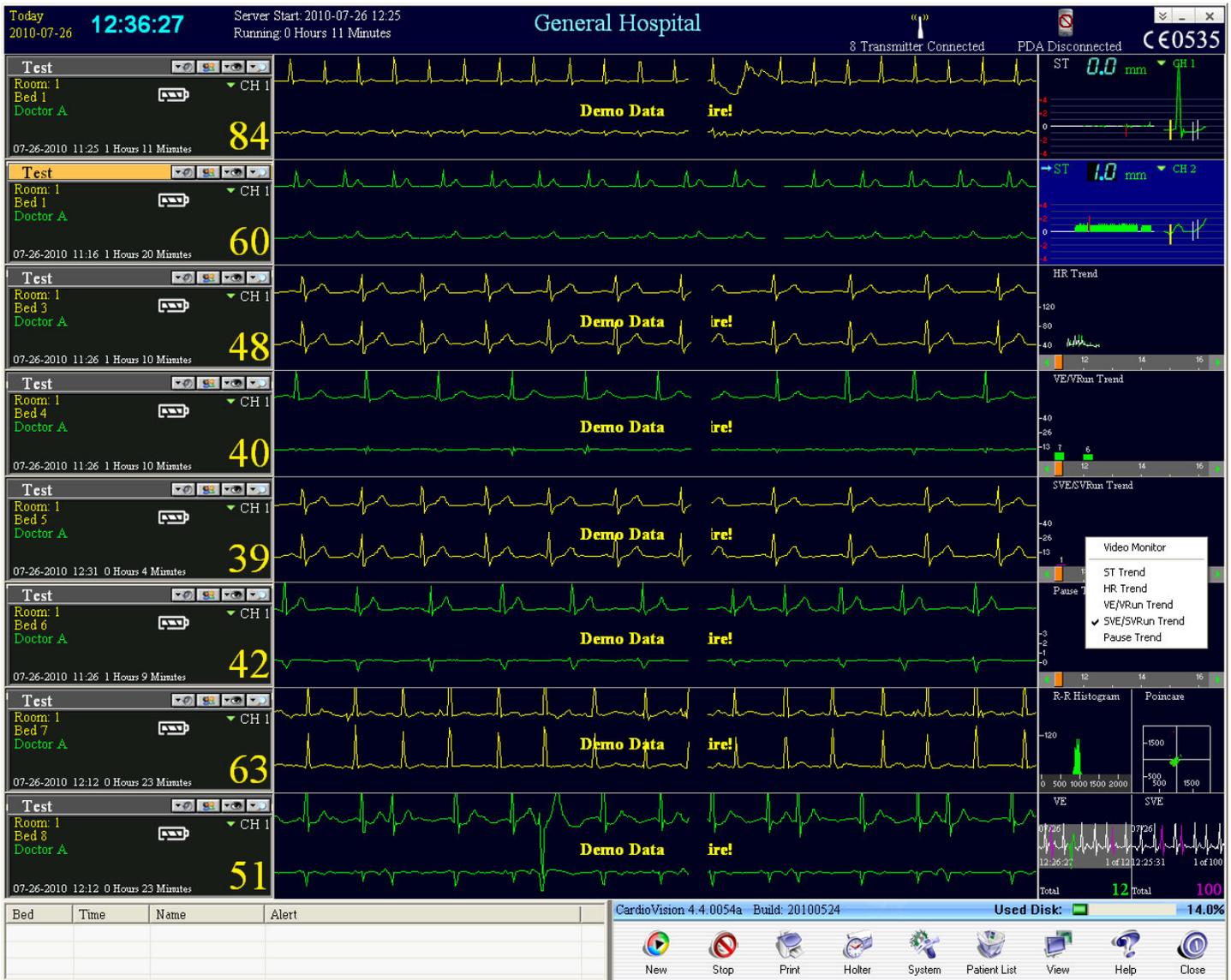
6.9 Settings Menu for Language Translations, Filters, etc.

1. At the bottom of the 8-Patient real-time ECG display, there is an icon for System Setting.
2. Click on this icon to bring up the above pop-up window.
3. The language can be translated for you country's needs.
4. We will give you a Translation Language Package. Translate and return it to DMS.
5. Type in the desired data for each field.
6. It is recommended to select the Filter in the "ON" position.
7. Before closing, click on the "Alarm Parameter" tab at the top. This will take you to the next pop-up window for analysis settings.



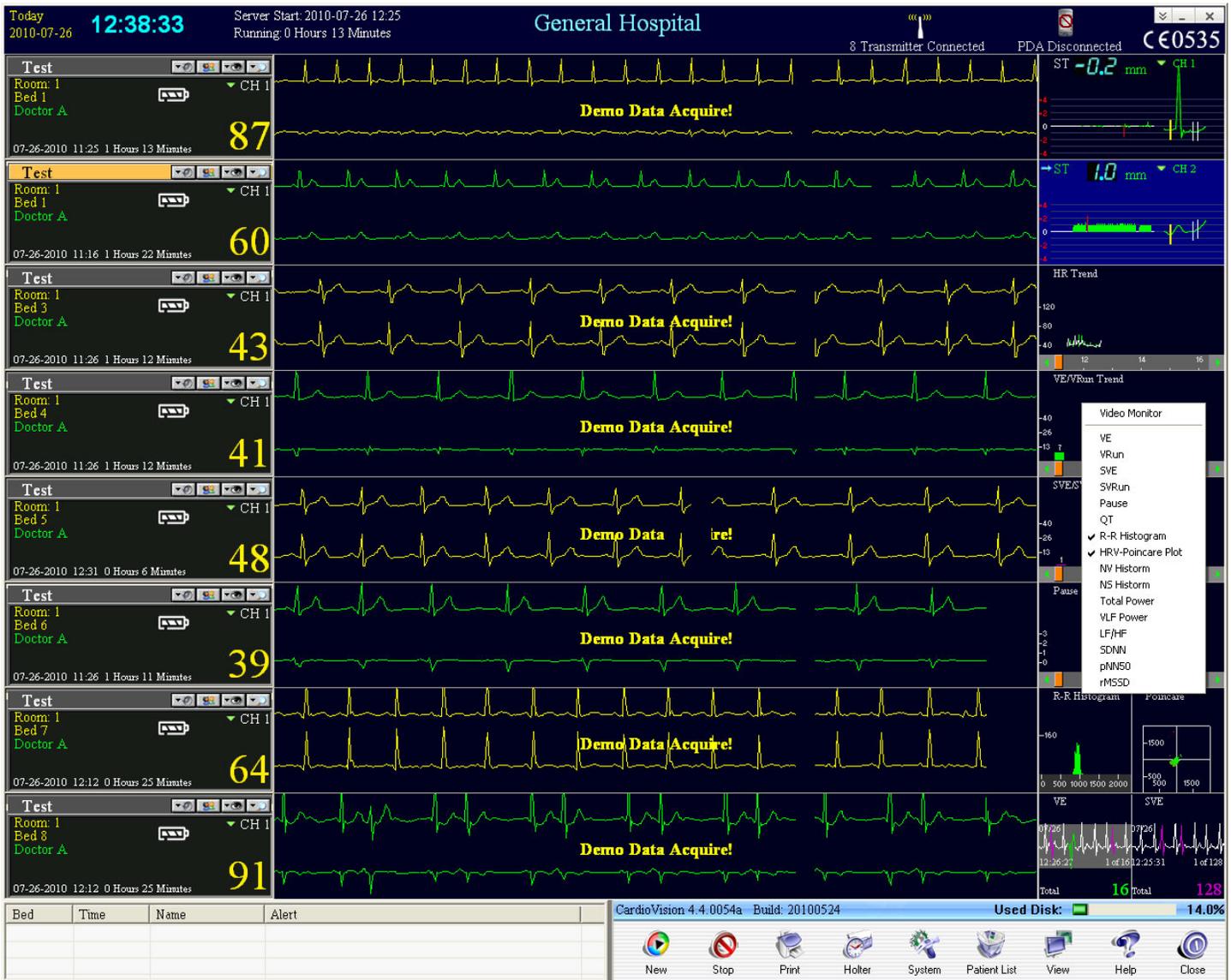
6.10 Settings Menu for Analysis

1. Note that the VRun and Pause alerts cannot be de-activated.
2. Heart Rate, ST, and SupraVentricular Runs alerts are optional.
3. A check-mark will activate Heart Rate, ST, and SupraVentricuar alerts.
4. There is a SVE Prematurity field.
5. For non Atrial Fib patients, the 25% setting is recommended.
6. For Atrial Fib patients, the 20% setting is recommended.
7. For ST Analysis, you can select Absolute or Delta. This selection varies from country-to-country. The Delta setting is the most common setting.
8. Absolute ST is the ST Depression or Elevation that is measured from the patient's PR baseline level.
9. Delta ST calculates the ST Level that occurs most often in 24-hours, and uses that ST Level as that individual patient's zero baseline. The ST Depression or Elevation is then measured as the amount of ST change from the patient's most common ST Level.
10. Alarm Output: PDA use is most highly recommended. Select your desired sound options.



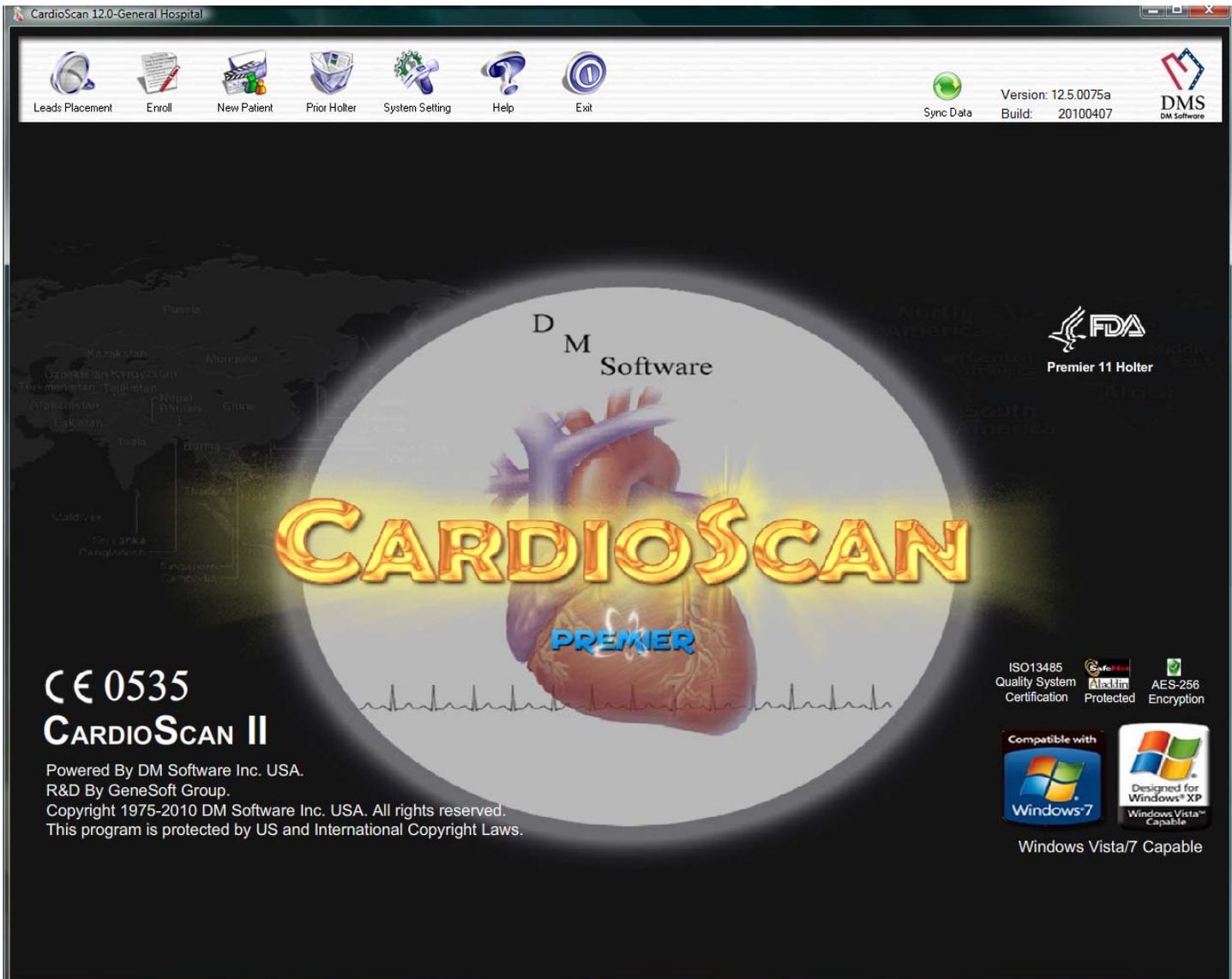
6.11 Different Analysis for Different Patients

1. The top six (6) patients are shown with ST or Heart Rate Trends in the analysis box at the far right side of each patient's real-time ECG.
2. The bottom two (2) patients show the two (2) box analysis display.
3. Click on the top left corner of the analysis box to bring up an analysis selection.
4. The very top option of the selections is a VIDEO MONITOR option.
5. If you place a low cost, off-the-shelf video camera in the patient's room, you can view at the central station the patient's presence in the bed. The video display is shown in the analysis box for the selected patient.
6. For an Analysis trend in the Analysis box, click on the desired Analysis.



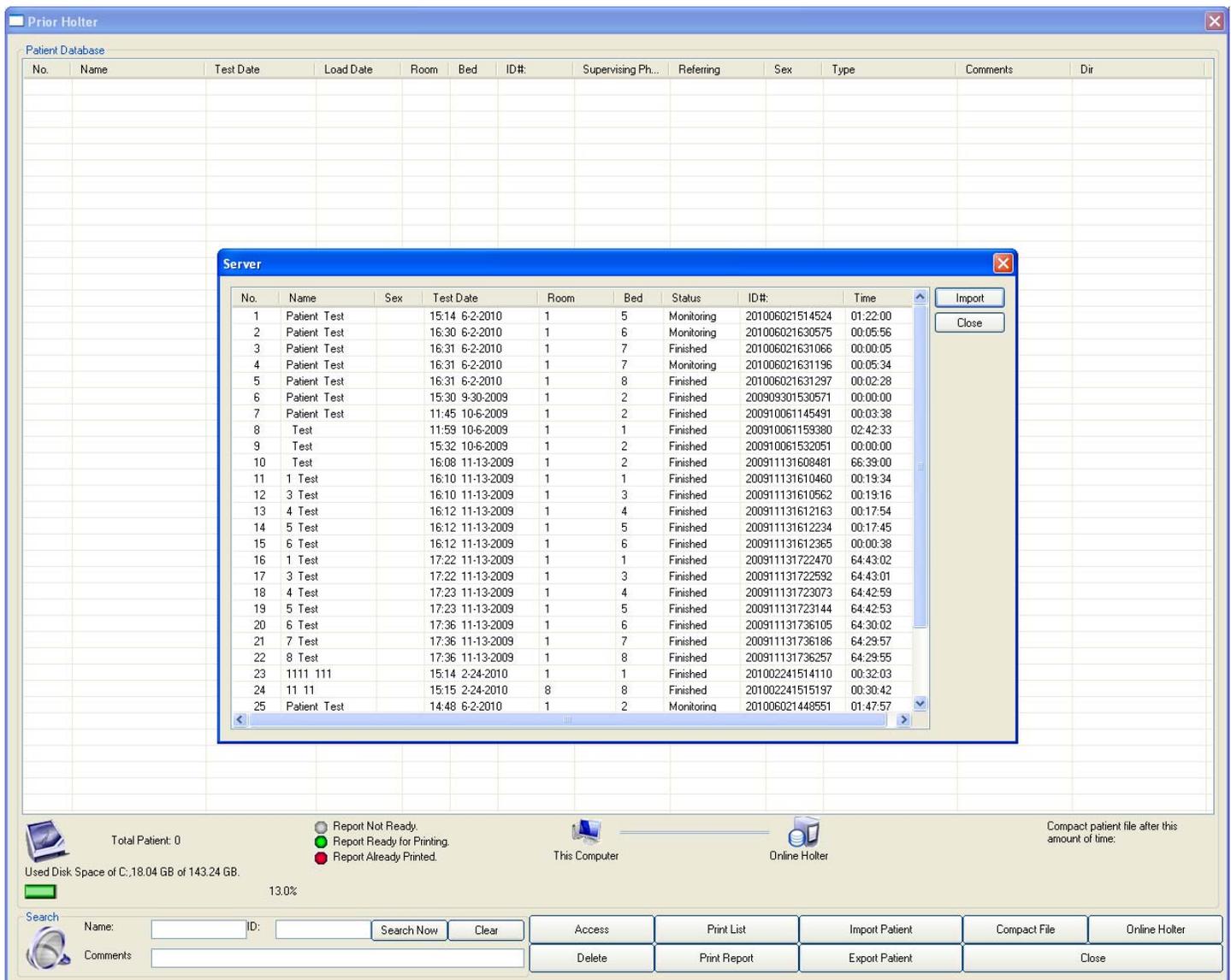
6.12 Selection of Desired Analysis for each Patient

1. You can select either the one Analysis box mode or the two Analysis box mode.
2. When you select the two Analysis box mode, you get the above pop-up window.
3. This will allow you to click on the two sets of Analysis that you want displayed.
4. The bottom two patients show the two Analysis box mode.
5. There are eight (8) different Heart Rate Variability (HRV) analysis modes.
6. Some of the HRV analysis modes show both the HRV analysis for the total time and also for the prior 5-minute time period.
7. All of the analysis is backed-up by the CardioScan Holter analysis, such as: ATRIAL FIBRILLATION, T-WAVE ALTERNANS, HRV-Time Domain and Frequency, QTc by Time and ms, DELTA ST SEGMENT.



6.13 Auto Holter backs up all the CardioVision real-time ECG

1. The CV system includes a separate CardioScan Holter ECG system.
2. The CV system can be considered to be a hospital Holter ECG system that also does the most sophisticated Wireless real-time ECG hospital monitoring at the same time as doing the Holter.
3. The CV system can also be considered a sophisticated Wi-Fi wireless real-time ECG hospital monitoring system that is backed-up minute-by-minute by the CardioScan Holter ECG system.
4. While being used as a hospital Holter ECG system, this is the only Holter system with the advanced technology that also provides beat-to-beat display and analysis at a central station.
5. The results of the Holter analysis of just a few hours, or up to 7-days, can be immediately accessed by the concerned cardiologist at any time from the PC in the cardiologist's office or home.
6. For a small hospital or clinic without a cardiologist, the cardiologist can always have remote access.



6.14 The Holter ECG Function: The Holter data is presented in the CV system in the same manner as the PRIOR menu in the Holter CardioScan system.

1. For the first transfer from the CV real-time data, click on the “Online Holter” icon at the lower right of the above menu.
2. This will start the process of Importing the patient ECG file into the format that is the same as the Holter CardioScan system.
3. There is no limit to the number of hours or days that the patient can be monitored in real-time or in the Holter mode.
4. When you click on the Online Holter icon, you will see a list of patients that have not been IMPORTED into the CardioVision Client (Holter CardioScan).
5. Click on the patient you wish to Import, and then click on the “IMPORT” icon. Close to finish.
6. To update a patient currently being monitored with the new and additional Holter ECG data, simply open the patient file and you will be prompted to update the patient Holter ECG data.



6.15 The Most Sophisticated Holter ECG System Available

1. When accessing the patient's Holter data, the patient may have multiple days of Holter ECG recordings.
2. When accessing the patient's Holter data, a pop-up window will be displayed in the Patient data box in the real-time CV ECG display. This pop-up window allows you to select the day of Holter ECG that you want to access.
3. Notice: If you use a one screen PC or Notebook, you may cover up the left side monitor with the right side PRIOR menu. This can prevent you from accessing the Holter day selection, and block you from proceeding. This is one of many reasons for always using a two (2) monitor display for the CardioVision system.
4. When you click on the desired day for the Holter ECG data, the right side monitor will take you into the standard Holter ECG program for editing, reporting, and storing.
5. All functions of the Holter CardioScan system are now available to you.
6. All CV systems include one (1) CV security key for the central station PC. There is also a security key for the CardioScan back-up PC for the Holter ECG lab. The Holter CardioScan PC in the Holter lab acts as both (1) the remote Holter editor for the CV central station PC, and (2) the out-patient Holter ECG capability. This out-patient Holter ECG capability includes the Satellite Easy technology that allows the Holter ECG from the patient's home to be transmitted each 24-hours. For the first time, with this capability, the cardiologist will know exactly how many days to perform an out-patient Holter ECG test. The out-patient Holter monitoring can be done from 1 to 30 days with the single Holter recorder.