Real-time patient views

You can view real-time data for patients located in your care unit, and when networked with other CIC Pro centers, you may also view real-time data for patients located outside of your care unit.

The CIC Pro center allows you to view real-time patient data from two different patient viewers. Each viewer provides a different level of data granularity:

- Multi-patient viewer
- Single patient viewer

CAUTION
TREATMENT — Do not treat a patient based solely on the alarm messages and/or numerics presented via the connectivity device to the monitor. You must verify the accuracy of the alarm message and/or numerics at the peripheral device itself before initiating treatment. Treatment should be based on the information presented at the peripheral device.

Data synchronization

Information displayed on the ECG tab sheet is synchronized with the source (transmitter) every two seconds. If differences are detected, the display is refreshed with new patient data.

Multi-patient viewer

The multi-patient viewer displays a snapshot of real-time parameter data for a maximum of 16 patients. You can do the following real-time tasks from the multi-patient viewer:

- View abbreviated real-time patient data.
- View a snapshot of real-time ***Graphic Trends*** data for a maximum of two different parameters. See Configuring the real-time trend window on page 7-6.
- Print parameter limits or waveform data for all patients in the care unit. See Printing parameter limits or waveforms for all in-unit patient beds on page 7-9.
- View a single patient's detailed real-time parameter data. See Single patient viewer on page 7-3.
- View a single patient experiencing an alarm condition. See Viewing in-unit patients experiencing an alarm condition on page 7-5.
- Admit or discharge a patient. See Chapter 6.
- View beds outside your care unit. See Out-of-unit patient beds on page 7-6.
- Silence all alarms. See Silencing alarms on page 5-7.

The multi-patient viewer displays ***menu bar*** options similar to the following:

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Multi-patient viewer menu bar options	
Option	**Function**
Auto Display	When enabled, the ***Auto Display*** button is selectable from the menu bar. Clicking the ***Auto Display*** button while viewing the multi-patient viewer automatically completes the following tasks: ■ Removes any un-locked, unoccupied beds. ■ Adds at least one empty patient window with an ***Admit*** button. ■ Resizes the remaining patient windows to maximize the amount of displayed patient data.
View Other	View any patient bed on the Unity Network that is inside or outside of the care unit, floor, or hospital. See In-unit patient beds on page 7-5. See Out-of-unit patient beds on page 7-6.
CIC Setup	View the CIC Pro center default settings. You can customize some of the user-level defaults. See Customizing the system on page 4-4.
Silence Alarms	Silence audible alarm tones for one minute. See Silencing alarms on page 5-7.
Graph All	Print the parameter limits or the waveform data for all patients in the care unit.
Browser	Access stored patient data from the web access server.

Single patient viewer

The single patient viewer displays detailed real-time parameter data for a selected patient. You can complete the following tasks from the single patient viewer:

- View detailed real-time parameter data.
- View, change, or print ***Alarm Control*** or parameter control settings for any in-unit patient. These changes are also adopted by the monitor. See Adjusting alarm control settings on page 5-8. See Adjusting parameter control settings on page 7-11.
- View ***Alarm Control*** or parameter control settings for out-of-unit patient beds on the Unity Network. See Adjusting alarm control settings on page 5-8. See Adjusting parameter control settings on page 7-11.

NOTE

You cannot change the ***Alarm Control*** or parameter control settings of an out-of-unit patient.

- Adjust the real-time trend window for any in-unit patient. See Configuring the real-time trend window on page 7-6.
- Print real-time parameter data and waveforms for any in-unit patient. See Printing real-time data on page 7-8.

The single patient viewer displays menu bar options similar to the following:

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Single patient viewer menu bar options

Option	Function
Real-Time View	Return to the real-time display of patient data.
Admit	Display the ***Admit*** window.
Monitor Setup...	Temporarily adjust a patient's parameter, alarm, or print control settings.
Patient Data...	Display stored patient data. See Chapter 8.
System Utilities...	Access web access server data.
View all ECG	Display waveforms for ECG leads ***I***, ***II***, ***III***, ***V***, ***aVR***, ***aVL***, and ***aVF***.
Sample	Record and store a 10-second sample of a patient's real-time ECG data. Data samples are stored in ***Events*** directory. ■ ***Monitor***: Parameter numeric data and up to three waveforms. ■ ***Telemetry***: ECG waveforms only.
Relearn	Relearn the selected patient's ECG rhythm after changes occur to heart rate or rhythm. The CIC Pro center uses 14 current complexes to relearn the patient's ECG pattern. The heart rate value appears briefly as ***X***s during the relearn process and returns to numerics when the relearn process is complete.
Configuration	Configure the selected patient's real-time trend window. See Configuring the real-time trend window on page 7-6.

In-unit patient beds

You can view any in-unit patient bed that is on the Unity Network.

Viewing in-unit patients experiencing an alarm condition

When an in-unit patient experiences an alarm condition, you can quickly display this patient's data by displaying the single patient viewer.

You can use one of the following methods to display the single patient viewer of an alarming patient bed:

- Click in the patient window.
- Click the alarm button.

The CIC Pro center can display an alarm button for a maximum of four patients. This row of alarm buttons display across the top of the multi-patient viewer and show the unit name, bed number, and the cause of the alarm.

The color of the alarm button indicates the severity of the patient alarm condition. Red indicates a ***Crisis*** alarm condition, yellow indicates a ***Warning*** alarm condition, and white indicates an ***Advisory*** alarm condition.

Another name for this row of alarm buttons is the Alarm Display Unit (ADU) line.

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Alarm buttons, also known as Alarm Display Unit (ADU) line

Viewing patient beds from another in-unit CIC Pro center

When you have more than one CIC Pro center in your care unit, you can view (monitor) a patient bed from another in-unit CIC Pro center.

Complete the following procedure to view (monitor) in-unit patient beds from another in-unit CIC Pro center:

1. Go to the CIC Pro center in your care unit that has room to view additional admitted patient beds.
2. From the multi-patient viewer, right click in an empty patient window displaying an ***Admit*** button. The right click menu displays.
3. From the right click menu, choose ***Select Care Unit then Bed Number***. A list of networked care units displays.
4. From the list, choose the care unit and bed name you want to view. The patient bed is displayed in the multi-patient viewer.

Out-of-unit patient beds

You can view out-of unit patient beds that are not displayed at your CIC Pro center. The bed you wish to view must be on the Unity Network.

NOTE

You cannot change the ***Alarm Control*** or parameter control settings of an out-of-unit patient.

Viewing an out-of-unit patient bed

Complete the following procedure to view networked out-of-unit patient beds:

1. From the multi-patient viewer, click ***View Other***. A list of networked care units, floors, or hospitals displays.
2. Click the + sign next to the desired unit, floor, or hospital to display the list of viewable beds.
3. Select the bed you want to view and click ***OK***. The single patient viewer displays for this patient. The patient bed is displayed in the multi-patient viewer and the single patient viewer also displays for this patient.
4. To close the single patient viewer, click the  (close button) on the top right side of the window.

Removing viewed out-of-unit patient beds

Complete the following steps to remove out-of-unit patient beds you are viewing from the multi-patient viewer:

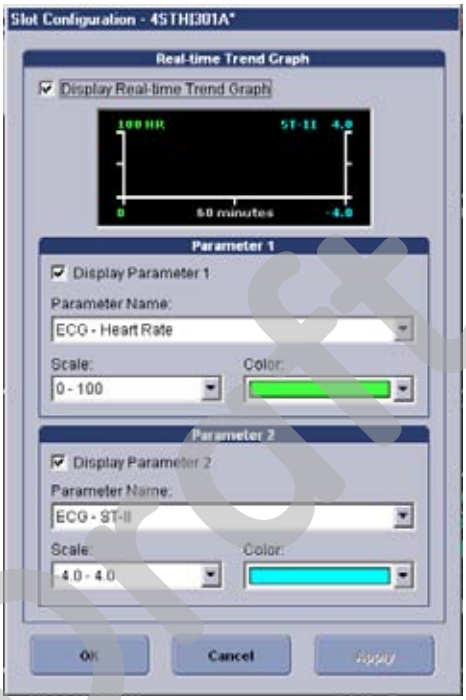
1. From the multi-patient viewer, right click on the patient bed you want to remove.
2. From the right click menu, choose ***Select Care Unit then Bed Number*** > ***None***.

Configuring the real-time trend window

You can configure the display of a real-time trend window in the multi-patient viewer. The real-time trend window displays the recent patient trends for a maximum of two parameters.

Complete the following procedure to configure a patient's real-time trend window:

1. Choose one of the following methods to access the ***Real-time Trend Graph*** configuration window from the multi-patient viewer:
   - Right-click on the patient you want to configure and select ***Configuration***. The ***Real-time Trend Graph*** window displays.
   - Click on the patient you want to configure. The single patient viewer displays. From the single patient viewer, click ***Real-time View*** to display the real-time window.
2. Click ***Configuration*** to display the ***Real-time Trend Graph*** window.



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3. Change any of the undimmed setting options.

***Real-time Trend Graph* control settings**	
Option	**Function**
Display Real-time Trend Graph	Display a real-time trend window with a maximum of two real-time parameter trends. To display the ***Real-time Trend Graph***, click in the empty check box to fill the box with a check mark.
Display Parameter 1	Display the first real-time parameter trend. To display one real-time parameter trend, click in the empty check box to fill the box with a check mark. Then, click the down arrow to set the display properties: ■ ***Parameter Name***: Set the displayed parameter. ■ ***Scale***: Set the size of the displayed waveform trend. ■ ***Color***: Set the color of the displayed parameter text and waveform trend.
Display Parameter 2	Display the second real-time parameter trend. To display a second real-time parameter trend, click in the empty check box to fill the box with a check mark. Then, click the down arrow to set the display properties: ■ ***Parameter Name***: Set the displayed parameter. ■ ***Scale***: Set the size of the displayed waveform trend. ■ ***Color***: Set the color of the displayed parameter text and waveform trend.

4. After making your selections, complete one of the following tasks:

   - Click ***OK*** to apply your changes and close the window.
   - Click ***Cancel*** to cancel your changes and close the window.
   - Click ***Apply*** to apply your changes without closing the window.

See Viewing stored patient data on page 8-1.

Printing real-time data

While viewing the in-unit real-time patient data from the multi-patient viewer, you can manually print a continuous ECG strip for a single patient bed or print the parameter limits and waveforms for all displayed patient beds.

Printing a continuous ECG strip

From the multi-patient viewer, you can click in the ECG parameter window of any displayed in-unit patient bed to print a continuous ECG strip. A print icon appears as you position the cursor over the ECG parameter window.

NOTE

When using a digital writer, click in the ECG parameter window of any displayed in-unit patient bed.

Then, press the  (**Graph Stop)** button on the front of the digital writer to stop printing a continuous ECG strip.

NOTE

The printing formats are controlled by the data source device (monitor or telemetry system). This includes printed waveforms, speed, and graph location. See the operating instructions for the devices you are using.

Printing parameter limits or waveforms for all in-unit patient beds

You can print the parameter waveform data for all in-unit patients displayed at a CIC Pro center by using the ***Graph All*** function. In addition, you can also print the parameter limits for telemetry beds.

Selecting the ***Graph All*** function results in printing a 10-second graph for each admitted telemetry bed and a 20-second graph for hard-wired beds. The graph speed of a telemetry graph is 25 millimeters per second and the graph speed of a hard-wired graph is determined by the monitor.

NOTE

Close any open single patient viewer windows before selecting the ***Graph All*** function. Otherwise, only the single patient viewer data prints.

The following conditions apply when using the ***Graph All*** function:

- When you press the  (**Graph Stop)** button on the local digital writer, the current patient's graph stops and the writer begins to print a 10-second graph for the next patient.
- When a patient's data is currently graphing or is being saved to graph when a ***Graph All*** function request is started, this patient's data is not included in the ***Graph All Patients*** graph. This patient's data graphs independently of the ***Graph All Patients*** graph.
- When you click in the ECG parameter window of a patient whose data is saving, this cancels the ***Graph All Patients*** request for that patient.
- When an arrhythmia alarm sounds for a patient while a ***Graph All Patients*** request is running, the alarm data replaces the data that was saved for the ***Graph All Patients*** request.
- When a telemetry patient initiates a graph from a transmitter while a ***Graph All Patients*** request is running, the ***Graph All Patients*** graph for that patient is replaced by a transmitter graph.

Complete the following procedures to print parameter limits or waveforms for all patient beds displayed in the multi-patient viewer:

Printing limits

NOTE

The ***Limits*** option only prints parameter limits for telemetry beds.

Complete the following procedure to print telemetry bed parameter limits:

1. From the multi-patient viewer, click ***Graph All***. The ***Graph All Patients*** window displays.
2. From the ***Graph All Patients*** window, click ***Limits***.
3. Click ***OK*** to begin printing.

Printing waveforms

Complete the following procedure to print parameter waveforms for all displayed patient beds:

1. From the multi-patient viewer, click ***Graph All***. The ***Graph All Patients*** window displays.
2. From the ***Graph All Patients*** window, click ***Waveforms***.
3. Click ***OK*** to begin printing.

Stopping a print job

You must stop a print job from the same CIC Pro center you used to send the print job to the printer.

Stop printing to a laser printer

Complete the following procedure to stop printing all print jobs sent to the laser printer:

1. From the multi-patient viewer, click ***CIC Setup*** > ***CIC Defaults***. The ***CIC Defaults*** window displays.
2. Under ***Printer/Writer***, click ***Cancel Print Jobs*** for the printer you want to stop printing to.
3. After making your selection, complete one of the following tasks from the ***CIC Defaults*** window:
   - Click ***OK*** to apply your changes and close the ***CIC Defaults*** window.
   - Click ***Cancel*** to cancel your changes and close the ***CIC Defaults*** window.
   - Click ***Apply*** to apply your changes without closing the ***CIC Defaults*** window.

Stop printing to a local digital writer

Complete the following procedure to stop printing all print jobs sent to a local digital writer:

1. Locate the digital writer.
2. Press the  (**Graph Stop**) button located on the front of the digital writer to stop the print job.

Monitored parameters

The CIC Pro center can display data for many monitoring parameters.

NOTE

For a complete list of supported parameters, refer to the CIC Pro Clinical Information Center Operator's Manual.

Adjusting parameter control settings

The following guidelines apply to adjusting parameter control settings at the CIC Pro center:

- You may view and adjust parameter settings for any in-unit patient. Any changes are temporary and return to the default settings when a patient is discharged. These changes are also adopted by the monitor.
- You may not be able to adjust some of the control settings for non-GE acquisition devices that are interfaced via the Unity Network Interface Device.
- You may view parameter settings for any out-of-unit patient. However, you cannot adjust these settings.
- To permanently change the parameter default settings, see the CIC Pro Clinical Information Center Bedrock Hardware Platform Service Manual.

This section briefly covers adjusting control settings for the following parameters:

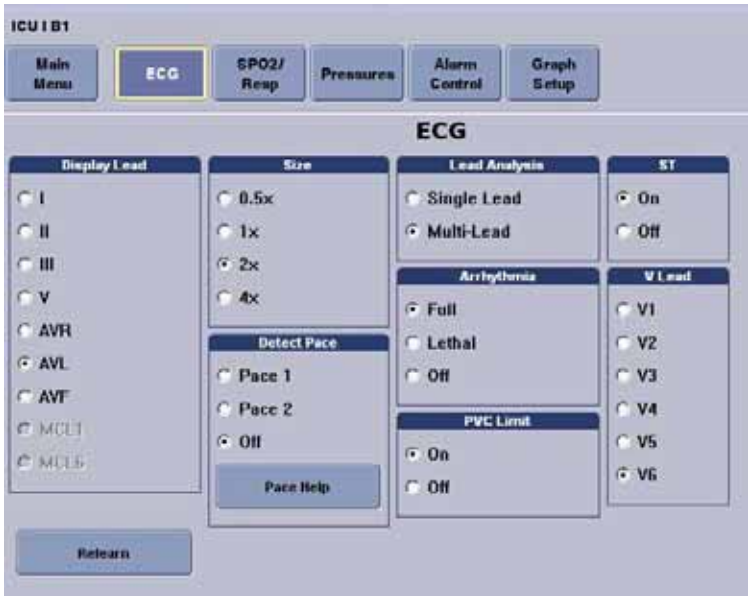
- ECG
- SpO_2
- Non-invasive pressures
- Invasive pressures

ECG

ECG control settings

Complete the following procedure to adjust the control settings.

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Monitor Setup***.
3. Click ***ECG*** to display the control window.
4. Change any of the undimmed setting options. When an option appears dimmed, you cannot change it unless you enter the service-level password.



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ECG control settings	
Option	**Function**
Display Lead	Set the top or first lead displayed on the monitor and on the CIC Pro center. This is the lead data that prints during an alarm or manual graph.
Relearn button	Relearn the selected patient's ECG rhythm after changes occur to heart rate or rhythm. The CIC Pro center uses 14 current complexes to relearn the patient's ECG pattern. Remove the ***V Fail*** message or activate the second V-lead when changing between a 5-and 6-leadwire set on the transmitter. **NOTE** The heart rate value appears briefly as ***X***s during the relearn process and returns to numerics when the relearn is complete.
Size	Set the waveform size. ***1X*** is standard.
Detect Pace	Set the pacemaker detection mode: ■ ***Pace 1***: Alternate pacemaker detection mode when ***Pace 2*** does not adequately detect pacemaker spikes. ■ ***Pace 2***: Normal pacemaker detection mode. For more information, refer to Monitoring pacemaker patients on page 7-13.
Pace Help button	View solutions to common pacemaker detection problems.
Lead Analysis	Set the leads for ECG and arrhythmia data processing: ■ ***Single-Lead***: Use the top ***Display Lead***. ■ ***Multi-Lead***: Use leads I, II, III and V lead.

ECG control settings	
Option	**Function**
Arrhythmia	Set the arrhythmia detection level: ■ ***Full***: Detect all arrhythmia conditions defined by the software. ■ ***Lethal***: Detect lethal arrhythmia conditions. ■ ***Off***: Turn off arrhythmia detection. Arrhythmia detection remains off until you choose ***Full*** or ***Lethal***, or the patient is discharged. **NOTE** ***OFF*** appears dimmed and is not selectable when the following option is set: ***CIC Setup*** > ***CIC Defaults*** > ***Allow Alarms OFF on this CIC*** > ***No***. The ***Allow Alarms OFF on this CIC*** setting is a service-level default and is protected by the ***Service Password***.
PVC Limit	Turn ***On*** to count PVCs per minute. A PVC counter appears in the ECG parameter window. **NOTE** To display the PVC counter, the ***Arrhythmia*** detection level must be set to ***Full***.
ST	Turn ***On*** to display, store, and enable ST alarms.
V Lead	Label the ***V Lead*** position.

5. After making your selections, complete one of the following tasks:
   - Click a different ***Monitor Setup*** option to apply your changes without closing the ***Monitor Setup*** window.
   - Click the  (close button) on the top right side of the window to apply your changes and close the ***Monitor Setup*** window.

Monitoring pacemaker patients

Be aware of the following when monitoring a patient with a pacemaker.

WARNING
FALSE CALLS—False low heart rate indicators or false asystole calls may result with certain pacemakers because of electrical overshoot.

WARNING
MONITORING PACEMAKER PATIENTS—Monitoring of pacemaker patients can only occur with the pace program activated.

WARNING
PACEMAKER SPIKE—An artificial pacemaker spike is displayed in place of the actual pacemaker spike. All pacemaker spikes appear uniform. Do not diagnostically interpret pacemaker spike size and shape.

WARNING
PATIENT HAZARD—A pacemaker pulse can be counted as a QRS during asystole in either pace mode. Keep pacemaker patients under close observation.

WARNING
RATE METERS—Keep pacemaker patients under close observation. Rate meters may continue to count the pacemaker rate during cardiac arrest and some arrhythmias. Therefore, do not rely entirely on rate meter alarms.

CAUTION
FDA POSTMARKET SAFETY ALERT—The United States FDA Center for Devices and Radiological Health issued a safety bulletin October 14, 1998. This bulletin states “that minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic equipment, causing the pacemakers to pace at their maximum programmed rate.”

The FDA further recommends precautions to take into consideration for patients with these types of pacemakers. These precautions include disabling the rate responsive mode and enabling an alternate pace mode. For more information contact:

Office of Surveillance and Biometrics, CDRH, FDA
1350 Piccard Drive, Mail Stop HFZ-510
Rockville, MD 20850
U.S.A.

NOTE

ECG monitoring with patients on non-invasive transcutaneous pacemakers may not be possible due to large amounts of energy produced by these devices. Monitoring ECG with an external device may be needed.

The ***Detect Pace*** option enables/disables the pacemaker detection program. It must be used whenever the monitored patient has a pacemaker.

There are two pacemaker processing modes, ***Pace 1*** and ***Pace 2***. The modes use different algorithms for pacemaker artifact rejection. The clinician must be the judge as to which mode is better for each patient. The pacemaker detection program defaults ***OFF***, so if you have a patient with a pacemaker, you will have to select a mode. For more information, refer to ECG control settings on page 7-11.

The ***Pace 1*** mode allows successful detection of the largest variety of paced QRS morphologies. As a direct consequence, this mode does have a higher risk of counting pacemaker artifact as QRS complexes during ***ASYSTOLE***. For this reason, it is imperative that the user keep patients with pacemakers under close observation. It is also recommended that the user set the low heart rate limit on the monitor close to the minimum pacing rate, and that the ***BRADY*** arrhythmia alarm level be elevated to a ***Warning*** or ***Crisis*** level.

The ***Pace 2*** mode is much more conservative in recognizing paced QRS morphologies and is recommended for use whenever possible. It is designed to minimize the possibility of counting pacemaker artifact as QRS complexes during ***ASYSTOLE***. If the monitor does not adequately detect paced beats in the ***Pace 2*** mode, then the user may wish to try the ***Pace 1*** mode.

When either pace mode is enabled, the software places an artificial spike on the waveform whenever the pacemaker triggers. When pacemaker detection is on, it is indicated by a ***"P"*** in the patient's ECG parameter window.

For successful monitoring of pacemaker patients follow these suggestions:

- Use recommended electrode placement.
- ***Brady***, ***Pause***, and Low Heart Rate are additional alarms available for use when monitoring pacemaker patients.
- Problems you may experience are:
  - heart rate double counting;
  - inaccurate alarms for low heart rate or asystole;
  - pacemaker spikes not recognized by the software.
- Possible solutions to above problems are:
  - relearn arrhythmia;
  - try an alternate electrode placement;
  - try ***Single-Lead*** analysis;
  - try switching to the other pace detection mode.

Multi-vector pace detection

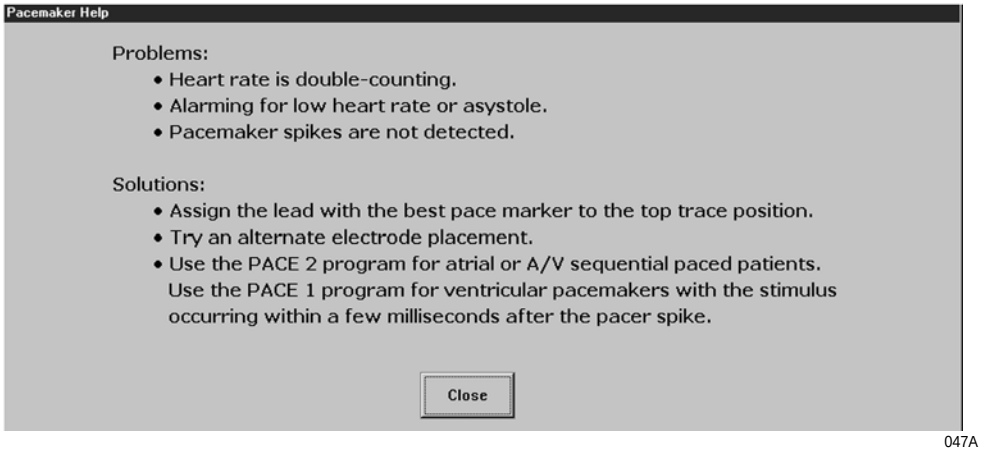
The T14 transmitter uses multi-vector pace detection. Here are some additional guidelines for successful monitoring pacemaker patients when using the T14 transmitter.

- When using the 5- or 6-leadwire set with all the electrodes attached, pace detection occurs on two ECG leads simultaneously.
- The default leads used for detection are II and V. If these leads are not available, multi-vector pace detection switches to available leads.
- Pace detection switches to ***Single-Lead*** when using a 3-leadwire set.

For more information, refer to "Pacemaker troubleshooting" on page D-3.

Pace help

Clicking on the ***Pace Help*** button opens a window that shows common problems and solutions in regard to pacemaker detection. This window is shown below.



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Lead analysis

The ***Lead Analysis*** control signals the transmitter to process the ECG in ***Single-Lead*** or ***Multi-Lead*** mode. Use the mouse to click on your selection. ***Multi-Lead*** analysis is the default setting for ***Adult***.

NOTE

ECG is relearned whenever ***Lead Analysis*** is changed.

Multi-Lead analysis

Multi-Lead analysis simultaneously examines ECG leads I, II, III, and V (whether they are displayed or not) to help eliminate false alarms and improve the ability of the system to:

- Detect beats which occur isoelectric to a single chest lead.
- Discriminate artifact that appears in one lead compared to the other lead vectors.
- Provide a smart-lead fail feature, where the failed lead is identified, and if available, another lead is provided for display.
- Continue arrhythmia processing even after a lead change.

Single-Lead analysis

Single-Lead analysis uses only the lead displayed on the CIC Pro center screen to process ECG and arrhythmia information. To change the lead used for ***Single-Lead*** analysis, you must change the displayed lead.

Single-Lead ECG may be acquired using a 3-, 5-, or 6-leadwire set. However, only a ***Single-Lead*** ECG is transmitted or processed.

Single-Lead analysis is beneficial when troubleshooting pacemaker detection and/or arrhythmia detection. ***Single-Lead*** analysis must always be used when monitoring with a 3-leadwire set. ***Single-Lead*** analysis can be set up as a unit default. Refer to Customizing the system on page 4-4 for more information.

Single-Lead ECG telemetry data

NOTE

When acquiring ***Single-Lead*** ECG data using a 5- or 6-leadwire set, it is *not* necessary to connect the V leads or the right leg lead to the transmitter or to the patient.

The following constraints apply when using ***Single-Lead*** ECG telemetry data.

Function	***Single-Lead* Constraints**
change the displayed lead	■ The factory default ***Display Lead*** is lead II. ■ Contact your local service representative to change the default displayed lead. ■ ***Display Lead*** appears to be selectable at the CIC Pro center. However, your selection is temporary and will revert back to the transmitter's default displayed lead. **NOTE** When the clinical situation dictates monitoring a lead other than the default lead, you can move the leads and/or electrodes to view a different lead. Be aware that the label on the display and on the printout will show the default lead label.
Lead Analysis	■ ***Multi-Lead*** analysis may appear to be selectable at the CIC Pro center. However, your selection is temporary and will revert back to the ***Single-Lead*** analysis mode.
select a V lead	■ V leads may appear to be selectable at the CIC Pro center. However, your selection does not change the transmitter's default displayed lead.
select displayed leads from a single viewer	■ Leads other than the default displayed lead may appear to be selectable at the CIC Pro center. However, your selection is temporary and will revert back to the transmitter's default displayed lead.
select graph waveforms	■ Leads other than the default displayed lead may appear to be selectable at the CIC Pro center. However, you must select the transmitter's default displayed lead to obtain a graph of the waveform.

Arrhythmia

WARNING
INCORRECT ALGORITHMS, ARRHYTHMIA PROCESSING AND CALCULATIONS BASED ON PATIENT AGE — After manually updating or automatically retrieving patient demographic information from a network database, *always* confirm that the entered patient's date of birth matches the patient's actual date of birth. Otherwise the appropriate age-related algorithms, arrhythmia detection, and calculations will not be applied.

WARNING

SUSPENDED ANALYSIS—Certain conditions suspend arrhythmia analysis. When suspended, arrhythmia conditions are not detected and alarms associated with arrhythmias do not occur. The messages which alert you to the conditions causing suspended arrhythmia analysis are: ***ALL ALARMS OFF, ALARM PAUSE, ARR OFF, ARR SUSPEND, DISCHARGED, LEADS FAIL,*** and ***NO TELEM.*** Additionally, the alarms off with reason options and disabling the ***Alarm Pause Breakthrough*** feature also suspend arrhythmia analysis.

WARNING

VENTRICULAR ARRHYTHMIAS—The arrhythmia analysis program is intended to detect ventricular arrhythmias. It is not designed to detect atrial or supraventricular arrhythmias, with the exception of atrial fibrillation. Occasionally it may incorrectly identify the presence or absence of an arrhythmia. Therefore, a physician must analyze the arrhythmia information in conjunction with other clinical findings.

The arrhythmia control signals the CIC Pro center to ignore or accept arrhythmia calls. To modify arrhythmia settings, use the mouse to click on ***Full, Lethal,*** or ***Off***.

NOTE

Full arrhythmia processing is suspended when the level 1 ***ARTIFACT*** message is displayed. Lethal arrhythmia is still active but its accuracy may be hindered by the artifact.

NOTE

When arrhythmia program is in ***Full*** mode, the program counts the number of PVCs that occur within a minute.

Turning arrhythmia on automatically starts a relearn procedure.

When arrhythmia is turned off, ***ARR OFF*** appears in the ECG parameter window.

No arrhythmia detection with 7015 software level patient monitors

If an ApexPro system patient is admitted to a patient monitor at the 7015 software level (ECG source is telemetry, not the monitor), the following scenario may occur when monitoring in ***Combo*** or ***Rover Combo*** monitoring modes:

- Since the 7015 software level does not support arrhythmia processing, arrhythmia detection for the telemetry patient is reduced from full arrhythmia detection to no arrhythmia detection (arrhythmia OFF). This occurs because the software is designed to take on the attributes of the bedside monitor when in ***Combo*** or ***Rover Combo*** monitoring modes.

CAUTION
Under these conditions, arrhythmia detection is OFF. There is NO INDICATION of this at the bedside monitor, central station or CIC Pro center.

- If the patient is later discharged from the monitor, and monitoring continues from telemetry, the message ***ARR OFF*** will then appear at the central station or CIC Pro center. Arrhythmia monitoring remains OFF.

  NOTE

  Solar 7000 monitors, Solar 8000 monitors, Dash monitors, and Eagle monitors may include the 7015 software level.

Full arrhythmia conditions

The following is an alphabetical list of the ***Arrhythmia*** messages that are displayed when full arrhythmia is selected and the condition occurs. Definitions of each condition are included. The CIC Pro center's response to each condition is determined by the alarm level to which the arrhythmia has been assigned.

ACC VENT	■ **Adult**—Accelerated ventricular occurs when six or more ventricular beats are detected with an average heart rate for the ventricular beat between 50 and 100 beats per minute. ■ **0-2 years**—Occurs when six or more ventricular beats are detected with an average heart rate for the ventricular beat between 60 and 160 beats per minute. ■ **3-10 years**—Occurs when six or more ventricular beats are detected with an average heart rate for the ventricular beat between 60 and 140 beats per minute. ■ **11-13 years**—Occurs when six or more ventricular beats are detected with an average heart rate for the ventricular beat between 60 and 130 beats per minute.
Atrial FIB	Atrial fibrillation identification occurs when random. chaotic, low-amplitude deflections of the supraventricular component of the ECG waveform. This results in irregular timing of QRS complexes and the absence of uniform P waves proceeding the QRS complex. **NOTE** AFIB alarms can take up to 90 seconds to display while the algorithm verifies the event.
ASYSTOLE	Ventricular asystole occurs whenever the displayed heart rate drops to zero.
BIGEMINY	Occurs when three or more bigeminal cycles (a ventricular beat followed by a non-ventricular beat) are detected.
BRADY	Bradycardia is the average of the most recent eight R-to-R intervals at a heart rate less than the set LOW heart rate limit. **NOTE** The Brady limit matches the low heart rate limit. If the low heart rate limit is changed, the Brady limit changes.
COUPLET	Occurs when two ventricular beats are detected and have non-ventricular beats before and after the couplet. The coupling interval must be less than 600 milliseconds.

IRREGULAR	Occurs when six consecutive normal R-to-R intervals vary by 100 milliseconds or more.
PAUSE	Occurs when a 3-second interval without a QRS complex is detected. **NOTE** Some bedside monitors allow the ***Pause*** time interval to be adjusted. For more information, refer to the appropriate bedside monitor's operator's manual.
PVC	Isolated premature ventricular complexes occur when a premature ventricular beat is detected and has non-ventricular beats before and after.
PVC limit	When on, the PVC Limit control displays a PVC counter in the ECG parameter window. When off, the PVC counter is not displayed. Use the mouse to turn the PVC Limit control ***On*** or ***Off***. The PVC limits are preset in ***Alarm Control*** defaults.
R ON T	Occurs when a ventricular complex is detected within the repolarization period of a non-ventricular beat.
TACHY	Tachycardia is four R-to-R intervals at a heart rate greater than the set HIGH heart rate limit. **NOTE** The Tachy limit matches the high heart rate limit. If the high heart rate limit is changed, the Tachy limit changes.
TRIGEMINY	Occurs when three or more trigeminal cycles (a ventricular beat followed by two non-ventricular beats) are detected.
V BRADY	**Adult**—Ventricular bradycardia occurs when a run of three or more ventricular beats is detected with an average heart rate that is less than or equal to 50 beats per minute. **0-2, 3-10, and 11-13 years**—Occurs when a run of three or more ventricular beats is detected with an average heart rate that is less than or equal to 60 beats per minute.
VFIB/ VTAC	Ventricular fibrillation occurs when the ECG waveform indicates a chaotic ventricular rhythm. **WARNING** ***VFIB/VTAC*** should not be considered a substitute for the ***V TACH*** arrhythmia call. Efforts to lower the ***V TACH*** alarm level can result in missed ventricular tachycardia alarms.

V TACH	■ **Adult**—Ventricular tachycardia occurs when a run of six or more ventricular beats is detected with an average heart rate greater than or equal to 100 beats per minute. ■ **0-2 years**—Occurs when a run of six or more ventricular beats is detected with an average heart rate greater than or equal to 160 beats per minute. ■ **3-10 years**—Occurs when a run of six or more ventricular beats is detected with an average heart rate greater than or equal to 140 beats per minute. ■ **11-13 years**—Occurs when a run of six or more ventricular beats is detected with an average heart rate greater than or equal to 130 beats per minute.
VT > 2	■ **Adult**—Ventricular tachycardia >2 occurs when a run of ventricular beats is detected with a duration of less than six beats but longer than two beats and with an average heart rate that is greater than or equal to 100 beats per minute. ■ **0-2 years**—Occurs when a run of ventricular beats is detected with a duration of less than six beats but longer than two beats and with an average heart rate that is greater than or equal to 160 beats per minute. ■ **3-10 years**—Occurs when a run of ventricular beats is detected with a duration of less than six beats but longer than two beats and with an average heart rate that is greater than or equal to 140 beats per minute. ■ **11-13 years**—Occurs when a run of ventricular beats is detected with a duration of less than six beats but longer than two beats and with an average heart rate that is greater than or equal to 130 beats per minute.

Lethal arrhythmia conditions

When ***Lethal*** arrhythmia is selected, the following conditions (as defined for ***Full*** arrhythmia) are detected:

- ***ASYSTOLE***
- ***VFIB/VTAC***
- ***V TACH*** (defaults to the ***Crisis*** level, but can be moved to a different level)
- ***BRADY*** (if the ***Patient Age*** range selected is ***0-2 years*** or ***3-10 years***)

AFIB identification

NOTE

AFIB trending is only available when the bedside monitor supports this feature. If your bedside monitor does not support AFIB trending, this feature is not available. Contact your sales/service representative for more information.

Atrial fibrillation (AFIB) is characterized by random, chaotic, low-amplitude deflections of the supraventricular component of the ECG waveform, resulting in irregular timing of QRS complexes and an absence of uniform P waves preceding the QRS complex.

The AFIB algorithm feature identifies atrial fibrillation arrhythmias for the transmitter. When an AFIB event is detected, the ***ATRIAL FIB*** alarm text replaces the ***IRREGULAR*** arrhythmia alarm text.

AFIB event patient data is stored for review in the ***Graphic Trends*** and ***Vital Signs*** tab sheets.

Alarms

A patient status alarm is triggered when an AFIB arrhythmia is detected. The message ***ATRIAL FIB*** is displayed in the message area of the display.

NOTE

There is approximately a 90 second delay while the AFIB algorithm verifies the AFIB arrhythmia condition.

The AFIB alarm defaults to a ***Message*** alarm level but can be changed under ***Arrhythmia Alarm Level***, in the ***Telemetry Alarm Control Defaults*** tab sheet on the CIC Pro center. How the monitor responds to each condition is determined by the alarm level to which the AFIB arrhythmia detection has been assigned. When set for ***Advisory*** or greater, AFIB alarms will be recorded and displayed in the alarm area on the CIC Pro center.

NOTE

AFIB alarms can only be adjusted at the CIC Pro center. If AFIB is not available/ enabled at a bedside monitor in ***Combo*** mode, you will not be able to immediately adjust the alarm. You must discharge the patient from the bedside monitor, adjust the alarm setting at the CIC Pro center and then admit the patient at the bedside monitor.

ST analysis

The patient's most dominant, normal beat is used for ST measurement. This beat is identified by the arrhythmia analysis program. Turn ST ***ON*** to display the numerics calculated for ST at the CIC Pro center.

GE identifies the ST segment of the QRS complex as beginning at the J point and ending 60 milliseconds following the J point in ***Adult*** mode. The ST measurement factory defaults are:

- ***Adult***— J+ 60ms
- ***0–2 years***— J+ 30ms
- ***3–10 years***— J+ 40ms
- ***11–13 years***— J+ 50ms

The ST numeric displayed (millimeters) indicates either a positive or negative elevation in relation to the isoelectric reference point (which is also determined by the arrhythmia program and the patient's age).

When ST is on, numerics are displayed under each ECG lead label on the screen. (A negative deflection is preceded by a minus sign.) These numerics are updated about every 15 seconds.

The ST value shown in the ECG parameter window is the lead with the greatest ST deviation. This may or may not be the lead that is in alarm, since a lead with a lesser deviation from the isoelectric line may have changed more than the lead with the greatest deviation.

NOTE

ST numerics are always calculated with reference to 1X size. Displaying the ECG waveform at a different size does *not* affect the ST values.

NOTE

When a new dominant beat is detected or a relearn occurs, the arrhythmia program calculates ST based on the new beat. This could affect the ST values displayed. This may not necessarily represent a change in the patient's condition. The clinician needs to assess the patient any time there is an ST change.

NOTE

Adjustable ST alarms are only available when using a CIC Pro center running software version 5 or later. If your CIC Pro center is running an earlier version of software, this feature is not available. Contact your sales/service representative for more information.

ST deviation alarm

When any individual ST value is beyond the limit, an ST deviation alarm occurs. It is considered a parameter alarm, and the default alarm level is ***Warning***. This can be modified in the parameter alarm level setup.

- When the ST program is turned on, or a relearn is done with ST on, the ST deviation values are set for all leads of ST.
- The current ST value is determined in all eight leads.
- The ST value in the ECG parameter window turns red to indicate an alarm.
- ST limits can also be adjusted individually in the patient's ***Alarm Control*** tab.

NOTE

ST limits can also be adjusted at the CIC Pro center from ***Monitor Setup*** > ***ECG***.

Adjusting ST limits

ST alarm limits and levels for telemetry patients are typically controlled by the default ST alarm levels from the CIC Pro center. Some bedside monitors allow users to adjust ST alarm limits and levels at the bedside when the patient is admitted in combination monitoring mode. For more information on adjusting ST limits, refer to the bedside monitor operator's manual.

SpO2

Introduction

NOTE

SpO2 and SPO2 are used interchangeably throughout this manual to refer to pulse oximetry.

The transmitter supports the Apex oximeter and the Xpod oximeter. Unless specified, oximeter refers to both units.

The Xpod oximeter connects to the transmitter and provides the following oximetry vital signs for display at the CIC Pro center:

- arterial oxygen saturation (SpO2)
- peripheral pulse rate (PPR)
- perfusion quality indicator

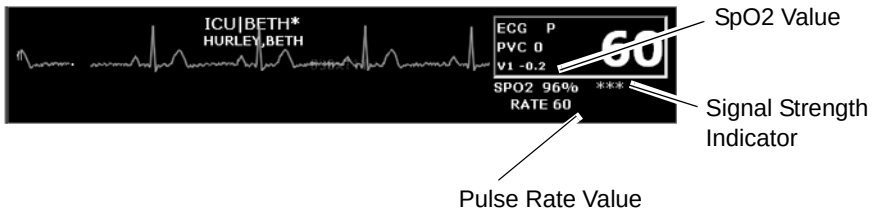
The Apex oximeter functions as a stand-alone device, and displays digital values for SpO2 and pulse rate. When the Apex oximeter is connected to the transmitter, digital values for SpO2 and pulse rate are also displayed at the CIC Pro center.

NOTE

When monitoring SpO2 using an transmitter, an SpO2 waveform is neither generated nor displayed on the Apex oximeter or CIC Pro center. Additionally, no alarm histories are generated or stored.

SpO2 in the multi-patient viewer

In the multi-patient viewer, the bed window for a telemetry patient being monitored for SpO2 displays the current SpO2 value; one, two, or three asterisks indicating signal strength; and, if turned on, the derived pulse rate for the patient. Below is an example of a telemetry patient's bed window in the multi-patient viewer.



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SpO_2 control settings

Complete the following procedure to adjust the control settings.

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Monitor Setup***.

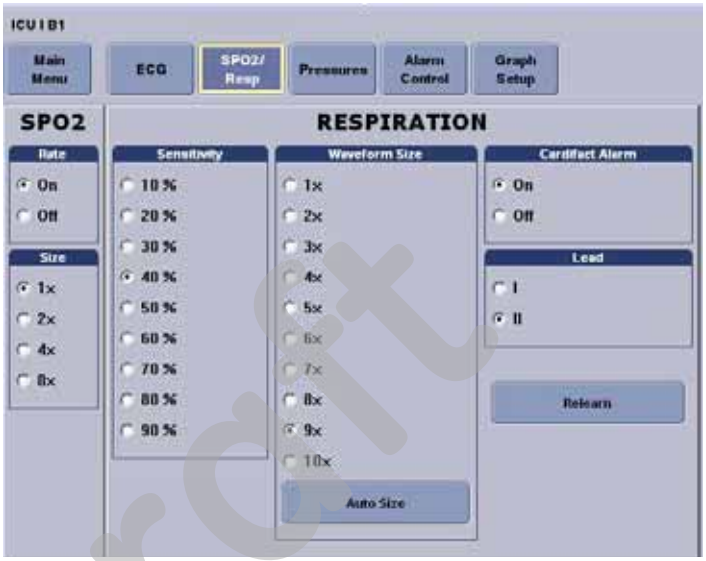
3. Click ***SPO2/Resp*** to display the control window.

NOTE

The SpO2 tab is labeled ***SpO2/Respiration*** because respiration monitoring settings are available on this tab sheet for bedside monitored patients only.

Respiration monitoring is not an option for telemetry patients. Therefore only SpO2 information appears on this tab sheet when monitoring a telemetry patient.

4. Change any of the undimmed setting options.



064A

SpO2 control settings	
Option	**Function**
Rate	Turn ***On*** to display the SpO_2 heart rate.
Size	Set the waveform size. No waveform is displayed for telemetry patients. This option will appear dimmed.

5. After making your selections, complete one of the following tasks:

- Click a different ***Monitor Setup*** option to apply your changes without closing the ***Monitor Setup*** window.
- Click the  (close button) on the top right side of the window to apply your changes and close the ***Monitor Setup*** window.

SpO2 probe safety

Be sure to read all literature accompanying probes for specific safety information. Be aware of the following safety precautions when using SpO2 probes.

WARNING
DATA VALIDITY—Do not expose probe detector to strong ambient light while monitoring a patient. A poor signal may result.

Do not allow tape to block the probe light detector.

WARNING
PATIENT SAFETY—Prolonged monitoring may require changing the probe site periodically. Move the probe if there is any sign of skin irritation or impaired circulation. Change the probe site AT LEAST every four hours to prevent ischemic skin necrosis. If required, reduce the application periods to HALF the times recommended above.

If a probe is damaged in any way, discontinue use immediately.

CAUTION
Use only Nonin SpO2 probes with the Apex oximeter and Xpod oximeter. The reliability of SpO2 data obtained with any other probe has not been verified.

Infants and pulse oximetry

WARNING
The display of inaccurate pulse oximetry (SpO2) values has been linked to the presence of poor signal strength or artifact due to patient motion during signal analysis. This condition is most likely to be encountered when the equipment is used on infants. These same conditions in adults do not impact the SpO2 values to the same extent.

When using pulse oximetry on infants, *always* observe the following precautions.

Precautions

We recommend the application of the following criteria when using the pulse oximetry function on infants:

1. The peripheral pulse rate (PPR) as determined by the SpO2 function must be within 10% of the heart rate, and
2. the SpO2 signal strength indicator must have 2 or 3 asterisks displayed, and
3. stable SpO2 values are displayed for six seconds.

Procedures or devices previously applied in your facility for SpO2 monitoring should be used in the event that the SpO2 value from the equipment cannot be validated by the above criteria.

CAUTION
Do not use the Apex oximeter on neonatal patients. It is not designed for use on neonates.

Signal and data validity

It is extremely important to determine that the probe is attached to the patient correctly and the data is verifiable. To make this determination, the signal strength indicators on the Apex oximeter and the CIC Pro center are of assistance.

Signal strength indicator

A signal strength (perfusion) indicator is displayed on the Apex oximeter display and at the CIC Pro center in the appropriate patient window.

On the Apex oximeter, this indicator is a perfusion LED that blinks with each SpO2 pulse detected. The LED blinks green for each acceptable strength pulse. It blinks yellow for SpO2 signals of marginal quality, and blinks red when the SpO2 signal is too weak or the quality is very poor. When the perfusion LED blinks red, the numeric data displayed on the Apex oximeter will be replaced by dashes within 10 seconds.

At the CIC Pro center, the signal strength indicator consists of 0, 1, 2, or 3 (strongest) asterisks, depending on the strength of the signal.

Proper environmental conditions and probe attachment help ensure a strong signal.

WARNING
In the monitoring of patients the coincidence of adverse conditions may lead to a disturbed signal going unnoticed. In this situation artifacts are capable of simulating a plausible parameter reading, so that the monitor fails to sound an alarm. In order to ensure reliable patient monitoring, the proper application of the probe and the signal quality must be checked at regular intervals.

Error messages

If the probe is not correctly attached to the patient and data is not verifiable, one of the following error messages may appear in the patient's bed window at the CIC Pro center:

- ***SPO2 PROBE OFF***
- ***SPO2 PROBE***

If either of the above messages appears, check the position of the probe or replace the probe. If the problem persists, call GE Service or contact your sales/service representative.

Pressures

The Pressures tab sheet allows you to view and modify settings specific to the viewed telemetry patient's NBP display. Settings may be viewed for any patient. However, you can only modify settings for patients who are admitted to a bed in your unit.

NOTE

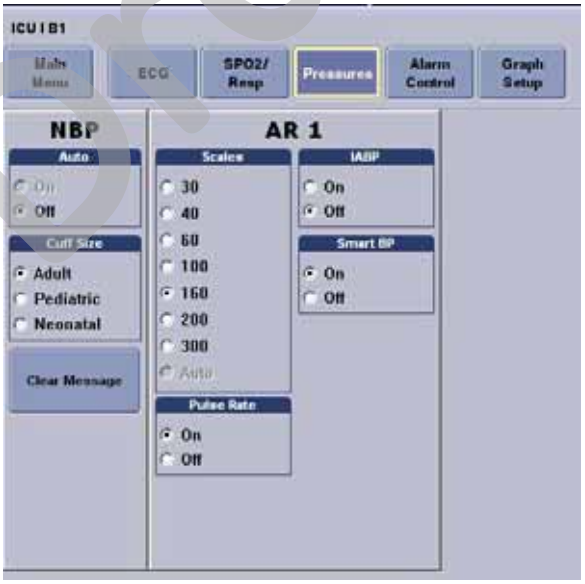
The NBP tab is labeled ***Pressures*** because other invasive pressures settings are available on this tab sheet for bedside monitored patients only.

Invasive pressure monitoring is not an option for telemetry patients. Therefore, only NBP information appears on this tab sheet when monitoring a telemetry patient.

Non-invasive blood pressure control settings

Complete the following procedure to adjust the control settings.

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Monitor Setup***.
3. Click ***Pressures*** to display the control window.
4. Change any of the undimmed setting options.



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Non-invasive blood pressure control settings	
Option	**Function**
Auto	Turn ***Off*** automatic NBP measurements. When turned ***On*** at the monitor, NBP measurements are acquired automatically at regular intervals. **NOTE** This option does not apply to telemetry beds and cannot be turned on from the CIC Pro center.
Cuff Size	Set the inflation pressure used during the first NBP measurement and for calculating the NBP pressure: **NOTE** For more information, refer to the appropriate bedside monitor's operator's manual.
Clear Message button	Clear the display of inflation messages and current NBP readings.

5. After making your selections, complete one of the following tasks:
   - Click a different ***Monitor Setup*** option to apply your changes without closing the ***Monitor Setup*** window.
   - Click the  (close button) on the top right side of the window to apply your changes and close the ***Monitor Setup*** window.

NBP monitoring with telemetry

NBP monitoring via telemetry is done with an Accutracker DX or Dinamap Pro blood pressure monitor connected to the transmitter. The blood pressure cuff is connected to the blood pressure monitor, which measures and displays systolic and diastolic blood pressures using the auscultatory method. When the blood pressure monitor is connected to an transmitter, digital values are also displayed at the CIC Pro center.

WARNING
The following conditions may affect the accuracy of noninvasive blood pressure readings: seizures, tremors, extreme hypotension or hypertension, arrhythmias, or extremely high or low heart rate.

Patient preparation

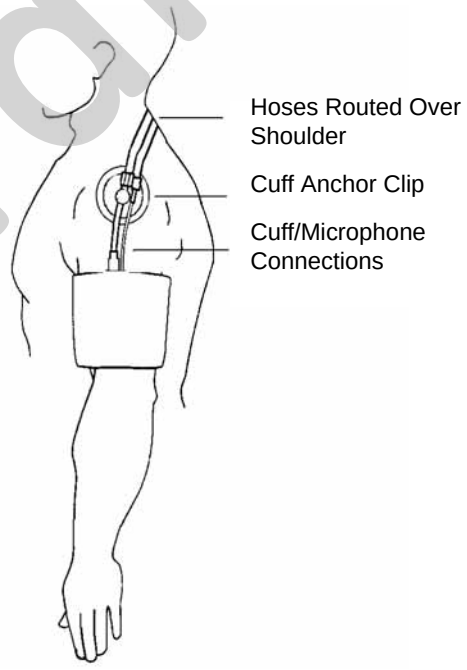
Blood pressure cuff selection and application are important. Inappropriate selection or improper application of the cuff will result in erroneous measurements.

Most people use their non-dominant arm for acquiring ambulatory noninvasive blood pressure readings.

Follow these steps to prepare the patient for NBP monitoring:

1. Place the K-sound microphone in the microphone pad (or blood pressure cuff). For more information on microphone placement, refer to Microphone placement on page 7-30.
2. Locate the patient's brachial artery on the inside of the arm, just above the elbow. Mark the location with a pen for easy microphone placement.
3. Remove the backing from the microphone pad and adhere it in the location marked on the patient's arm. Do not bend or squeeze the microphone. Route the microphone cable up, toward the patient's shoulder.
4. Wrap the blood pressure cuff around the arm. Be sure that the artery marker is aligned over the brachial artery.
5. Drape the cuff hose over the patient's shoulder and attach an adhesive cuff anchor to the snap on the cuff hose. Do not adhere the cuff anchor to the patient at this time.
6. Place the blood pressure monitor in its pouch and attach it to the patient using the belt or shoulder strap provided.
7. Adhere the cuff anchor to the patient's upper arm by removing the adhesive backing and pressing firmly.

When attached, the blood pressure cuff and hoses should be positioned like those in the following illustration.



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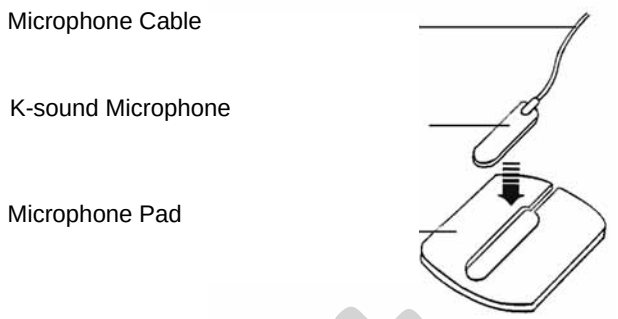
Microphone placement

A microphone is used to hear the Korotkoff sounds (K-sounds) that the blood pressure monitor uses to determine the systolic and diastolic pressure readings. The microphone can be placed in a microphone pad and adhered to the patient's arm under

the blood pressure cuff, or alternatively, it can be placed directly into the microphone pocket inside the blood pressure cuff.

Placement in the microphone pad

Using a microphone pad is recommended. Place the microphone in the pad as illustrated below. Do not bend or squeeze the microphone when placing it in the pad, or when adhering the pad to the patient's arm.



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Placement in the blood pressure cuff

As already stated, using the microphone pad is recommended, especially in the case of ambulatory patients or patients with weak K-sounds. However, as an alternative, the microphone can also be placed directly in the blood pressure cuff. Follow the directions below.

NOTE

Blood pressure readings taken with the microphone in the blood pressure cuff may not be as accurate as readings obtained when using the microphone pad.

1. Remove the bladder from the cuff.
2. Turn the cuff bladder pouch inside out to expose the microphone pocket.
3. Open the Velcro pocket flap and gently insert the microphone into the pocket.
4. When the microphone is completely inserted, close the Velcro flap over the microphone cable and turn the cuff right side out.
5. Replace the bladder and exit the bladder hose and microphone cable out of the same exit site, either right arm or left arm, as marked on the cuff.

Safety considerations

WARNING

The Accutracker DX blood pressure monitor is designed for use with adult patients only. Do not use on neonates or on patients known to be susceptible to bruising.

Do *not* attach the blood pressure cuff to a limb being used for IV infusions as the cuff inflation can block the infusion, causing harm to the patient.

CAUTION

The blood pressure monitor's safety and effectiveness in neonates has not been established.

Blood pressure measurements may be affected by the patient's position, physical condition, and other factors.

Do not use the blood pressure monitor if it has failed its diagnostic self test or if it displays a pressure greater than zero with no cuff attached. The values displayed by such a unit may be inaccurate.

If you must ship the Accutracker DX blood pressure monitor for service or other reasons, place it in a sealable plastic bag, seal it tightly, then package it in a cardboard box. Label the shipping container –20 to +50° C and ship appropriately. Failure to follow these instructions can result in device failure due to improper shipping/storage conditions.

Setting the measurement interval

When the blood pressure monitor is turned on, it performs a battery voltage check, then the display shows the following:

INT= 5 (***)

INCR DECR START?

NOTE

The number ***5*** above represents any measurement interval, including ***MAN*** (manual). When the blood pressure monitor is turned on, the number displayed is the last measurement interval set as the default.

Use the **YES +** button or the **NO –** button on the blood pressure monitor to increase or decrease the interval (***INT***) at which the blood pressure readings are taken.

The available measurement intervals are: ***MAN*** (manual), or ***5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 90, 120***, or ***240*** minute intervals.

When the desired measurement interval is reached, press the **START/STOP** button. The blood pressure monitor immediately begins a measurement cycle. It will attempt one retry if the first measurement cycle fails.

Measurements are taken at the selected interval. A measurement may be initiated in between intervals by pressing the **START/STOP** button. This wakes up the blood pressure monitor from sleep mode, and offers the option to change the measurement interval as described above, as well as the option to view the time left until the next measurement. A manual measurement is initiated by pressing the **START/STOP** button a second time. The next measurement will then be taken at the scheduled interval (X number of minutes) after the manual measurement is complete.

The patient's blood pressure is displayed for one minute on the blood pressure monitor and for two hours on the CIC Pro center. The blood pressure reading is updated each time a measurement is successfully completed.

Measurements are taken at the selected interval until the blood pressure monitor is turned off, or until the monitor determines that the batteries are too weak for additional measurements.

A measurement may be stopped by pressing the **START/STOP** button while the measurement is in progress.

Setting test parameters

The maximum and minimum inflation pressures, dynamic or fixed inflate, and deflate rate can be adjusted. Follow these steps:

1. Turn the blood pressure monitor on while holding down the **NO –** button. The display shows:

   CHANGE TEST

   PARAMETERS?

2. Press the **YES +** button to change the parameters.

3. The ***MAXIMUM PRESSURE*** can be set to: ***250, 240, 230, 220, 210, 200, 190, 180, 170, 160, 150, 140, 130, 120, 110***, or ***100*** mmHg using the **YES +** and **NO –** buttons. A setting of 200 to 250 mmHg is recommended for the maximum cuff inflation pressure.

4. When the maximum pressure has been set, press the **NEXT** button to set the ***MINIMUM PRESSURE***. It can be set to: ***100, 90, 80, 70, 60, 50, 40, 30, 20,*** or ***10*** mmHg using the **YES +** and **NO –** buttons. A setting of 40 mmHg is recommended for the minimum cuff deflate pressure.

5. When the minimum pressure has been set, press the **NEXT** button to select ***DYNAMIC INFLATE*** or ***FIXED INFLATE***. Press the **YES +** button to turn dynamic inflate on, or press the **NO –** button for fixed inflate.

   When dynamic inflate is turned on, the blood pressure cuff inflation pressure automatically ranges 30 mmHg above the most recent systolic reading.

   Fixed inflate always inflates the blood pressure cuff to the set maximum inflation pressure.

Dynamic inflate is recommended for most patients. However, if a patient's systolic pressure readings vary by 25 mmHg or more, fixed inflate may be more comfortable for the patient. In all likelihood, dynamic inflate would not inflate the cuff high enough for such a patient, prompting the blood pressure monitor to retry, and causing the patient to endure two inflations for each reading. A fixed inflation to the set maximum pressure eliminates the double inflation and increases the patient's comfort. Reducing the maximum cuff inflation pressure setting for a patient being monitored with fixed inflate will also increase the patient's comfort.

6. After selecting dynamic or fixed inflate, the ***DEFLATE RATE*** can be set. It can be set to: ***6, 5, 4, 3***, or ***2*** mmHg, using the **YES +** and **NO –** buttons. A deflate rate of 3 mmHg per second is recommended.

   NOTE

   A patient with a slow heart rate requires a slower deflation rate than a patient with a faster heart rate. If the cuff deflates too quickly, it may not be possible to determine a blood pressure. If the cuff deflates too slowly, it may be uncomfortable for the patient. The recommended deflate rate of 3 mmHg per second meets most patients' requirements, but it can be adjusted when needed.

7. Press the **NEXT** button to return to the ***CHANGE TEST PARAMETERS?*** prompt, then press the **NO –** button to return to:

   INT= 5 (***)

   INCR DECR START?

Setting limits

It is possible to set the maximum and minimum values, as well as the change (delta) limit, at which the blood pressure monitor will reject a systolic, diastolic, or pulse pressure reading and attempt a new measurement. Contact technical support for more information about setting these limits.

Software and hardware versions

To verify what software and hardware versions your blood pressure monitor has, turn on the blood pressure monitor while holding down the **LAST** button. A display similar to the following appears:

Vsn: XX/ZZ

K3: 0 PR: 0

Your hardware version appears in place of the ***XX*** in the above example; your software version appears in place of the ***ZZ*** in the above example.

NOTE

Although it is not shown on the blood pressure monitor display, both the software and hardware version have a period in them. For example, if the hardware version reads 11 on the display, this actually indicates that it is hardware version 1.1.

8 Viewing stored patient data

Stored data

The CIC Pro center can retrieve in-unit parameter data from patient monitors connected to the Unity Network and retrieve parameter data from secondary devices connected through a Unity Network Interface. Stored events, parameter numeric data, graphic trends, and full disclosure patient data is identified by the date and time the data was collected. As a result, stored data is linked to a specific time focus.

You can review or print stored patient data from the following data review tools:

- ***Events*** directory
- ***Event Strip***
- ***FD Strip*** (full disclosure) (purchased option)
- ***FD Page*** (full disclosure) (purchased option)
- ***Graphic Trends***
- ***Vital Signs*** (parameter numeric data)
- ***Calipers***

NOTE

When using a second display, the second display will always open the most recently used data review tool.

NOTE

Solar 9500 information monitor parameters not supported by the CIC Pro center will not be available for viewing or printing at the CIC Pro center. However, this data will be available locally at the Solar 9500 monitor.

Time focus data

When parameter data is collected and stored, the stored patient data is linked to a specific time focus. When viewing an area of interest for one type of patient data (e.g. ***Vital Signs***), you can view another type of patient data (e.g. ***Graphic Trends***) that was collected and stored at that same time focus.

As a result, when viewing a patient's parameter numeric data (vital signs) that was collected and stored at 7:28 pm on January 10, you can select ***Graphic Trends*** to view the graphic trend data that was also collected and stored at 7:28 pm on January 10.

NOTE

When reviewing stored ECG data samples or strips, the degree of linking between time focus and the data is determined by your Full Disclosure license. You can only view full disclosure data that was stored within the time span identified by your Full Disclosure license. If you attempt to view data that exceeds your Full Disclosure license, the CIC Pro center displays the following message: ***No data is available for requested time***.

NOTE

When using a second display, you can display data from two different data review tools using the same time focus in the top and bottom halves of the display screen.

Events directory

From the ***Events*** directory, you can view information about any ***Crisis***, ***Warning***, or ***Advisory*** level arrhythmia or ST event that is stored at a bedside monitor. You can also view any ECG data sample that is also stored at a bedside monitor from the ***Events*** directory.

Up to 131 alarm events are stored for each admitted patient, with the following maximum number of event types:

- 100 arrhythmia alarm events
- 20 ***ST*** limit alarm events
- 10 samples
- 1 ***ST*** reference

NOTE

The ***Events*** directory can be displayed along with the other data review tools. If it is not displayed, you can display the directory by clicking ***Events***.

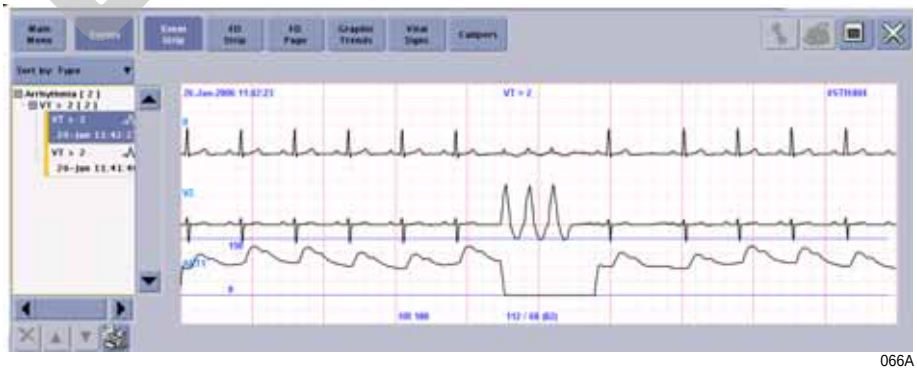
NOTE

To review stored non-ECG parameter data, use the ***FD Strip*** and ***FD Page*** data review tools.

Viewing the Events directory

Complete the following procedure to view the ***Events*** directory:

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory window displays.



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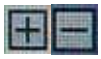
	Event list. When the list is sorted by type, click the plus sign to expand the list or the minus sign to collapse the list.
	Sort tool. Click the down arrow to sort stored events and data samples by the date and time the event occurred or by the type of event (e.g. arrhythmias).

	Scroll bar. Move up or down through the directory.
	Print directory button. Print the list of events displayed in the ***Events*** directory.
	Up and down buttons. Move up or down through the directory one event at a time.
	Delete event button. Delete the selected event or data sample from the ***Events*** directory.

Printing the Events directory

Complete the following procedure to print a list of events and data samples stored in the ***Events*** directory:

1. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory displays.
2. Sort the data by event time or by event type.
3. Click  (print directory button) located under the ***Events*** directory to print the displayed list of events.

Counting how many events occurred

Complete the following procedure to identify how many events occurred in each event category (e.g. ***V TACH*** or ***VFIB/VTAC***):

1. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory displays.
2. When the ***Events*** list is not sorted by type, click the down arrow next to ***Sort by: Time*** and choose ***Sort by: Type*** from the displayed list. The list sorts itself by event category.
3. Use the scroll bar to move up or down through the list. The quantity of each event category is listed in square brackets next to the event name (e.g. ***V TACH [2]***).

Identifying the most recent occurring event

Complete the following procedure to identify the most recent occurring event:

1. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory window displays.
2. When the ***Events*** list is not sorted by date and time, click the down arrow next to ***Sort by: Type*** and choose ***Sort by: Time*** from the displayed list. The list sorts itself by event time.
3. To move up or down through the list of events one at a time, click  arrows located under the ***Events*** directory.

4. Use the scroll bar to move up or down through the list of events and data samples.

Deleting a stored event or data sample

NOTE

- Deleting an event or data sample from the CIC Pro center ***Events*** directory also deletes the corresponding data from the monitor or telemetry system.
- When the Patient Data Server (***PDS***) is active, the delete events button is dimmed and you cannot delete any events or data samples from the ***Events*** directory.
- To delete a stored event or data sample, use the  (delete event button) with the red X.

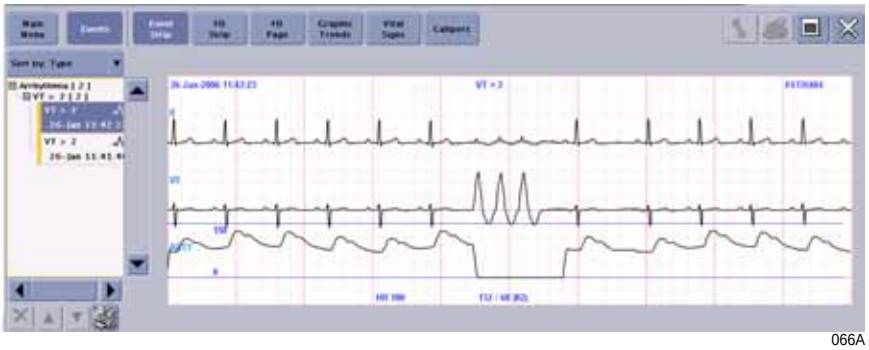
Complete the following procedure to delete an event or data sample stored in the ***Events*** directory:

1. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory displays.
2. Sort the data by event time or by event type.
3. Use the scroll bar to move up or down through the list of events and data samples.
4. Click the single event or data sample you want to delete, or hold down **CNTRL** and continue to click the left mouse button to select multiple events or data samples.
5. Click the  (delete event button). This button is located under the ***Events*** directory and has a red-colored X on it. A window displays a message similar to the following, ***Are you sure you want to delete this event?***
6. Verify you selected the correct event or data sample for deletion:
   - Click ***OK*** to delete this event or data sample.
   - Click ***Cancel*** if you do not want to delete this event or data sample.

Viewing or printing an Event strip

You can view or print a maximum of a 10-second strip for any arrhythmia event or ECG data sample stored in the ***Events*** directory. You can also view or print the current and reference ST complexes for all available ECG leads.

The following is an example of an ***Event Strip***.



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Complete the following procedure to view or print an event strip or data sample stored in the ***Events*** directory:

1. From the single patient viewer, click ***Patient Data...*** > ***Events***. The ***Events*** directory displays.
2. Sort the data by event time or by event type.
3. Use the scroll bar to move up or down through the list of events and data samples.
4. Click on a single event or data sample you want to view or print.
5. From the patient data menu, click ***Event Strip***. The selected event strip displays.
6. To print this strip, click  (print button) located in the upper right corner of the single patient viewer.

Full disclosure data

NOTE

This section provides a brief overview of the Full Disclosure function. For more information, refer to the CIC Pro Clinical Information Center Operator's Manual.

An admitted patient's parameter waveforms and numeric data is continually collected for a maximum of 72 hours (license dependent). After the maximum hours of data collection have elapsed, the oldest data is deleted to accommodate newer data.

NOTE

The amount of full disclosure data collected for a patient is determined by the type of licenses installed on the CIC Pro center. One hour of full disclosure data collection and storage is standard without additional licensing.

You can view full disclosure data using the following data review tools:

- Full disclosure strip: Automatically scan forwards and backwards through full disclosure data for specific areas of interest.
- Full disclosure page: View full disclosure waveform data in a full page format and view specific areas of interest.

Full disclosure strip

A full disclosure strip displays a maximum of 10-seconds of available full disclosure parameter waveforms and numeric data. You can choose to view the waveforms and numeric data for all monitored parameters or all of the ECG waveforms and numeric data.

You can automatically scroll backward or forward through the displayed data, view, and print a selected full disclosure strip.

For more information, refer to the CIC Pro Clinical Information Center Operator's Manual.

Viewing or printing a full disclosure strip

NOTE

Requires a laser printer to print.

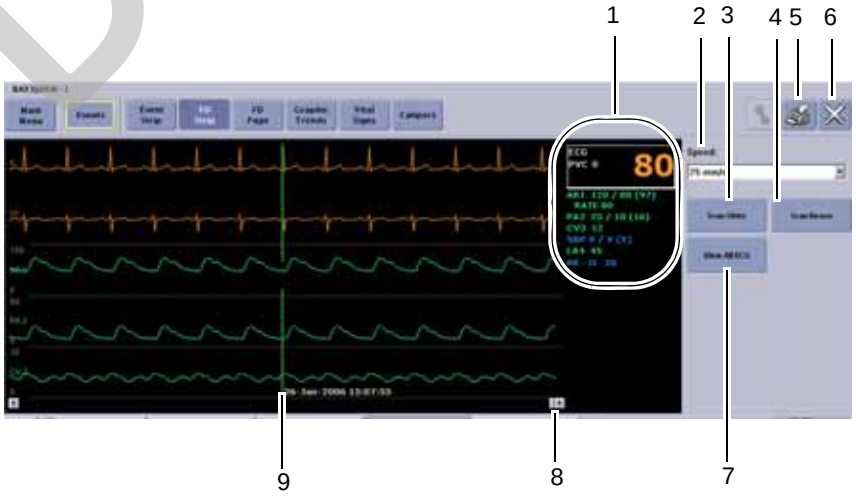
NOTE

When viewing the full disclosure strip, the arrhythmia label text follows the waveform event and is displayed to the left of the cursor.

Complete the following procedures to view or print a full disclosure strip:

Display the full disclosure strip window

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Patient Data...*** > ***FD Strip***. The full disclosure strip window displays.



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***FD Strip* window**	
Item	**Description**
1	Parameter numeric data corresponding with the cursor's time focus.
2	***Speed***. Adjust the sweep speed of the scanned waveforms. For example, when you choose ***25 mm/s***, the displayed data scrolls in 8-second increments.
3	***Scan Older***. Scan through the older full disclosure data. When the end of the data has been reached, the scan automatically stops. During the scanning process, this button function changes to ***Stop***. Click ***Stop*** to stop the scan at any time.
4	***Scan Newer***. Scan through the newer full disclosure data. When the end of the data has been reached, the scan automatically stops. During the scanning process, this button function changes to ***Stop***. Click ***Stop*** to stop the scan at any time.
5	Print button. Print the full disclosure waveform and parameter numeric data displayed in the ***FD Strip*** window. The print duration of the ***FD Strip*** is determined by the in the ***Strip*** > ***Duration*** setting in the ***Full Disclosure Defaults*** window.
6	Close button. Close the ***FD Strip*** window.
7	***View All ECG***. Display all of the available ECG leads and parameter numeric data. Once selected, this button function and label changes to ***Monitor***. ***Monitor***. Display all of the parameter waveforms and numeric data displayed at the monitor when the CIC Pro center collected the full disclosure data. Once selected, this button function and label changes to ***View All ECG***.
8	Scroll bar. Move backward or forward in time. **NOTE** The scroll bar and the scroll bar arrows move the displayed data at different rates of speed: ■ Clicking inside the scroll bar moves the displayed data in time increments defined by the ***Speed*** setting. ■ Clicking the scroll bar arrows moves the displayed data in one-second increments.
9	Cursor. Identify the date and time of the parameter waveform and parameter numerics data you are currently viewing. You can move the cursor by using the scroll bar or by clicking on the waveform to move the cursor to that position.

Print a full disclosure strip

Once you have placed the cursor on an area of interest, you can print a strip of this full disclosure data. The printed strip displays the parameter waveform and numeric data for the selected time focus.

The duration of the printed ***FD Strip*** is determined by the in the ***Strip*** > ***Duration*** setting in the ***Full Disclosure Defaults*** window.

Complete the following procedure to print a full disclosure strip:

1. Position the cursor on the waveform area of interest.
2. Click  (print button) located in the top right corner of the ***FD Strip*** window. The full disclosure strip prints.

Full disclosure page

The full disclosure page allows you to view and examine the full range of stored waveforms, zoom in on areas of interest, and print a customized full disclosure report.

Viewing or printing a full disclosure page

NOTE

Can print to a laser printer or DDW.

Complete the following procedures to view the stored full disclosure waveforms:

Display the FD Page window

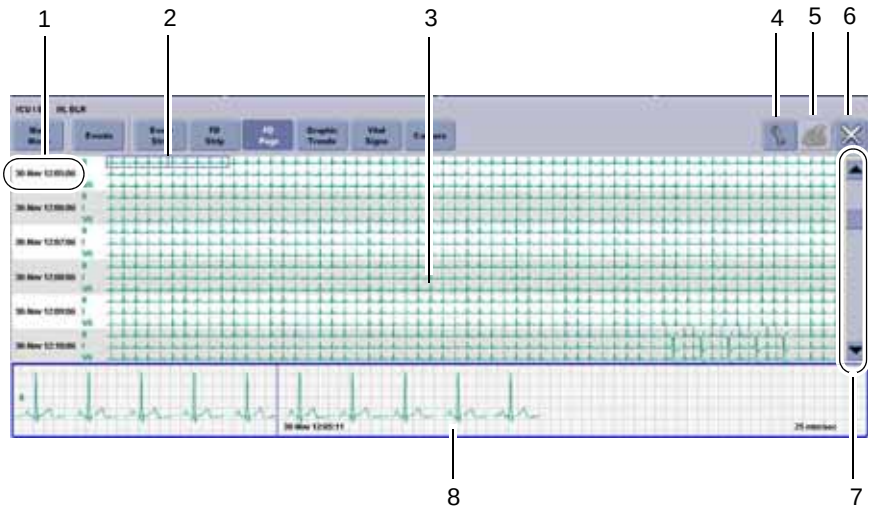
1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Patient Data...*** > ***FD Page***. The full disclosure page displays.

NOTE

When you select a specific time focus or an alarm event from the ***Events***, ***Event Strip***, ***Graphic Trends***, or ***Vital Signs*** data review tools, the ***FD Page*** automatically displays the available full disclosure data for that time focus or event. Otherwise, the most current full disclosure data displays.

NOTE

When an event or ECG data sample occurs outside of the time limit of your full disclosure license, a message similar to the following displays: ***No patient data is available for the selected time***.



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FD Page window	
Item	**Description**
1	Time and date stamp for this row of waveform data.
2	Zoom box. ■ Click inside the small blue-colored zoom box to display an enlarged view of the selected waveform area. ■ Click on another area of interest to re-position the zoom box.
3	Waveform data.
4	Tools icon. Customize the on-screen display of full disclosure data.
5	Print icon. Customize and print a full disclosure report.
6	Close icon. Close the ***FD Page*** window.
7	Scroll bar. Display older or newer data.
8	***Zoom Window***. View the enlarged waveform selected in the small blue-colored zoom box.

Graphic trends data

The CIC Pro center can retrieve parameter numeric data from patient monitors connected to the Unity Network and retrieve parameter numeric data from secondary devices connected through a Unity Network Interface. The CIC Pro center can display this collected data in a graphical format, over a specified period of time. Depending how your CIC Pro center is configured, you can view a maximum of six graphic trends in half-screen mode and a maximum of 12 graphic trends in the full-screen mode. You can view graphic trends in varying time scales and print them at a laser printer or a digital writer.

A patient's parameter numeric data is continually collected for a maximum of 24 hours. After the maximum hours of data collection have elapsed, the oldest data is deleted to accommodate the newer data.

The CIC Pro center retrieves non-episodic parameter data at one-minute resolution from the patient monitor and displays it at one-minute resolution. Episodic parameter events (e.g. NBP) are retrieved every time episodic events are recorded. If more than one episodic event occurs during the same minute, the more recent episodic event overwrites the older episodic event.

The CIC Pro center also retrieves AFIB trend data from telemetry patients. AFIB event patient data is stored for review in the ***Graphic Trends*** and ***Vital Signs*** tab sheets.

Viewing graphic trends

NOTE

From the multi-patient viewer, you can click in the real-time trend window to automatically display the current ***Graphic Trends*** window for this patient.

NOTE

When two trends are displayed across from each other in the ***Graphic Trends*** window and both trends have the same data values, those graphic trend waveform areas will overlap each other. The overlapping waveform colors will not blend together. This is a normal behavior. As the trend values change, the waveform shape will also change, allowing its individual waveform color to become visible.

NOTE

If you position the time cursor inside a visible gap of trended data, parameter numerics are displayed. Depending upon the position of the time cursor within the gap, the displayed parameter numerics are either the last known parameter values before the gap or the first known parameter values after the gap.

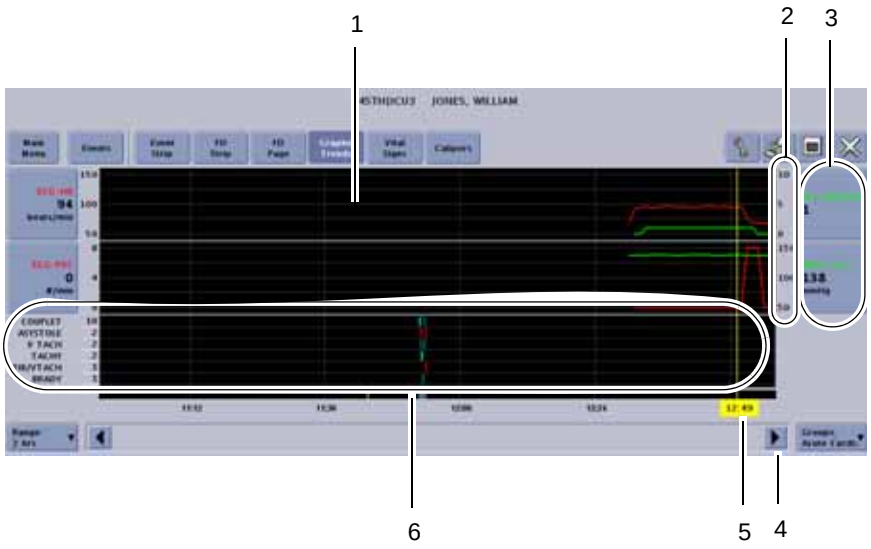
NOTE

When viewing episodic telemetry data, any data reading collected after the minute mark will display in the next trended minute.

Complete the following procedures to view the graphic trends of parameter numeric data:

Display the graphic trends window

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Patient Data...*** > ***Graphic Trends***. The ***Graphic Trends*** window displays the current parameter trends.



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***Graphic Trends* window**	
Item	**Description**
1	***Graphic Trends*** window.
2	Graphic trend scales.
3	Graphic trend buttons. Identify the trended data and the associated parameter numeric values. Click on a graphic trend button to change the scale of this graphic trend.
4	Scroll bar. Move backward or forward in time.
5	Time focus cursor (yellow line) and time focus label (yellow label). Landmark the date, time, and parameter numeric data corresponding to the cursor placement. **NOTE** The date only appears in the time cursor label when the viewed data is not from the current day.
6	Event summary. Display a brief overview of the type and number of events that occurred during a specific time focus.

Choose the trend group you want to display

Complete the following procedure to display trends from a preset group of parameters:

1. From the ***Graphic Trends*** window, click ***Groups***. A list of trend groups displays.
2. Choose the trend group you want to display.

Adjust the displayed time period

NOTE

The ***Graphic Trends*** window displays the current trends.

Complete the following steps from the ***Graphic Trends*** window to adjust the start and stop time of the displayed graphic trends:

1. To make minor time adjustments, use the scroll bar to move backward and forward in time.
2. To display a specific time range (e.g. ***30 Minutes***), complete the following steps:
   a. Click ***Range*** to display a list of time ranges.
   b. Choose the time range for the displayed trended data. You can choose from ***15***, ***30*** minutes or ***1, 2, 4***, ***8***, ***12***, ***24*** hours.

Adjust the trend scale size

Complete the following steps to adjust the scale size of a parameter trend:

1. From the ***Graphic Trends*** window, click on the parameter trend you want to adjust. A window displays the parameters scales available for the selected parameter trend.
2. Choose the desired scale. The window closes and the scale setting is automatically applied.
3. Repeat step 1 and step 2 for each parameter trend scale you want to adjust.

Printing graphic trends data

When printing graphic trends data, the following factors apply:

- Graphs print in the same scale as displayed on screen.
- A maximum of four graphs can be printed on each page.
- The event trend prints on its own page and includes all the event calls that occurred during the report period.
- Trend values that exceed the displayed trend scale print as a red-colored dashed line.
- For monitor patients, graphic trend printouts that are initiated from a CIC Pro center print only to a laser printer. If the graphic trend printout is initiated from a patient's bedside, it can print to a digital writer or to a laser printer (depending on how the print functions are configured on the monitor).
- For telemetry patients, graphic trend printouts can print to a laser printer or to a digital writer.

NOTE

When printing graphic trends data from telemetry patients to a digital writer, the time duration of the printed output is as follows:

Digital writer output for stored telemetry graphic trends data	
Displayed data	**Printed output**
15, 30, 60 minutes	90 minutes
2 hours	3 hours
4 hours	6 hours

Digital writer output for stored telemetry graphic trends data	
Displayed data	**Printed output**
8 hours	12 hours
24 hours	24 hours

To print the displayed graphic trends data, click  (print button) located in the top right corner of the ***Graphic Trends*** window.

Vital signs data

The CIC Pro center can continuously retrieve parameter numeric data (vital signs) from in-unit or out-of-unit patient monitors connected to the Unity Network and retrieve parameter numeric data from secondary devices connected through a Unity Network Interface.

You can view trended parameter numeric data for varying time intervals. When the CIC Pro center is connected to a laser printer, you can also print the trended parameter numeric data. Telemetry beds can print to a writer if a laser printer is not connected to the CIC Pro center.

For non-episodic parameters (e.g., HR), a median value is determined and stored for display at one-minute resolution. Episodic parameters (e.g., NBP) are stored every time one occurs. If more than one episodic event occurs during the same minute, the more recent event overwrites the earlier one.

NOTE

When the first parameter on the list is an episodic parameter (e.g. NBP), all other parameters on the list only display data at the episodic measurement points. For example, when NBP is the first parameter on the list, and NBP measurements were taken at 10:10, 10:15, and 10:20, then data for all other parameters on the list is only available for the same times.

NOTE

Episodic data is displayed at the closest time interval for the selected time. If the time for the measurement occurred before or after the displayed time, an ellipses symbol (...) is appended after the episodic value.

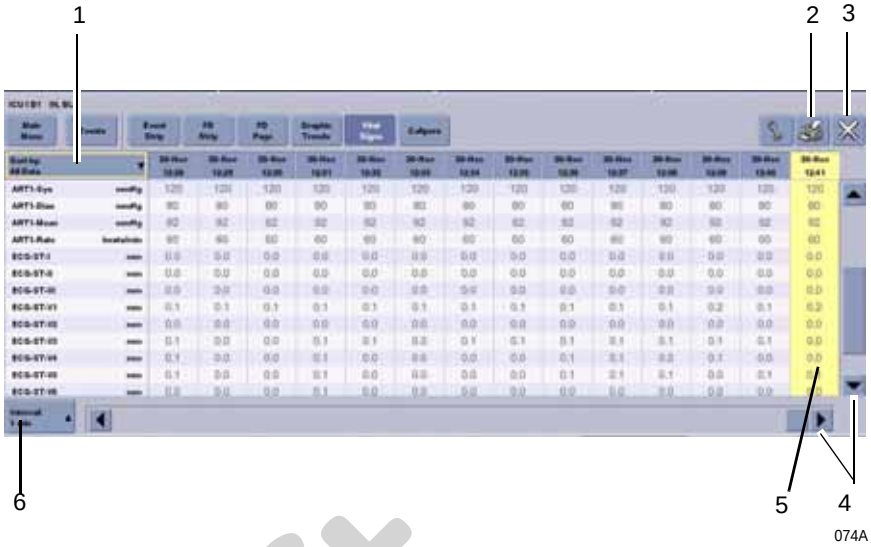
The CIC Pro center also retrieves AFIB trend data from telemetry patients. AFIB event patient data is stored for review in the ***Graphic Trends*** and ***Vital Signs*** tab sheets.

Viewing vital signs data

Complete the following procedure to view periodic and episodic trend data in a tabular format:

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.

2. From the single patient viewer, click ***Patient Data...*** > ***Vital Signs***. The ***Vital Signs*** window displays.



Vital Signs **window**	
Item	**Description**
1	***Vital Signs*** sort tool. Click the down arrow to choose the data group you want to display.
2	Print button. Print the list of events displayed in the ***Events*** directory.
3	Close button. Close this window.
4	Scroll bars. Move up and down or left and right through the displayed data.
5	Focus indicator. Highlights one event for easier viewing.
6	Interval button. Click the down arrow to choose the time interval of the displayed data.

3. Click the down arrow next to the ***Vital Signs*** sort tool and choose the data group you want to display. The data sorts itself by your chosen category.

NOTE

When reviewing data in the ***Vital Signs*** window, be aware that if you changed to monitoring a different V lead, both the current and previous V lead data is trended and both V lead labels will appear in the ***Vital Signs*** window. In addition, the V lead numeric data appears at the time the V lead data was collected.

4. Click the ***Interval*** button to choose the time interval of the displayed data. You can choose from ***1***, ***5***, ***15***, ***30***, or ***60*** minutes.

5. Use the up and down or left and right scroll bars to move through the displayed data.

Printing vital signs data

NOTE

Up to five events of the ***Vital Signs*** data for telemetry patients can be printed to a digital writer.

Complete the following procedure to print periodic and episodic trend data in a tabular format to a laser printer:

1. From the single patient viewer, click ***Patient Data...*** > ***Vital Signs***. The ***Vital Signs*** window displays.
2. Click the down arrow next to the ***Vital Signs*** sort tool and choose the data group you want to display. The data sorts itself by your chosen category.
3. Click the ***Interval*** button to choose the time interval of the displayed data.
4. Click  (print button) located in the top right corner of the ***Vital Signs*** window.

Measuring ECG waveform intervals and amplitude

NOTE

This section provides a brief overview of the calipers function. For more information, refer to the CIC Pro Clinical Information Center Operator's Manual.

When full disclosure data is collected and stored at the CIC Pro center, you can use the ***Calipers*** measurement tool to measure the PR, QRS, QT, and R-R waveform intervals and the ST waveform amplitude.

Viewing or printing a waveform from the Calipers window

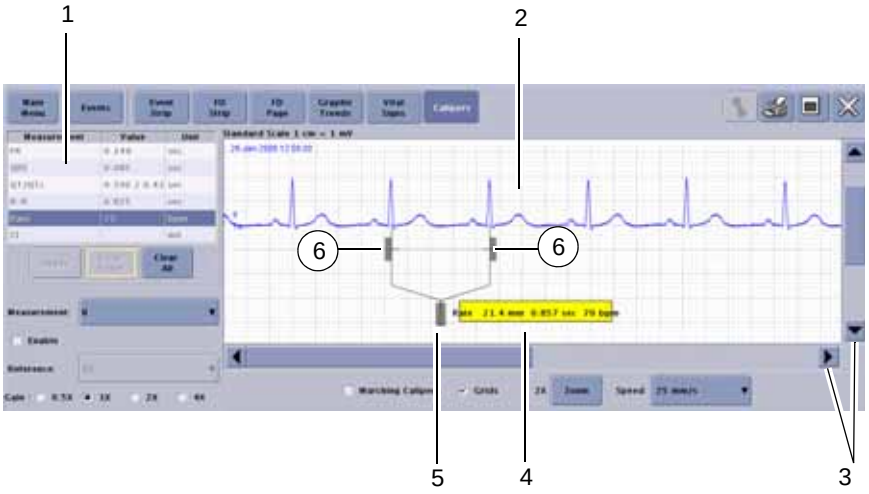
Complete the following procedure to print or view a waveform from the ***Calipers*** window:

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Patient Data...*** Then, choose the data review tool you want to use to locate a waveform segment or waveform strip you want to measure.

   NOTE

   When an event or ECG data sample occurs outside of the time limit of your full disclosure license, the data will not be available to view from the ***Calipers*** measurement tool.

3. Click ***Calipers*** to display the ***Calipers*** window. Ten seconds of waveform data displays.



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***Calipers* window**	
Item	**Description**
1	Measurement table. Enter or clear the waveform measurement values for the PR, QRS, QT, R-R, and ST intervals or amplitudes. **NOTE** The QTc value is a calculated value.
2	Measurement window. View, measure time intervals and amplitude for displayed waveforms, and compare the interval of multiple waveform complexes.
3	Scroll bars. Move up and down or left and right through the displayed data.
4	Calculated measurement label. Click and drag to reposition.
5	Calipers central handle. Click and drag this handle to position the caliper on a desired waveform complex.
6	Caliper arm handles. Click and drag these handles to resize or reposition the caliper arms over the waveform.
	Measurement: Choose one of the following leads to measure: I, ***II***, ***III***, ***V***, ***AVR***, ***AVL***, and ***AVF***. For telemetry only, a second ***V*** lead would be available for display.
	Reference: Fill the ***Enable*** box with a check mark and choose one of the following reference leads for display: ***I***, ***II***, ***III***, ***V***, ***AVR***, ***AVL***, and ***AVF***. For telemetry only, a second ***V*** lead would be available for display. Measurements taken on a reference lead are not recorded in the measurement table.
	Gain: Adjust the gain of the displayed waveform.
	Marching Calipers: Compare the rate of multiple waveforms.
	Grids: Apply a background grid.
	Zoom: Zoom in for a closer look at the waveform.
	Speed: Change the sweep speed of the displayed waveform.

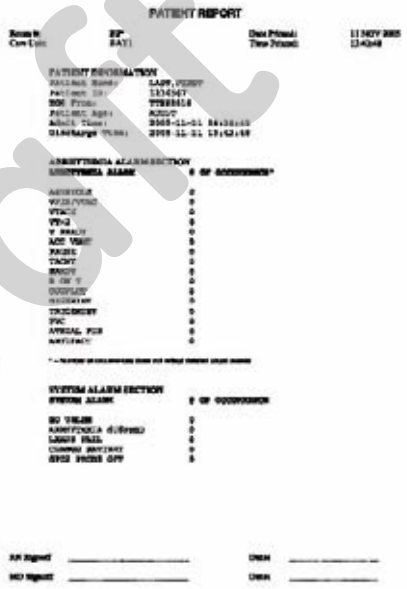
4. Click  (print button) located in the top right corner of the ***Calipers*** window. All measurements are lost when the window is closed.

Reports

The following reports are available for telemetry patients if a laser printer is configured for the CIC Pro center. These reports are enabled and configured through Webmin. Refer to the CIC Pro Clinical Information Center Bedrock Hardware Platform Service Manual for more information.

Patient discharge summary report

The Patient Discharge Summary report automatically prints to a configured laser printer for the CIC Pro center when a telemetry patient is discharged. The report provides general patient, system status alarm and patient status alarm information.


PATIENT REPORT

PATIENT INFORMATION

ARRHYTHMIA ALARM SECTION

SYSTEM ALARM SECTION

Transmitter battery status report

The Transmitter Battery Status report prints to a configured laser printer for the CIC Pro center on a user demand basis. The report lists all transmitters with admitted telemetry patients, the associated unit and bed name and transmitter's current battery level.

9 Printing

Print devices

You can print real-time and stored parameter data to the following Unity Network print devices:

- PRN 50-M digital writer
- Laser printer

Print output

You can print displayed real-time or stored parameter data from a CIC Pro center or from other GE patient monitors that are connected to the Unity Network.

The type of parameter data available to print depends on the source of the patient data (e.g., hardwired bed, ***Combo*** bed, or telemetry bed) and from where you choose to initiate the printing of this information (e.g., CIC Pro center or patient monitor).

Telemetry bed parameter data

The following table identifies the telemetry bed parameter data available to print from a CIC Pro center or GE patient monitor.

Telemetry bed parameter data				
	Data printed from a CIC Pro center		**Data printed from a monitor**	
Parameter data	**Writer**	**Printer**	**Writer**	**Printer**
Vital Signs	Yes	Yes	Yes	Yes
Graphic Trends	Yes	Yes	Yes	Yes
Alarm history	Yes	Yes	Yes	Yes
Events directory	Yes	Yes	Yes	Yes
Alarm control	Yes	Yes	Yes	Yes
View patient	Yes	Yes	Yes	Yes
Alarm graph	Yes	Yes	Yes	Yes
Full disclosure strip	--	Yes	--	--
Full disclosure report	--	Yes	--	--
Calipers	--	Yes	--	--

Graph location

Where your data prints out (graph location) is first determined by the default ***Graph Setup*** control settings and second, by other operating conditions.

Use the following guidelines to identify the operating conditions that determine where your data prints out (graph location):

- Manual graphs and print windows: These print at the CIC Pro center where the graph was requested, provided that CIC Pro center has the same type of writer or printer as the graph location set for the patient for that type of graph. If the CIC Pro center where the graph was requested does not have the same type of writer or printer, the graph prints to the patient's specified graph location.
- When the CIC Pro center is not connected to a printer: When viewing a patient on a CIC Pro center that is not connected to a printer, the graph settings default to the graph location configured in the ***Graph Setup*** defaults.
- Patient moved to a different bed: When you move a patient bed, the patient's graph settings are retained as set on the CIC Pro center where the patient was first admitted.
- Duplicated telemetry patient: When a telemetry patient is duplicated on another CIC Pro center, alarm graphs continue to print at the CIC Pro center where the patient was first admitted.
- No graph location for a telemetry patient: When no graph location is defined for a telemetry patient at the time of admission, the message ***Saving*** displays. Graphs are not sent to printers outside the unit.

Printing real-time data

In addition to patient alarm graphs printing automatically, you can print a continuous strip for a single patient, or print parameter waveforms or parameter limits for all patients displayed in the multi-patient viewer.

To print real-time data, see the following sections of this manual:

- Printing a continuous ECG strip on page 7-8.
- Initiating a graph all patients request on page 9-5.

Printing stored patient data

You can print patient data that has been collected and stored at this CIC Pro center.

To print stored patient data, see the following sections of this manual:

- Printing the Events directory on page 8-4.
- Viewing or printing an Event strip on page 8-5.
- Viewing or printing a full disclosure strip on page 8-7.
- Printing graphic trends data on page 8-13.
- Printing vital signs data on page 8-16.

Initiating a manual graph

If you click on a patient's ECG parameter window, a continuous graph is initiated for the patient. Clicking on the ECG parameter window again will stop the graph.

The PRN 50 digital writer and the Direct Digital Writers (DDW) print patient data (generally referred to as a graph or graph strip). Data can also be printed on a laser printer.

The waveforms graphed and graph speed are controlled in the individual patient's ***Graph Setup*** tab sheet. Unit defaults for telemetry patients can be set in the ***CIC Defaults*** tab sheet and the ***Telemetry Unit Defaults*** tab sheet. Refer to Telemetry unit defaults on page 4-7 for more information on setting ***Telemetry Unit Defaults***.

Transmitter initiated graphs (manual graphs)

When the **Graph** button on the transmitter is pressed, a 20-second graph strip is printed at a speed of 25 millimeters per second and the event is stored in alarm history.

When an IMPACT.*wf* paging system (version II or later) is also available in the same care unit, pressing the **Graph** button enables the View on Demand feature (also called the Apex Graph Button Push feature). The IMPACT.*wf* server generates a manually initiated sample page or snapshot of the patient's ECG waveform and any other enabled/monitored non-arrhythmia parameters.

When you press the **Graph** button on the transmitter, it generates both an IMPACT.*wf* update page as well as a standard ECG waveform graph at the CIC Pro center. The IMPACT.*wf* page is labeled ***Sample*** when this data is displayed on the IMPACT.*wf* receiver and stored in history. Additionally, all pagers assigned to the patient receive a page.

Automatic alarm graphs

A graph prints automatically when a patient experiences a ***Crisis*** or ***Warning*** alarm condition. Arrhythmia alarm graphs run until the end of the alarm event unless manually stopped by the user. The printer prints up to 10 seconds of data that occurred immediately before the event, and prints for the duration of the event. The printer stops printing when the patient returns to a normal rhythm.

If a printer is not available at the time of the alarm event, a 20-second graph is saved. This saved graph will print when a printer becomes available.

Graph messages

One of the following messages is displayed on the CIC Pro center screen during graphing:

GRAPH ALARM—An alarm graph was initiated and is running.

GRAPH MANUAL—A manual graph was requested and is running.

GRAPH TTX—The **Graph** button on the transmitter was pressed and a 20-second graph strip is running.

PRINTING—A non-real time graph is currently being printed.

SAVING—An alarm or a manual graph has been requested but the writer is in use; the writer door is open; or the writer is out of paper. The graph is being saved until the

writer is available. The most recent 20-second alarm or manual graph will be saved in alarm history. Additional data maybe available with Full Disclosure.

Graph all patients

Clicking on the ***Print*** button at the bottom of the CIC Pro center display sends a Graph All Patients request to all beds displayed on the CIC Pro center, initiating a 10-second graph for all telemetry and ***Combo*** patients and a 20-second graph for all bedside patients. When this option is selected for telemetry patients, graph requests always print at a speed of 25 millimeters per second.

NOTE

This Graph All Patients function is only available when the single patient viewer is closed. If a single patient viewer is open, selecting ***Print*** from the main menu initiates a printout of whichever tab sheet is in front.

The print process stops automatically. If the **Graph Stop** control key is pressed on the external DDW, the current patient's graph stops and the writer begins to print a graph for the next patient.

If a patient's data is currently printing or is being saved to print when a Graph All Patients request is initiated, this patient's data will not be included in the Graph All Patients graph. This patient's data will print independently of the Graph All Patients graph.

Clicking on the ECG parameter window for a patient whose data is saving will cancel the Graph All Patients request for that patient.

If, while a Graph All Patients request is in progress, an arrhythmia alarm occurs for a patient, the alarm data will replace the data that was saved for the Graph All Patients request. The alarm data will then appear on the graph printout.

If, while a Graph All Patients request is running, a telemetry patient initiates a graph from his or her transmitter, the saved data for the Graph All Patients graph will be replaced by data from the patient's transmitter. The data from the transmitter will then appear on the graph printout.

Initiating a graph all patients request

To initiate a Graph All Patients request, follow these steps.

1. Click on the ***Print*** button at the bottom of the CIC Pro center display. The Graph All Patients window opens.
2. Click on ***Limits*** or ***Waveforms***.
   - Selecting ***Limits*** graphs all patient limits.
   - Selecting ***Waveforms*** graphs all patient waveforms.
3. Click on the ***OK*** button to complete the Graph All Patients request.

Stopping a print job

You must stop a print job from the same CIC Pro center you used to send the print job to the printer.

Stop printing to a laser printer

Complete the following procedure to stop printing all print jobs sent to the laser printer:

1. From the multi-patient viewer, click ***CIC Setup*** > ***CIC Defaults***. The ***CIC Defaults*** window displays.
2. Under ***Printer/Writer***, click ***Cancel Print Jobs*** for the printer you want to stop printing to.
3. After making your selection, complete one of the following tasks from the ***CIC Defaults*** window:
   - Click ***OK*** to apply your changes and close the ***CIC Defaults*** window.
   - Click ***Cancel*** to cancel your changes and close the ***CIC Defaults*** window.
   - Click ***Apply*** to apply your changes without closing the ***CIC Defaults*** window.

Stop printing to a local digital writer

Complete the following procedure to stop printing all print jobs sent to a local digital writer:

1. Locate the digital writer.
2. Press the  (**Graph Stop**) button located on the front of the digital writer to stop the print job.

Adjusting print control settings

To temporarily adjust the graph location and settings for a specific patient, complete the following procedure:

NOTE

All changes are temporary and return to the default settings when the patient is discharged. To permanently change these settings, see the CIC Pro Clinical Information Center Bedrock Hardware Platform Service Manual.

1. From the multi-patient viewer, click on the patient you want to view. The single patient viewer displays.
2. From the single patient viewer, click ***Monitor Setup*** > ***Graph Setup*** to display the ***Graph Setup*** window.

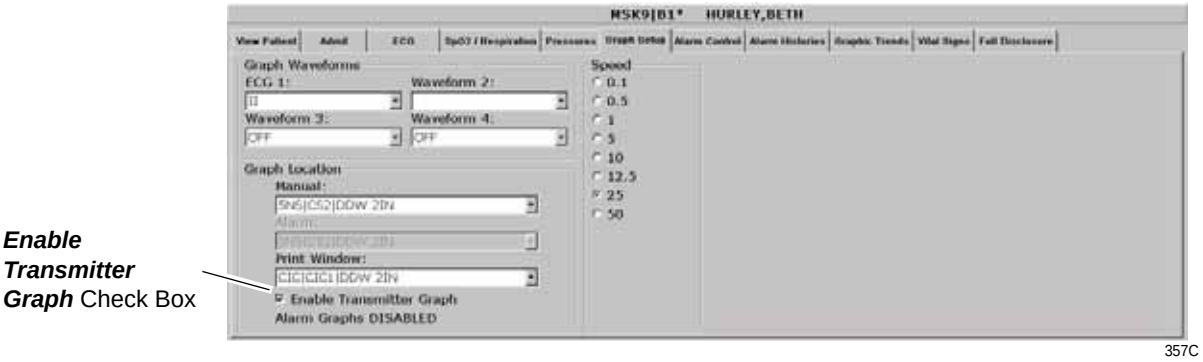
3. Change any of the undimmed setting options. When an option appears dimmed, you cannot change it unless you enter the service-level password.

Option	Function
Graph Waveforms	Set the print order of the ECG waveforms: ■ ***ECG 1:*** Set the lead and its associated waveform to print first. ■ ***Waveform 2***: Set the ECG lead or parameter and its associated waveform to print second. ■ ***Waveform 3***: Set the ECG lead or parameter and its associated waveform to print third. ■ ***Waveform 4***: Set the ECG lead or parameter and its associated waveform to print fourth.
Graph Location	Choose from available printers to set the graph location of the manual, alarm, and print window graphs: ■ ***Manual***: Any real-time patient data you initiate the printing of. ■ ***Alarm***: An alarm graph that is triggered by a patient ***Crisis*** or ***Warning*** alarm condition. ■ ***Print Window***: Any stored patient data you initiate the printing of. This graph location also prints the ***Graph All*** > ***Limits*** data.
Enable Transmitter Graph	Turn on or turn off the ability to initiate graph printing from a transmitter.
Speed	Set the print speed. The slower the speed, the more condensed the data. 25 mm/second is standard.

Enable transmitter graph

The ***Enable Transmitter Graph*** option allows you to turn off/on the ***Transmitter Graph*** function for telemetry patients. When this option is enabled at the CIC Pro center, you can initiate a graph by pressing the graph button on the transmitter. When this option is disabled at the CIC Pro center, no graph can be initiated from the transmitter. To enable or disable this option, follow this procedure:

1. To enable the ***Transmitter Graph*** option, point and click with the mouse to place a check mark in the ***Enable Transmitter Graph*** check box.



2. To disable the ***Transmitter Graph*** option, point and click with the mouse to remove the check mark in the ***Enable Transmitter Graph*** check box.

Alarm graphs enabled/disabled

This message line indicates whether the graph on alarm feature is on (***Alarm Graph ENABLED***) or off (***Alarm Graph DISABLED***). This feature cannot be set on an individual patient basis. Use the ***Alarm Graph*** option in the ***Telemetry Unit Defaults*** tab sheet to set it for all patients admitted to the CIC Pro center.

Graph paper out indicator

When there is no graph paper in the writer (or the door is open), the message ***Graph Paper Out/Door Open*** is displayed at the top of the screen.

When printing to a laser printer, a similar status message is displayed if the printer is unable to print.

NOTE

Because the CIC Pro center can communicate with many laser printers, specific status messages are not documented in this manual.

A Abbreviations and symbols

Abbreviations

Abbreviations and symbols that you may encounter while reading this manual are listed below with their meanings.

12SL	12-lead ECG analysis
A	
AC	alternating current
Acc	accelerated
ACI	acceleration index
AD	adult
ADU	alarm display unit
AFIB	atrial fibrillation
ALRM	alarm
AMI	acute myocardial infarctions
ANT	anterior
Arr, Arrhy	arrhythmia
ART	arterial
Auto	automatic
Aux	auxiliary
A-V	arterial venous
AVG	average
AVOA	automatic view on alarm
B	
BIS	bispectral index
BP	blood pressure
Brady	bradycardia
BT	blood temperature
C	
C	celsius
Cal	calibrate
Calc, calcs	calculation(s)
cc	cubic centimeter
CC	computation constant
CCO	continuous cardiac output
CD	compact disc

CI	cardiac index
CIC	CIC Pro Clinical Information Center
cm	centimeter
CO	cardiac output
CO	carbon monoxide
CO_2	carbon dioxide
comm	communication
CP	cardiopulmonary
CPP	cerebral perfusion pressure
CRG	cardiorespirogram
CSA	Canadian Standards Association
CVP	central venous pressure
D	
D	diastolic
DES	desflurane
DIDCA	direct interface device connection adapter
DSC	digital signal converter
E	
E	expired
e.g.	for example
ECG	electrocardiograph
eDO2I	estimated delivered oxygen index
EEG	electroencephalograph
EMC	electromagnetic compatibility
EMI	electromagnetic interference
ENF	enflurane
ESU	electrosurgical cautery unit
et al	and others
ET CO_2	end-tidal carbon dioxide
etc.	etcetera
ETO	ethylene oxide
EXP	expired
F	
F	Fahrenheit
FEM	femoral

G	
g	gram
gHz	gigahertz
gtt	drops
H	
HAL	halothane
Hb	hemoglobin
HR	heart rate
Hz	hertz
I	
I	inspired
IABP	intra-aortic balloon pump
ICG	impedance cardiography
ICP	intracranial pressure
ICU	intensive care unit
ID	identification
in	inches
INDV	individual
INF	infusion, inferior
Inject	injectate
INSP	inspired
INT	interior
ISO	isoflurane
IT	injectate temperature
IV	intravenous
J	
J	ST measurement point
K	
kg	kilogram
L	
L, LD	lead
L	left
l	liter
LA	left arm
LA	left arterial
LAN	local area network

LAT	lateral
lbs	pounds
LCWI	left cardiac work index
LED	light emitting diode
LIS	lab information system
LL	left leg
LVET	left ventricular ejection time
LVSWI	left ventricular stroke work index
M	
M	mean
MAC	minimum alveolar concentration
MAP	mean arterial pressure
Min	minimum
mm	millimeters
mmHg	millimeters of mercury
MPSO	multiple portable socket outlet
MRI	magnetic resonance image
ms	milliseconds
mV	millivolt
N	
N/A	not applicable
N_2O	nitrous oxide
NBP, NIBP	non-invasive blood pressure
Neo	neonatal
O	
O_2	oxygen
O_2CI	oxygen consumption index
OR	operating room
P	
P	pace
PA	pulmonary artery
PAD	pulmonary artery diastolic
Par	parameter
PAW	pulmonary artery wedge
PC	personal computer

pCO_2, pO_2	partial pressure of arterial carbon dioxide
PED	pediatric
PEP	pre-ejection period
PVC	premature ventricular resistance
Q	
QRS	interval of ventricular depolarization
Qty	quantity
R	
R	right
R	rate
R&TTE	Radio and Telecommunication Terminal Equipment
RA	right arm
RA	right artial
REF	reference
Reprep	re-prepare
RES	resistance
Resp	respiration
RF	radio-frequency
RHY	rhythm
RL	right leg
RR	respiration rate
S	
S	systolic
sec	second
SEV	sevoflurane
SIM	simulator
Sol	solution
SP	special
SpO_2	arterial oxygen saturation (pulse oximetry)
SQI	signal quality index
ST	interval of ventricular repolarization
Stat	right away
STR	systolic time radio
SV	stroke volume
SvO2	mixed venous oxygen saturation

SVR	systemic vascular resistance
SVRI	systemic vascular resistance index
Sync	synchronized
T	
T1, T2	temperature sites
Tachy	tachycardia
TC	transcutaneous
Tech	technical
Temp, TMP, TP	temperature
TFC	thoracic fluid content
TIR	technical information report
U	
UAC	umbilical artery catheter
UO	urometer
UVC	umbilical venous catheter
V	
V	volt
V	version
V	ventrical lead
Vent	ventilator
VFib	ventricular fibrillation
VI	velocity index
VOA	view on alarm
Vol	volume
VTach	ventricular tachycardia
W	
WF, WFS	waveform(s)
X	
X	multiplier (2X)
X	invalid data

Symbols

&	and
°	degree(s)

>	greater than
<	less than
-	minus
#	number
%	percent
±	plus or minus
"	inches
µ	micro

B Customized defaults worksheet

NOTE

Before filling out this worksheet, you should make additional copies for future use.

Use this worksheet to record customized settings for the following defaults:

Alarms Off selection

This telemetry setting is located in ***CIC Setup*** > ***CIC Defaults***.

Allow ***Alarms Off On this CIC***? (Circle one) Yes No

Telemetry Unit Defaults

Telemetry unit default		Default setting
Graph Setup		
Default Locations for this CIC	***Manual***	
	Alarm	
	Print Window	
Waveforms	***ECG 1***	***II***
	Waveform 2	***V***
	Waveform 3	***Off***
	Waveform 4	***Off***
	Transmitter Graph	***On***
	Alarm Graph	***Always On***
	Event Marker Graph	***On***
ECG		
	Display Lead	***II***
	Arrhythmia	***Full***
	Lead Analysis	***Multi-Lead***
	ST Analysis	***On***
	Va Lead	***V1***
	Vb Lead	***V2***
	Detect Pace	***Off***

Telemetry unit default		Default setting
	Patient Age	***Adult***
	Transmitter Pause	***Enabled***
	Alarm Pause Breakthrough	***Always On***
	Event Marker[1]	***On***

[1]The ***Event Marker Graph*** and ***Event Marker*** features are not applicable to all transmitters.

Telemetry parameter limits and alarm levels

Parameter Limits and Alarm Levels		Low	High	Level
HR	bpm	50	150	***Warning***
ST-I	mm	-2.0	2.0	***Warning***
ST-II	mm	-2.0	2.0	***Warning***
ST-III	mm	-2.0	2.0	***Warning***
ST-V	mm	-2.0	2.0	***Warning***
ST-V2	mm	-2.0	2.0	***Warning***
ST-V3	mm	-2.0	2.0	***Warning***
ST-V4	mm	-2.0	2.0	***Warning***
ST-V5	mm	-2.0	2.0	***Warning***
ST-V6	mm	-2.0	2.0	***Warning***
ST-AVR	mm	-2.0	2.0	***Warning***
ST-AVL	mm	-2.0	2.0	***Warning***
ST-AVF	mm	-2.0	2.0	***Warning***
NBP-S	mmHg	80	200	***Warning***
NBP-D	mmHg	20	120	***Warning***
NBP-M	mmHg	40	140	***Warning***
SPO2	%	90	105	***Warning***
SPO2-R	bpm	50	150	***Warning***
RR	breaths/min	5	30	***Warning***
RR-APNEA	seconds		30	***Warning***
PVC	#/min		6	***Advisory***

Arrhythmia Alarm Levels	Levels
Asystole	***Crisis***
VFIB/VTAC	***Crisis***
V Tach	***Crisis***
VT > 2	***Crisis***
V Brady	***Crisis***
Acc Vent	***Advisory***
Pause	***Advisory***
Tachy	***Advisory***
Brady	***Advisory***
R on T	***Message***
Couplet	***Message***
Bigeminy	***Message***
Trigeminy	***Message***
PVC	***Message***
Irregular	***Message***
Atrial Fib	***Message***

System Alarm Levels	Levels
CHANGE BATTERY	***System Warning***
OFF NETWORK	***System Warning***
ARR SUSPEND	***System Warning***
LEADS FAIL	***System Warning***
PROBE OFF	***System Warning***

C Maintenance

Biocompatibility

When used as intended, the parts of the product described in this operator manual, including accessories that come in contact with the patient during the intended use, fulfill the biocompatibility requirements of the applicable standards. For more information, contact your local sales/service representative.

Supplies

To ensure patient safety, use only supplies manufactured or recommended by GE. For more information, contact your local sales/service representative.

Inspection

An effective maintenance schedule should be established for your monitoring equipment and reusable supplies. This should include inspection as well as general cleaning on a regular basis. The maintenance schedule must comply with the policies of your institution's infection control unit and/or biomedical department.

CAUTION
Failure on the part of the responsible hospital or institution employing the use of this monitoring equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.

Check with your biomedical department to be sure preventive maintenance and calibration is complete. Qualified service personnel should repair or replace damaged equipment or reusable supplies. Refer to the appropriate service manuals for detailed maintenance and repair information.

Use the following guidelines when inspecting the equipment:

- Inspect the equipment for obvious physical damage.
- Inspect all cords for fraying or other damage.
- Inspect all plugs and connectors for corrosion, contaminants, bent prongs or pins.
- Inspect all cable insulation for cracks, tears, or other damage.

In the U.S., GE Service is available 24-hours a day by calling 800-558-7044. Outside the U.S., please contact your local sales/service representative.

NOTE

Refer to the appropriate service manuals for more comprehensive checkout procedures.

Disposal

WARNING
PACKAGING DISPOSAL—Dispose of all packaging material, observing all applicable waste control regulations and keeping out of children's reach.

WARNING
DISPOSAL—At the end of its service life, the products described in this manual, as well as its accessories, must be disposed of in compliance with guidelines regulating the disposal of each product. If you have any questions concerning disposal of a product, please contact GE or its representatives.

Cleaning

All equipment should be cleaned on a regular basis. Comply with the policies of your institution's infection control unit and/or biomed department. The decision to disinfect or sterilize must be made per your institution's requirements with an awareness of the effect on the integrity of the transmitter and leadwire.

WARNING
Disconnect AC-powered equipment from the power line before cleaning or disinfecting its surface. Turn off the power to battery-powered equipment before cleaning or disinfecting its surface.

WARNING
CONTAMINATED LEADWIRES— Contaminated leadwires may cause infection. Always follow the skin preparation guidelines and leadwire cleaning instructions provided in this manual.

WARNING
IMPROPER TRANSMITTER/LEADWIRE APPLICATION — Applying a transmitter and/or leadwire that is not thoroughly dry to a patient can result in an electrically conductive path being established and a ***Leads Fail*** alarm not being provided if leadwires come off the patient.

CAUTION
Never immerse devices, cables, or leadwires in any liquid.

CAUTION
Do not pour or spray any liquid directly on cables or leadwires or permit fluid to seep into connections or openings.

CAUTION
Never use conductive solutions, solutions that contain chlorides, wax, or wax compounds to clean devices, cables or leadwires.

CAUTION
Never use solutions or products that contain the following:

- Any type of Ammonium Chloride such as, but not limited to:
  - Dimethyl Benzyl Ammonium Chloride
  - Quaternary Ammonium Chloride solutions
- Abrasive cleaners or solvents of any kind
- Acetone
- Ketone
- Betadine
- Alcohol-based cleaning agents
- Sodium salts

CAUTION
Never autoclave or steam clean devices, cables or leadwires.

CAUTION
Do not attach the device to a patient until it is thoroughly dry.

Results of improper cleaning

- Appearance of waveforms when the device is not connected to a patient, causing false alarms instead of a ***Leads Fail*** alarm and may not provide a visual and/or audible ***Leads Fail*** alarm.
- Brittle and breaking device case.
- Overall system performance degradation.
- Melting, dulling, or distorting the case.
- Total handheld medical device failure requiring replacement.
- Unit malfunction.
- Void warranty.

Cleaning products to avoid

Cleaning products known to cause the types of problems listed above include, but are not limited to:

- Sani-Cloth Wipes
- Ascepti Wipes
- HB Quat
- Clorox Wipes (they do not contain bleach)
- Over-the-counter detergents (e.g. Fantastic, Tilex, etc.)

Products that contain active ingredients and solutions similar to these products should also be avoided.

Transmitter/device cleaning

These instructions apply to transmitters and any other devices, such as oximeters, blood pressure monitors, etc.

Cleaning/disinfecting

1. Remove all batteries and leadwires.
2. Close the battery door before cleaning the device.
3. Wipe the exterior of the device with a soft lint-free cloth, using the following solution as recommended in the APIC Guidelines for Selection and Use of Disinfectants (1996):
   - Sodium hypochlorite (5.2% household bleach) minimum 1:500 dilution (minimum 100 ppm free chlorine) and maximum 1:10 dilution.
   - Any sodium hypochlorite wipe product that meets the above guidelines of can be used.

   NOTE

   Wring excess disinfectant from wipe before using.

   NOTE

   Any contact of disinfectant solutions with metal parts may cause corrosion.
4. Allow disinfectant solution to remain on device for a minimum of one minute or per hospital guidelines.
5. Wipe off cleaning solutions with a clean, moist cloth.
6. Dry thoroughly with a dry lint-free cloth and let air dry for at least 30 minutes.

   NOTE

   Drying times may vary based on the environmental conditions.
7. Take care not to let fluid pool around connection pins. If this should happen, blot dry with a soft, lint-free cloth.

Storage

- Always remove batteries when the device is not in use (even for short periods of time).
- Store in a dry well-ventilated area.
- Hang the device, use a holder if available.
- If leadwires/cables are attached, they should hang straight.
- Do not coil leadwires/cables tightly around the device.

ECG cable/leadwire cleaning

Results of improper cleaning

- Product discoloration.
- Metal part corrosion.
- Brittle wires.
- Brittle and breaking connectors.
- Reduced cables and leadwires life.
- Unit malfunction.
- Void warranty.

Cleaning/disinfecting

1. Remove cables and leadwires from the handheld device or system before cleaning.
2. Use care in cleaning leadwires to prevent pulling the long wires from the connector ends. Metal connections can be pulled away from the connectors.
3. For general cleaning of cables and leadwires, wipe using a lightly moistened cloth with a mild soap and water solution. Then wipe and air dry.
4. For disinfecting the cables and leadwires, wipe exterior with a soft lint-free cloth, using the following solution as recommended in the APIC Guidelines for Selection and Use of Disinfectants (1996):
   - Sodium hypochlorite (5.2% household bleach) minimum 1:500 dilution (minimum 100 ppm free chlorine) and maximum 1:10 dilution.
   - Any sodium hypochlorite wipe product that meets the above guidelines of can be used.

   NOTE

   Wring excess disinfectant from wipe before using.

   NOTE

   Any contact of disinfectant solutions with metal parts may cause corrosion.
5. Do *not* immerse either end of a cable or leadwire connector. Immersing or soaking the connector ends may corrode metal contact ends and affect signal quality.

6. Wipe off cleaning solutions with a clean, lightly moistened cloth.
7. Dry thoroughly with a dry lint-free cloth and let air dry for at least 30 minutes.

   NOTE

   Drying times may vary based on the environmental conditions.

8. Take care not to let fluid pool around connection pins. If this should happen, blot dry with a soft, lint-free cloth.
9. Do *not* use excessive drying techniques, such as oven, forced heat or sun drying.

Sterilizing

NOTE

EtO sterilization is *not recommended*, but may be required for cables and leadwires. Frequent sterilization will reduce the useful life of cables and leadwires.

Sterilize with ethylene oxide gas (EtO) at a maximum temperature of 50° C (122° F). After EtO sterilization, follow the recommendations from the sterilizer manufacturer for required aeration.

Storage

- Store in a dry well-ventilated area.
- Vertically hang cables and leadwires.
- Do not coil leadwires or cables tightly around any medical device.

D Troubleshooting

ECG

Arrhythmia troubleshooting

Problem: Inaccurate heart rate and/or false asystole

Solution: Check ECG signal from patient:

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes.

Check amplitude of ECG waveform:

1. Click on the patient's ***ECG*** tab.
2. Click on all ECG leads in the Display section and check for 0.5 mV amplitude at normal (1X) size. (At least 0.5 mV amplitude is required for QRS detection.) For borderline signals, validate on a graph.
3. If amplitudes are low, electrodes may need to be repositioned or replaced.

Relearn arrhythmia:

1. Click on the patient's ***ECG*** tab.
2. Click on the ***Relearn*** button.

IF PROBLEM CONTINUES: Change to ***Single-Lead*** ECG detection and processing:

1. Click on the patient's ***ECG*** tab.
2. Click on ***Single-Lead*** in the ***Lead Analysis*** section.
3. Click on the ECG leads in the Display section and change top ECG waveform to display the lead with the greatest amplitude. (At least 0.5 mV amplitude is required for QRS detection.)

Problem: False ventricular calls

Solution: Check ECG signal from patient: (V leads may exhibit polarity changes which may occasionally cause an inaccurate call.)

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes. (If V lead is a problem, move the V lead to another V position.)
4. Relearn ECG:
   - Click on the patient's ***ECG*** tab.
   - Click on the ***Relearn*** button.

IF PROBLEM CONTINUES:

1. Remove the V lead(s).

2. Click on the patient's ***ECG*** tab.
3. Click on the ***Relearn*** button.

Problem: ARR Suspend

Solution: Check ECG signal from patient.

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes.
4. Correct artifact source.

Pacemaker troubleshooting

There are two general things that occur when the pace mode is activated for pacemaker patients:

1. Beats that would otherwise be classified as ventricular are instead classified as V-paced if a ventricular pacemaker event is detected.
2. Residual pacemaker energy that might otherwise appear in the ECG is removed, and a white pacemaker enhancement spike is artificially placed in the ECG.

Pace detection is indicated visually in the ECG parameter box. When watching the ECG waveform, pace detection is indicated by uniform, upright pacemaker enhancement spikes in the ECG data (both displayed and graphed).

NOTE

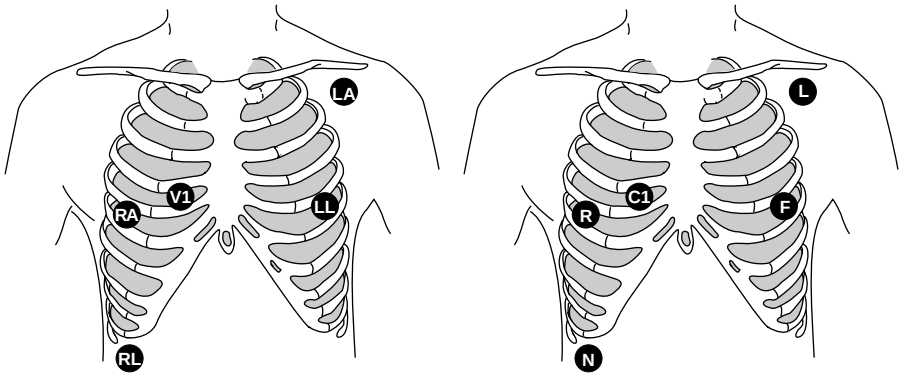
To improve pacemaker detection, reposition the electrodes and ensure a good skin preparation to maximize R-wave detection. Perform a relearn any time lead positions are changed. For more information, refer to Electrode placement on page 6-2.

During telemetry monitoring, the pacemaker signal is acquired from lead II or on II and V simultaneously when using the T14 transmitter. Changing the displayed lead has no effect on pacemaker detection.

NOTE

With all leads connected, pacemaker signal acquisition occurs on lead II or on II and V simultaneously when using the T14 transmitter. In a ***Leads Fail*** condition, signal acquisition occurs on any available lead. When a 3-leadwire set is used, single channel acquisition occurs on the programmed lead.

To improve pacemaker detection, reposition the electrodes and assure a good skin preparation to maximize R-wave detection. The following is a suggested configuration:



369B, 374B

The right arm electrode is moved down to the fifth intercostal space, and the left leg electrode is moved up to the fifth intercostal space.

NOTE

After all electrodes are in place, ensure that a minimum of 1/2 mV of signal is present on each lead (I, II, III, V).

Interface connector ports

Pace detection performance is optimized with proper lead application and correct use of the serial interface connector ports. If you are experiencing degraded pace detection performance, verify that all leads are properly attached to the patient and verify that any connected serial device(s) are in the appropriate serial interface connector ports.

- The inside port, labeled **2** on the dust cover, is for use with episodic monitoring serial devices, such as NBP.
- The outside port, labeled **1** on the dust cover, is for use with continuous monitoring serial devices, such as SpO2.

Problem: Inaccurate pacemaker detection

Solution: Use pacemaker processing:

1. Click on the patient's ***ECG*** tab.
2. In the ***Detect Pace*** section, select either ***Pace 1*** or ***Pace 2***.

Solution: Exchange the right and left arm leads and perform a relearn.

Notes

- In general, BE AWARE that a pacemaker pulse could be falsely counted as a QRS during asystole.
- ***Pace 1*** mode analyzes the presence of a pacer spike, assesses the waveform for residual pacemaker energy, and determines the presence of an R wave following the pacer spike. If an event occurs during the first few milliseconds following the pacer spike, it will be counted.

- ***Pace 2*** mode analyzes waveforms with the added capability of minimizing the chance of counting severe residual pacemaker energy as QRS complexes. In relation to the event rejection capability of Pace 2 pace mode, certain morphologies may not be detected. Arrhythmia calls like asystole or pause may be made with heart rate identified as less than actual.

Again, pacemaker patients should be kept UNDER CLOSE OBSERVATION. The appropriate pace mode may be determined at the time the pacemaker patient is admitted to the monitoring system. The ***Pace 2*** mode is recommended for use whenever possible.

Check ECG signal from patient:

1. Check/adjust lead placement.
2. Check/perform skin preparation.
3. Check/replace electrodes.

ST troubleshooting

Problem: ST numerics changed to Xs

Solution: An ST value changes to Xs when the patient's dominant morphology has not been detected 16 times in the last 30 seconds. The program waits one minute and then automatically relearns. ST numerics will be displayed after the relearn.

IF PROBLEM CONTINUES:

1. Check for morphology change.
2. Check for noise on ECG.
3. Relearn:
   a. Click on the patient's ***ECG*** tab.
   b. Click on the ***Relearn*** button.

SpO2 messages

Below is a list of system status alarm messages that may be displayed in the patient's bed window during monitoring. SpO2 messages appear in abbreviated form in graph headers. If you are unable to resume SpO2 monitoring, contact your sales/service representative.

NOTE

The Xpod oximeter can display the same SpO2 system status messages as the Apex oximeter, except for the ***CHANGE BATTERY*** message. The Xpod oximeter uses the battery power supplied by the transmitter and therefore does not support this message.

CHANGE BATTERY	Message displayed with SPO2 data displayed—The batteries in the Apex oximeter are low. There is approximately 1 hour of reserve power left in the batteries. Change the batteries. Message displayed, no SPO2 data displayed—The batteries in the Apex oximeter are depleted. Replace the batteries. This is a system ***Warning*** alarm. The alarm will sound, and a red alarm button will appear on the CIC Pro center display. If the batteries are not replaced within 20 minutes, all SPO2 parameter information will be removed from the display. If the batteries are replaced within 20 minutes, SpO2 monitoring will resume.
SPO2 PROBE	The probe has been disconnected from the oximeter (no data is displayed).
SIGNAL	SpO2 data continues to be displayed, but the quality of the signal is questionable. Check the patient and the probe.
NO DATA	The oximeter is still connected, but no valid data is being transmitted to the receiver. Check that the patient is within antenna range. If the problem persists, contact GE Service.
SPO2 PROBE OFF	The probe is off the patient. Check the probe.
The saturation value is X	The oximeter is still connected, but no valid data is being received at the receiver. The patient may be in an area of poor antenna reception, where some, but not all data is being transmitted. This message remains on the CIC Pro center for three minutes. If no data is detected after three minutes, the message changes to *NO DATA*.

NBP

Troubleshooting

Problem: Erroneous NBP measurement

Solution:

1. Check for proper cuff size:
   - Too small a cuff can give an erroneously high value.
   - Too large a cuff can give an erroneously low value.

   NOTE

   For proper fit of an NBP cuff, the arm should be measured from the top of the shoulder joint to the elbow. Divide the length by 2 and measure from the middle of measurement on the arm. Measure the circumference in centimeters around the arm. Refer to the NBP cuffs for proper fitting size.
2. Check for residual air left in the cuff from a previous measurement. This could indicate a hardware problem that may require service.
3. Make sure the cuff is not too tight or too loose.
4. Make sure the cuff and the heart are at the same level; otherwise hydrostatic pressure will offset the NBP value.
5. Watch for pulsus paradoxis.
6. Check for leak in cuff or tubing.

7. Patient may have a weak pulse.
8. Calibration may be necessary.

NBP status messages

NBP status messages appear in abbreviated form in graph headers, when applicable.

A message will clear when the next measurement is initiated, or a message can be cleared manually with the ***Clear Message*** option on the NBP tab sheet.

The following system status alarm messages may be displayed in the patient's bed window during monitoring.

CHANGE BATTERY	An NBP measurement was attempted with low batteries. Change the batteries in the blood pressure monitor and try another measurement.
FAIL	A hardware failure has been detected in the blood pressure monitor. In the U.S., contact GE Service. Outside the U.S., contact your local sales/service representative.
LEAK	The NBP cuff is loose or there is an air leak in the cuff or tubing. Check that the cuff is on snugly. Check the connection between the cuff and the tubing. Check the connection between the tubing and the blood pressure monitor. Try another measurement. If the problem persists, contact your local sales/service representative.
LOW INFLATION PRESS	This message appears when K-sounds are detected immediately upon inflation. The inflation pressure is too low for proper NBP measurement. Try another measurement or adjust dynamic/fixed inflate. If the problem persists, contact your local sales/service representative.
MOVEMENT	This message appears when there is excessive patient arm movement, or if the patient's arm was bent during the measurement. Check the patient and try another measurement.
SENSOR?	This message appears when the K-sounds on the measurement were too weak, or not enough sounds were detected. Reposition the microphone and try another measurement. This message can also appear if the deflate rate is not properly adjusted. If the problem persists, contact your local sales/service representative.
WEAK PULSE	The patient's heart rate is erratic. Check that the microphone cable is plugged firmly into the patient cable, and check that the microphone is positioned correctly on the patient. Try another measurement. If the problem persists, it could indicate a defective microphone, microphone cable, or patient cable. Contact your local sales/service representative.

Messages

Alarm messages

The following messages appear in the patient's bed window at the CIC Pro center.

ALARM PAUSE	All alarms for this patient have been turned off for five minutes. This is initiated from the transmitter by pressing both the **Verify Leads** and **Graph** buttons simultaneously. Refer to ALL ALARMS OFF.
ALL ALARMS OFF	All alarms for this patient have been turned off. No graph strips run, arrhythmia events are not stored, and no audible tones sound if an alarm condition should occur.
ARR OFF	The arrhythmia program for a selected patient has been turned off. No arrhythmia messages are displayed, arrhythmia event s are not stored, no graph strips run, and no audible tones sound if an arrhythmia alarm condition occurs.
ARTIFACT ARR SUSPEND	All artifact begins at level 1. Sustained artifact progresses to level 2 when noise on ECG lasts for 20 of the last 30 seconds. ■ Level 1 — Upon immediate detection of artifact, the message ***ARTIFACT*** is displayed. There is no alarm tone. Only lethal arrhythmia processing is available. ■ Level 2 — Arrhythmia monitoring is suspended in this condition. A system warning alarm sounds, no arrhythmia messages are displayed, no graph strips run and no arrhythmia events are stored. Heart rate and PVC values change to X, an additional message, ***ARR SUSPEND***, is displayed.
LEADS FAIL	All leads have failed, right leg lead failed, lead wires unplugged or reference lead failed. If set to ***Warning*** or ***Advisory*** level, a system alarm is heard. This will self-silence if condition is corrected, or the user can silence for one minute with the ***Silence Alarms*** button at the bottom of the CIC Pro center display.

NO TELEM	The ***NO TELEM*** alarm occurs in two situations: 1. The patient moves out of range. If the transmitter is out of range for more than 30 seconds, the ***NO TELEM*** message displays. Should a ***LEADS FAIL*** condition occur prior to a ***NO TELEM*** condition, the ***LEADS FAIL*** condition takes priority. The ***LEADS FAIL*** message is displayed along with the ***NO TELEM*** message. 2. Transmitter batteries are extremely low or dead. If batteries are extremely low or completely dead, the ***NO TELEM*** message appears, a ***CHANGE BATTERY*** message appears in the patient's bed window, and the audible alarm sounds. Activating the ***ALL ALARMS OFF*** feature prevents the audible alarm from sounding.
OFF NETWORK	In the ***Combo*** mode, telemetry patient data is provided from the bedside monitor to the CIC Pro center. If the bedside monitor is removed from the network or becomes otherwise unavailable, the ***NO COMM*** message displays first on the CIC Pro center and there is a loss of monitoring for about 45 seconds, then waveforms return and the ***OFF NETWORK*** message is displayed below the HR parameter window. The CIC Pro center will then display patient data directly from the telemetry bed along with this message in that CIC Pro center bed window. Should the bedside monitor reappear on the network, the ***Combo*** monitoring application will automatically resume and the alarm will be cleared. This alarm is also generated if the receiver system is removed from the network or becomes otherwise unavailable. The bedside monitor does not sound alarms, but the alarms must be turned back on at the bedside monitor if they were previously paused or off.

Graph messages

The following messages appear in the patient's bed window on the CIC Pro center display. These relate to running graphs at the printer.

GRAPH ALARM	An alarm graph was initiated and is running.
GRAPH MANUAL	A manual graph was requested and is running.
GRAPH TTX	The **Graph** button on the transmitter was pressed and a 20-second graph strip is running.
PRINTING	A non-real time graph is currently being printed.
SAVING	An alarm or a manual graph has been requested but the writer is in use, the writer door is open, the print location is not correct, or the writer is out of paper. The request is saved and will run as soon as the writer is available.

Transmitter-related messages

The following messages appear in the patient's bed window on the CIC Pro center display.

CHANGE BATTERY	This message flashes when the batteries are low. There is approximately 1 hour of use left after this message appears. If the batteries are extremely low or completely dead, a ***NO TELEM*** message flashes, and an audible alarm sounds.
LEADS FAIL	All leads have failed, right leg lead failed, right arm lead failed, leadwires unplugged or reference lead failed. If set to System ***Warning*** or System ***Advisory*** level, a system alarm occurs. This will self-silence if condition is corrected, or user can silence for one minute with ***Silence Alarms*** button at the bottom of the CIC Pro center display. **NOTE** ***LEADS FAIL*** will not result in a ***NO TELEM*** alarm message after 30 seconds.
RA (LA, LL, V) FAIL	One of these may appear, indicating failure of a lead.
NO TELEM	The transmitter was out of range for more than 30 seconds. If this condition persists, contact GE Technical Support. If a ***LEADS FAIL*** condition occurs prior to a ***NO TELEM*** condition, the ***LEADS FAIL*** condition takes priority
TTX number is already in use	This message displays when attempting to admit a transmitter that is sequentially numbered with another admitted transmitter. For example, you cannot admit TTX ID number 54078 and 54079 at the same time. Use another transmitter with a non-sequential TTX ID number to admit the patient.

System status messages

System status alarms (generated by mechanical conditions) are displayed in the lower left corner of the CIC Pro center screen. Each message is preceded by the receiver system's name, if it has been entered, or a name created by using the last six numbers of the receiver system Ethernet address.

DUPLICATE TOWER NAME	A network problem exists. Restart the system. If this condition persists, contact GE Technical Support.
DUPLICATE NAME	A network problem exists. Restart the system. If this condition persists, contact GE Technical Support.

Patient status messages

Patient status messages are also displayed in the lower left corner of the CIC Pro center screen. They are not, however, preceded by the receiver system name or Ethernet address.

"Unit/Bed" IS UNMONITORED	A telemetry patient is admitted but is not displayed (and therefore is unmonitored) on any CIC Pro center. If an alarm occurs on an unmonitored bed, the information will appear in the alarm text line and an audible tone will sound. You must view the patient first if you would like to silence the alarm. To view an unmonitored bed, click on the ***View Other*** button.
"Unit/Bed": DUPLICATE NAME	There is another device on the network with the same bed name. The duplicate device must be renamed.

E Technical specifications

NOTE

Specifications are provided to help you determine the space, ventilation, air conditioning and power requirements to ensure proper operation of your system. Specifications are approximate and may change with the actual unit shipped. Specifications are subject to change without notice. Contact your sales or service representative for more information.

T14 transmitters

Power requirements

Battery type	ANSI/NEDA 15 A, 1.5V AA alkaline (2 required)
Battery life	hours
Polarity	Electronic reverse polarity protection

Alarms and controls

Battery integrity	Transmitted and indicated via LED
Leads Fail indication	Transmitted and indicated via LED

Transmission

Channel spacing	25 kHz
Frequency stability	± 0.0001% of assigned channel frequency
Bit rate	10 kbps
Antenna	Formed by leadwire shield

ECG

Multi-channel configuration (5- or 6- leadwire)	I, II, III, Va, Vb, aVR, aVL, aVF
Leads analyzed simultaneously	Four (I, II, III, V)
Single-channel (3-leadwire) configuration	I, II or III, configurable
Heart rate detection	30 to 300 BPM
QRS detection range	0.5 to 5 mV
Frequency response	0.05 to 40 Hz (-3 dB)

A/D converter resolution	10 bits, 9.75 µV (RTI)
Sample rate	240 samples/seconds

Environmental specifications

Operating conditions

Temperature	5 to 40° C
Relative humidity	15 to 95% (non-condensing)

Storage conditions

Temperature	-20 to 70° C
Relative humidity	15 to 95% (non-condensing)
Pressure	700 to 1060 hPa

Device specifications

Water resistance	IEC 60529 IPX7 rating (can survive inadvertent submersion)
Input configuration	3, 5 or 6 electrodes
Frequency range	
Modulation	GFSK
Serial I/O ports	2
Alarm pause	Transmitted and indicated via LED
Graph request	Transmitted
Event Marker	Transmitted
Attendant request	Transmitted
Maximum transmitters	239 active within WTMS at a single facility
Dynamic range	± 5 mV (RTI)
Input offset	± 400 mV (RTI)
Input impedance	15 M ohm minimum differential @ 10 Hz
ECG gain selection	5, 10, 20, 40 mm/mV (RTI)
ECG gain accuracy	± 5% @ 15 Hz
Common mode rejection	100 dB minimum @ 60 Hz
Defibrillator protection	± 5000 VDC, 360 joules into 100 ohm
Defibrillator recovery time	Transmitter recovers within 2 seconds

Pacemaker detection	± 2 mV to ± 700 mV (RTI); 100 µsec to 2 msec; either polarity; on multiple leads
Patient leakage current	Meets UL/IEC 60601-1
Serial communications	2 ports at 9600 baud asynchronous

Physical specifications

Height	13.7 cm (5.38 in)
Width	7.3 cm (2.875 in)
Depth	2.3 cm (0.91 in)
Weight	141.8 g (0.275 lb) without battery; 170.1 g (0.375 lb) with battery

FCC compliance information

This device complies with Part 95 of the FCC Rules and RSS-210 of Industry Canada.

Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

Certifications

- UL/IEC/EN 60601-1
- IEC/EN 60601-1-1
- IEC/EN 60601-1-2
- IEC/EN 60601-1-4
- IEC/EN 60601-2-27
- IEC/EN 60601-2-49
- 608.025 to 613.975 MHz - FCC Part 95

ApexPro telemetry server

Display specifications

Video output	1024 X 768 @ 75 Hz

Power specifications

Power supply	300 watt ATX dual-redundant

Environmental specifications

Operating conditions

Temperature	10 to 35° C (50 to 95° F)
Relative humidity	15 to 80% (non-condensing)
Vibration	5 to 500 Hz, 0.5 G RMS
Altitude	0 to 3048m (0 to 10000 ft)
Acoustic noise	Less than 52 dB sound pressure at 5 to 28° C (41 to 82° F)

Storage conditions

Temperature	-23 to 49° C (-10 to 120° F)
Relative humidity	10 to 90% (non-condensing)

Physical specifications

Height	8.8 cm (3.46”)
Depth	45 cm (17.7”)
Width	48.2 cm (19”)
Weight	15.8 kg (35 lb)

FCC compliance information

This device complies with Part 95 of the FCC Rules and RSS-210 of Industry Canada.

Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

Certifications

- IEC/EN/UL 60950-1
- CAN/CSA C22.2 No.950
- IEC/EN 60601-1-4
- EN 55022 (Class A)
- EN 55024
- EN 61000-3-2
- EN 61000-3-3
- CE marked to the Medical Device Directive 93/42/EEC

ApexPro receiver system

Performance specifications

RF module type	GFSK and GMSK digitally demodulated
UHF frequency range	560.025 to 613.975 MHz (U.S.) 420 to 460 MHz (International)
Frequency step resolution	Synthesized tuning to any transmitter; 25 kHz spacing
Receiver system capacity	1 to 4 quad receiver modules (4 to 16 receivers)
Frequency stability	± 0.0003% (3 PPM) of assigned channel frequency
Bit rate	10 kbps
Sensitivity	8.7 µV (-90 dB) minimum for 1 bit error/million bits received

Network requirements

Physical	IEEE 802.3 compatible, physical connector via 10 base T
Serial protocol	19200 baud, 1 stop bit, 8 data bits, no parity, XON/XOFF flow control
System status indicators	7 bicolor LEDs

Power requirements

Input voltage	100 to 240 VAC
Input frequency	50/60 Hz
Power consumption	25 watts maximum with 4 quad receiver
Cooling	Free air convection

Environmental specifications

Operating conditions

Temperature	5 to 40° C
Relative humidity	15 to 90% (non-condensing)

Storage conditions

Temperature	-20 to 50° C
Relative humidity	15 to 90% (non-condensing)
Pressure	700 to 1060 hPa

Physical specifications

Height	17.0 cm (6.7 in)
Width	32.5 cm (12.8 in)
Depth	25.0 mm (9.8 in)
Weight	6.4 kg (14 lb)

FCC compliance information

This device complies with Part 95 of the FCC Rules and RSS-210 of Industry Canada.

Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

Certifications

- UL/IEC/EN 60601-1
- CAN/CSA C22.2 No.601.1
- IEC/EN 60601-1-2
- IEC/EN 60601-1-4
- CE marked to the Medical Device Directive 93/42/EEC

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