IntelliVue Information Center

INSTRUCTIONS FOR USE

Release E

English

PHILIPS

Notice

Instructions for use

Equipment specifications are subject to alteration without notice. All changes will be in compliance with regulations governing manufacture of medical equipment.

Printed in the USA.

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Printing History

New editions of this document will incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged by a revision date at the bottom of the page. Note that pages which are rearranged due to changes on a previous page are not considered revised.

The documentation printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The document part number changes when extensive technical changes are incorporated.

First Edition ..... December, 2002

Warnings

The warnings described below refer to the following devices:

- IntelliVue M3150 Information Center
- IntelliVue M3151 Information Center Client
- Philips Recorder

Warning

Some pace pulses can be difficult to reject. When this happens, the pulses are counted as a QRS complex, and could result in an incorrect HR and misdetection of cardiac arrest or some arrhythmias. Keep pacemaker patients under close observation. See Chapter 5, "ST/AR Arrhythmia Monitoring," for specific warnings about monitoring paced patients.

Warning

This device provides ST level change information; the clinical significance of the ST level change information should be determined by a physician.

Warning

Always confirm Information Center observations with clinical observation of patient at the bedside before administering interventions.

About this Book

Overview

This User's Guide can be used with the family of IntelliVue Information Centers and the Philips Recorder. The IntelliVue Information Centers include the:

- IntelliVue M3150 Information Center
- IntelliVue M3151 Information Center Client

The terms "Information Center" and "central" are used throughout this book to refer to all three models listed above. Specific differences between the various models are noted in the text where applicable.

This User's Guide contains information specific to the Information Center including information on performing day-to-day tasks and troubleshooting common problems, as well as detailed information about all clinical applications. It also provides a complete list of alarm and INOP messages and configuration choices. Sections that contain information about telemetry have this telemetry transmitter icon next to the title:

Note—For specific information on using the Philips Telemetry System, please refer to the your *Philips Telemetry System Instructions for Use* manual.

The on-line Information Center Help provides a Quick Guide for completing basic tasks and troubleshooting problems. The on-line Quick Guide also provides user information for the Philips Telemetry System.

Note—Not all functionality described in this manual may be available to you.

For information about your computer, printer, or other hardware, please consult the accompanying documentation. To verify that the device is installed and working correctly see the *"Performance Assurance"* section of the Philips Information Center Service Manual.

Document Conventions

Procedures

Procedures are indicated in text by the heading “Task Summary” followed by the following table:

Step	Action
1	
2	
3	

Bold Typeface

Objects of actions in procedures appear in **bold** typeface. Note the following example:

> Click the **Update** button.

Warnings

Warning

Warnings are information you should know to avoid injuring patients and personnel.

Cautions

Caution

Cautions are information you should know to avoid damaging your equipment and software.

Notes

Note—Notes contain additional information on the Information Center usage.

About this Book

Contents

1 Introduction to the Information Center

This chapter provides an overview of the IntelliVue Information Center. It includes the following sections:

The IntelliVue Information Center

The IntelliVue Information Center is part of the Philips Patient Care System. The IntelliVue Information Center consists of:

- the Information Center Software, including the ST/AR ST Segment and Arrhythmia Algorithm Software
- the NT Workstation
- an uninterruptible power supply (UPS)
- the Philips Recorder
- accessory printer (optional)

There are two different models to meet your specific patient monitoring needs. These include the:

- IntelliVue M3150 Information Center
- IntelliVue M3151 Information Center Client

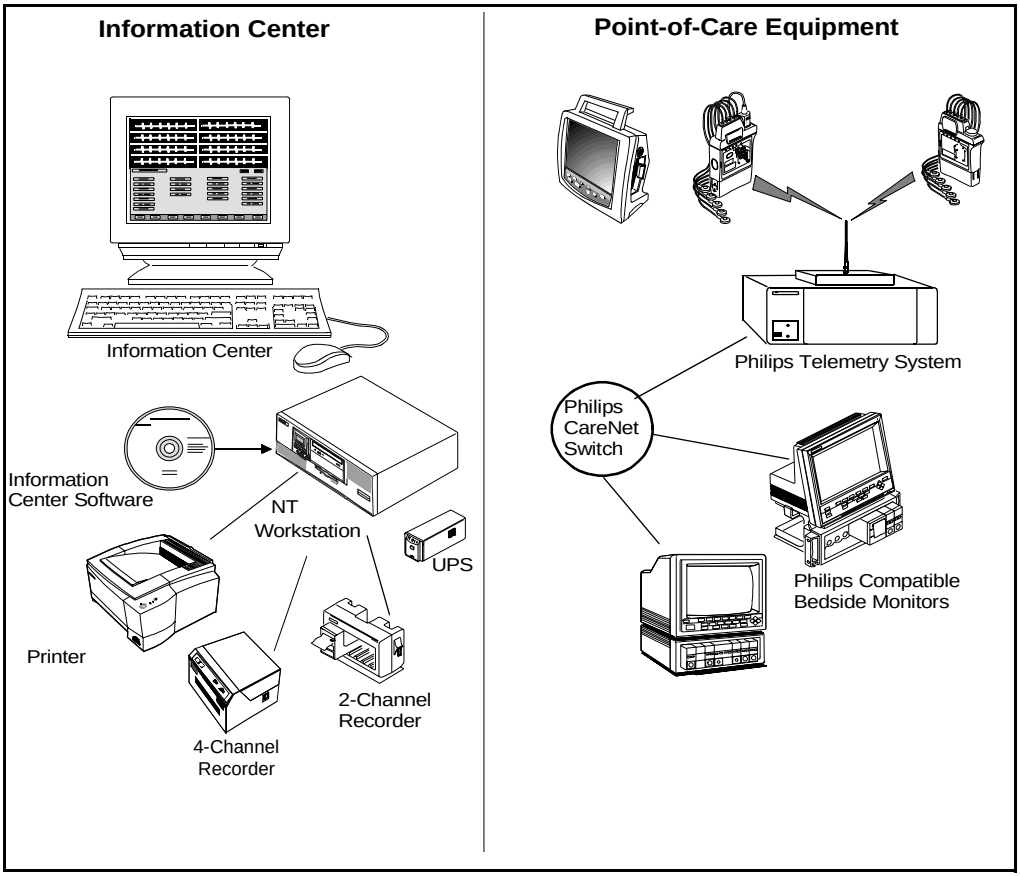
Note—In this book the term “Information Center” is used for both models. Differences in features or functionality are called out where appropriate.

For a description of the features and available options with each of the models refer to Chapter 10, “Information Center Safety and Specifications.”

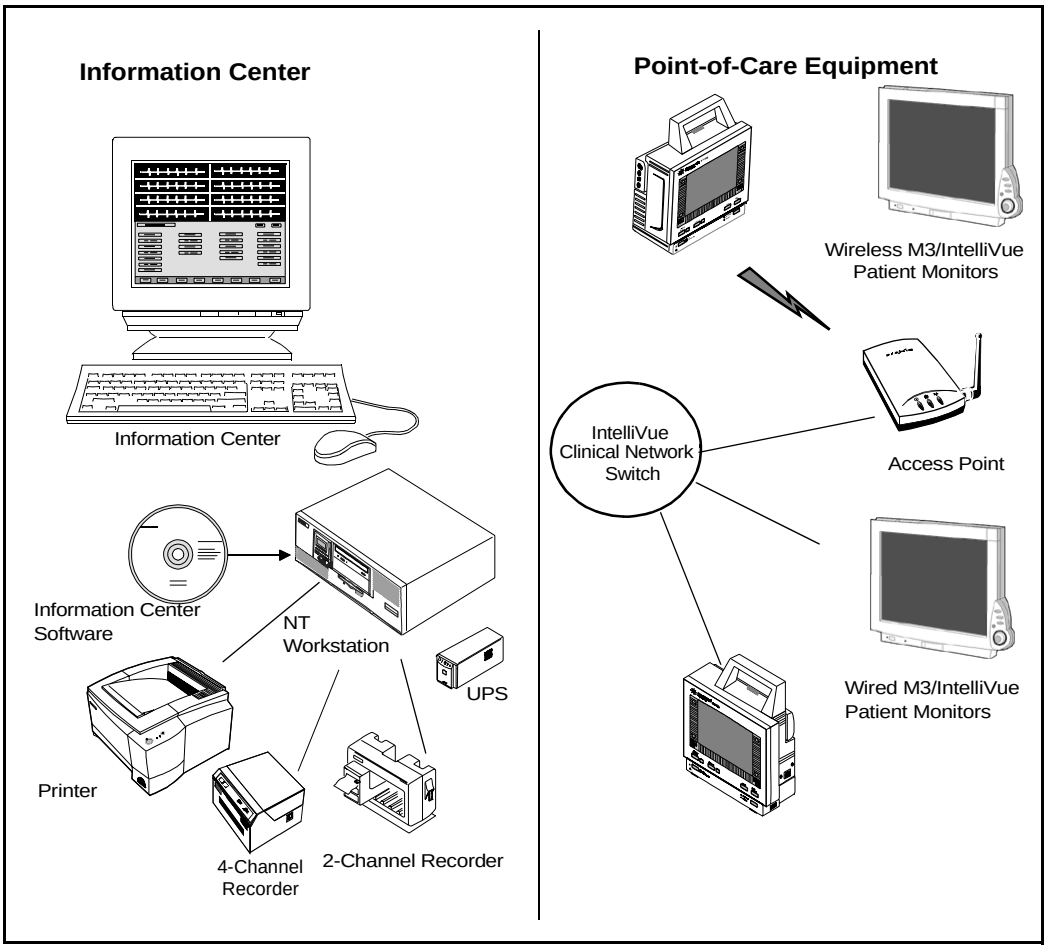
Philips Patient Care System

The Information Center displays information via the Philips CareNet network and/or IntelliVue Clinical Network, received from point-of-care equipment connected to the network.

The illustrations on the following pages show an Philips Patient Care System with an Philips CareNet network and the IntelliVue Clinical Network.



Philips Patient Care System with CareNet



Philips Patient Care System with IntelliVue Clinical Network

IntelliVue Clinical Network with Database Server

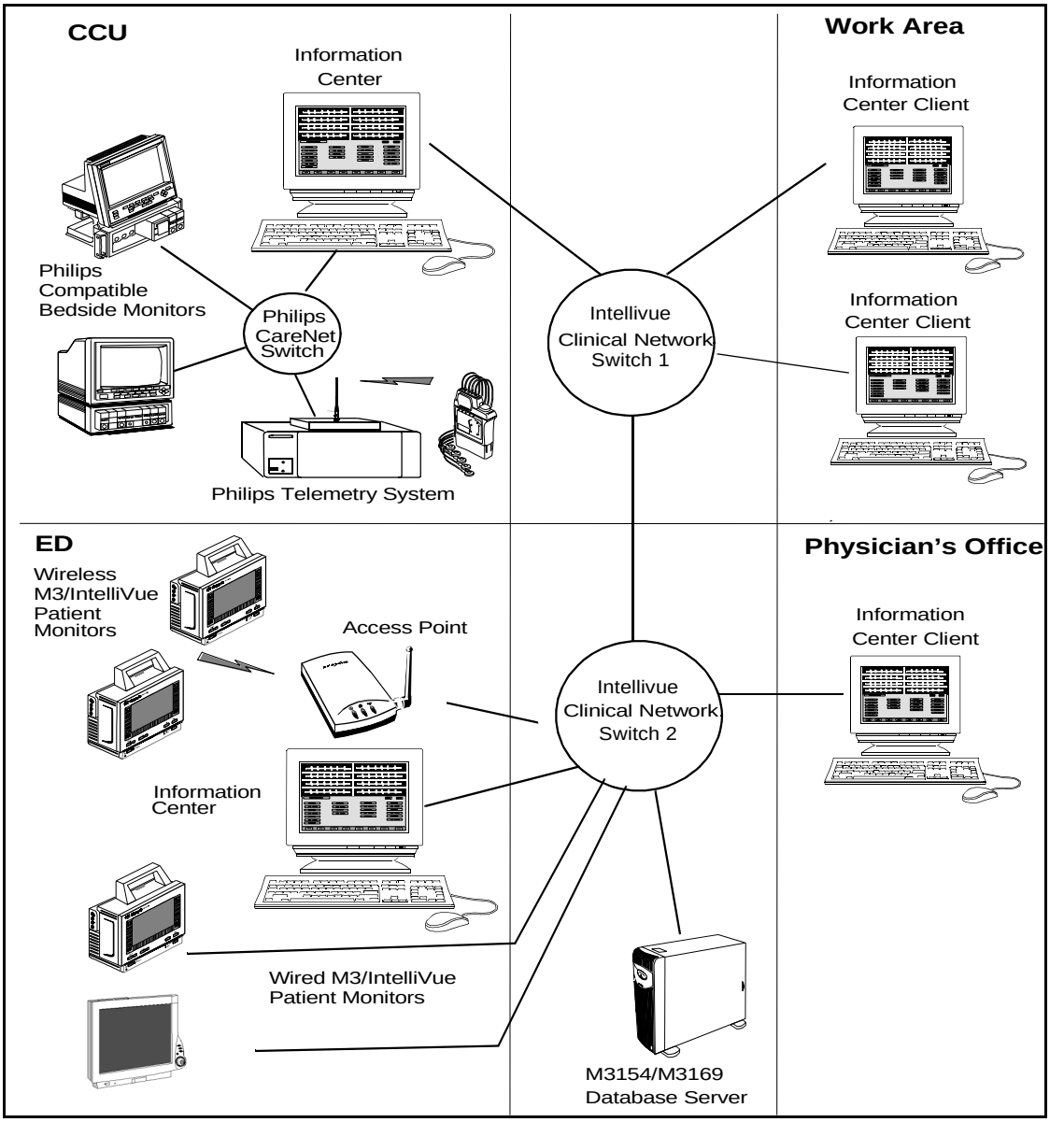
The IntelliVue M3185 Clinical Network with the M3154 Database Server or the M3169 Database Server, enables transmission of data between centrals, providing access to both real-time and stored data within and across clinical units. The patient data storage includes full disclosure waveforms and physiologic parameters for up to 48 hours per patient, up to 4 waves per patient, and up to 150 30-second alarm records and saved strips, with up to 4 waves per event.

The IntelliVue Clinical Network with the M3169 Database server stores data for up to 48 patients and supports up to 3 M3150 Information Centers for monitoring patients and up to 3 M3151 Information Center Clients for reviewing patient data.

The IntelliVue Clinical Network with the M3154 Database Server stores data for up to 96 patients and supports up to 8 M3150 Information Centers for monitoring patients and up to 8 M3151 Information Center Clients for reviewing patient data.

The IntelliVue Clinical Network is based on industry standard components and cabling.

The following illustration shows an example of a IntelliVue Clinical Network connecting centrals in separate clinical units.

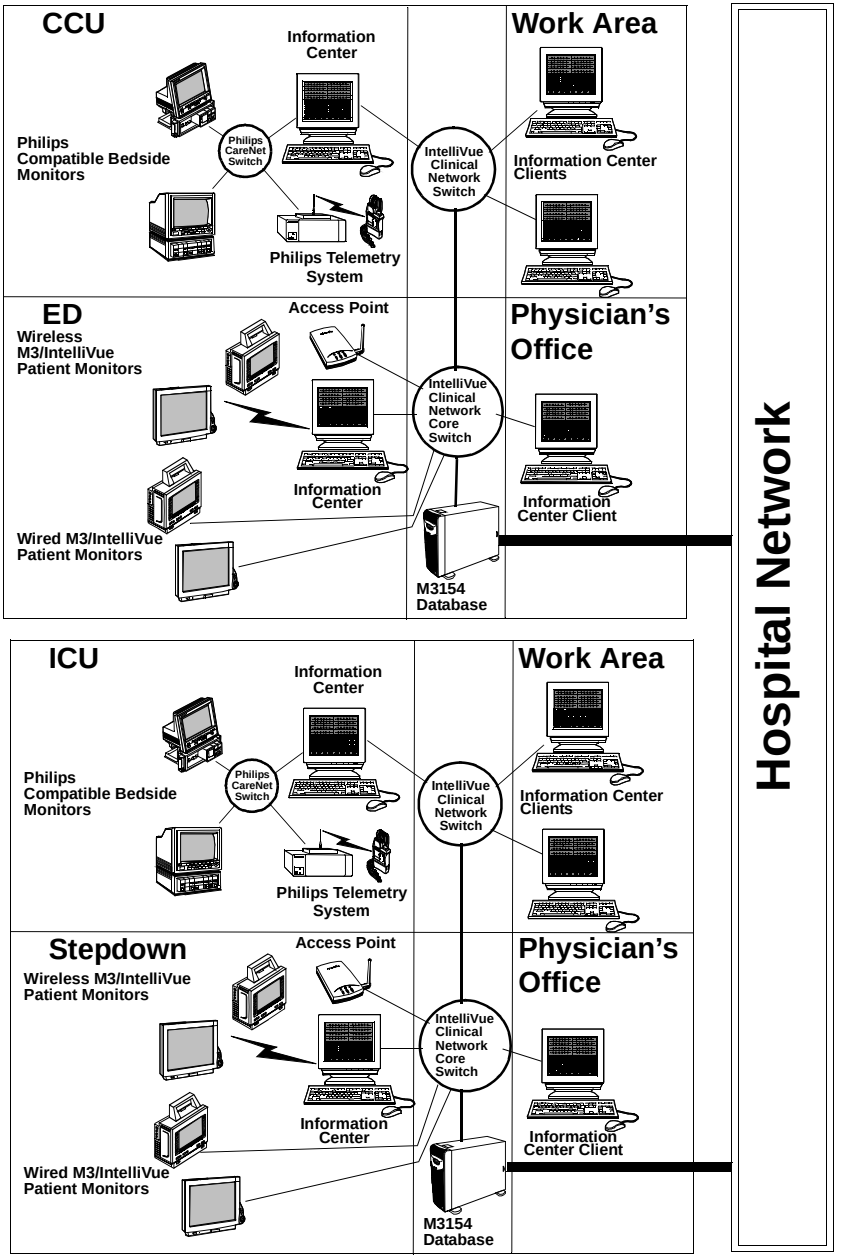


Philips Patient Care System with IntelliVue Clinical Network and Database Server

Large Network Central Database System

The Large Network Central Database System allows up to 10 M3154 Database Servers to be interconnected on the hospital network. This connectivity provides clinicians with the ability to transfer patients across care units that are on separate database servers. In addition, for systems with the M3185 Application Server, the Large Network Central Database System allows you to view, through the Information Center Web Access, near-realtime waves, parameters and alarms, as well as review all retrospective data for up to 960 patients across care units that are on separate database servers (see “Information Center Web Access” on page 6-62).

The following illustration shows an example of a Large Network Central Database System.



Philips Patient Care System with Large Network Central Database System

Intended Use

The intended use of the Information Center Software is to display physiologic waves, parameters, and trends, format data for strip chart recordings and printed reports, and provide the secondary annunciation of alarms from other networked medical devices at a centralized location. The Information Center Software provides for the retrospective review of alarms, physiologic waves and parameters from its database.

An additional intended use of the Information Center Software is to provide primary annunciation of alarms and configuration and control access for networked telemetry monitors.

This product is not intended for home use.

Rx only.

The Information Center Features

The Information Center Software allows you to:

- View waves and physiological parameter information sent over the monitoring network. Up to 24 waves can be displayed on a single main screen. Up to 32 waves can be displayed on dual displays with two main screens.
- Be alerted to patient alarms that have been detected by networked monitoring devices and respond to the alarms.
- Perform ST/AR multilead arrhythmia analysis on up to two leads of ECG. ST/AR ST segment monitoring provides ST elevation and depression measurements for telemetry-monitored patients.

  Note—ST/AR analysis for M3 and IntelliVue Patient Monitors is done at the monitor. ST analysis for all bedside monitors is done at the monitor.
- Make strip chart recordings on a Philips Recorder and (if a printer is available) printed reports requested from the point-of-care and/or the Information Center.
- Access a retrospective review of up to 48 hours of patient data, including full disclosure waves and parameters, alarms, ST segments, events, trends, EASI derived reconstructed 12 lead ECG and captured conventional 12 lead ECG.
- View real-time data for a patient being monitored by another Information Center connected via Philips CareNet. If connected via the IntelliVue Clinical Network, you can view both real-time and stored data for a patient monitored on another central, and that central can be in the same clinical unit or in another unit.
- Provide the clinical operator with secondary notification of patient alarms and wave snippets on a small paging device through the integration of the Data Critical Statview™ paging system (available in limited geographies) with the Information Center.

- Provide the management of grouping of beds per nursing assignment (‘Care Groups’). A single Care Group is typically named for a caregiver who is responsible for multiple patients within a single care unit. A Care Group can be assigned a color that will display as the background for the bed label on the Information Center. Color by Care Group helps the caregiver to quickly identify beds within their Care Group.
- Export ECG waveform data from the Information Center to an Zymed Holter for Windows™ - Model 2010 for analysis.

Recordings and Reports

Recordings can be requested from the Information Center or from networked products.

If a printer is connected, reports requested from the Information Center or from networked products can be printed.

Point-of-Care Equipment

The Information Center communicates with the following monitoring devices:

- Bedside monitors: IntelliVue Patient Monitor, CMS, V26 and V24, M3 (wired and wireless), and Compact Configurable Monitor 78352C/54C.

  Note—In this book the term “M3” refers to Revision D.0 of the M2, M3, and M4 bedside monitors. Differences in features or functionality are called out where appropriate.

- Philips Telemetry System and Hewlett-Packard M1403 Digital UHF Telemetry System with Option C03. The telemetry system must be Release C or greater. If the Philips transmitter is connected to the TeleMon bedside monitor, it is referred to as “docked”.

The Information Center provides the following functionality for point-of-care equipment connected via Philips CareNet or the IntelliVue Clinical Network.

Function	M3 Bedside Monitors connected via the IntelliVue Clinical Network	Bedside Monitors connected via Philips CareNet	Telemetry	IntelliVue Patient Monitors connected via the IntelliVue Clinical Network
Central monitoring (patient management alarm annunciation, etc.)	Yes	Yes	Yes	Yes
ST/AR Arrhythmia monitoring at the central	No -- provided by bedside monitor.	Yes	Yes	Yes -- ST/AR Arrhythmia functionality is available at the central but is provided by the bedside monitor.
Arrhythmia control and review at the bedside.	Arrhythmia control is at the bedside; review is available at the bedside and at the central.	Yes - CMS patient monitors must be Rev. C or greater.	N.A.	Yes
ST/AR ST segment monitoring at the central	No - if present, ST segment monitoring is provided from the bedside.	Yes - with limited functionality at the Information Center. Primarily provided from the bedside.	Yes	No - if present, ST segment monitoring is provided from the bedside.

Function	M3 Bedside Monitors connected via the IntelliVue Clinical Network	Bedside Monitors connected via Philips CareNet	Telemetry	IntelliVue Patient Monitors connected via the IntelliVue Clinical Network
ST trends and waves in ST Review	Yes	Yes	Yes	Yes
EASI™ ECG capability	No	Yes - CMS patient monitors must be Rev. B.0 or greater. V26 and V24 monitors must be Rev. C.0 or greater.	Yes	Yes
Central printing of recordings and reports requested from the point-of-care	Yes *Note*—Reports are not available if requested from M3 wireless monitors to be printed at the central printer. However, they can be printed on a local printer.	Yes	Yes - recordings via patient button on transmitter (if configured) or from TeleMon (if transmitter docked).	Yes

EASI is a trademark of Zymed Inc.

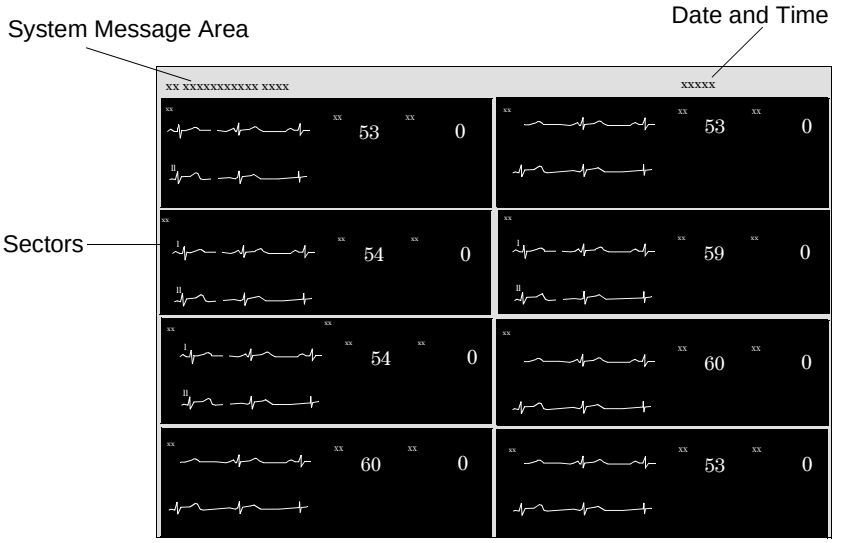
Information Center Display Screens

The Information Center has two types of screens on the display:

- The Main Screen, or resting display, (illustration below) which has patient sectors; no windows are open.
- The Patient Window, which displays data for a patient. You perform most tasks either on the Patient Window or other application windows that you access from the Patient Window.

Main Screen

The Main Screen displays real-time waves, numerics, and alarms from multiple patients. It can be configured to show up to 32 waves in either single- or dual-column configurations.



Main Screen

System Message Area

An area at the top of the screen displays system status messages, date and time and any name that may be associated with this central, for example, “CCU Hallway1”.

Patient Sectors

Up to 16 patients can be displayed on the Main Screen. The number of waves and amount of information in a sector depends on the size of the sector. All waves are 3.3 seconds in length in a dual-column format and 7.0 seconds in length in a single-column format (at 25 mm/s speed -- waves at 12.5 mm/s are twice as long).

In addition to the bed label, waves, and numerics, the information that displays in a sector can include:

- Patient name, if configured.
- Heart Rate alarm limits, if configured (not available for M3 monitors).
- First line of screen notes, if configured.
- Paced indicator (if set).
- Alarms off indicators and alarm and INOP messages (if applicable).
- The  icon to the right of the bed label for telemetry monitored patients. *Note*—If the telemetry transmitter is docked at TeleMon, the icon will have a box around it.
- If the M3 or IntelliVue Patient Monitor is connected to a wireless IntelliVue Clinical Network, there is a wireless equipment icon  to the right of the bed label.
- An "*" to the left of the bed label for overview beds (see page 1-28).
- A  in the upper right-hand corner to indicate that a conflict exists between patient data at the Information Center and patient data at the M3 or IntelliVue Patient Monitor.

When the cursor is positioned over the bed label, the following information is displayed:

- Transmitter number, if telemetry monitored.
- Monitor label (number), if M3 or IntelliVue Patient Monitor.

When the Patient Window is open, the bed label in the sector for the open Patient Window has a dashed line around it. For beds assigned to a Care Group (see "Care Groups" on page 2-12) the bed label in the patient sector will display the selected color as the background for the bed label. For beds not assigned to a Care Group, or beds who have the color black assigned, the bed label has white text on black background.

Patient Sector Buttons

All tasks start in the patient sector. Normally, there are no buttons visible in the sector. Buttons in the sector are activated when the cursor is in the sector. The sector is then outlined, and the buttons become visible.

There are two buttons available from the patient sector. One is the **Patient Window** button, which accesses the Patient Window. The other depends on how your system is configured. The following table explains the button labels.

Condition	Button Label	Action when Button Clicked
No alarm pending	**Record**	Starts a delayed non-continuous (timed) recording (can also click anywhere in the sector except the Patient Window button).
	Save	Generates the saving of a 30-second strip in Alarm Review (can also click anywhere in the sector except the Patient Window button).
	Record and Save	Starts a delayed non-continuous (timed) recording as well as the saving of a strip (can also click anywhere in the sector except the Patient Window button).
Alarm pending	**Silence**	Turns the alarm sound off, and the sector changes to its normal color (can also click anywhere in the sector except the Patient Window button).
	Silence/Review	Turns the alarm sound off and the sector changes to its normal color and opens a Patient Window with the Fast Alarm Review for that alarm. *Note*—Can click anywhere in the sector (except on a button) to turn the alarm sound off without displaying the alarm.
Note—Your central may be configured to not allow silencing of bedside alarms at the Information Center. In this case a Silence button will only appear for telemetry beds. In the case of M3 and IntelliVue Patient Monitors, alarms can be silenced at the central if both the central and M3 or IntelliVue Patient Monitor are configured with remote silence enabled. If this is not the configuration, the Silence button is present at the central, but is not active.		

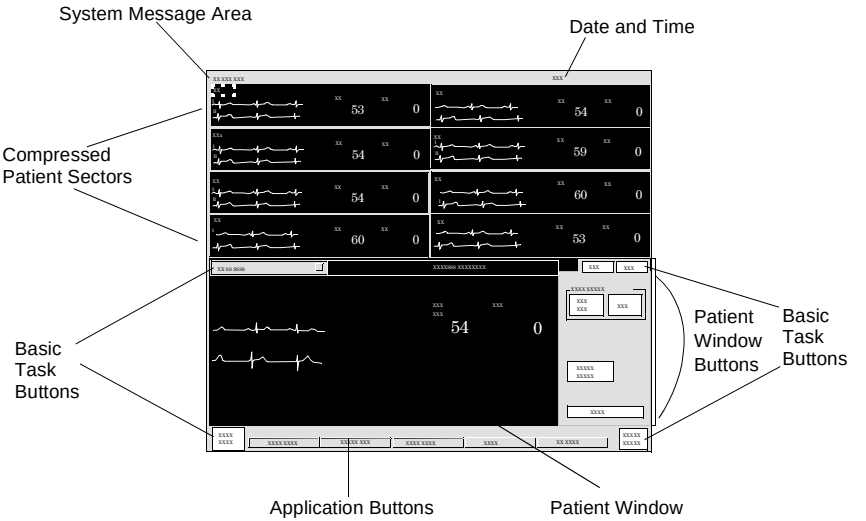
Condition	Button Label	Action when Button Clicked
Bed in Standby	**Resume monitoring**	Bedside Monitor (other than M3 or IntelliVue Patient Monitor): button is greyed out, indicating that monitoring must be resumed at the bedside. Telemetry, M3, and IntelliVue Patient Monitors: takes the bed out of Standby, and the button reverts to the normal label. *Note*—If the transmitter is docked at TeleMon, the bed cannot be put in Standby.

Note—If there is no bed assigned to a sector, the **Sector Setup** button is displayed instead of the Patient Window button. Clicking this button accesses the appropriate page of the Sector Setup Window.

Patient Window

Single Display

When a Patient Window or an application window is open, all the patient sectors are still visible in the top half of the screen, but are compressed (see the illustration below). The Patient Window allows you to view up to 4 waves at a time.



Display with Patient Window Open

Dual Displays

Dual displays offer the advantage of enabling clinicians to view the Patient Window and the data review applications on a full screen. You can view up to 7 waves at a time (may be up to 6 with EASI ECG). A dual display system can be configured with one or with two main screens.

One Main Screen

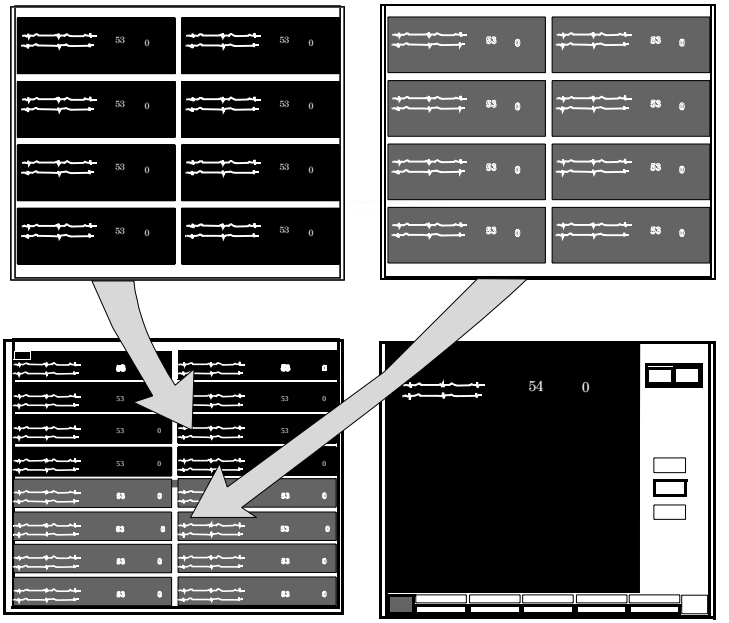
One display is used for the Main Screen, and the other is used for a full-screen Patient Window or application window.

Two Main Screens

- Both displays have patient sectors when Main Screen is active. For example, for a 16-patient central, the Main Screen of each display includes 8 sectors. This feature is available for 8, 12, and 16-patient centrals.
- When an application window is open, all the sectors move to one display, and the second display has the full-screen application window. To remove the application window, click the Main Screen button.

Main Screen

Application Window open



Information/ Icons on the Patient Window

Some of the information/icons that can be displayed in the patient sector also appear on the Patient Window:

- Telemetry icon -- upper left corner
- Wireless bedside icon -- upper left corner
- Screen Notes (if available) -- all text that was entered in the Admit Window -- bottom of sector
- Paced indicator (if applicable) -- upper left corner

Adjustments on the Patient Window

Depending on the equipment assigned to a sector, clinicians can make the following adjustments on the Patient Window to parameters:

- Telemetry beds
  - the lead/label for the primary and secondary ECG lead
  - the size of the primary and secondary ECG waves (on the display and recordings)
  - the heart rate alarm limits
  - SpO2 alarm limits (if SpO2 is on)
- Bedside monitors with EASI ECG capability
  - the size of the primary and secondary ECG waves (on the central display and recordings)
- IntelliVue Patient Monitors
  - the size of the ECG waves (on the central display and recordings)
  - the heart rate alarm limits

Note—If EASI ECG is being used, the label “EASI” is displayed below the primary waveform.

Patient Window Buttons

The Patient Window provides the following buttons that allow you to perform actions within the Patient Window:

Button	Description
Continuous Recording	Allows you to select waves to continuously record.
Stop	Stops any continuous recording in progress.

Button	Description
Suspend Alarms and **Unsuspend Alarms** (telemetry only)	Suspends/unsuspends alarms at the Information Center.
NBP Alarms (telemetry docked at TeleMon only)	Allows you to adjust NBP alarms.
Arrhythmia Analysis	Displays up to two “live” delayed waves, with beat labels. The beat labels represent analysis of both the primary and secondary waves. See Chapter 5, “ST/AR Arrhythmia Monitoring” for additional information on arrhythmia monitoring.
Multilead ECG (if not using EASI ECG)	Displays a snapshot of up to six leads of ECG, plus a 10-second rhythm strip. You can use this window to verify that the ECG waves are optimized for arrhythmia monitoring.
12-Lead ECG (if using EASI ECG)	Displays the 12 leads derived from the EASI ECG system, plus a 10-second rhythm strip. From this window, you can print a 12-lead report.
More Waves	Displays additional waves, if available. If none available, displays the Arrhythmia analysis data (see “Arrhythmia Analysis”, above).

Application Buttons

When the Patient Window or an application window is open, a “task bar” at the bottom of the screen allows access to other Information Center applications for that bed. There are two rows in the task bar.

Top Row

The buttons in the top row change with the active application to provide access to related applications. The buttons in the table below appear on the Patient Window.

Button	Description
Discharge	Accesses the Discharge Window to clear the patient data and return alarm limits controlled at the central to unit settings.
Sector Setup	Accesses the Sector Setup Window to clear the sector and assign an overview bed. Additional functionality depends on whether the central is fixed or flexible. See “Fixed and Flexible Monitoring” on page 2-26.
Standby	Accesses the Standby Window, enabling you to suspend monitoring for telemetry, M3 beds, and IntelliVue Patient Monitors when the patient is temporarily off the unit or out of antenna range. Enables you to resume monitoring when the patient returns. For bedside monitors other than the M3 or IntelliVue Patient Monitor, you must put bedside monitor in Standby and resume monitoring at the bedside.
Wave Review	Accesses full disclosure.

Bottom Row

The buttons in the bottom row are available no matter which application is active.

Button	Description
Arrhythmia Alarms	Accesses a window to adjust arrhythmia monitoring for a patient. This button is not available for M3 monitors
Trend Review	Accesses graphical and/or tabular trends.
Alarm Review	Accesses stored alarm events and user-saved strips.
Admit	Accesses the Admit Window to enter the patient name and other data.
All Controls	Provides access to the full array of clinical and support functions.

Note—A list of the applications associated with each button is displayed when the mouse cursor rests on the button for approximately 10 seconds.

Basic Task Buttons

In addition to the buttons in the task bar, the following basic task buttons are always available, no matter which window is open.

Button	Description
Main Screen	Closes the open window and brings you back to the resting display.
Patient Window	Brings up the Patient Window when another application is open.
Patient List	Allows you to switch the patient in the open window (the application does not change). See “Viewing a Bed Temporarily” on page 1-28.

Button	Description
Print	If a printer is available, starts a printout of the screen or a report. This key is available only for the Arrhythmia Analysis and Multilead ECG Patient windows, data review applications, and unit settings windows. *Note*—If a printer is not available or is not configured, the print key is greyed out.
Help	Brings up the on-line Help Window (see "Using the On-line Help/Quick Guide" on page 1-35).

Using Standby

Standby is used to suspend monitoring for a patient. Control of the Standby function depends on the monitoring device being used.

Telemetry, M3 and IntelliVue Patient Monitors

Standby is used to temporarily suspend monitoring, for example, when the patient goes out of antenna range. In addition, when the patient is discharged, the bed can be put in Standby until the new patient is connected.

Task Summary Place the bed in Standby and resume monitoring by performing the following steps:

Step	Action
1	On the Patient Window, click the **Standby** button. Click on the appropriate location, then on **Suspend Monitoring**. The message "TELEMETRY STANDBY" or "MONITOR STANDBY" and location, if selected, are displayed in the sector.
2	The bed can be taken out of Standby by placing the cursor in the sector and clicking on the **Resume Monitoring** button.

Other Bedside Monitors

The bed is put in Standby and taken out of Standby at the bedside monitor. At the central, you can select the location that is displayed in the sector, along with the Standby message.

Task Summary Select the Standby location by performing the following steps:

Step	Action
1	On the Patient Window, click the **Standby** button. Select the location from the list. The "MONITOR STANDBY" message and location, if selected, are displayed in the sector. *Note*—At the central, when the cursor is placed in the sector, a **Resume Monitoring** button is available. Clicking on it reminds you to take the bed out of Standby.

EASI 12-lead Review and Report

If the monitoring device has EASI 12-lead capability, you can view all available leads from the Patient Window. In addition, you can request a 12-lead report.

Note—EASI derived 12-lead ECG's and their measurements are approximations to conventional 12-lead ECG's and should not be used for diagnostic interpretations.

Task Summary

Display the 12-leads and print a report by performing the following steps:

Step	Action
1	On the Patient Window, click the **12-Lead ECG** button. A 2.5 second ECG wave is displayed for each of the derived 12 leads. *Note*—It is not possible to display the derived 12-lead waves if there is an INOP condition in any lead. To view the EASI AI, AS, and ES leads, click on 3 EASI Leads.

Step	Action
2	To: • View the most recent ECG data -- click **Update Waves**. • Change the wave layout -- click on the wave layout on the top right side of the window then select wave format (3x4, 6x2, or 12x1) from the list that displays. In 3x4 layout an additional rhythm lead displays. • Change the size of the waves -- click on the cal bar and select the size of the wave you want from the list that displays (x1/2, x1, x2, x4). • Change the wave speed (25 mm/s or 50 mm/s) -- click on the speed on the bottom right of the window and select the speed from the list that displays. When you select a different speed the window re-displays with the selected speed.
3	To print a report click the **Print** button at the top of the window. The report shows all of the monitored vital signs, the 12 leads, and the high pass and low pass bandwidth frequencies with: • 3 rows x 4 columns -- showing 12 2.5-second waves and a 10-second rhythm strip at the bottom of the page • 6 rows x 2 columns -- showing 12 5-second waves • 12 rows x 1 column -- showing 12 7-second waves.

Viewing Other Patients over the IntelliVue Clinical Network

Information Centers and Clients on the IntelliVue Clinical Network enable you to view both real-time and stored patient data for patients monitored by other centrals on the IntelliVue Clinical Network.

There are two ways to do this:

- *View the bed temporarily*, in the Patient Window
  You select the patient via the Patient List. You can then monitor the patient or review the data for that bed until you change to another patient or go to the Main Screen. If configured, you may also be able to admit, discharge, and transfer data for that bed.

  or
- *Overview a bed* in a sector on your central
  You use Sector Setup to overview a bed that is monitored by another networked central. The actions allowed for overview beds depend on how the system is configured. See “Types of Access” on page 1-29.

Viewing a Bed Temporarily

You can view data temporarily for any bed monitored by another networked central. This feature enables you to view patients that are in other clinical units or that are being monitored by another central in your unit.

Task Summary

View other patients temporarily by performing the following steps:

Step	Action
1	Click the **Patient Window** button *in any sector* to bring up a Patient Window.
2	On the Patient Window, click the bed label at the left in the title bar to display the Patient List. The beds listed are those that are displayed *on this central*.

Step	Action
3	Click the button to the left of the Patient List for the unit you want. The Patient List will now contain all beds currently monitored *in the unit* you selected. *Note*—Click on your unit name to access patients on other centrals in your unit.
4	Click on the bed you want. That patient's data will be displayed in the Patient Window. You can then access any other window for that patient.
5	You can then access data for another patient or click Main Screen to remove the window. *Note*—You don't have to return to the Patient Window. For example, if you are on the Alarm Review Window, you can remain there and change the patient you are viewing. Other windows you access will then be for that patient.

Overview Beds

You can overview a bed on your Main Screen that is monitored by another networked central. See Chapter 2, "Patient Management" for information on assigning overview beds.

Types of Access

Each central on the IntelliVue Clinical Network can be configured to specify the following types of access control of beds monitored by another central:

- Full Control (read-write) access -- you can view patient data and change measurement controls (such as alarm limits).
  - Telemetry Setup controls are for that central only.
  - Functions that affect the central as a whole, rather than a specific bed, such as volume control are accessible for the local central only.
- Read-Only access -- you can view patient data, but measurement controls cannot be changed. The controls that are available are:
  - Record button in the Patient Sector
  - Continuous Recording in the Patient Window
  - Arrhythmia Analysis Windows -- Update Waves (but not Relearn)
  - Alarm Review -- navigation and record or print alarm.
  - Event and Wave Review -- navigation.

  - Trend Review -- navigation.
  - ST Review -- navigation, superimpose
  - Record All (from All Controls)
  - Sector Setup
- No access -- you cannot access any bed on that central.

Full Control if Multiple Viewers

Since more than one Information Center can have access to a bed at the same time, there may be situations when two or more clinicians are viewing information for the same patient at the same time. If multiple clinicians have full control access to the same patient, then, in general, the last operation wins.

Consulting Beds over the Philips CareNet

If you have a Information Center on the Philips CareNet and you have flexible monitoring configured, you can view real-time patient data for patients monitored by other centrals on the same CareNet. You do this by assigning a sector as a consulting bed.

Consulting Beds

To assign a consulting bed, you assign a sector on the Main Screen to display that bed. You can use either an empty sector, or you can clear a sector that is currently being used. See “Assigning a Bed and/or Equipment to a Sector” on page 2-27 for a task summary.

The following functions are available from consulting beds:

- Main Screen: same as monitoring central, except there will not be a pacing indicator. You can make a recording from the patient sector -- you cannot save a strip (if the system is configured for Save or Record and Save from the sector). You can also silence alarms.
- Alarm recordings (as configured in the consulting central’s Record/Store Unit Settings).
  - If a yellow alarm condition persists after the inhibitory period ends and the alarm is generated again, that alarm will not produce a recording at the consulting central.
  - If there are multiple red alarms, the consulting central records the highest priority alarm.

- Patient Window: controls for Continuous Recording, the Patient List, Main Screen button, and All Controls button.
  Note— For EASI monitored patients, the leads displayed are fixed at lead II and V2. The ST values correspond to primary and secondary ECG waves displayed at the monitoring central and are reflected as ST 1 and ST 2.
  For non-EASI monitored patients, the leads and ST values correspond to the primary and secondary ECG waves displayed at the monitoring central.

- Sector Setup Window: Clear Sector tab (if bed assigned), or Assign Bed/ Equipment tab (if no bed assigned).
- All Controls: Sector Setup button, Volume Control button, service-related applications.
- The on-line Help function is available, where applicable.

Guidelines for Ensuring Correct Data

If a bed is monitored by one Information Center and is a consulting bed on another Information Center, it is important to ensure that patient data is labeled correctly. To do this, follow the guidelines listed below. For these examples, the monitoring (primary) central is “Central 1” and the consulting central is “Central 2”.

On Central 1, when you are going to begin monitoring a *new patient*:

1. On Central 2, use **Clear Sector** in Sector Setup to clear any consulting sectors that have the bed label or the equipment for the new patient.
2. On Central 1, admit the patient.
3. On Central 2, use **Assign Bed and Equipment** in Sector Setup to assign the new patient’s bed and equipment.

On Central 1, before you *change the equipment and/or bed label* for this patient:

1. On Central 2, use **Clear Sector** to empty the sector that is consulting the patient.
2. On Central 1, make the changes (bed, equipment, or both) for the patient.
3. On Central 2, use **Assign Bed and Equipment** in Sector Setup to assign the same bed and/or equipment for the patient.

On Central 1, before you *discharge* this patient:

On Central 2, use **Clear Sector** to empty the sector that is viewing the patient.

Optimizing Wireless System Performance

Bedside monitors with a wireless connection to the IntelliVue Clinical Network have their advantages, however the flexibility the wireless link offers is not without its challenges. The reliability and quality of the wireless signal transmission through the air and hospital walls are governed by a number of variables that can be difficult to control. A wireless connection from a bedside cannot be as dependable as a wired connection.

The effect of low signal strength and interference on the display of the patient information from a wireless bedside at the central station can range from a momentary period to a lengthy period of data loss. Although data loss due to the wireless link may be occurring at the central station, monitoring and alarming continue at the bedside (this differs from telemetry where monitoring and alarming occur in the central station, so when data loss due to the wireless link occurs, monitoring cannot continue).

Minimizing Data Loss

In order to minimize data loss at the central station due to low signal strength and interference, there are several things a hospital should do.

Low Signal Strength

Devices called “Access Points” are used to receive the radio signals from the bedsides. A wireless bedside must be within the coverage area of an associated access point for proper operation. When a wireless bedside is taken out of the designated coverage area, data loss at the central station will increase.

Warning

Interference

Various equipment and/or electrical or medical devices that operate in the 2.4 to 2.48 GHz range could interfere with radio transmission of important medical data to the central station. Facilities utilizing wireless devices need to manage the use of these devices for safe operation.

The effect of interference on the amount of data loss at the central station depends on the strength, type and proximity of the interfering device to the wireless bedside or access point. Any wireless device operating between 2.4 and 2.48 GHz can cause interference with the monitoring wireless network. Likely sources of interference include microwave ovens, other vendors’ wireless

networks, wireless telephone headsets, certain cellular telephones, handheld computers, transceiver devices, and Bluetooth devices. In cases where the source of interference is known, removing the device or moving it away from the wireless bedside or access point will improve the system's performance.

Since the wireless network used for monitoring emits radio frequencies, it is also possible for it to interfere with other devices (for example, programmers for cardiac pacemakers). Contact the manufacturers of other equipment used in the vicinity of the monitoring wireless network for information on possible susceptibility to these frequencies.

It is the hospital's responsibility to keep track of all of the wireless devices in use in the hospital, and manage their use for safe operation.

Wireless System Messages

The system continually monitors the signal quality sent from wireless monitors. When data transfer from one or more monitors across the wireless link is compromised due to interference or too many transmitting devices, the system displays one of the following messages at the top of the screen.

Message	Possible Cause	What to Do
Excessive wireless data loss	Data loss (no signal or excessive dropout of signal) because of too many monitors using an Access Point, excessive interference, or weak signal.	• Turn off unused monitors. • If a microwave is in use, move monitors away from the microwave signals. • Locate and remove source of interference. • If condition persists, contact service.
Excessive wireless interference	Dropout of signal on one or more monitors due to interference of the signal, e.g., microwave oven interference.	• Make sure all microwave ovens are turned off or at least 20 feet from the monitors. • Turn off unused monitors. • Locate and remove source of interference. • If condition persists, contact service.

Message	Possible Cause	What to Do
Weak radio signal	Excessive occurrence of dropped messages and weak (wireless) radio errors have occurred between one or more wireless M3/M4 bedsides and an access point. This could happen due to a device being marginally out of range of an access point or because of some signal attenuator, for example a monitor being behind a large metal cabinet.	• Move the monitor within range of an access point. • If condition persists, contact service.

Configuration

The Information Center Software is shipped with factory defaults. At installation, (or at any time after installation), the Information Center Software can be configured with defaults for the unit in which it is installed.

In addition, adjustments such as changes to alarms being stored and recorded can be made on a per patient basis.

See Chapter 9, “Information Center Configuration,” for a list of factory defaults and configuration choices.

Using the On-line Help/Quick Guide

An on-line Help feature is a Quick Guide that is always available to answer questions and provide information on using the Information Center.

There are two types of information available:

- Context-Sensitive: This is information you get when you first click the Help button. It tells you about the window you're looking at.
- Task and Problem-Solving Quick Guide: This is information on performing tasks and troubleshooting problems. To get to this type of information, click Quick Guide on any Help Window. You'll get the Quick Guide Menu. Click on an item to get to that topic.

In the Help windows, text in green (and underlined) indicates that you can click on it and get more information.

Note—To print a topic, click the right mouse button and select Print Topics.

2
Patient Management

This chapter describes how to manage patient data using the Information Center. It includes the following sections:

Introduction

The Information Center provides the following applications to manage patients:

Application	Description
Admit	The Admit application connects all stored data to a patient's name and puts the name on the display, recordings, and reports. See "Admitting a Patient" on page 2-3 for information on admitting patient to the Information Center.
Discharge	The Discharge application clears a patient's name and data from the central database and returns *central* settings to unit defaults. See "Discharging a Patient" on page 2-18 for information on discharging patients.
Sector Setup	The Sector Setup application allows you to: • Assign a bed and or equipment to a sector (flexible monitoring only). See page 2-27. • Change the equipment for a sector (flexible monitoring only). See page 2-29. • Assign an overview bed to a sector. See page 2-32. • Unassign (clear) a sector. See page 2-34.

For patients connected to M3 and IntelliVue Patient Monitors, you can admit, discharge, transfer, or update patients from either the bedside or the Information Center. When you admit or discharge a patient being monitored by an M3 or IntelliVue Patient Monitor on the Information Center that patient is also admitted or discharged on the bedside.

Note—A related application is Stored Waves. When the patient is first connected (or at any time) you can change the waves that are stored in the database. See "Changing the Waves that are Stored" on page 6-50 for more information.

Admitting a Patient

Overview

You must admit a patient to the Information Center in order for the name to appear on the display, recordings, or reports. You admit a patient by using the Admit Window.

With M3 or IntelliVue Patient Monitors

For patients connected to a M3 or a IntelliVue Patient Monitor you can admit the patient at either the bedside or at the Information Center. When you admit the patient on the Information Center that patient is also admitted to the bedside monitor. The patient name, medical record number, paced status, patient category, screen notes, and Care Group assignment are communicated to the bedside monitor. For IntelliVue Patient Monitors the additional fields of patient weight, height, gender, and date of birth are communicated to the bedside.

With Other Bedsides

The Information Center communicates a patient's name and medical record number to the bedside monitor. Other patient information must be entered at the bedside, however. Information entered on the Admit window at the bedside monitor is not displayed at the central.

Task Summary

Since data collection starts when a patient is connected to the monitor, it is important that you perform a discharge prior to connecting a new patient. See “Discharging a Patient” on page 2-18 for information on discharging patients.

Admit a patient to the Information Center by performing the following steps:

Step	Action
1	On the Patient Window for the bed you want to admit, click on the **Admit** button. *Note*—If the bed to which you want to admit this patient does not appear on the display and you have flexible monitoring, you can display the bed by using the Sector Setup Window. See “Assigning a Bed and/or Equipment to a Sector” on page 2-27.
2	If this patient is on telemetry, be sure the label on the transmitter matches the transmitter label in the Equipment field. If the label does not match and you have: **Fixed Monitoring** You must either change the transmitter or admit to the bed label with that transmitter assigned to it. **Flexible Monitoring** If another patient is not currently admitted to a bed assigned to this equipment, you can assign the equipment to this bed by using the Sector Setup Window. See “Changing Equipment for a Sector” on page 2-29.

Step	Action
3	On the Admit Window specify a patient to admit by either: • typing a 1- to 18-character first and last name in the appropriate **Patient Name** fields. Only the last name is required. You can use the Tab key to move from field to field. To avoid any potential conflicts, be sure to enter a unique patient name in the name fields. or • clicking on a patient name in the **Transfer List**. If the patient is in a different care unit, first click on the unit, then on the name. See “Transferring Patient Data to a New Bed” on page 2-23. *Note*—The Transfer List contains a listing of up to four discharged patients per Information Center for which data from previous monitoring has been saved. When you select a name from the Transfer List and then click the **Admit Patient** button, any data since you began monitoring will be erased, and the saved patient data will be retrieved. If you want to keep the current monitoring data, do not use the Transfer List. If the patient’s first and last name is 18 characters or less, the Information Center communicates the patient’s entire name to the bedside monitor. If the patient’s name is longer than 18 characters, the Information Center communicates the first 18 characters of the patient’s last name to the bedside monitor.
4	Enter a 1- to 12-character medical record number for this patient in the **Medical Record Number** field. The central communicates the medical record number to the bedside monitor.

Step	Action
5	If the patient has a cardiac pacemaker (including demand, fixed, or any type), click on **Patient Paced** to display a checkmark in the box. This enables the ST/AR algorithm to detect and reject pace pulses (spikes) from the HR count. **Warning** **If you do not have a checkmark in the Patient Paced box, pace pulses could be detected as beats and the monitor may not alarm for an asystole condition. Keep pacemaker patients under close observation. See Chapter 5, "ST/AR Arrhythmia Monitoring," for specific warnings about monitoring paced patients.** *Note*—When **Patient Paced** is checked, the word "Paced" displays in the lower right corner of the sector and the upper left corner of the Patient Window. If the bed is a consulting bed for a central on Philips CareNet, the word "Paced" does not appear. If the patient is on a bedside monitor, and arrhythmia analysis is off, this field is greyed out.
6	Specify what type of patient this is in the **Patient Category** field. Your choices include: • Adult • Pediatric (if selected, telemetry ST monitoring is not available) • Neonatal (bedside monitors only) The patient category you select affects arrhythmia analysis and alarm limits. If the patient category is changed for a bedside monitored patient be sure to check the alarm settings at the bedside. *Note*—For M3 and IntelliVue Patient Monitors, changing the patient category does not change alarm limits. You should check for correct alarm limits at the bedside monitor.

Step	Action
7	Specify the patient's birth date in the **Date of Birth** field. You can specify the date by entering a numeric date or by selecting the date by clicking on the calendar. *Note*—The calendar only allows you to specify the birth date by clicking on the appropriate date on the calendar. You cannot enter text into the calendar.
8	Enter the patient's weight in the **Weight** field. Depending on how your system is configured, valid values are: • Adult/Pediatric— 0 to 999 lbs or 0 to 450 kg • Neonatal—0 to 9999 g
9	Enter the patient's height in the **Height** field. Depending on how your system is configured, valid values are 0 to 99 in or 0 to 250 cm.
10	Specify a gender in the **Gender** field by selecting the gender using the drop down arrow.
11	If you would like to associate text (for example the physician's name) with this patient, enter the text in the **Screen Notes** field. You can enter up to 60 characters. The first 34 characters you enter will appear in the patient sector when in the Main Screen (if configured). All the text will display in the Patient Window. *Note*—If the monitoring device is the M3 or IntelliVue Patient Monitor, the screen notes text will be displayed in the Admit window. If a previous screen note was entered, it will be overwritten by the text entered at the central.
12	Assign this patient to a Care Group if desired by selecting the Care Group from Care Group field. See "Care Groups" on page 2-12.
13	Review all the fields to be sure they are correct then click the **Admit Patient** button. The Information Center admits the patient.

Note—If paging is available on your system, after admitting the patient, you can assign the patient to a clinician's receiver (pager). See "Assigning Patients to Caregivers" on page 8-7.

Changing Patient Information

Overview

You can change patient information such as patient's name, Care Group assignment, and medical number by using the Admit Window.

With M3 or IntelliVue Patient Monitors

For patients connected to a M3 or a IntelliVue Patient Monitor you can change the patient information at either the bedside or at the Information Center. When you change the patient information on the Information Center that information is also changes on the bedside monitor. The patient name, medical record number, paced status, patient category, screen notes, and Care Group assignment are communicated to the bedside monitor. In general, any fields changed at either the Information Center or the M3/IntelliVue Patient Monitors will be copied to the other device. The last entry wins. For IntelliVue Patient Monitors the additional fields of patient weight, height, gender, and date of birth are communicated to the bedside.

Task Summary

Change patient information by performing the following steps:

Step	Action
1	On the Patient Window for the bed for which you want to change information, click on the **Admit** button.
2	On the Admit Window change the patient information in the appropriate fields. For information on specific fields see "Admitting a Patient" on page 2-3.
3	When you have finished modifying the patient information click the **Update** button. *Note*—Changing the patient name affects all stored data, not just the data from the update time forward.

Resolving Conflicts with M3 or IntelliVue Patient Monitors

Overview

Since you can admit, discharge, or transfer patients from both the Information Center or the M3 and IntelliVue Patient Monitor, a possibility exists that the information between the two systems does not match. If user intervention is required a  icon displays in the patient sector for the patient when data between the Information Center and the bedside do not match. In addition, when in the Admit or Discharge windows, a Conflict Resolution screen will display on the Information Center where you can resolve the conflict manually.

Warning

It is important to resolve the conflicts as soon as they are identified. Failure to do so could result in using incorrect/confusing data to make clinical decisions. Certain settings, for example, Paced and Patient Category between the Information Center and the bedside may not match. If the Paced status setting is set incorrectly the system could mistake a pace pulse for a QRS and fail to alarm in the case of asystole. It is important that the Patient Category is set correctly so the ECG can be analyzed correctly and initial arrhythmia alarm limits set.

In addition if conflicts are not resolved as soon as they are identified patient identifiers (for example, patient name, medical record number) will not be available through Information Center Web.

Task Summary

When the Conflict Resolution window displays, resolve the conflict by performing one of the following:

If you want to	then . . .
Use the patient information from the Information Center.	Click the **Use Information Center** button. The patient information is retrieved from the Information Center and you return to the Admit/ Discharge/Transfer window. When you choose this option the Information Center settings, including patient category, are applied to the bedside monitor. Any stored bedside data is cleared. The patient category setting applies to the algorithms used to process incoming patient data. Verify that all bedside alarm settings, including arrhythmia alarm settings, are correct.

If you want to	then . . .
Use the patient information from the bedside	Click the **Use Bedside Monitor** button. The patient information is retrieved from the bedside and you return to the Admit/Discharge/ Transfer window. When you choose this option the bedside settings are applied to the Information Center. Any stored Information Center data is cleared. Verify that all bedside alarm settings, including arrhythmia alarm settings, are correct.
You do not want the patient information from either the Information Center or the bedside.	Click the **Clear and Begin New Patient** button. Patient information and stored data at both the Information Center and the bedside is cleared and you return to the Admit/ Discharge/Transfer window where you can enter new patient information.

Note—In the event that a patient is admitted on both the IntelliVue Patient Monitor and the Information Center and there are no differences between patient name, medical record number, paced or patient category but there are differences for date of birth, gender, weight, or height the IntelliVue Patient Monitor bedside value is always used.

Care Groups

Overview

Care Groups allow you to associate one or more beds with a group. A single Care Group is assigned to one nurse who is responsible for multiple patients within a single care unit. A Care Group can have a specific color associated with it. When a color is assigned to a particular care Group the color appears as the background for the bed label on the Information Center. Color by bed label helps the nurse to quickly identify patients in his/her Care Group.

Up to 12 beds can be assigned to a single Care Group and there can be up to 18 Care Groups in a unit. When a bed is assigned to a Care Group the bed remains in that Care Group across equipment changes, standby/resume, patient admit or discharge, and power cycles. A bed assigned to a Care Group is removed from that Care Group when the bed is unassigned from the Information Center that was monitoring that bed or if the bed label is changed.

With M3 or IntelliVue Patient Monitors

With M3 or IntelliVue Patient Monitors, you can use Care Groups to notify the nurse of any alarms for the patients in their Care Group through alarm overview at the bedside. In addition, the nurse can see the current alarm status of each of the patients within the same Care Group at the bedside (see your appropriate bedside user documentation for details).

Setting up a Care Group

To set up a Care Group perform the following steps:

Step	Action
1	From the All Controls window click the **Care Group** button under Patient Management. The Care Group Settings window displays.
2	On the Care Group Settings window click on the **Setup** tab.
3	Click the **New Care Group** button.
4	Enter a 1 to 18-character name for the Care Group you are setting up in the **Name** field. To avoid any potential confusion when identifying Care Groups in the system, the name you specify in this field must be unique.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>5</td><td>If this is a Care Group with M3 or IntelliVue Patient Monitors, specify the Auto Alarm setting for this Care Group (see your bedside monitor User's Guide) by clicking on the appropriate radio button in the Auto-alarm field. Choices are:
<table>
<tr><th>Choice</th><th>Description</th></tr>
<tr><td>Disabled</td><td>Selecting this option turns off the Auto Alarm Pop-up feature at the bedside.

Warning—If the bedside overview status bar is not enabled and Auto Alarm Pop-up is disabled, alarming beds will not be visible in overview at the bedside. Do not disable the Auto Alarm Pop-up if you use overview at the bedside as your primary monitoring source. You must enable Auto Alarm Pop-up at both the Information Center and the bedside in order for this feature to work. At the bedside, you can turn auto pop-up on/off on a per bed basis.</td></tr>
<tr><td>Red</td><td>Selecting this option causes an Auto Alarm Pop-up window to display at the bedside when beds in this Care Group have a red alarm condition.</td></tr>
<tr><td>Red and Yellow</td><td>Selecting this option causes an Auto Alarm Pop-up window to display at the bedside when beds in this Care Group have a yellow alarm condition or greater.</td></tr>
</table>
</td></tr>
</table>

Step	Action
6	If this is a Care Group with M3 or IntelliVue Patient Monitors, specify whether a prompt tone will be audible at the bedside when beds in this Care Group have an alarm condition by clicking on the appropriate radio button in the **Prompt-tone** field. If you select **Disabled**, no tone will be audible at the bedside when a bed in this Care Group has an alarm condition.
7	Assign a color to this particular Care Group by clicking on a color in the **Assign Central Color** field. The color you assign will appear as the background for the bed label on the Information Center. *Note*—If you do not want to assign a color to this Care Group click on the color black in the **Assign Central Color** field. When you select the color black no color displays as the background or the bed label.
8	Click the **OK** button. The Information Center sets up the Care Group with the choices you selected.
9	If you would like to set up another Care Group, click on the New Care Group button and repeat Steps 1 through 8.
10	When you are done setting up Care Groups return to the All Controls window by clicking the **All Controls** button or go to another Care Group Settings window by clicking on the appropriate tab on the top of the window.

Assigning a Bed to a Care Group

From the Admit Window

You can assign a specific patient to a Care Group when admitting the patient or updating patient information in the Admit window by selecting the Care Group from the **Caregroup** field. See page 2-3 for information on using the Admit window.

From All Controls

To assign a bed(s) to a Care Group from the All Controls window perform the following steps:

Step	Action
1	From the All Controls window click the **Care Group** button. The Care Group Settings window displays.
2	Select the Care Group that contains the beds you want to assign from the **Source Care Group** drop-down list. If the bed is not currently assigned to a Care Group select “Unassigned” from the **Source Care Group** list.
3	From the Source Care Group **Current Beds** field, highlight the name of the patient/bed you want to assign to the Care Group. *Note*—You can select all the beds in the **Current Beds** field by clicking the **Select All Beds** button or select more than one bed by holding down the **Shift** key. You can assign up to 12 beds to a single Care Group. *Note*—For M3 and IntelliVue Patient Monitors, the order in which you assign beds does not necessarily dictate the order in which they will display in the alarm reflector at the bedside.
4	Select the Care Group to which you want to assign this bed(s) from the **Target Care Group** drop-down list.
5	Click the **Move** button to move the bed(s) to the Target Care Group.

Step	Action
6	Click the **Update** button to assign the bed(s) to the selected Care Group. *Note*—Clicking the Cancel button before you click the Update button cancels changes and returns the Care Group Settings window to the state it was in upon entry.
7	When you are done assigning beds to a Care Group return to the All Controls window by clicking the **All Controls** button on the bottom of the screen or go to another Care Group Settings window by clicking on the appropriate tab on the top of the window.

Note—If you have sectors assigned for consulting beds (see page 1-30) it is possible to assign the consulting bed to a different Care Group than the primary Information Center for the bed. This would result in same bed being assigned to two different Care Group. You should, therefore, only assign patients to Care Groups at the primary Information Center.

Viewing Care Groups

To view beds assigned to a Care Group perform the following steps:

Step	Action
1	From the All Controls window click the **Care Group** button.
2	On the Care Group Settings window click on the **View** tab. The Care Group Settings window displays the Care Group settings corresponding to the current bed. A list of all beds assigned to the Care Group appears on the right side of the window.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>3</td><td>
<table>
<tr><th>If you would like to view</th><th>then . . .</th></tr>
<tr><td>the Care Group settings for a particular bed</td><td>highlight the Care Group for the bed of interest then click on the plus sign. The Care Group settings for the bed display.</td></tr>
<tr><td>all the Care Groups currently assigned to a unit</td><td>on the left side of the window, click on the plus sign next to All. All bed assignments for all Care Groups in the unit display.</td></tr>
<tr><td>a specific Care Group</td><td>on the left side of the window, click on the plus sign next to All then click on the plus sign next to the Care Group of interest. The settings for that Care Group display.</td></tr>
</table>

Note—You can print a report of all of the Care Groups in the system by clicking the Print button.
</td></tr>
<tr><td>4</td><td>When you are done viewing Care Groups return to the All Controls window by clicking the All Controls button on the bottom of the screen or go to another Care Group Settings window by clicking on the appropriate tab on the top of the window.</td></tr>
</table>

Discharging a Patient

Overview

Important—Discharging from the central clears the central database for a bed. At that point, data storage begins for that bed. For this reason, you should perform a discharge prior to connecting a new patient. This ensures that data from a previous patient is not mixed with the data from the new patient. It also ensures that alarm limits controlled at the Information Center go back to unit settings.

When you enter the Discharge Window, you are given the choice of saving, removing the patient data, or if this is an M3 or an IntelliVue Patient Monitor, discharging for transport.

If you save the data, the patient's name appears in the "Transfer List" in the Admit Window. It can then be retrieved if the patient is re-admitted, or, if the central is connected via the IntelliVue Clinical Network or connected to a Large Network Central Database System, it can be retrieved if the patient is transferred to another unit.

If you discharge for transport, the Information Center discharges the patient on the Information Center and stores the patient data but does not discharge the patient from the bedside monitor. See "Discharging for Transport" on page 2-21.

With M3 and IntelliVue Patient Monitors

If this is a patient connected to an M3 or IntelliVue Patient Monitor, discharging the patient at the Information Center also discharges them from the bedside monitor and clears both databases. All monitor and measurement server settings are reset to their defaults including arrhythmia settings. With IntelliVue Patient Monitors your monitor can be set up with predefined monitor configurations called profiles. Depending on how your monitor is set up when you discharge a patient the monitor either continues with the previous profile, or resets to the default profile configured for that monitor. Refer to your bedside documentation for details.

With Other Bedsides

If this is a bedside monitor other than the M3 or IntelliVue Patient Monitor, discharging a patient from the Information Center clears the patient name and medical record number at the bedside monitor. You must, however, discharge the patient at both the Information Center and the bedside monitor to clear both databases. Discharge the patient from the Information Center first, then from the bedside. When you discharge a patient from the Information Center, all pending reports are cancelled, arrhythmia alarm settings go back to Unit Settings and any screen notes are cleared. The settings for alarms controlled at the bedside (for example, HR limits) do not change -- to set these alarms back to the defaults, consult your bedside monitor documentation.

Task Summary

Discharge a patient by performing the following steps:

Step	Action
1	From the Patient Window click the **Discharge** button.
2	Unassign the Care Group associated with this patient, if desired, by clicking in the **Unassign Caregroup** checkbox.

Step	Action
3	On the Discharge Window specify whether you want to save or remove the patient data associated with this patient after discharge or, if this is an M3 or IntelliVue Patient Monitor, to discharge for transport by clicking on the appropriate button. Specify **Save Data with Discharge** (only available for admitted patients) if this patient will be transferred to another bed/unit or re-admitted soon and you want to save the data. If you are transferring the patient to a unit over a large network, select the unit to which to transfer the data by clicking on the unit name in the **Transfer Destination** list before clicking the Save Data with Discharge button. The maximum number of patients for whom data can be saved is four per central unless the central is connected to the M3154 Database Server in which case the maximum number of patients is four times the number of Information Centers. Only select this option if the patient will be transferred/readmitted soon. If the list is full, the oldest patient data will be removed and the new patient data will be added. Specify **Discharge and Remove Data** if you want to discard the patient's data (the patient's name will not be available on the Transfer List). Specify **Discharge for Transport** if this is an M3 or IntelliVue Patient Monitor and you are moving the patient to a new location with either the monitor or measurement server. See "Discharging for Transport" on page 2-21 for information on using this option.
4	When the central prompts you whether you are sure you want to discharge this patient, click the **OK** button. The central discharges this patient with the option you selected in Step 3 and returns you to the Patient Window.

Note—If you have flexible monitoring and want to use a telemetry transmitter in a different bed, you must clear the sector after discharging the patient. If you don't, the transmitter will not be available for any other bed. You clear the sector by using the Clear Sector page in Sector Setup -- see "Clearing (Unassigning) a Sector" on page 2-34.

If a patient has been admitted, you must discharge the patient in order to clear the sector.

Discharging for Transport

Overview

For those times when you want to transport the patient and use the monitor at the new location a discharge option, Discharge for Transport, is available. The Discharge for Transport option is for patients being monitored by an M3 or IntelliVue Patient Monitor operating via a wired connection to the IntelliVue Clinical Network. The Discharge for Transport option discharges the patient on the Information Center and stores the patient data but does not discharge the patient from the bedside monitor. When you monitor the patient in a different location and reconnect the monitor to the network the bed will automatically be admitted on the Information Center at the new location.

Note—The Discharge for Transport option is not available for transporting patients to units connected to other database servers across a Large Network Central Database System.

Task Summary

To transport a patient using the Discharge to Transport perform the following steps:

Step	Action
1	Prepare the patient for transport.
2	From the Patient Window click the **Discharge** button. The Discharge window displays.
3	From the Discharge window click the **Discharge for Transport** button. The Information Center moves the patient data to the transfer list and the message “No patient admitted” displays in the bed’s sector. *Note*—Alternatively, the Transfer key on the M3 or IntelliVue Patient Monitor can be selected.
4	Disconnect the monitor from wall power and the network. If you transporting an IntelliVue Patient Monitor patient with a Measurement Server disconnect the Measurement Server from the monitor.

Step	Action
5	If you have flexible monitoring, clear the sector by using the Sector Setup window. See page 2-34 for information on clearing a sector.
6	Move the patient with the monitor or Measurement Server to the new location.
7	If you have flexible monitoring, at the new location assign the bed label and monitor label by using Sector Setup window. See page 2-27 for information on assigning equipment.
8	Reconnect to wall power and the network at the new location. For patients with a Measurement Server, reconnect the Measurement Server to the new monitor. The Information Center retrieves the patient information from the monitor and re-admits the patient to the new bed.

Transferring Patient Data to a New Bed

Overview

The Information Center allows you to transfer a patient to another bed without losing patient data. Transferring data involves two steps; discharging the patient from the current bed using the Discharge Window; then re-admitting the patient to the new bed using the Transfer List in the Admit Window.

The sector for the destination bed must have equipment associated with it (bedside monitor or a transmitter).

Note—If the central is connected via Philips CareNet, the new bed must be on the same central. If the central is connected via the IntelliVue Clinical Network, the new bed can be on any central on the IntelliVue Clinical Network or if the central is connected via the Large Network Central Database System the new bed can be on any central connected to the large network. A large network is a option where multiple database servers can be interconnected on the hospital network. This connectivity provides clinicians with the ability to transfer patients across care units that are on separate database servers. A patient can be transferred to any bed that does not have a patient admitted. However, both the bed and the equipment must be assigned to the sector to which you are transferring a patient. If no bed and/or equipment is assigned you must first assign the bed and/or equipment using the Sector Setup Window then transfer the patient. See “Assigning a Bed and/or Equipment to a Sector” on page 2-27.

Task Summary

Transfer data for a patient by performing the following steps:

Step	Action
1	On the Patient Window click the **Discharge** button.
2	If you are transferring the patient to a unit over a Large Network Central Database System, select the unit to which to transfer the data by clicking on the unit name in the **Transfer Destination** list.

Step	Action
3	On the Discharge Window specify that you want to save the patient data associated with this patient after discharge by clicking on the **Save Data with Discharge** button. This ensures that patient data is retained and remains intact when the patient is moved to the new bed. The data that is saved includes: • Patient's name and ID. • Alarm history (50 or 150 alarms). • Events and trends (and ST data for telemetry beds) going back 24/48 hours and full disclosure waves going back 1/24/48 hours. The amount of data that can be retrieved depends on when the re-admission is done. For example, if a patient is re-admitted 10 hours after discharge (and your system has 24 hour trend storage), 14 hours of trends are available on re-admission. *Note*—For bedside monitors other than the M3 or IntelliVue Patient Monitor, you still have to discharge the patient at the bedside monitor to clear the bedside database and reset bedside alarm limits.
4	When the central prompts you whether you are sure you want to discharge this patient click the **OK** button. The central discharges this patient and returns you to the Patient Window. *Note*—If you have flexible monitoring and want to use this equipment for a different bed, you must clear the sector after discharging the patient. If you don't, the equipment will not be available for any other bed. You clear the sector by using the Clear Sector page in Sector Setup -- see "Clearing (Unassigning) a Sector" on page 2-34.
5	On the Patient Window click the **Admit Patient** button.

Step	Action
6	On the Admit Window, click on the patient's name in the **Transfer List**. *Note*—The names that are displayed when you first enter the Admit Window are the names of patients that were discharged from this central. To see the names for all centrals in your care unit, click on your unit name. To see names for centrals in another unit, click on that unit name.
7	Click the **Admit Patient** button. The transfer is now complete. *Note*—You cannot modify any of the patient data until after you click the **Admit Patient** button. Change the patient information, if needed, and click **Update**. *Important*—When a patient is admitted from the Transfer List, the Paced status is not retrieved -- it is set to NO for all monitoring devices. If the patient is paced, change it after you click the **Admit Patient** button.

Note—When transferring patients across a Large Network Central Database System you can check the status of the transfer in the Transfer Status window. Access the Transfer Status window by clicking the **Transfer Status** button on the All Controls window.

Fixed and Flexible Monitoring

The functions available to manage the beds on the Main Screen and the equipment for those beds depend on whether the central is configured for fixed or flexible monitoring.

Changes are made through the Sector Setup Window. You can access the Sector Setup Window via the task bar button on the Patient Window or Patient Management applications, or via All Controls.

Fixed Monitoring

Fixed monitoring is typically configured for units where the number of beds equals the number of sectors on the Main Display. The equipment assigned to a sector cannot be changed.

With fixed monitoring you can temporarily view other beds in the Patient Window. (See “Viewing a Bed Temporarily” on page 1-28 for instructions.)

In addition, if a sector is configured as an overview (blank) sector at installation, you can display any bed on the network. If the cursor is placed in an empty sector, the **Sector Setup** button is displayed. Clicking this button brings up the Overview Bed page, where you can select the bed.

Flexible Monitoring

With flexible monitoring, bed and equipment changes are possible. An example of a unit with flexible monitoring is the unit that has both bedside monitors and telemetry beds. Units may need to change patients back and forth between bedside monitoring and telemetry. Flexible monitoring allows you to make the appropriate equipment changes. Another example of a unit with flexible monitoring is the telemetry unit that has more beds than sectors on the Main Screen. Flexible monitoring allows the unit to make bed label changes as needed. For example, transmitters can be assigned to different beds as necessary.

If your system is configured for flexible monitoring, you can transition between SDN based equipment (for example, telemetry) and IntelliVue Clinical Network-connected wired and wireless bedsides on the same Information Center.

As with fixed monitoring, if your central is connected to other centrals, you can use patient sectors to display overview/consulting beds for patients monitored by those centrals.

Note—All wireless M3 bedside monitors will **automatically** be configured for flexible monitoring.

Assigning a Bed and/or Equipment to a Sector

Overview

If your system is configured for flexible monitoring, the Information Center allows you to assign a bed and/or equipment to an empty sector.

For centrals connected via the IntelliVue Clinical Network: you use the Assign Bed/ Equipment page to change the bed and/or equipment that is being monitored in the sector.

For centrals connected via Philips CareNet: you use the Assign Bed/Equipment page not only to change the bed and/or equipment that is being monitored in the sector, but also to assign a sector to be a consulting bed. This enables you to view real-time patient data for a bed that is being monitored by a primary central. Information on assigning consulting beds can be found in “Chapter 1. Introduction to the Information Center” on page 1-1.

You assign a bed and/or equipment for a sector by using the Sector Setup Window.

If the sector is empty

When the cursor is placed in the sector, one button appears in the sector, **Sector Setup**. Clicking on this brings you directly to the Assign Bed/Equipment page of the Sector Setup Window.

If there is a bed and equipment assigned

You must first use the Clear Sector page of the Sector Setup Window to clear the sector. See “Clearing (Unassigning) a Sector” on page 2-34. Then, you use the Assign Bed/Equipment page to assign the bed.

Note—You can use Assign Bed/Equipment to move a *telemetry-monitored* patient to another bed and preserve all settings (including alarm limits) as well as the patient's history. If this central is connected via Philips CareNet, the new bed must be on a central that is connected to the same CareNet switch. If this central is connected via the IntelliVue Clinical Network, the new bed can be on any central that is connected to the IntelliVue Clinical Network. You can do this whether or not the patient has been admitted.

You can access the Sector Setup Window via the task bar button on the Patient Window or Patient Management applications, or via All Controls

Task Summary

Assign a bed/equipment to a sector by performing the following steps:

Step	Action
1	On the Patient Window for the appropriate sector, click on the **Sector Setup** button.
2	On the Sector Setup Window select the Assign Bed/Equipment page by clicking on the **Assign Bed/Equipment** tab. *Note*—If you have flexible monitoring, this page displays automatically when you select Sector Setup for sectors that currently do not have a bed and/or equipment assigned to them.
3	Select the bed you want to assign to the sector by clicking on a bed name from the list. *Note*—The only beds that appear in the list are beds not currently displayed. Some beds may not be from your unit. Be sure to select the correct bed label. If the equipment moves between multiple Information Centers, for example an M3 monitor, the equipment will need to be cleared from the other Information Center before you can assign it.
4	Select the equipment you want to assign to the sector by clicking the appropriate equipment from the list.
5	Once the necessary selections are made and verified, click the **OK** button. The Information Center assigns the bed/equipment to the sector. Once you have assigned equipment to the sector, you can admit a patient to that bed. See “Admitting a Patient” on page 2-3. *Note*—Clicking the **Cancel** button cancels your changes and returns you to the Assign Bed/Equipment page.

Changing Equipment for a Sector

Overview

The equipment assigned to the bed can be a bedside monitor or telemetry transmitter. If your system is configured for flexible monitoring, you can change the equipment that is currently assigned to a bed. You change the equipment assigned by using the Change Equipment page in the Sector Setup Window.

Note—You can identify the transmitter label that is currently assigned to a bed by placing your cursor over the bed label in the sector. When you place your cursor over the bed label a pop-up box indicates the transmitter label.

Patient Settings

When you change the equipment assigned to a bed a short gap occurs in the wave data for the patient and the following occurs to patient settings:

- **Transmitter to transmitter**
  All patient settings remain the same as before the equipment change.

  If using Philips transmitters, the items controlled by the Wave Viewer or TeleMon depend on how the transmitter is set up. For example, the SpO_2 sample rate will be the one configured for the transmitter you are changing to.

- **Bedside monitors (other than M3/IntelliVue Patient Monitors) to telemetry**
  All existing arrhythmia settings remain the same. Settings that were not previously being monitored (for example, SpO2 and ST) default to the unit settings.

- **Telemetry to bedside monitor other than M3/IntelliVue Patient Monitor**
  All existing arrhythmia settings remain the same. However, the local bedside settings for all other parameters, including high and low HR alarm limits, go into effect. In addition, if telemetry ST segment monitoring was enabled, it is turned off (ST monitoring can be enabled at the bedside, if it is available).

- **Bedside/Telemetry to M3/IntelliVue Patient Monitor**
  All parameter settings will be those in the M3/IntelliVue Patient Monitor. If there are discrepancies in patient demographics, patient category or paced status a  icon will display in the upper right-hand corner of the patient sector to indicate that a conflict exists. You will need to go to the Admit Window and resolve the conflict. See "Resolving Conflicts with M3 or IntelliVue Patient Monitors" on page 2-9.

  Note—Differences in the height, weight, date of birth, or gender fields at the Information Center and these fields at the IntelliVue Patient Monitor will not cause a conflict to occur. If there are differences between the height, weight, date of birth, or gender fields, then the IntelliVue Patient Monitor value is always used.

- **M3/IntelliVue Patient Monitor to M3/IntelliVue Patient Monitor**
  All parameter settings will be those in the new bedside monitor. If there are discrepancies in patient demographics, patient category or paced status a icon will display in the upper right-hand corner of the patient sector to indicate that a conflict exists. You will need to go to the Admit Window and resolve the conflict. See "Resolving Conflicts with M3 or IntelliVue Patient Monitors" on page 2-9.

  Note—Differences in the height, weight, date of birth, or gender fields at the Information Center and these fields at the IntelliVue Patient Monitor will not cause a conflict to occur. If there are differences between the height, weight, date of birth, or gender fields, then the IntelliVue Patient Monitor value is always used.

- **M3 bedside monitor to telemetry**
  All parameter settings will be those in the Information Center.

- **IntelliVue Patient Monitor to telemetry**
  All existing arrhythmia settings remain the same, except the settings for Multilead, Singlelead, or Arrhythmia off. The Multilead, Singlelead, or Arrhythmia Off settings reflect the setting of the transmitter when it was last used. Settings that were not previously monitored (for example, SpO2 and ST) default to unit settings.

Task Summary

Change equipment assigned to a sector by performing the following steps:

Step	Action
1	On the Patient Window for the appropriate sector, click on the **Sector Setup** button.
2	On the Sector Setup Window select the Change Equipment page by clicking on the **Change Equipment** tab. *Note*—If you have flexible monitoring, this page displays automatically when you select Sector Setup for sectors that currently have a bed and equipment assigned to them.
3	On the Change Equipment page select the new equipment you want to assign to this sector by clicking on the Bedside Monitor or the transmitter label on the new equipment list. *Note*—Only transmitters that are unassigned to a bed are in the equipment list. If the transmitter you will be using to monitor a patient is not on the list, check that it is not assigned to a bed (put the cursor over the bed label to see the transmitter number). If the transmitter is assigned to a bed, use the **Clear Sector** tab to clear the sector. The transmitter will then be available for assignment to the new bed. If the equipment moves between multiple Information Centers, for example an M3 monitor, the equipment will need to be cleared from the other Information Center before you can assign it.
4	Verify that the bed and equipment you have selected are correct, then click the **OK** button. The bed and/or equipment will be changed for the sector. If the Bedside Monitor you selected is an M3 or IntelliVue Patient Monitor proceed to Step 5. *Note*—Clicking the **Cancel** button cancels your changes and returns you to the Change Equipment page.
5	If the Bedside Monitor is an M3 or IntelliVue Patient Monitor verify that the patient information/settings in the Admit Window are correct. Resolve any conflicts if necessary. See “Resolving Conflicts with M3 or IntelliVue Patient Monitors” on page 2-9.

Note—If using Overview while equipment change is taking place, the data from these beds may momentarily not be available.

Assigning an Overview Bed to a Sector

Overview

If your central is connected to the IntelliVue Clinical Network, you can assign an overview bed to a sector. An overview bed is a bed that is currently being monitored by another connected Information Center (the primary central).

You assign an overview bed to a sector by using the Overview Bed page in the Sector Setup Window. Sectors that have no bed label assigned contain a **Sector Setup** button from which you can directly access the Sector Setup Window.

Fixed monitoring

You can overview a bed in a sector if a sector is configured as an overview (blank) sector at installation. If the sector already has an overview bed, you must clear the sector before assigning another overview bed. See “Clearing (Unassigning) a Sector” on page 2-34.

Flexible Monitoring

You can assign an overview bed to a sector for:

- Sectors that currently do not have bed/equipment assigned.
- Sectors that display a bed label but do not have equipment assigned.

Overview Bed Controls

The controls available when viewing an overview bed depend upon how your system is configured and whether you have Read-Only or Full Control access. Read-Only access means you can view the patient data but cannot make any changes. Full Control access means you can view the patient data and make changes. For more information, see “Types of Access” on page 1-29.

Task Summary

To assign a sector to a bed currently being monitored by another connected central perform the following steps:

Step	Action
1	On the Patient Window for the appropriate sector, click on the **Sector Setup** button.
2	On the Sector Setup Window select the Overview Bed page by clicking on the **Overview Bed** tab. *Note*—If fixed monitoring, the Overview Bed page is automatically displayed for a blank sector.
3	Select the unit you want, then the bed you want to overview by clicking a bed name from the list.
4	Click the **OK** button. The Information Center assigns an overview bed to the sector. *Note*—Clicking the **Cancel** button cancels your changes and returns you to the Overview Bed page.

Clearing (Unassigning) a Sector

Fixed Monitoring

If your system is configured for fixed monitoring, you must clear the current overview bed before assigning another overview bed to that sector.

Flexible Monitoring

If your system is configured for flexible monitoring, you use Clear Sector to remove the bed/equipment that is currently displayed in a sector.

Note—If a patient is admitted to the bed, you must first discharge the patient before clearing the sector. See “Discharging a Patient” on page 2-18.

When the sector is empty, you can:

- Assign a new bed/equipment to monitor a bed.

or

- Overview a bed being monitored by another connected Information Center.

Important—For M3/M4 or IntelliVue Patient Monitors, when you clear the sector the bed will no longer be available for Overview at other bedsides. See your user documentation for information on using Overview at the M3/M4 or IntelliVue Patient Monitor.

You clear a sector by using the Clear Sector page in the Sector Setup Window.

Task Summary

Clear a sector by performing the following steps:

Step	Action
1	On the Patient Window for the appropriate sector, click on the **Sector Setup** button.

Step	Action
2	On the Sector Setup Window select the Clear Sector page by clicking on the **Clear Sector** tab.
3	On the confirmation box that displays click the **OK** button. The Information Center clears the bed/equipment assignment from this sector and returns you to the Main Screen. **Warning** **Clearing a sector can stop monitoring for a bed. Therefore, be sure to check that the sector you will clear is no longer monitoring a patient.** *Note*—Clicking the **Cancel** button resets the sector assignment to its initial condition.

3
Recordings and Reports

This chapter describes the Information Center recordings and reports. It includes the following sections:

Introduction

The intended use of the Philips Recorder is to provide hardcopy of text, graphics, and wave data for the Information Center.

You can initiate recordings and reports (if a printer is available) from the Information Center or from the bedside. See page 3-24 for bedside monitors from which printing requests cannot be made.

You can make recordings on the Philips 2-Channel Recorder or the M3160A 4-Channel Recorder if the 4-Channel Recorder is available on your system. The Philips 2-Channel Recorder consists of the M1116B strip chart recorder module housed in a rack. The Philips Recorder rack can contain up to three recorder modules. Recordings can be automatically generated by alarm events or you can manually request them. Delayed recordings contain the primary and secondary waves selected at the bedside, or, for telemetry, on the Patient Window. Delayed recordings, for bedsides other than the Intellivue Patient Monitors, are always made on the Philips 2-Channel Recorder. IntelliVue Patient Monitors can make delayed recordings on the Philips 2-Channel Recorder or the M3160A 4-Channel Recorder if the 4-Channel Recorder is available on your system. Real time recordings can be made on the Philips 2-Channel Recorder or the M3160A 4-Channel Recorder if the 4-Channel Recorder. The clinician selects the waves for real-time recordings. Continuous recordings can have overlapping waves. The 2- channel recorder speed is configured at 6.25mm/s, 25 mm/s, or 50 mm/s. The 4-channel recorder speed is configured at 12.5mm/s, 25 mm/s, or 50 mm/s,

The central can be configured so that clicking in the patient sector has the following action:

- initiates a delayed recording (not available on 4-channel recorders).
- saves a strip in Alarm Review and Event Review.
- both initiates a delayed recording and saves a strip.

The Philips Recorders are not intended for home use.

Rx only.

Types of Recordings

The following types of recordings can be made at the central.

Recording	Description
Alarm	An alarm recording is a timed non-continuous recording that is generated automatically (if configured) when an alarm occurs. The recording shows waves both before and after the alarm was announced. Alarm recordings can be made continuous from the recorder and can be extended from M3 bedside monitors. Alarm recordings are made on the 2-Channel Recorder.
Delayed	A delayed recording is a timed non-continuous recording that shows waves both before and after it is initiated. Delayed recordings can be made continuous from the recorder, and can be extended from M3 bedside monitors. Delayed recordings are made on the Philips 2-Channel Recorder.
Real-time	A real-time recording is a continuous recording that shows waves that occur after you request the recording. Real-time recordings must be manually stopped. Real-time recordings can be directed to the Philips 2-Channel Recorder or the M3160A 4-Channel Recorder if the 4-Channel Recorder is available on your system.
Procedure	A procedure recording is a timed recording made from the bedside (for example, cardiac output).

Alarm Recordings

You can turn off the recording of specific alarms in the Record/Store Window. See “Chapter 4. Alarm Management and Setup”.

The waves that are recorded are based on the waves

- Primary wave (usually ECG)
- Wave corresponding to the alarming parameter. If only the primary wave is available, a 40-mm single-channel recording is generated.

Note—In order for an alarm recording generated from the M3 or the IntelliVue Patient Monitor to be made at the central, the recording must be configured On at both the bedside and the central (in the Record/Store Alarm Window).

Arrhythmia Alarm Recordings

If an arrhythmia alarm recording is running for a patient and other arrhythmia alarms occur for the same patient (with the same waves), the recording will be extended to include the superseding alarms.

Making a Delayed Recording

Overview

A delayed recording is a non-continuous, timed recording that shows waves prior to your record request along with a few seconds of waveforms after your request. You can make a delayed recording for one patient or for all patients. Delayed recordings contain the primary and secondary waves selected at the bedside, or, for telemetry, on the Patient Window. Delayed recordings always print on the Philips 2-Channel Recorder.

Note—

- For EASI CMS and V24 bedsides, if your system is configured for second ECG the secondary wave will always be the second channel of ECG regardless of the secondary wave selected at the CMS or V24 bedside.

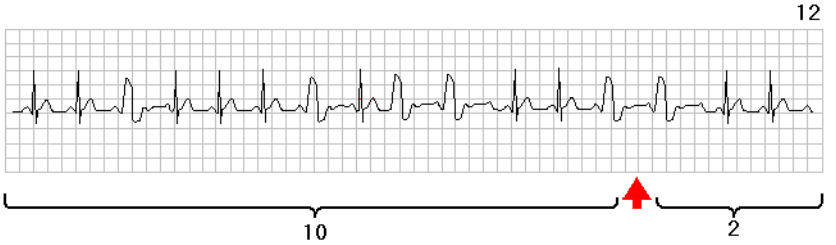
- For M3 bedside monitors, waves for delayed recordings are not selectable. The pre-set waves for recording are: ECG CH-1 and Invasive Pressure-1. If Invasive Pressure-1 is not available, the following waves are substituted (by the following pre-set priority): Invasive Pressure-2, CO2, ECG CH-2, ECG CH-3, Pleth, Resp.

- For IntelliVue Patient Monitors, the waves that are recorded are those that are configured for recording at the IntelliVue Patient Monitor. For IntelliVue Patient Monitors, when selecting waves for recording only select waves that are available to you at the Information Center and are visually present in the patient window. If you select waves that are not available at the Information Center, the Information Center will substitute the primary ECG and the highest priority bedside wave on the recording. See your IntelliVue Patient Monitor user documentation for details.

Delayed recordings can be initiated from the central, or from the bedside. For telemetry patients, a Nurse Call recording can be initiated when the Patient Button on the telemetry transmitter is pressed (if configured and turned on).

The length of the recording and the waves are pre-set for your unit. Factory defaults are 10 seconds pre-event and 2 seconds post-event. In the example below the arrow indicates when the recording was requested.

10 seconds PRE-EVENT + 2 seconds POST-EVENT = 12 seconds TOTAL RECORDING



Note—The actual length of a delayed recording may be longer that the pre-set length to allow for all of the annotations to be printed. In timed recordings, since the number of seconds of pre-event and post-event wave(s) are pre-set for your unit, if the event is longer than this amount of time, you will not capture the entire event. Use Wave Review to see the entire event. See “Wave Review” on page 6-31.

Task Summary

When you request a delayed recording the Philips Information Center begins recording the waves for the sector(s) you selected and stops automatically.

If your system is set up to produce a delayed recording, the label on the button in the patient sector that appears when the cursor is in the sector will be **Record** or **Record and Save**. You request a delayed recording by performing the following step:

Step	Action
1	Click on the button (or anywhere in the sector except the **Patient Window** button).

Action of Patient Sector Button

Depending on how your system is configured, clicking a button in the patient sector initiates a delayed recording or the saving of a strip. The action of the button is shown by the button label.

The labels are:

- **Record** -- this generates a paper recording of the primary and secondary waves.
- **Save** -- this generates a 30-second strip saved in Alarm Review and Event Review.
- **Record and Save** -- this generates both a paper recording and a strip in Alarm Review and Event Review.

Note—Strips can be viewed in Alarm Review if “ALL ALARMS” or “USER-SAVED STRIPS” is selected. Strips can be viewed in Event Review if “USER-SAVED STRIPS” is displayed.

The number of user-saved strips is limited (10 if your Alarm Review has a 50-record capacity, or 30 if your Alarm Review has a 150-record capacity). If the maximum number of strips is reached, when a new strip is saved, the oldest saved strip is automatically deleted.

Making an Alarm/ Delayed Recording Continuous

You can make an alarm or delayed recording continuous while the recording is printing by pressing the RUN/CONT key on the recorder module. To terminate a recording, press the STOP key on the recorder module.

If the recording was queued (e.g., because the recorder was busy or out of paper), it cannot be made continuous.

Extending a Delayed Recording at the M3 Monitor

You can extend a delayed recording requested from the bedside by pressing the **Delayed Recording** button on the M3 monitor. This causes the recording to run, then be extended by a pre-set number of seconds. That is, if the recording is pre-set to run for 12 seconds, the recording will be extended an additional 12 seconds. The recording will be extended for each time the button is pressed.

If the recording was queued (for example, because the recorder was busy or out of paper), it cannot be extended.

Making a Delayed Recording for All Beds

Regardless of whether or not your system is set up to allow delayed recordings initiated from the patient sector, you can make a delayed recording for all beds that are displayed. You request a delayed recording for all sectors by performing the following steps:

Step	Action
1	Get to the All Controls Window for any sector.
2	Click the **Record All** button in the title bar. The central will initiate a delayed recording for all sectors that currently have patient data. *Note*—Sectors without beds or equipment assigned will not have a recording printed.

Saving a Strip from the Patient Sector

Overview

Your system can be configured to allow you to click a button in the patient sector to quickly capture 30 seconds of waveforms that are saved in the database. You can view these saved strips in either Alarm Review or Event Review. The strip contains 20 seconds of wave before the button was clicked, and 10 seconds after.

Task Summary

If your system is set up to allow saving of strips, the label on the button in the patient sector that appears when the cursor is in the sector will be **Save** or **Record and Save**. To save a strip, click on the button (or anywhere in the sector except the **Patient Window** button).

Selecting the Waves that are Saved

The waves that are saved can be selected on a per patient basis in the Stored Waves Window, Alarm Waves tab. See “Changing the Waves that are Stored” on page 6-50.

Making Real-Time Recordings

Overview

A real-time recording is a continuous recording that shows waves that occur after you request the recording. You select the waves to record and have to manually stop real-time recordings.

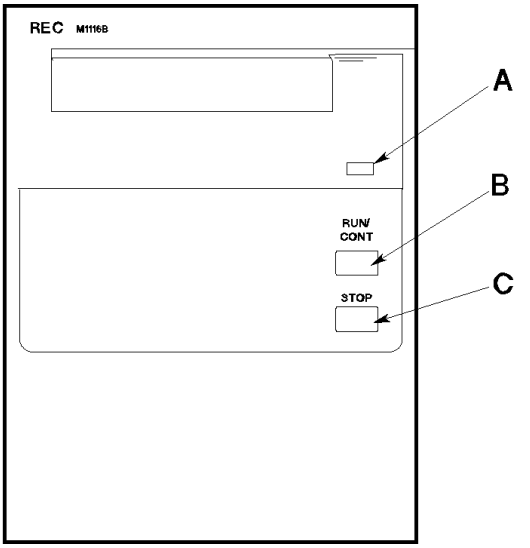
Task Summary

Make a real-time recording by performing the following steps:

Step	Action
1	In the Patient Window click on the **Continuous Recording** button. The Philips Information Center displays a pop-up box.
2	If a 4-channel recorder is available in your unit, specify whether this recording is going to the 2-channel or 4-channel recorder by clicking on the appropriate radio button in the **Recorder Type** field. Clicking the 4 Channel button directs the recording to the 4-channel recorder. Clicking the 2 Channel button directs the recording to the 2-channel recorder.
3	Select the waves to record by selecting the waves from the **Wave Settings** drop-down list. *Note*—You can make wave one an arrhythmia wave by clicking on the **Beat Labels** box. *Note*—For IntelliVue Patient Monitors, when selecting waves for recording only select waves that are available to you at the Information Center. Selecting waves that are monitored but not displayed in the Patient Window would result in blank sectors appearing in the recording.

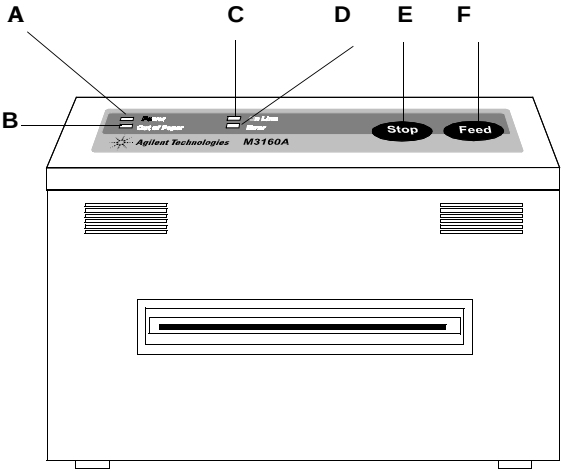
Step	Action
4	Specify whether to overlap the waves or not by clicking on the **Overlap** box. With the 2-channel recorder: • **No overlap** -- no waves overlapped. The size of the grid is 40 mm for one wave, 20 mm for two waves. • **Overlap** -- overlap two waves in one 40 mm sector. With the 4-channel recorder: • **No overlap** -- no waves overlapped. The size of each grid is 100/(number waves selected). • **Overlap** -- produces a recording of Wave 1 (50 mm) above Wave 2-4 (50 mm).
5	Click the **Record** button. The recording begins and continues until you click the **Stop** button in the Continuous Recording box or press **Stop** on the recorder module.

Controls and Indicators on the Philips 2-Channel Recorder Module



A. Continuous light	Lights if the currently printing recording is continuous.
B. RUN/CONT (continue) key	Makes a currently printing recording continuous (if possible).
C. STOP key	Stops the currently printing recording.

Controls and Indicators on the M3160A 4-Channel Recorder



A. Power	Light illuminates when power is on.
B. Out of Paper	Illuminates when the paper has not been properly set or when there is no paper.
C. On Line	Illuminates when the recorder is ready to accept data. The light flickers on and off during normal operation.
D. Error	Illuminates to indicate that an error occurred during data transmission or there is a problem with the recorder.
E. Stop	Press this button to stop the currently recording.
F. Feed	Pressing this button causes the printer to eject paper for as long as the button is depressed.

Recording Priority

If all recorder modules are busy or inoperable, recording requests are queued (stacked). Recordings then print when a recorder module becomes available. The table below provides the priority (from highest to lowest) and the number of requests per patient that can be in the queue.

Recording Requested	Priority
Real-time	One request per patient is queued. If other recordings are printing when you request a real-time recording the Philips Information Center processes the request as follows: • If a real-time recording is running, a new real-time request for a different patient is queued. If the new request is for the same patient, the new request is not accepted. • If a timed recording is running, the real-time request is queued. When the current recording finishes printing, the real-time recording starts. The waves will be from the time the recording starts printing, and not from the time of the request.
Alarm	Five alarms per patient are queued. New alarm requests replace the oldest request. If alarms are older than 1 hour, only 1 alarm is queued.
Delayed	One request per patient is queued. New delayed requests for the patient replace the pending request.
Procedure	Ten strips per patient are queued.

If there is no recorder available for 12 hours due to a recorder failure, the recorder door being left open, or the recorder out of paper, then all recordings in the queue are deleted. In addition, all recordings in the queue are deleted if monitoring mode is exited (for example, if the system is rebooted).

Recording Status Messages

Main Screen Messages

The messages in the table below appear in the status message line at the top of the Main Screen.

Note—The "X" indicates the position of the 2-channel recorder module in the rack, for example, Left, Center, Right.

Message	Meaning
X recorder out of paper	No recording can be made on this recorder module until you replace the paper.
X recorder door is open	No recording can be made on this recorder module until you close the recorder module door.
No recorder connected	No recorder module is plugged into the recorder rack.
X recorder hardware fault	The recorder module is inoperable. Contact service.
Recorder Rack or Power Supply Fault or No Recorder	There is a fault in the recorder rack or the rack power supply. Contact service if the message persists.
4 Channel Recorder Not Ready	Indicates that either the 4-channel recorder is out of paper, has no power, the serial recorder cable is not connected or the recorder had some internal failure causing it to be offline. *Note*—There is a LED on the front of the recorder that illuminates when there is no paper in the recorder.

The device name is also indicated in the message (for example "CCU1 Left recorder door is open").

Recorder Messages at the M3 Monitor

The messages in the table below appear at the M3 monitor when recordings are generated.

Recording Type	Message	Meaning
Alarm	No Alarm Recording Available	No recorders configured on the central are functioning; no recorders are configured on the central.
Delayed	Delayed Recording Accepted	Delayed recording request successfully received at the central.
	Delayed Recording Running	Delayed recording request is active.
	Delayed Recording Extended	Delayed recording successfully extended.
Delayed	Recording Stopped	Delayed recording stopped.
Continuous	Continuous Recording Running	Continuous (Realtime) recording request is active.
	Recording Stopped	Realtime recording was manually stopped.

Annotation

The recording annotation for delayed, real-time, and alarm recordings includes the following information:

- Patient name (as entered in the Admit Window)
- Patient Medical Record number (as entered in the Admit Window)
- Bed label
- Date and time (time of the first wave data on the recording)
- Current alarm text (for alarm recordings only)
- If the alarms are suspended, the text “Alarms Suspended”
- INOP text (if available)
- Patient parameters (associated with the date and time of the recording -- subset for alarm recordings)
- Rhythm (if available)
- Recorder speed
- Bandwidth (for ECG waves suitable for ST measurements)

The recording annotation for recordings made from Alarm Review (for both alarm strips and saved strips) includes the following information:

- Patient name (as entered in the Admit Window)
- Patient Medical Record number (as entered in the Admit Window)
- Bed label
- Date and time (time of the first wave data on the recording)
- Alarm text specific to the alarm (for alarm strips only)
- Recorder speed

Note—Procedure recordings generate their own annotation.

Timed, delayed recordings continue until all of the annotation is complete.

Re-Annotation

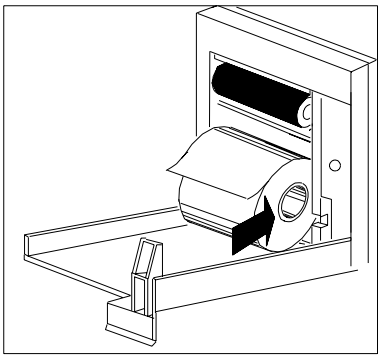
Real-time and delayed recordings that are continued are re-annotated every 50 mm with a subset of the annotation information.

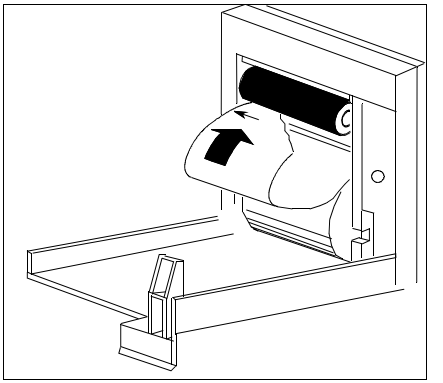
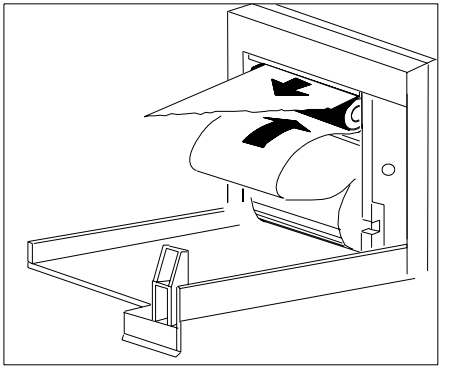
Loading Paper into the 2-Channel Recorder

A message appears at the top of the screen when the recorder is out of paper.

Task Summary

To load paper into the recorder perform the following steps:

Step	Action
1	Insert a new roll with paper feeding from the top. Hold paper lead then push on the roll until it clicks into place. 
2	Tear paper at a 45 degree angle.

Step	Action
3	Feed paper under roller, using left edge of paper as a guide. 
4	Pull paper out and close door. 

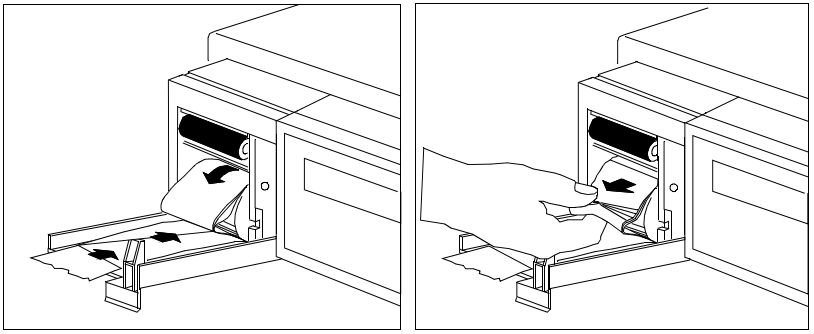
Testing

You can test to see if the recorder paper is loaded correctly by clicking the **Record** button in any Patient Sector that has waves. If no printing appears on the strip, the paper is loaded backwards. Remove the roll and reload.

Task Summary

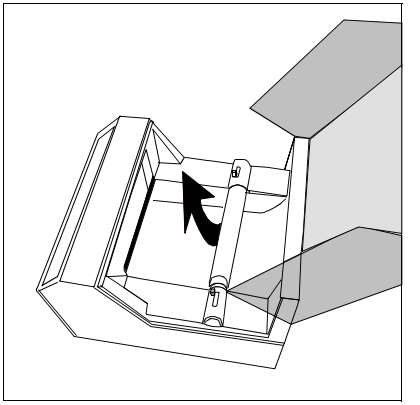
To remove roll:

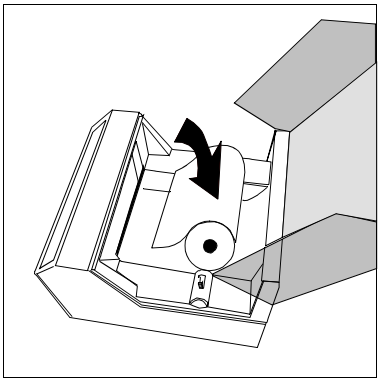
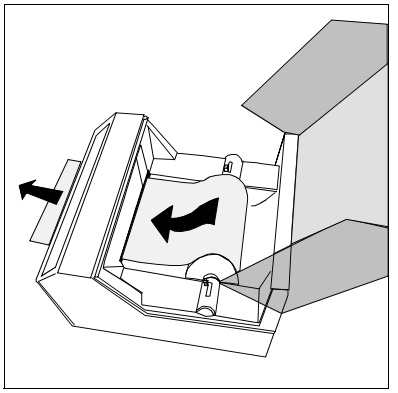
Step	Action
1	Tear off the paper.
2	Open the recorder door.
3	Pinch the paper at the shelf below the roller, and pull the paper off the roller.
4	Gently push the excess paper back onto the paper roll to loosen.
5	With the paper rolled loosely, pinch several thicknesses and pull roll out.



Loading Paper into the 4-Channel Recorder

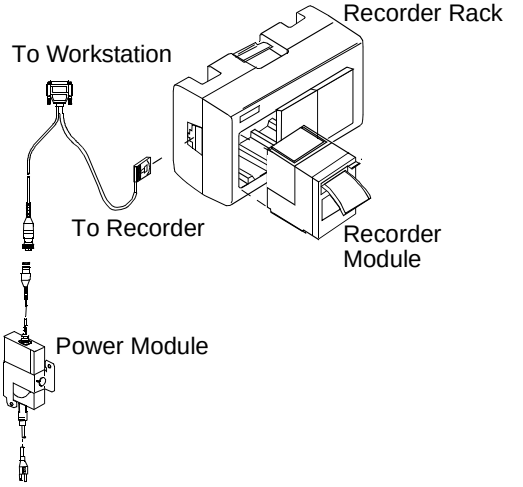
To load paper into the 4-channel recorder perform the following steps:

Step	Action
1	Lift the clear plastic cover on the top of the recorder.
2	Remove the old spool from the recorder by pushing up and out on the two plastic tabs that hold the spool in place. 

Step	Action
3	Place the new spool in the recorder by pushing down and in on the two plastic tabs. Be sure that the paper feeds from the top of the roll. 
4	Trim the end of the paper to make a clean edge.
5	Insert the paper near the feed slot. The recorder automatically takes up the paper. 
6	Close the plastic cover on the top of the recorder.

Philips 2-Channel Recorder Connections

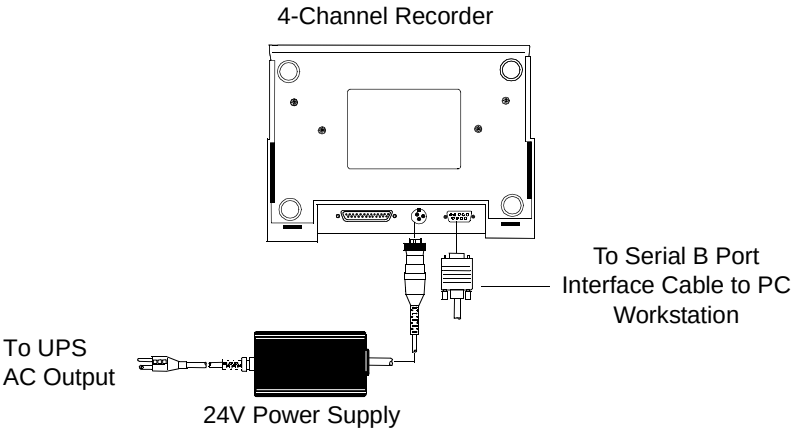
The following diagram displays the 2-channel recorder connections.



Note—To remove a recorder module press on the two tabs on the bottom of the module and pull the module out.

M3160A 4-Channel Recorder Connections

The following diagram displays the 4-channel recorder connections.



Ordering Information for Supplies for Recorders

Paper

Paper for the 2-Channel Recorder Module

Part Number 40477A	Recorder paper -- 20 rolls
Part Number 40477B	Recorder paper -- 80 rolls

Paper for the 4-Channel Recorder

Part Number PSE 11268	Recorder paper -- 24 rolls

Cleaning Kit

Cleaning Kit for 2-Channel Recorder Module

Part Number M1116-80201	Cleaning Kit for Printhead

Printing Reports

If a central printer is connected, you can initiate reports from the Philips Information Center or from a bedside monitor, with the exception of the wireless M3 or the Compact Configurable Monitor.

Note—Reports requested from a wired/wireless M3 bedside monitor can be printed via the IR link on a printer located at the bedside.

See Chapter 6, “Patient Data Review” for a description of the reports that you can initiate from the Philips Information Center. For operating information on printers, please see the documentation that was shipped with your printer.

Printer Status Message

The message “Printer needs attention” appears in the status message line at the top of the Main Screen when any of the following occur:

- Printer is out of paper
- Printer has a paper jam
- Printer memory is full
- Printer is not turned on
- Printer cable is not connected
- Printer has a software or hardware failure
- Connectivity to a LAN-connected printer has failed
- NT print spool is full

In all cases you should check the status display on the printer and fix the problem or notify service.

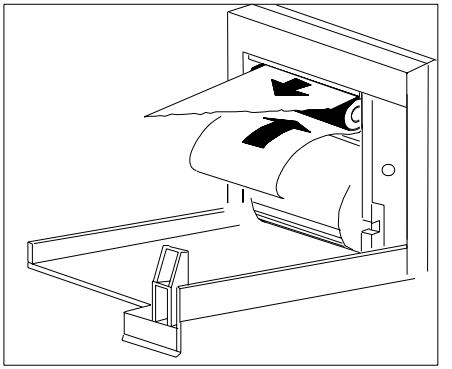
Printer Messages at the M3 Monitor

The messages in the table below appear at the M3 monitor when a report is requested at the bedside.

Message	Meaning
Printing	The report request was successfully received at the central.
Printer Not Available	The configured printer is not currently available due to a network failure or printer failure.

Cleaning the Philips 2-Channel Recorder Printhead

If you run recordings at low speed (1 or 2cm/min) for extended periods, deposits of paper debris may collect on the print head making recordings unevenly fainter in horizontal stripes.

Step	Action
1	Remove the recorder.
2	Open the recorder door and un-thread the paper from behind the rubber roller.
3	Tear off or roll up the excess paper into the roll chamber to get it out of your way.
4	Thread the cloth cleaning strip instead of paper around the rubber roller until approximately two inches of the leader come out from the top of the roller. 
5	Close the recorder door, aligning both ends of the strip over the top of the door.

Step	Action
6	Holding the top end of the cleaning strip between your thumb and forefinger. Pull the strip through and out of the recorder.
7	Open the door and ensure that the paper cavity is dust-free. Re-thread the paper and replace the recorder.

4
Alarm Management and Setup

This chapter describes the alarms detected by the Information Center. It includes the following sections:

Overview

The Information Center annunciates all alarm conditions that it detects as well as those detected by bedside monitors. Control of alarm limits and alarm on/off status depends on the device where the alarm event is detected.

The Information Center *detects* the following alarms:

- Arrhythmia alarms for both bedside monitors (other than M3 monitors) and telemetry.
- ST segment alarms for telemetry.

The Information Center detects arrhythmia alarm conditions by comparing ECG data against a set of pre-defined rules/criteria for the condition. An alarm condition can be in the form of a rate exceeding a threshold (for example, HR >xx), an abnormal rhythm (for example, Ventricular Bigeminy), or an ectopic event (for example, Pair PVCs).

You can adjust the thresholds for arrhythmia alarm conditions through the Arrhythmia Alarms Window (for monitoring devices other than M3 monitors). See “Adjusting Alarms” on page 4-13 for information on adjustments available in the Arrhythmia Alarms Window. You can adjust the thresholds for ST alarms through the ST Alarms Window. See the *Telemetry System Instructions for Use.*

Note—Except for telemetry EASI ECG, arrhythmia analysis can be set to off either for an individual patient or for all patients (under unit settings). In this case, no arrhythmia alarms are generated by the central. (Asystole and V-Fib alarms from the bedside/telemetry cardiotach are active.) See “Arrhythmia Analysis Off” on page 4-21 for more information. Also, no arrhythmia alarms are generated if alarms are suspended, if ECG alarms are turned off, or if the HR alarm source is set to Pulse.

M3 Monitors

If the patient is monitored by a M3 monitor, arrhythmia monitoring is done at the bedside monitor. All alarms (including arrhythmia alarms) are announced at the central; all alarm settings are controlled at the monitor. See the M3 User’s Guide for information.

IntelliVue Patient Monitors

If the patient is monitored by a IntelliVue Patient Monitor, arrhythmia monitoring is provided by the bedside monitor. All alarms (including arrhythmia alarms) are announced at the central. Controls for arrhythmia analysis and alarm limits are adjustable and viewable at both the Information Center and the IntelliVue Patient Monitor. See your IntelliVue Patient Monitor user documentation for information on arrhythmia monitoring and the IntelliVue Patient Monitors.

Alarm Indicators

The Information Center indicates alarm conditions by using the following signals:

- The patient sector turns blue (except for soft INOPs, see page 4-5).
- An alarm message displays in the patient sector and in the Patient Window.
  - For rate alarm conditions, the message indicates what parameter is in alarm, the maximum or minimum value, and the alarm limit that was violated (for example, HR 134>120)
  - For event alarm conditions, the message indicates the event that caused the alarm (for example, Asystole).
- An alarm tone sounds that is indicative of the alarm type (except for soft INOPs, see page 4-5).

  Note—There is no sound for soft INOPs.

All active alarms for bedside monitors are annunciated at both the bedside and at the Information Center. All alarms for telemetry-monitored beds are only annunciated at the Information Center.

Alarm Levels and Priorities

There are three different levels of alarm conditions:

- Red
- Yellow
- Inoperative (INOP).

The Information Center indicates the level of the alarm by:

- The alarm sound.
  Note—Depending on how your system is setup the alarm sounds can be configured for either Traditional/CareNET or IEC/ISO standard alarm sounds. See the table below.

- Number of asterisks (*) in the alarm message
- The color of the message

The table below lists the levels of alarms in order of their priority.

Alarm Level	Sound	Message	Meaning
Red (***)	*Traditional/ CareNet Sound*: Continuous high-pitch rapid tone *IEC/ISO Sound*: Repeated bursts of five rapid high-pitch beeps	*** next to the alarm message	Life threatening, for example, ASYSTOLE
Yellow (**) (long yellow)	*Traditional/ CareNet Sound:* Continuous medium- pitch tone *IEC/ISO Sound:* Repeated bursts of three rapid low-pitch beeps	** next to the alarm message	Non-arrhythmia alarm limit violation. *Note*—This does not apply to HR, which is an arrhythmia alarm

Alarm Level	Sound	Message	Meaning
Yellow (**) Arrhythmia (short yellow)	*Traditional/ CareNet Sound:* Noncontinuous medium-pitch tone sound (for several seconds) *IEC/ISO Sound:* Two rapid low-pitch beeps	** next to the alarm message	Arrhythmia yellow alarm detected
Yellow (**) Nurse Call (Telemetry) (short yellow)	*Traditional/ CareNet Sound:* Noncontinuous medium-pitch tone sound (for several seconds) *IEC/ISO Sound:* Two rapid low-pitch beeps	** next to the alarm message	The patient button on the telemetry transmitter has been pressed (and the system is configured to alarm and the patient button is on).
Hard INOP (inoperative condition)	*Traditional/ CareNet Sound:* Continuous slow low-pitch tone *IEC/ISO Sound:* Repeated bursts of two slow low-pitch beeps	no asterisks appear next to the message	Inoperative condition that prevents monitoring, for example, LEADS OFF or which has a direct effect on the patient, for example, NBP CUFF OVERPRESS.
Soft INOP (inoperative condition)	none	no asterisks appear next to the message	Inoperative condition which prevents the system from processing signals properly, for example, NOISY ECG. Monitoring usually continues during this INOP condition.

Active Alarm Sound

There can be only **one** alarm sound annunciating at the central monitor at one time.

- If there is an unacknowledged red level alarm in the presence of any other level alarm the sound for the red alarm will annunciate.
- If there is no unacknowledged red level alarm condition and there is an unacknowledged long yellow alarm in the presence of any other yellow or INOP alarm (acknowledged or unacknowledged) the sound for the long yellow will annunciate.
- If there is no unacknowledged red level alarm or long yellow level alarm condition and there is an arrhythmia or nurse call event, the short yellow (**) alarm sound will annunciate.
- If there are no unacknowledged red or long/short yellow alarm conditions and there is any bed with an unacknowledged hard INOP condition the sound for the hard INOP annunciates.

Alarm Messages

There are two alarm condition message areas in the patient sector and the Patient Window: one area for red and yellow level alarm messages, and the other for INOPs. If you place the cursor over the alarm condition message, a pull-down list displays the message with the time of the alarm/INOP condition.

If there is more than one alarm/INOP condition present, there will be an arrow to the right of the message. In this case, placing the cursor over the alarm/INOP condition message displays a pull-down list with up to 10 active alarm condition messages (with times indicated), the oldest alarm condition appearing first. If there are 10 alarm conditions and a new alarm condition occurs, the oldest alarm condition is removed from the list and the new alarm condition is added to the bottom of the list.

Note—For IntelliVue Patient Monitors, the highest priority alarm is always shown in the alarm conditions message area. Up to 10 current alarms conditions are shown in the pull-down list. If more than 10 alarms are active, then some will not be shown in the list. A review of all active bedside alarms is available at the bedside. See your bedside documentation.

If there are concurrent red and yellow alarm conditions, the red alarm condition message displays first, and the yellow alarm condition message(s) are available in the pull-down list.

- Cardiac alarms have the highest priority.
- If there is a red alarm condition, and a new red alarm occurs, the new alarm message replaces the old.
- If there is a yellow alarm condition, and a new yellow alarm condition occurs, the new alarm condition message replaces the old.
- If there is an INOP condition, and a new INOP condition occurs, the new INOP condition message replaces the old.

- If there is a yellow arrhythmia alarm condition, the message displays for 3 minutes unless silenced regardless of whether the alarm condition persists or not. If silenced and the alarm condition is no longer active, the message goes away immediately. If the alarm condition is still active the message remains until the alarm condition clears, whether silenced or not. See page 4-28 for information on yellow alarm behavior and silencing alarms.

Warning

If alarm annunciation is silenced and alarm reminders are configured off, the alarm condition message will persist but there will be no audible alarm annunciation.

The table on the following page lists the arrhythmia alarm condition messages. For a list of ST alarm condition messages (for telemetry monitored patients) see the *Philips Telemetry System Instructions for Use*.

Arrhythmia Alarm Messages

The following table lists the Arrhythmia alarm conditions and the description of the criteria required to generate these alarms. In the table below, yyy = patient's rate and xxx = limit that was exceeded. The messages that display depend on whether you have basic or enhanced arrhythmia. See "Levels of Arrhythmia Analysis" on page 5-3.

Red-level alarm conditions are announced by continuous chiming. Yellow-level alarm conditions are announced by a tone that sounds for several seconds (to distinguish them from non-arrhythmia alarm conditions that have a continuous tone.)

Message	Level	Description
*** ASYSTOLE	Red	No QRS detected for x seconds. Choices of > 2.5 to 4 seconds [a] Note: M3/M4 - No QRS detected for 4 consecutive seconds
*** V-FIB/TACH	Red	Fibrillatory wave (sinusoidal wave between 2-10 Hz) for 4 consecutive seconds

Message	Level	Description
*** V-TACH	Red	Consecutive PVCs >/= V-Tach Run limit and HR > V-Tach HR limit
*** TACHY yyy > xxx	Red	Heart Rate (yyy) greater than the Extreme Tachy limit (xxx)
*** BRADY yyy < xxx	Red	Heart Rate (yyy) less than the Extreme Brady limit (xxx)
** NON-SUSTAIN VT	Yellow	A run of Vs having a ventricular HR>V-Tach HR limit, but lasting for less than the V-Tach Run limit
** VENT RHYTHM	Yellow	A dominant rhythm of adjacent Vs > vent rhythm limit and ventricular HR<V-Tach HR limit
** RUN PVCs	Yellow	Run of PVCs greater than 2
** PAIR PVCs	Yellow	Two consecutive PVCs between non-PVCs
** PAUSE	Yellow	No QRS detected for x seconds. Choices of >1.5 to 2.5 seconds.[a] *Note*—M3/M4- No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only)
** PACER NOT CAPT	Yellow	No QRS for 1.75 x the average R-R interval with Pace Pulse (paced patient only)
** PACER NOT PACE	Yellow	No QRS and Pace Pulse for 1.75 x the average R-R interval (paced patient only)
** MISSED BEAT	Yellow	No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only) Note: M3/M4-this alarm is not available

Message	Level	Description
** SVT	Yellow	Run of SVPBs >/= SVT Run limit and with SVT Heart Rate greater than the SVT HR limit
** R-ON-T PVCs	Yellow	For HR <100, a PVC with R-R interval <1/3 the average interval followed by a compensatory pause of 1.25 x average R-R interval or 2 such Vs without a compensatory pause occurring within 5 minutes of each other. (When HR >100, 1/3 R-R interval is too short for detection.)
** VENT BIGEMINY	Yellow	A dominant rhythm of N, V, N, V (N=supraventricular beat, V=ventricular beat)
** VENT TRIGEMINY	Yellow	A dominant rhythm of N, N, V, N, N, V (N=supraventricular beat, V=ventricular beat)
** PVCs > xxx/MIN	Yellow	PVCs within one minute exceeded the PVCs /min limit (xxx)
** MULTIFORM PVCs	Yellow	The occurrence of two differently shaped Vs, each occurring at least twice within the last 300 beats as well as each occurring at least once within the last 60 beats
** HR yyy > xxx	Yellow	Heart Rate (yyy) greater than the upper HR limit (xxx)
** HR yyy < xxx	Yellow	Heart Rate (yyy) lower than the lower HR limit (xxx)
** IRREGULAR HR	Yellow	Consistently irregular rhythm (irregular R-R intervals)

a. With a pause/asystole event lasting > 2.5 secs and when the time interval for Asystole is set to 2.5 secs and when the Pause interval is set to 2.5 secs, the system will annunciate for asystole.

Arrhythmia INOP Messages

The following table lists the Arrhythmia INOP messages and the description of the criteria required to generate these alarms, along with the action to take.

Message	Level	Description	Action to Take
ALL ARRH ALRMS OFF	Soft INOP (no sound)	All of the arrhythmia alarms are turned off because one of the following: a. Alarms are suspended. b. HR alarm is turned off at the bedside c. HR alarm source at the bedside is switched to Pulse d. "All Arrhythmia Alarms Off" in the Arrhythmia Alarms Window is checked for a telemetry bed	Depending on the cause: a. Unsuspend alarms b. Turn HR alarm on at bedside c. Switch HR/Pulse alarm source to HR at bedside d. Click "All Arrhythmia Alarms Off" to remove the check in the Arrhythmia Alarms Window of telemetry bed
CANNOT ANALYZE ECG	Hard INOP (can be changed to Soft INOP on a per patient basis)	The Arrhythmia algorithm cannot reliably analyze the ECG data on any monitored leads. *Note*—If a LEADS OFF condition exists, the LEADS OFF message has a higher priority than CANNOT ANALYZE ECG and will be displayed first in the INOP message area. You can view all current INOP messages in the pulldown list.	Improve lead position; reduce patient motion If EASI ECG from a bedside monitor, check that the ECG module is M1001B or M1002B.

Message	Level	Description	Action to Take
ARRHYTHMIA OFF (not displayed at the bedside)	Soft INOP (no sound)	Arrhythmia analysis (and ST, if telemetry) is turned off -- the bedside/telemetry cardiotach is used.	You can turn arrhythmia analysis back on in the Arrhythmia Alarms Window -- Analysis control.
SOME ECG ALRMS OFF (can be configured to be disabled in Unit Settings)	Soft INOP (no sound)	One or more ** level Arrhythmia alarms have been manually turned off	Use the Arrhythmia Alarms Window to review current status of all alarms
ARRHYTHMIA REQUIRED (telemetry only)	Hard INOP	An EASI transmitter is being used, and arrhythmia analysis has been turned off at the central.	Turn arrhythmia analysis on in the Arrhythmia Alarms Window -- Analysis control

Alarm Adjustments

Overview

All alarm conditions generated by the Information Center come with unit default settings (limits and on/off status) that are configured for a unit (see Chapter 9, “Information Center Configuration”). In addition, you can make adjustments to alarm settings to accommodate the clinical condition of the individual patient.

Note—Alarm conditions generated at a bedside monitor are controlled only at that monitor. For M3 monitors, all alarm settings (including arrhythmia) are controlled at the bedside monitor.

Adjusting Alarms

The adjustments to alarm settings that you can make from the Information Center depend on the point-of-care equipment being used. The table on the next page summarizes the arrhythmia and ST alarm controls.

Feature	M3 bedside monitors	IntelliVue Patient Monitors	Other bedside monitors	Telemetry	Telemetry with EASI transmitters
Arrhythmia Monitoring	• Provided by bedside monitor • Single-lead or Arrhythmia Off • Basic or enhanced capability, depending on model and configuration	• Provided by the bedside monitor • Multilead, Single-lead, or Arrhythmia Off • Basic or enhanced capability	• Provided by central • Multilead, Single-lead, or Arrhythmia Off • Basic or enhanced capability	• Provided by central • Multilead, Single-lead, or Arrhythmia/ST Off • Basic or enhanced capability	• Provided by central • Multilead or Single-lead (cannot be turned off for EASI ECG) • Basic or enhanced capability

Feature	M3 bedside monitors	IntelliVue Patient Monitors	Other bedside monitors	Telemetry	Telemetry with EASI transmitters
Arrhythmia Controls	• At bedside only • Relearn available at central Arrhythmia Analysis Window	• At bedside or central However, the following controls are not available for an IntelliVue Patient Monitor: • Unit settings • Sound at bedside for ECG yellow alarms • Cannot analyze ECG (sound) *Note*—You must enable remote controls at the bedside for them to be available to use at the Information Center. See your IntelliVue Patient Monitor documentation for information on enabling remote controls.	• At bedside or central, except for the Compact Configurable Monitor	• At central only	• At central only

Feature	M3 bedside monitors	IntelliVue Patient Monitors	Other bedside monitors	Telemetry	Telemetry with EASI transmitters
ST-Segment Monitoring	• Provided by bedside monitor • ST analysis is done on up to 3 leads • Waves available at central ST Review Window	• Provided by bedside monitor • Waves available at central ST Review Window	• Provided by bedside monitor • Limited functionality at the central • Waves available at central ST Review Window	• Provided by central for adult patients • ST analysis is done on up to 6 leads • Waves available at central ST Review Window	• Provided by central • ST analysis is done on up to 12 leads • Waves available at central ST Review Window
ST-Segment Controls	• At bedside only	• At bedside only	• At bedside • Limited functionality at the central	• At central only	• At central only

Note—When you discharge a patient from the Information Center, the alarm limits and on/off settings controlled from the Information Center go back to unit settings. Please review the User's Guide for the monitoring device to determine how to return alarm conditions controlled from the monitor back to unit settings.

Turning Alarms On/ Off

The On/Off adjustments for arrhythmia alarms that you can make at the central are:

- Turn all yellow alarm off/on.
- Turn all red and yellow arrhythmia alarm off/on (telemetry) unless your system is configured to not allow this.
- Turn individual yellow arrhythmia alarm off/on.

  Note—Red alarms can all be turned off by suspending alarms (or turning all ECG alarms off), but cannot be turned off individually. If the HR alarm condition is turned off at the bedside monitor, or the alarm condition source is changed to Pulse, all arrhythmia alarm conditions are turned off. See page 4-32 for information on suspending/unsuspending alarms.

Task Summary Make adjustments to arrhythmia alarm conditions on the Arrhythmia Alarms Window.

Step	Action
1	Access the Arrhythmia Alarms Window by clicking on the **Arrhyth Alarms** button in the Patient Window.
2	Make the adjustments on the Arrhythmia Alarms Window. The table below describes each of the available adjustments.

Adjustment	Description
Unit Settings	Click on this button if you want to return all alarm settings to the pre-set limits for your unit, for example, PVC Rate > 10 PVCs/min. *Note*—This adjustment is not available for IntelliVue Patient Monitors.
All Yellow On/All Yellow Off	Click on these if you want to turn on or off all yellow ** alarms simultaneously. For example, the last shift turned off several yellow ** alarm conditions, but you are not familiar with the patient's clinical condition and you want all alarms turned on. Rather than turning each individual alarm on, you can use this function to accomplish your goal in one step. *Note*—You can still turn on/off individual alarm after clicking the All Yellow On/All Yellow Off button.

Adjustment	Description
Patient Paced	If the patient has a cardiac pacemaker (including demand, fixed, or any type), there should be a check in the **Patient Paced** box, indicating that pace pulse detection is On. ***Warning*—If the patient is paced, pace pulse detection must be On, enabling the ST/AR algorithm to detect and reject pace pulses (spikes) from the HR count. Otherwise, pace pulses could be detected as beats and the monitor may not alarm for an asystole condition.** *Note*—If the Patient Paced status is on, the word "Paced" displays in the lower right corner of the sector and on the Patient Window. The word "Paced" is not displayed on consulting beds for centrals connected via Philips CareNet.
Analysis	Use this control to specify the type of arrhythmia analysis (and ST analysis, if telemetry) used by the system. **Multilead** The system uses the primary and secondary leads for arrhythmia analysis. This produces optimal arrhythmia detection. Bedside Monitors: Select the primary and secondary leads at the bedside. Telemetry: Select the primary and secondary leads on the Patient Window. **Singlelead** The system uses only the primary lead. You may want to choose this type of analysis when it is difficult to provide more than one optimized ECG lead. Make sure that this optimized lead occupies the first ECG channel when you have more than 1 ECG lead displayed.

Adjustment	Description
Analysis (continued)	**Arrhythmia Off** Select **Arrhythmia Off** to turn arrhythmia analysis off for bedside-monitored patients or **Arrhythmia/ST Off** to turn arrhythmia analysis and ST off for telemetry-monitored patients. Consider doing this if: • arrhythmia monitoring is not appropriate for the patient, or • you are not getting a reliable HR because the signal is below a minimum amplitude, unstable, or contains artifact, *and* you have tried to improve the system performance by choosing another lead, changing to Singlelead Analysis, and changing electrodes. *Note*—For patients monitored with telemetry EASI ECG, selecting ARRHYTHMIA OFF results in an ARRHYTHMIA REQUIRED INOP. If arrhythmia (and ST, for telemetry) analysis is turned off, the INOP message “ARRHYTHMIA OFF” appears in the patient sector. The “ARRHYTHMIA OFF” message is not displayed at the bedside. *Note*—Arrhythmia analysis and arrhythmia/ST analysis (for telemetry) may be turned off as a unit setting (for example in a neonatal unit). In this case, it may be turned on for individual patients. See “Arrhythmia Analysis Off” on page 4-21 for important information about no arrhythmia analysis.

Adjustment	Description
All Arrhythmia Alarms Off (telemetry only)	Click this button (check in box) to turn all arrhythmia alarms off. (You still get arrhythmia events stored, and rhythm status displayed when arrhythmia alarms are off.) If your system is configured to not allow the enabling/disabling of all arrhythmia alarms this field is not available (greyed-out) for selection. *Note*—This field is for telemetry monitored patients only, and is for arrhythmia alarm conditions only -- the status of ST alarms is not affected.
All ECG Alarms Off (telemetry only, when Analysis is set to Arrhythmia/ST Off)	When arrhythmia monitoring is turned off, the telemetry cardiotach is used, and the only ECG alarms are HR, ASYSTOLE, and VFIB. Click this button (check in box) to turn these alarms off. If your system is configured to not allow the enabling/disabling of all ECG alarms this field is not available (greyed-out) for selection.
Sound at bedside for ECG yellow alarms (bedside only)	This field applies to bedside monitors only. Setting this to Off inhibits the sound of yellow** arrhythmia alarm conditions but not the alarm messages at the bedside monitor. Alarms sounds and messages will still occur at the Information Center. *Note*—This adjustment is not available for IntelliVue Patient Monitors.

Adjustment	Description
HR Alarm Limits (telemetry and IntelliVue Patient Monitors)	Use these fields to set heart rate alarm limits. You can set the limit based on your assessment of the patient's clinical condition, unit protocols, physician orders or medication specified limits Or, for telemetry bedsides, you can choose **Smart Limits**. Smart Limits automatically set high and low limits around your patient's current heart rate. The difference above and below the patient's HR is pre-set for your unit. See “Telemetry Smart Limits” on page 4-33 for additional information on using Smart Limits.
Red Alarms	Use these fields to make adjustments to specific red alarm limits. In some cases changing a HR alarm limit will affect other alarm limits. See “Extreme Bradycardia and Extreme Tachycardia Alarms” on page 4-22.
Yellow Alarms	Use these fields to make adjustments to specific yellow alarm limits and to individually turn on/off yellow alarm conditions. *Note*—You cannot turn off or adjust HR limit alarms at the central for bedside monitors other than the IntelliVue Patient Monitor.
Cannot Analyze ECG (sound)	Click on this field if you want the Information Center to annunciate an INOP sound when the “Cannot Analyze ECG INOP” occurs. If there is no check for this field, when this INOP occurs, there will be a message, but no sound (and the sector will not turn blue). *Note*—This adjustment is not available for IntelliVue Patient Monitors.

Arrhythmia Analysis Off

This section describes the conditions when arrhythmia analysis or, for telemetry, arrhythmia/ST analysis is turned off.

IMPORTANT: If arrhythmia is turned off, the bedside cardiotach is used. If arrhythmia/ST is turned off, the telemetry cardiotach is used, and there is no ST monitoring.

- The only available ECG alarms are: HR limit, Asystole, and VFIB.
- There are no telemetry ST alarms.

The following controls on the Arrhythmia Alarms Window are available (others are greyed out -- for example, alarm limits controls).

- The Analysis control is active so that arrhythmia can be turned back on.
- For bedsides, no other controls are active -- changing HR limits and turning HR alarms off must be done at the bedside.
- For telemetry, the following controls are active:
  - Patient Paced (can also be changed in the Admit Window).
  - "All ECG Alarms Off" if enabled in configuration (so that you can turn off the telemetry HR alarms).
  - HR alarm limit controls except Smart Alarms. (HR limits can also be changed on the Patient Window.)

Note—When arrhythmia is turned off, pace pulse detection is controlled by the bedside/telemetry cardiotach and is automatically set to ON. If the patient is not paced, turn pacing detection off at the bedside (this setting will not be reflected on the Arrhythmia Alarms Window). For telemetry the pacing controls at the central are active.

If arrhythmia (and ST, for telemetry) analysis is turned off, the INOP message "ARRHYTHMIA OFF" appears in the patient sector at the central. This message is not displayed at the bedside.

The Arrhythmia Analysis control returns to the unit setting when the patient is discharged from the central (except M3 beds or when changing equipment from an IntelliVue Patient Monitor to telemetry), as do the other arrhythmia controls. Arrhythmia can also be manually turned back on in the Arrhythmia Alarms Window. You cannot turn central arrhythmia analysis off or on at the bedside.

Alarm Adjustment Effects

In some cases changing an arrhythmia alarm limit at the central will affect other alarm limits.

Extreme Bradycardia and Extreme Tachycardia Alarms

The difference between the low HR alarm limit and the extreme bradycardia limit is unit configured. For example, if the low alarm limit is 60 b/min and the extreme bradycardia limit difference is configured to be 20 b/min, then the extreme bradycardia limit is 40 b/min. If the difference is configured to be 0, there will always be an extreme bradycardia alarm when the HR falls below the HR low limit.

The same is true for the difference between the high HR alarm limit and the extreme tachycardia limit. In the same way, the extreme tachycardia limit is determined from the high HR limit.

For safety, the extreme bradycardia and extreme tachycardia limits clamp at a configured value. For example, the extreme bradycardia limit for neonates has a default limit clamp at 70 b/min. Thus if the HR low alarm limit is moved to 80 b/min and the extreme bradycardia limit difference is 20 b/min, the extreme bradycardia limit will be 70 b/min. However, if the clinician moves the HR low alarm limit to 65, the extreme bradycardia limit will also be 65 and only the extreme bradycardia alarm will occur if the HR falls below this limit.

See Chapter 9, “Information Center Configuration” for the extreme bradycardia and extreme tachycardia limit difference defaults, clamps, extreme bradycardia trigger time, and ranges.

Timeout Periods

Overview

Normally, an arrhythmia alarm is annunciated upon the detection of an alarm condition. However, there are certain situations that can inhibit the audible and visible indications of the alarm even though the alarm condition was detected. These situations include:

- A more serious alarm condition is active.
- A timeout period is in effect for a higher priority alarm condition in that chain. See “Alarm Chaining” on page 4-24.
- A timeout period is in effect for that alarm condition.

Timeout periods and alarm priority chains are explained below.

When a yellow arrhythmia alarm is annunciated, it automatically initiates a timeout, or inhibitory period. This means that during the timeout the same alarm condition or another condition lower on the same alarm priority chain will not annunciate an alarm during the timeout period. If the timeout period is set to 0, the alarm is immediately reset when the alarm condition is no longer active. The length of the timeout period is configured for your unit.

When the timeout period has expired, the system is reset, and if the condition persists, the alarm condition will be annunciated again.

There are two levels of timeout periods:

- First level (configured to 0, 1, 2, 3, 4, or 5 minutes) applies to all yellow ECG alarm conditions that are above Vent Bigeminy on the priority chain (Non Sustain VT, Vent Rhythm, Run PVCs, Pair PVCs, R-T PVCs, Pacer Not Capture, Pacer Not Paced, Pause SVT, HR>, HR<). See page 4-26 for an illustration of the alarm condition priority chain.
- Second level (configured to 0, 1, 2, 3, 4, 5, 10, or 15 minutes) applies to Vent Bigeminy and all alarm conditions that are below Vent Bigeminy on the priority chain (Vent Bigeminy, Vent Trigeminy, PVCs >xx/min, Multiform PVCs, Irregular HR). See page 4-26 for an illustration of the alarm condition priority chain.

If the timeout period is set to 0 and your system is configured for alarm reminders, the alarm reminder for that level will sound every three minutes while the alarm condition remains active (if configured). See “Alarm Reminders” on page 4-30 for information on alarm reminders.

Clearing the Timeout Period

The timeout period is cleared if it is ended or a learning phase occurs. See “Learning” on page 5-17 for information on learning.

Note—A superseding alarm does not clear the timeout period.

Alarm Chaining

Overview

For arrhythmia alarms, the presence of multiple alarm conditions is quite possible. Announcing all of the detected alarm conditions would be confusing, and less serious conditions might hide a more serious condition. For this reason, the alarms are prioritized and put in alarm “chains” so that the most serious or highest priority alarm condition is announced. The diagram on page 4-26 shows the alarm priority chains.

Alarm Groupings

The alarm conditions detected by the ST/AR Arrhythmia system are grouped into the following categories:

- PVC Alarms (for example, Pairs, Vent Rhythm)
- Beat Detection Alarms (for example, Pause, Pacer Not Capt)
- Rate Alarms (for example, Extreme Tachy, High/Low HR)

Alarm Announcing

The Information Center displays and announces:

- Life threatening (red) alarms are announced first, since they have the highest priority level.
- If there are no life threatening red alarm conditions active, the highest priority yellow alarm in any chain is announced.
- If alarm conditions in different chains are detected, the alarm condition that occurred most recently is announced. The exception is Irregular HR, which only annunciates if no other alarms are annunciating.

Alarm Behavior and Timeout periods

During a timeout period for a particular alarm condition the re-occurring alarm condition or a lower priority alarm condition in the same chain will not annunciate. However, alarm conditions in another priority chain will still annunciate. Once a timeout period is completed any active alarm conditions will annunciate. For example, if there is an active Vent Bigeminy alarm, a PVCs > xx/min will not become active because it is lower on the same chain. However, a high HR alarm will become detected because it is on another chain.

Higher priority alarms will supersede the previous alarm condition and the higher priority alarm condition will annunciate. For example, if a Vent Trigeminy alarm is active and a Pair PVCs occurs, the Pair alarm will be annunciated. Only one arrhythmia alarm can be annunciated for a patient at any one time.

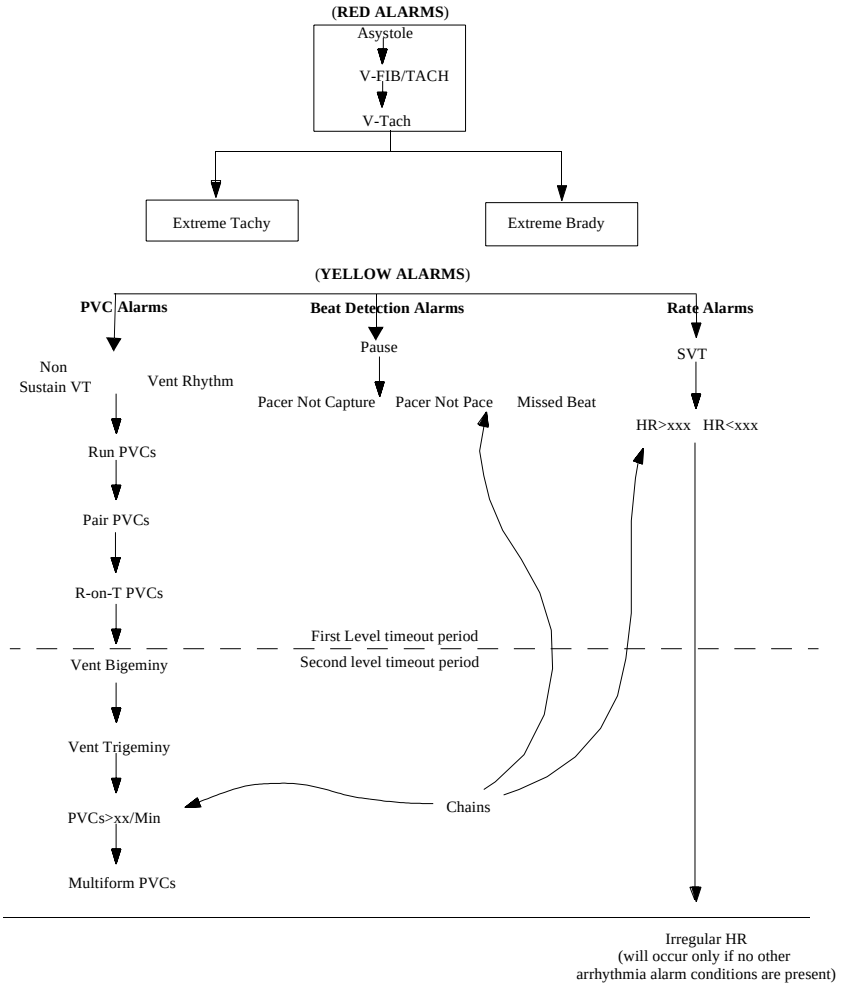
The alarms in each chain are prioritized according to the relative level of seriousness.

You can view arrhythmia alarm activity in the Patient Data Review applications. See Chapter 6, “Patient Data Review,” for information on Data Review applications.

Alarm Priority Chains

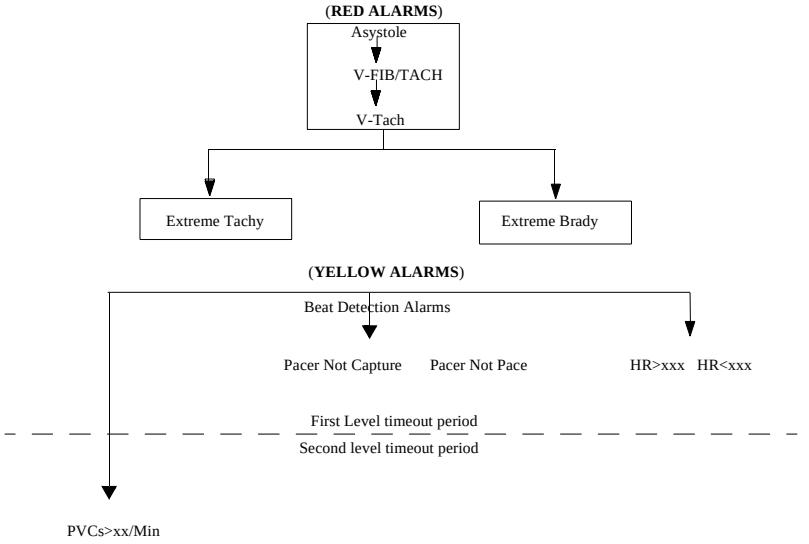
Enhanced Arrhythmia

The diagram below shows the alarm condition priority chains for enhanced arrhythmia. The alarm conditions in each category are prioritized according to the level of seriousness (see “Levels of Arrhythmia Analysis” on page 5-3).



Basic Arrhythmia

The diagram below shows the alarm condition priorities for basic arrhythmia and the timeout levels for yellow alarm conditions.



Silencing Alarms

Overview

Alarm conditions generated from bedside monitors can be configured to allow or not allow acknowledgment from the Information Center. Alarms are acknowledged at the Information Center by using the Silence button (selecting Suspend can also acknowledge an active alarm see page 4-32). Alarms for telemetry-monitored patients can only be silenced from the Information Center or Information Center Client (if configured for Full Control). Silencing an alarm condition at the Information Center turns off the audible annunciation of an alarm condition.

Note—For IntelliVue Patient Monitors, if the bedside is configured for audible non-latching and visual latching alarms and the alarm condition no longer exists the alarm text will remain at the Information Center but Silence button will not be available. You must go to the bedside to clear the alarm text for both the bedside and the Information Center. See your bedside documentation.

Alarm Behavior

If the alarm annunciation is silenced:

- *If the alarm condition is present,* the blue background goes away, but the alarm condition message remains until the condition ends or the timeout period is over. When the timeout period is over if the condition is present or re-occurs the alarm is annunciated. There is no additional audible tone, unless alarm reminders are configured.
- *If the alarm condition is no longer present,* the alarm indicators are automatically reset.

Warning

If alarm annunciation is silenced and alarm reminders are configured off, the alarm condition message will persist until the condition ends but there will be no audible alarm annunciation.

If the alarm is NOT silenced:

The alarm behavior depends on the type of alarm condition and how your alarm system is configured. The table below describes the alarm system behavior for each type of alarm condition.

Type of Alarm Condition	What happens when alarm condition ends
Red arrhythmia alarms	Alarm indicators (sound, message, blue highlighting in sector) remain, whether or not the condition is present (latching).
Yellow arrhythmia alarms	Alarm indicators (message, blue highlighting in sector) are active for a 3-minute period after the alarm is announced. • *If the alarm condition ends during this period,* the alarm indicators remain until the 3-minutes are over, then go away. • *If the alarm condition remains after this period,* the indicators remain until the condition clears. • *If the alarm condition ends after this period,* the alarm indicators are automatically reset.
INOPS - arrhythmia and telemetry	Alarm indicators are automatically reset after the condition ceases (non-latching).
Telemetry ST and SpO_2 alarms	Alarm indicators are automatically reset (non-latching).
Alarms generated at the bedside	Alarm indicators (sound, message, blue highlighting in sector) will be automatically reset (non-latching) or will remain (latching), depending on how the alarms are configured at the bedside.

Alarm Reminders

Red Alarms

If your Information Center is configured to have alarm reminders, when an active alarm condition is silenced and the condition persists, the Information Center repeats the appropriate alarm sound once every three minutes while the alarm condition remains present.

Only one alarm sound can annunciate at one time. Therefore, if a continuous red alarm is annunciating for another patient the red alarm reminder will not sound until the previous alarm sound has cleared. However, if a continuous yellow alarm is annunciating, the red alarm reminder will annunciate (interrupting the yellow alarm).

Yellow Alarms

If a yellow arrhythmia alarm is continuous (for example, IRREGULAR HR), an alarm reminder will sound every 3 minutes as long as the condition exists if:

- Reminders are configured
- Timeout is set to 0

Yellow arrhythmia alarm reminders also affect ST alarm indicators. If configured, after the alarm has been silenced, an alarm reminder will sound every 3 minutes as long as the condition exists (see page 4-23).

INOPs (telemetry beds only)

If your Information Center is configured to have INOP reminders, the hard INOP alarm sound for either LEADS OFF or REPLACE BATTERY repeats once every three minutes while the INOP condition remains active and if there are no continuous alarm sounds for other patients.

Task Summary

When there is an annunciating alarm condition, the **Record/Save/Record and Save** button in the Patient Sector changes to enable the clinician to silence the active alarm. The label and action of the button depends on whether or not Fast Alarm Review is enabled.

Note—Your unit may be configured to not allow silencing of bedside-generated alarm conditions at the Information Center. In this case, a Silence button would not appear. If the bedside monitor is M3 or IntelliVue Patient Monitor, both the monitor and the central must be configured to allow silence of bedside-generated alarm conditions. Otherwise, the **Silence** button appears, but is not operative.

Fast Alarm Review Disabled

If Fast Alarm Review is not enabled, the button changes to **Silence**. The clinician can silence the alarm condition by clicking on the **Silence** button or by clicking anywhere in the Patient sector, except the **Patient Window** button.

Fast Alarm Review Enabled

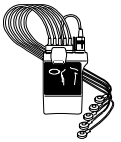
If Fast Alarm Review is enabled, the button changes to **Silence/Review**. Clicking the button silences the alarm and opens a Patient Window with the Fast Alarm Review strip for that alarm. See Chapter 6, “Patient Data Review” for information on using Fast Alarm Review. If there is an application window open for any patient, when the **Silence/Review** button is clicked, the Fast Alarm Review strip overlays it.

- This capability can be enabled for red alarm conditions only, or for red and yellow alarm conditions.
- To silence the alarm condition without displaying it, just click anywhere in the Patient Sector except the **Patient Window** button or **Silence/ Review** button.
- If the clinician clicks the **Silence/Review** button for another alarm condition, the new one is displayed, and the current one is closed.

Note—If 15 seconds of data that preceded the alarm condition are not available when an alarm condition is announced, the button label is **Silence**. Clicking it silences the alarm condition, and no Fast Alarm Review strip is displayed. The waves for that alarm condition can be viewed in Alarm Review (if the alarm condition was set up to be stored) or in Wave Review.

Suspending/Unsuspending Alarms

Telemetry



The **Suspend/Unsuspend** buttons on the Patient Window allow you to turn all alarm sounds off/on for telemetry-monitored patients. When you suspend the alarm sound, a appears in the patient sector and Patient Window next to all numerics indicating that all alarm sounds are off for this patient. You also get a "ALARMS SUSPENDED" message.

The number of minutes that the telemetry alarms remain suspended depends on the configuration (see the *Philips Telemetry System Instructions for Use*). If your unit is configured to suspend alarms for 3 minutes, the alarms automatically turn back on after the 3 minutes elapses. If your unit is configured to suspend alarms for an infinite amount of time, you must manually turn the alarms back on.

Note—The alarms suspended status does not change when a patient is discharged. If alarms are suspended, they remain suspended after the discharge.

Bedside Monitors

You suspend/unsuspend alarms for bedside monitors at the monitor. When alarms are suspended, at the central the "ALARMS SUSPENDED" message is displayed and a symbol appears next to all parameter numerics.

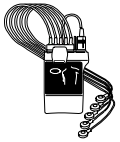
Note—For M3 bedside monitors, the symbol only appears next to the numerics for parameters whose alarms were turned off individually.

TeleMon

When a telemetry transmitter is docked at TeleMon, you suspend alarms at TeleMon. Alarms are suspended for three minutes, then turn back on automatically. When alarms are suspended, at the central the "ALARMS SUSPENDED" message is displayed and a symbol appears next to all parameter numerics.

Telemetry Smart Limits

Overview



When setting heart rate or ST alarm limits you can set the limit based on your assessment of the patient's clinical condition, unit protocols, physician orders or medication specified limits or you can choose Smart Limits.

Smart Limits are set around the patient's current numeric values. The amount above and below the current value (the offset) is configured for the unit and cannot be adjusted on a per patient basis. You can set Smart high and low limits for HR and ST only.

When activated, Smart Limits are rounded to the nearest 5 b/min for HR and the nearest .2 mm for ST.

Automatically Set Smart Limits

Smart alarm limits can be configured for the unit to be automatically set when:

- When parameter is turned on (ST only).
- The telemetry bed is taken out of standby.
- At discharge.
  Note—At discharge, it is important to first remove the patient from the transmitter, then discharge the patient from the Information Center. Since there is no HR coming from the patient on discharge, although Smart Limits have been activated, no Smart Limits are set. When a new patient is attached to the transmitter and a HR becomes available, Smart Limits are set on that HR and ST. If the patient continues to send a HR when you discharge, Smart Limits will be set on the HR and when a new patient is admitted the alarms will be based on the previous patient's values.

When Smart Limits are automatically activated, the unit offset is bound by the configured unit settings. In this way, Smart Limits will never automatically be set outside the unit settings.

Manually Set

You can manually set Smart Limits from the Arrhythmia Alarms Window or ST Alarms Window. In this case, Smart Limits are *not* bound by the unit settings. However, outside of the unit settings, a tighter offset is used. See Chapter 9, “Information Center Configuration” for a list of factory default offsets and offset ranges.

Smart Limits Examples

Below are examples of how manually set Smart Limits work.

Example of Smart Limits Inside Unit Settings

Unit setting high HR limit = 150
Unit setting low HR limit = 50
Offset **inside** unit settings = +/- 25
Offset **outside** unit settings = +/- 10
Current HR = 80

Produces:
High HR limit set to 80 + 25 = 105
Low HR limit set to 80 - 25 = 55

Examples of Smart Limits Outside Unit Settings

Example 1

Unit setting high HR limit = 150
Unit setting low HR limit = 50
Offset **inside** unit settings = +/- 25
Offset **outside** unit settings = +/- 10
Current HR = 55

Produces:
High HR limit set to 55 + 25 = 80
Low HR limit set to 55 - 10 = 45

Note—In this example, the current HR less the offset of 25 would fall outside the unit setting. Therefore, the offset outside the unit setting (10) is used.

Example 2

Unit setting high HR limit = 150
Unit setting low HR limit = 50
Offset **inside** unit settings = +/- 25
Offset **outside** unit settings = +/- 10
Current HR = 65

Produces:

High HR limit set to 65 + 25 = 90
Low HR limit set to 65 - 10 = 55 (System uses 50. See note below.)

Note—In this example, the current HR less the outside offset would result in a low limit of 55. However, the system uses the unit setting of 50, since this is a wider limit.

Adjusting the Alarm Tone Volume

To adjust the alarm tone volume perform the following steps:

Step	Action
1	On the Patient Window click the **All Controls** button.
2	On the All Controls Window click the **Volume Control** button.
3	Place your cursor over the number in the Current Volume box and use the pop-up arrows to adjust the volume up or down. At the lowest volume, the tone is still audible. To hear the volume you are selecting, click on Test Volume While Setting. If there is an alarm sounding, the alarm volume will change accordingly. If there is no alarm sounding, there will be a short sound to indicate the volume. *Note*—The alarm tone volume cannot be set to zero.
4	If you want to return the volume back to the default unit setting click the **Set to Default** button.

Recording/Storing Alarms

Overview

The Record/Store Alarms Window allows you to:

- Turn alarm recording on/off for individual patients.
- Turn alarm storage on/off for individual patients.
- If paging is available on your system, specify the alarms that will generate an automatic page for a patient. See “Automatic Alarm Paging” on page 8-9.

Turning off recording or storage does not effect audible and visual indicators for these alarms.

Record determines which recordings start when the alarm is sounded. Store determines which alarm strips the Information Center stores in memory for review later in the Alarm Review Window.

Note—You can inhibit the recording of red alarms but not the storage.

Task Summary

Perform the following steps to turn recording and storage on/off:

Step	Action
1	On the Patient Window click the **All Controls** button.

Step	Action
2	On the All Controls Window click on the **Record/Store** button under Alarm Management and Setup.
3	On the Record/Store Alarms Window specify which alarms to record or store by clicking on the appropriate check box to the left of the alarm. A check mark in the box selects the alarm for recording/storage. Storage of Red alarms cannot be turned off. *Note*—If the central is not the primary monitor, there may be fewer/more alarms listed on the Record/Store Window than the primary central can provide. For example, the primary central may be configured for basic yellow arrhythmia alarms, and your central may be configured for enhanced alarms. The Arrhythmia Alarms Window must be reviewed to determine which alarms are available for this patient. *Note*—For **All Red Non-Arrhythmia Alarms** or **All Yellow Non-Arrhythmia Alarms**: if set to Off, no recordings are generated. If set to On, only the alarms set to be recorded by the bedside will generate recordings.

Storage of Arrhythmia Alarms at the Central

If there is an arrhythmia alarm, and a superseding arrhythmia alarm occurs within six seconds of it, the system only stores the latest alarm. For example, if there is a PAUSE alarm, and in six seconds it is superseded by ASYSTOLE, the system will only store the ASYSTOLE alarm.

Note—For patients on M3 or IntelliVue Patient Monitors, superseding alarms are treated as separate alarms. In the example above, two alarms (the PAUSE alarm and the ASYSTOLE alarm) will be stored.

5
ST/AR Arrhythmia Monitoring

This chapter describes the ST/AR arrhythmia algorithm. It includes the following sections:

Introduction

Overview

The intended use of the ST/AR arrhythmia algorithm is to monitor adult, pediatric, and neonatal (not telemetry) patients' ECGs for heart rate and ventricular arrhythmias and produce events/alarms for one or two ECG leads. The ST/AR arrhythmia algorithm is capable of monitoring both paced and non-paced patients.

The Information Center provides ST/AR arrhythmia monitoring for patients that are either on bedside monitors or telemetry that are connected to the Philips monitoring network. You can use arrhythmia analysis to aid in assessment of a patient's condition (for example, heart rate, PVC rate, rhythm, ectopics) and manage treatment accordingly. In addition to detecting changes in the ECG, it also offers patient surveillance and alarm generation.

M3 Bedside Monitors

If the patient is monitored by a M3 monitor, arrhythmia monitoring is done at the bedside monitor. See your M3 user documentation for information specific to the M3 monitors.

IntelliVue Patient Monitors

If the patient is monitored by a IntelliVue Patient Monitor, ST/AR arrhythmia algorithm is provided by the IntelliVue Patient Monitor. Controls, however, for arrhythmia analysis and alarm limits are adjustable and viewable at both the Information Center and the IntelliVue Patient Monitor. The level of arrhythmia analysis between the IntelliVue Patient Monitor and the Information Center may differ. The level of arrhythmia analysis on the monitor (basic or enhanced) will determine the level of arrhythmia analysis performed for that patient. See your IntelliVue Patient Monitor user documentation for information specific to IntelliVue Patient Monitors.

Warning **During complete heart block or pacemaker failure (to pace or capture), tall P-waves (greater than 1/5 of the average R-wave height) may be erroneously counted by the arrhythmia algorithm, resulting in missed detection of cardiac arrest.**

Levels of Arrhythmia Analysis

The number of rhythms being classified, events being detected, and alarms being called depends on whether your system is configured for basic or enhanced arrhythmia capability. The sections that follow describes each of these options.

Basic Arrhythmia

The basic arrhythmia capability configuration provides the basic cardiotach functions of heart rate and PVC rate, beat annotation, and the detection of the 10 alarms listed below.

- Asystole
- Ventricular Fibrillation
- Ventricular Tachycardia
- Extreme Tachycardia
- Extreme Bradycardia
- Pacer Not Capture
- Pacer Not Paced
- Frequent PVCs (PVC > limit)
- High heart rate
- Low heart rate

Enhanced Arrhythmia

The enhanced arrhythmia capability configuration provides all of the basic functions, as well as the detection of the 12 additional alarms listed below. In addition it provides rhythm and ectopic status messages.

Basic Alarms

- Asystole
- Ventricular Fibrillation
- Ventricular Tachycardia
- Extreme Tachycardia
- Extreme Bradycardia
- Pacer Not Capture
- Pacer Not Paced
- Frequent PVCs (PVC > limit)
- High Heart Rate
- Low Heart Rate

Additional Alarms

- Nonsustained V-Tach
- Supraventricular Tach
- Ventricular Rhythm
- Run PVCs
- Pair PVCs
- Pause
- R-on-T PVCs
- Ventricular bigeminy
- Ventricular trigeminy
- Multiform PVCs
- Missed Beat
- Irregular HR

How the ST/AR Algorithm Works

Overview

ST/AR multi-lead analysis is performed on the user-selected primary and secondary leads. If only one lead is available for multilead, ST/AR analysis is performed on the single available lead.

Arrhythmia analysis consists of several steps:

1. The ECG signal is pre-processed to filter out baseline wander, muscle artifact, and signal irregularities. In addition, if the Patient Paced status = Yes, pace pulses are detected then rejected from the processing to avoid seeing them as QRS beats.
2. Beat detection to locate the QRS complexes for further analysis.
3. Feature measurement such as R-wave height, width, and timing.
4. Beats classification. Templates are created and are matched to incoming beats, and the appropriate beat label is determined.
5. Rhythm and alarm detection. Beat labels are used to produce the values and events needed to generate rhythms and alarms.

Working in parallel with beat detection and classification, a separate detector examines continuously for ventricular fibrillation, asystole, and noise.

The quality of the ECG signal is important for accurate arrhythmia analysis. The section below provides guidelines for optimizing signals for arrhythmia analysis.

Ensuring Accurate Arrhythmia Monitoring

For accurate arrhythmia monitoring make sure the ECG waves are optimized for arrhythmia monitoring by performing the following steps:

Step	Action
1	Once you have selected the optimal lead at the bedside monitor (or at the Information Center for telemetry), check the arrhythmia alarm limits by selecting **Arrhyth Alarms** on the Patient Window and reviewing the limits in the Arrhythmia Alarms Window. *Note*—See page 5-11 for examples of optimized leads.
2	Verify that the patient paced setting is accurate. (If pacing detection is on, the word “Paced” should appear in the Patient Window.) Change if necessary.

Step	Action
3	Check the arrhythmia beat labels by clicking **Arrhythmia Analysis** on the Patient Window. The beat labels indicate how the arrhythmia system is classifying beats. N = Normal V = Ventricular Ectopic S = Supra-ventricular Premature P = Paced ' = Pacer spike (If the patient is both atrially and ventricularly paced, the system will show two' marks above the waveform aligned with the atrial and ventricular pacing.) L = Learning patient's ECG A = Artifact (noisy episode) ? = Insufficient information to classify beats I = Inoperative condition (e.g., LEADS OFF) M = Pause or missed beat When you click the **Arrhythmia Analysis** button you get one or two waves that are delayed by approximately 6 seconds. In multilead analysis, when you click the **Arrhythmia Analysis** button you get up to two waves. The primary lead and the other lead being used for arrhythmia analysis are both displayed. The primary wave shows the delayed lead with beat labels. The beat labels represent analysis of both the primary and secondary waves. *Note*—In multilead analysis, the Information Center displays two waves for locally connected patients. If, however, you are viewing a patient monitored by another central, the system displays only the primary wave with beat labels.

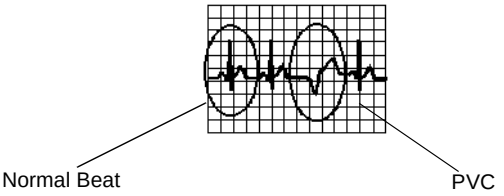
Step	Action
4	If you don't agree with how beats are labeled, you can cause arrhythmia to relearn the ECG by clicking the **Relearn** button. During the learning process beats are labeled with the letter **L** for the first valid 15 beats. The beat shape is then learned and a new template is created. If the beats that are classified as **N** (normal beat) look similar to the patient's ventricular ectopic beats you should change the lead to one where the normal and ventricular beats look different (see page 5-11). *Note*—Initiate learning only during periods of predominantly normal rhythm and when the ECG signal is relatively noise-free. See "Learning" on page 5-17 for additional information the learning process. **Warning** **If you initiate learning during ventricular rhythm the ectopics may be incorrectly learned as the normal QRS complex. This may result in missed detection of subsequent events of V-Tach and V-Fib.** **Warning** **When using EASI ECG monitoring, Relearn happens automatically when there is a LEADS OFF INOP condition (see "Monitoring During Leads Off" on page 5-19). If learning takes place during ventricular rhythm, the ectopics may be incorrectly learned as the normal QRS complex. This may result in missed detection of subsequent events of V-Tach and V-Fib. Be sure to check the beat labels and initiate a relearn to correct**
5	After relearning is complete, check the delayed arrhythmia wave to ensure that the algorithm is labeling the beats correctly.
6	If beats are still not classified correctly, check that the ECG is optimized for arrhythmia monitoring by changing the lead(s) or moving the electrodes, if needed. See page 5-11 for examples of optimized ECGs.

Step	Action
7	For telemetry and bedsides other than the M3 or IntelliVue Patient Monitor, if changing the lead does not provide accurate analysis of the beats the minimum threshold for single QRS detection can be adjusted manually by: 1. Selecting **Manual** in the QRS Detection box in the bottom of the Arrhythmia Analysis window. 2. If using Multilead Analysis, choosing whether to use the primary or secondary lead for QRS detection by selecting the lead from the **Lead** drop-down list. 3. Using the up and down arrows to move the horizontal cursor bars to the desired detection threshold. *Note*—When making manual adjustments be sure to place measurements off the P and T waves capturing the QRS complex. 4. Verifying selections then clicking the **Update** button to activate the measurement.

Step	Action
8	If you want to view all leads that can be obtained from the patient's ECG, click the **Multilead ECG** button on the Patient Window. This accesses a window showing a few seconds of wave for all available leads, plus a 10-second rhythm strip. • If only one lead is sourced then only one lead displays. • If two leads are being sourced and one of the leads is a chest lead then the two leads are displayed. If both leads are limb leads then six leads are displayed. To: • View the most recent ECG data -- click **Update Waves**. • Change the wave layout click on the wave layout on the top right side of the window then select wave format (3x4, 6x2, or 12x1) from the list that displays. In 3x4 layout an additional rhythm lead displays • Change the size of the waves place the cursor over the cal bar and select the size of the wave you want from the list that displays (x1/2, x1, x2, x4). • Change the wave speed (25 mm/s or 50 mm/s) by clicking on the speed on the bottom right of the window and selecting the speed from the list that displays. When you select a different speed the window re-displays with the selected speed. • Print a snapshot of the leads by clicking the **Print** button on the top of the window. *Note*—If the bedside or telemetry system has EASI 12-lead capability, click the **12-Lead ECG button**. All 12 derived leads will be displayed, enabling you to determine the optimal leads. For information on using the 12-Lead ECG Window, see "EASI 12-lead Review and Report" on page 1-26.

Example of Optimized Non-Paced ECG

The graphic below shows an ECG optimized for arrhythmia monitoring a non-paced patient.



Normal QRS:

- Tall (recommended amplitude > 0.5mV), narrow, with R-wave above or below the baseline (but not biphasic)
- T-wave smaller than 1/3 R-wave height; P-wave smaller than 1/5 R-wave height

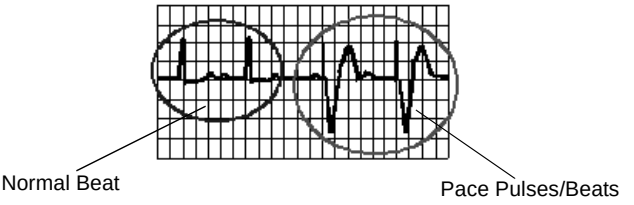
Note—In order to comply with the AAMI-EC13 specification, ST/AR internally removes the gain adjustment before the signal is analyzed for detection and classification. The detection threshold for the QRS cannot be less than 0.15 mV. This specification is aimed at preventing the detection of P-waves or baseline noises as QRS complexes during complete heart block or asystole. This increasing or decreasing of the gain has no effect on the ECG size for QRS detection. Therefore, for optimal performance and to prevent false alarms such as pause or asystole, it is important that leads selected for monitoring are optimized.

Ectopic beats:

- PVCs wider and different shape from normal beats
- PVCs not too tall or too small compared to the normal beat

Example of Optimized Paced ECG

The graphic below shows an ECG optimized for arrhythmia monitoring a paced patient.



Normal QRS:

- Tall (recommended amplitude > 0.5mV), narrow, and above or below the baseline (not biphasic)
- T-wave smaller than 1/3 R-wave height; P-wave smaller than 1/5 R-wave height

Ventricular paced beats:

- Paced beat not much larger than the normal QRS, and taller than pace pulse
- Paced beat wider than Normal QRS
- Pace pulse large enough to be detected, with no width (no re-polarization)

Aberrantly conducted beats

Since P-waves are not analyzed, it is difficult and sometimes impossible for a monitoring system to distinguish between an aberrantly conducted supraventricular beat and a ventricular beat. If the aberrant beat resembles a ventricular morphology, it is classified as ventricular. You should always select a lead where the aberrantly conducted beats have an R-wave that is as narrow as possible to minimize incorrect calls. Any ventricular beats should look different from these ‘normal beats’. Instead of trying to select two leads with a narrow R-wave, it may be easier to just select one lead and use the single lead arrhythmia monitoring option. Extra vigilance is required by the clinician for this type of patient.

Atrial Fibrillation and Flutter

Since P-wave morphology is not analyzed, there is no method to discriminate atrial rhythms. If there is constant variance in the R-R interval, the rhythm is classified as Irregular.

It is extremely important for accurate analysis of the rhythm to have p-waves with a amplitude of less than 1/5 the height of the R-wave or < 0.150 mVolts. If the p-waves are larger than this there is the possibility they can be counted as QRS complexes.

Intermittent Bundle Branch Block

The phenomenon of bundle branch or any of the other fascicular blocks creates a challenge for the arrhythmia algorithm. If the QRS during the block changes considerably from the learned normal, the blocked beat may be incorrectly classified as ventricular, causing false PVC alarms.You should always select a lead where the Bundle branch block beats have an R-wave that is as narrow as possible to minimize incorrect calls. Any ventricular beats should look different from these ‘normal beats’. Instead of trying to select two leads with a narrow R-wave, it may be easier to just select one lead and use the single lead arrhythmia monitoring option. Extra vigilance is required by the clinician for this type of patient.

Paced Patients

When monitoring paced patients, it is important to set the pacing status correctly to enable pace pulse detection. For M3 bedside monitors, you must change the pacing status at the bedside monitor. For all other point-of-care equipment, you can change pacing status at the central in either the Admit Window or the Arrhythmia Alarms Window. When the pacing status is on, the text “Paced” displays in the lower right corner of the patient sector and the upper left corner of the Patient Window.

Warnings for Paced Patients

Some pace pulses can be difficult to reject. When this happens, the pulses are counted as a QRS complex, and could result in an incorrect HR and failure to detect cardiac arrest or some arrhythmias. Keep pacemaker patients under close observation.

- **During complete heart block or pacemaker failure (to pace or capture), tall P-waves (greater than 1/5 of the average R-wave height) may be erroneously counted by the arrhythmia algorithm, resulting in missed detection of cardiac arrest.**
- **When arrhythmia monitoring paced patients who exhibit only intrinsic rhythm, the monitor may erroneously count pace pulses as QRS complexes when the algorithm first encounters them, resulting in missed detection of cardiac arrest.**

  For patients who exhibit intrinsic rhythm only, the risk of missing cardiac arrest may be reduced by monitoring these patients with the low heart rate limit at or slightly above the basic/demand pacemaker rate. A low heart rate alarm alerts you when the patient begins pacing. Proper detection and classification of the paced rhythm can then be determined.
- **Pacemaker pulses may not be detected when the output of a defibrillator or telemetry unit is plugged into a bedside monitor. This may result in the arrhythmia algorithm's failure to detect pacemaker non-capture or asystole.**

Instruments such as defibrillators or telemetry units produce a filtered ECG signal. When this signal is used as an input to the bedside monitor, it is filtered again. If this twice-filtered signal is passed to the arrhythmia algorithm, it may cause the algorithm to fail to detect pace pulses thus compromising paced patient monitoring performance.

- **When an external pacemaker is being used on a patient, arrhythmia monitoring is severely compromised due to the high energy level in the pacer pulse. This may result in the arrhythmia algorithm's failure to detect pacemaker noncapture or asystole.**

- **Pacemakers can be susceptible to radio frequency (RF) interference which may temporarily impair their performance.**

  The output power of telemetry transmitters and other sources of radio frequency energy, when used in the proximity of a pacemaker, may be sufficient to interfere with the pacemaker's performance. Due to the shielding effects of the body, internal pacemakers are somewhat less vulnerable than external pacemakers. However, caution should be exercised when monitoring any paced patient.

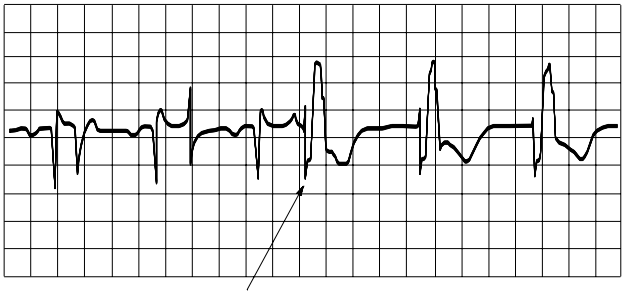
  Consult the pacemaker manufacturer for information on the RF susceptibility of their products and the use of their products with the telemetry transmitters.

  In order to minimize the possibility of interference, position electrodes, electrode wires, and transmitter as far away from the pacemaker as possible.

Repolarization Tails

Some unipolar pacemakers display pace pulses with repolarization tails. These tails may be counted as QRSs in the event of cardiac arrest or other arrhythmias.

If you note a visible repolarization tail, choose a lead that decreases the size of the repolarization tail.



AVOID PACE PULSE REPOLARIZATION TAILS (NOTE WIDTH)

Learning

Overview

The arrhythmia system's goal is to learn the patient's normal complexes so it can differentiate abnormal beats. This "learning" process uses the 15 first valid beats (for example, free from noise) encountered during the learning phase.

While the system is learning the complex, the delayed arrhythmia wave displays the beat label "L". Also, the rhythm status message "LEARNING ECG" displays. Then the system determines the dominant rhythm. During this time the beats are labeled "N", and the rhythm status message changes to "LEARNING RHYTHM".

Learning

A learning phase involves the system learning the patient's dominant complexes. During a learning phase:

- Alarm timeout periods are cleared.
- Stored arrhythmia templates are cleared.
- Asystole, Vfib, and HR alarms (when there are enough beats to compute the HR) are active.
- All other alarms are not active.

Single Lead Analysis

If single lead analysis is selected, the arrhythmia system begins a learning whenever:

- ECG monitoring is initiated.
- The Relearn key is activated. See page 5-7.
- The ECG Lead or Lead Label is changed manually, or when Fallback occurs (see page 5-19).
- A Leads Off INOP condition (that has been active for >60 seconds) ends.

Multilead Analysis

If multilead analysis is selected, the arrhythmia system begins a learning on *both* leads whenever:

- ECG monitoring is initiated.
- The Relearn key is activated. See page 5-7.
- There has been a Leads Off INOP condition (that has been active for >60 seconds) for both leads, and the condition ends in either lead.

Multilead Analysis With Changes in One Lead

Since the arrhythmia system uses more than one lead for analysis, if there is a change in one lead, the system does a relearn only on the affected lead. This happens whenever:

- An ECG lead or label is changed.
- A Leads Off INOP condition (that has been active for >60 seconds) ends.

Note—During this learning phase the system will continue monitoring using the operative lead. Therefore, the delayed arrhythmia wave is not labeled "L" and there is no "LEARNING ECG' rhythm status message. In addition:

- Alarm timeout periods are maintained.
- Stored arrhythmia templates are maintained for the operative lead.
- All alarms turned on are active.

EASI ECG Monitoring

Whenever there is an INOP condition, the arrhythmia algorithm performs a Relearn, using the available lead.

Warning

Since Relearn happens automatically, if learning takes place during ventricular rhythm, the ectopics may be incorrectly learned as the normal QRS complex. This may result in missed detection of subsequent events of V-Tach and V-Fib. For this reason, you should:

1. **Respond to the INOP message (for example, re-connect the electrode(s).**
2. **Ensure that the arrhythmia algorithm is labeling beats correctly.**

Monitoring During Leads Off

Fallback

Multilead Analysis

If there is a Leads Off INOP in the primary lead for >10 seconds, the active secondary lead becomes the primary lead. This is known as lead fallback. In lead fallback, the arrhythmia system switches the leads on the display. When the Leads Off condition is corrected, the leads are switched back.

Singlelead Analysis

For single lead analysis, if there are two leads available, the other lead is made the primary lead (until the Leads Off condition is corrected).

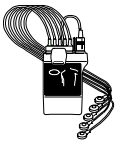
EASI ECG Monitoring

If one of the derived EASI leads has an INOP condition (for example, LEADS OFF), a flat line is displayed. After ten seconds, the directly acquired EASI AI, AS, or ES lead (depending on which is available) is displayed with the label "ECG" and is analyzed by the arrhythmia system.

Note—If there is artifact in the ECG waves or a CANNOT ANALYZE ECG INOP condition, you can use the three EASI leads to troubleshoot.

1. Click 1**2-Lead ECG** on the Patient Window, then on 3 EASI Leads.
2. The three directly acquired EASI leads will be displayed so that you can determine which electrodes are causing the problem and need to be replaced.

Extended Monitoring (Telemetry)



For telemetry-monitored patients, when both the primary and secondary leads have a Leads Off condition, if another lead is available it becomes the primary lead and the system does a relearn. This is called extended monitoring.

Extended monitoring applies if:

- Telemetry is configured for extended monitoring ON.
- The lead set provides more than two leads.
  - 5-wire lead set if using the Philips transmitter.
  - 4-wire lead set, if using the M1400A/B transmitter.

Status Messages

The Information Center displays two types of status messages in the Patient Window:

- Rhythm Messages -- to indicate the patient's rhythm.
- Ectopic Status Messages -- to indicate the presence of ectopic beats (if present).

The Information Center updates these status messages every second.

Note—If you have basic arrhythmia capability configured, you will get only messages for the basic alarms (see "Levels of Arrhythmia Analysis" on page 5-3).

Rhythm Status Messages

Message	Description
ASYSTOLE	No QRS detected for x seconds. Choices of > 2.5 to 4 seconds *Note*—M3/M4 - No QRS detected for 4 consecutive seconds
VENT FIB/TACH	A fibrillatory wave (sinusoidal wave between 2-10 Hz) for 4 consecutive seconds
V-TACH	A dominant rhythm of adjacent Vs and a HR > the V-Tach Heart Rate Limit
SUST V-TACH	Ventricular Tachycardia rhythm for more than 15 seconds
VENT RHYTHM	A dominant rhythm of adjacent PVCs and a HR less than or equal to the V-Tach Heart Rate Limit
VENT BIGEMINY	A dominant rhythm of N, V, N, V (N=supraventricular beat, V=ventricular beat)

Message	Description
VENT TRIGEMINY	A dominant rhythm of N, N, V, N, N, V (N=supraventricular beat, V=ventricular beat)
PACED RHYTHM	A dominant rhythm of paced beats
IRREGULAR HR	Consistently irregular rhythm
SINUS BRADY* SINUS RHYTHM* SINUS TACHY*	A dominant rhythm of SV (supraventricular) beats preceded by P-waves
SV BRADY* SV RHYTHM* SV TACHY*	A dominant rhythm of SV (supraventricular) beats not preceded by P-waves
UNKNOWN RHYTHM	Rhythm cannot be determined
LEARNING ECG	Algorithm is learning the ECG beat morphology
LEARNING RHYTHM	Algorithm is learning the rhythm of the classified beats

* The Sinus and SV rhythm messages are updated based on the current heart rate, taking into account the patient category, adult, pediatric, or neonatal. In order to make a transition from one rhythm status to another (for example, from Sinus Rhythm to Sinus Brady) the HR must be in the new range for 5 beats.

The table below indicates the ranges for Sinus and SV rhythms.

Rhythm	Adult Range	Ped Range	Neo Range
Brady	15 to 60	15 to 80	15 to 90
Normal	60 to 100	80 to 160	90 to 180
Tachy	> 100	> 160	> 180

Ectopic Status Messages

Message (numeric definition is in brackets)	Explanation
(No message displayed)	No ectopic activity detected within the last minute
RUN PVCs [longest run in last minute]	More than 2 consecutive PVCs within the last minute
PAIR PVCs [number of pairs in last minute]	Pair PVCs within the last minute
PAUSE	No QRS detected for x seconds. Choices of >1.5 to 2.5 seconds. *Note*—M3/M4- No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only)
PACER NOT CAPT [number of pacer not captured episodes in last minute]	Pause with pace pulse (paced patient only) within the last minute
PACER NOT PACE [number of pauses with no pacer in last minute]	Pause without pace pulse (paced patient only) within the last minute
MISSED BEAT [number of pauses in last minute]	No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only) *Note*—M3/M4-this alarm is not available
R-ON-T PVCs	R-ON-T detected within the last minute
MULTIFORM PVCs [number of PVCs in last minute]	Multiform PVCs detected within the last minute

Message (numeric definition is in brackets)	**Explanation**
FREQUENT SVPBs [number of SVPBs in last minute]	SVPB count within last minute is greater than 5
SVPBs [number of SVPBs in last minute]	1-5 SVPBs in the last minute with a sinus rhythm and no Vs
SV BEATS [number of SVs in last minute]	SV (supraventricular) count within last minute (if 0 this message is blank) and rhythm status is PACED
PACED BEATS [number of paced beats in last minute]	Paced beat count within last minute (if 0 this message is blank) and rhythm status is not PACED

False Alarms

If you are getting false alarms perform the following steps:

Step	Action
1	On the Patient Window click the **Arrhythmia Analysis** button. The Information Center displays up to two delayed Arrhythmia waves, with beat annotations. *Note*—You can view all the leads that can be obtained from the patient's ECG by clicking the **Multilead ECG** or **12-Lead ECG** button. See "Ensuring Accurate Arrhythmia Monitoring" on page 5-6 for more information.
2	Check the delayed arrhythmia wave and beat labels to ensure that the algorithm is labeling the beats correctly. For patients with pacemakers, make sure the system is not counting pacer spikes as QRS complexes -- the beat label should not be above the pacer spike, detecting the pacer spike as a QRS.

Step	Action
3	If you don't agree with how beats are labeled click the **Relearn** button to cause the system to relearn the patient's ECG. See "Learning" on page 5-17 for additional information on learning. **Warning** **If you initiate learning during ventricular rhythm the ectopics may be incorrectly learned as the normal QRS complex. This may result in missed detection of subsequent events of V-Tach and V-Fib.**
4	If you still don't agree with how the system is labeling beats, change the ECG lead(s) to get better waves for arrhythmia analysis.
5	If it is difficult to provide more than one optimized ECG lead, consider changing to singlelead arrhythmia analysis. In singlelead analysis, the system uses only the primary lead. If you change to singlelead analysis, make sure that this optimized lead occupies the first ECG channel when you have more than 1 ECG lead displayed.
6	For telemetry and bedsides other than the M3 or IntelliVue Patient Monitor, if changing the lead does not provide accurate analysis of the beats the minimum threshold for single QRS detection can be adjusted manually by: 1. Selecting **Manual** in the QRS Detection box in the bottom of the window. 2. If using Multilead Analysis, choosing whether to display the primary or secondary lead from the Lead drop-down list. 3. Using the up and down arrows to move the horizontal cursor bars to the desired detection threshold. 4. Clicking the **Update** button to activate the measurement.

6
Patient Data Review

This chapter describes the Information Center's patient data review windows. It includes the following sections:

The Information Center Review Windows

Overview

Patient data storage begins when the patient is connected to a bedside monitor or telemetry transmitter. The Information Center provides review windows that allow you to display a patient's physiological parameters and alarm events that have been collected from a bedside monitor or telemetry transmitter and stored over time in the database.

The review windows display the data in a variety of formats so that clinicians can use it to evaluate the patient's status and make rapid diagnosis/prognosis, medication adjustments, and discharge/transfer decisions.

Note—If you have dual displays, the full screen is used when a data review application is open.

The Information Center review windows are accessible via the Trends or Alarm Review control buttons as well as the All Controls Window. They are:

Window	Description
Alarm Review	Displays the alarm events that have been automatically stored as well as strips that have been manually saved. See "Alarm Review" on page 6-9.
Wave Review	Displays stored waves. Wave Review allows you to examine the data for a significant episode in detail. See "Wave Review" on page 6-31.
Trend Review	Displays the parameter data in graphical format. Trend Review allows you to view data over time. See "Trend Review" on page 6-19.

Window	Description
Event Review	Displays the frequency and duration of events that have been configured for your unit. Event Review allows you to view events over time. You can navigate between significant episodes. See “Event Review” on page 6-24.
ST Review	Displays the patient’s ECG beats and ST segment values. ST Review allows you to examine the data for a significant episode in detail. See “ST Review” on page 6-38.
12-Lead Review	Displays a 10-second retrospective review of the 12 EASI derived ECG waves for EASI enabled bedside monitors and telemetry or the results of 12 Lead Captures performed at an IntelliVue Patient Monitor. See “12-Lead Review” on page 6-42.
Stored Wave	Allows you to change the waves stored for a patient. See “Changing the Waves that are Stored” on page 6-50.

Review Window Features

The Information Center review windows provide the following.

Feature	Description
Reporting	You can print a report from the review window by clicking the **Print** button on the top of the window.
Easy Navigation Between Windows	The related application buttons on the bottom of the review windows enable easy navigation between review windows. *Note*—If you enter a review window directly from the Patient Window, the current time frame and current values are displayed. If you enter a review window from a related review window, the cursor time position for that patient is the same as it was on the previous review window.
Time Focus	The review windows allow you to display data for a specific period of time. For Alarm Review you can change the time focus by placing your cursor over the time duration displayed at the bottom right of the screen and selecting from the pop-up list. Use this feature to display data over a longer period of time (with less detail) or a shorter period of time (with more detail). *Note*—A '?' mark will display on the timeline in any of the review windows whenever the time on the central or SDN bedside monitor is changed, for example, with daylight savings time. This a normal event. A question mark will also display when the central clock and the SDN bedside monitor clock sync or re-sync. Clocks tend to drift, when this happens the clock adjusts the time forward or backward by 1 minute. The expected frequency of the time clock synchronization is about 1 per 48 hours.

Feature	Description
Cursor/Page Arrows	You can also change the time focus in review windows by “paging” backward and forward. The double arrows page back/forward by a larger amount than the single arrow. For example, if 8 hours of data are shown on the screen, the double arrows move back/forward by 8-hour increments, while the single arrows move back/forward by smaller increments.
Data Updating	Review windows update the data when you navigate forward in time or leave the window and come back to it.

Using Strips in Review Windows

Strip windows in the review applications (except for Trend Review, ST Review and 12-Lead Review) enable the clinician to view details. Strips display about 10 seconds of data. Event Review displays a strip permanently, while the other review applications enable you to produce one or more strips that overlay a part of the window.

When you display a strip, all other buttons in the window remain active. The table below describes how to use the strip windows to display details.

If you want to...	Do this...
Move back/forward in time	Use the single arrows to move the time back/forward by approximately one second. Use the double arrows to move back/forward by a “page”.
Change the wave size (scale)	Put the cursor over the cal bar and use the arrows to choose the size you want.
Save the strip in Alarm Review (not applicable for Alarm Review)	Click the **Save** button. A box will appear that allows you to enter a comment. This comment will then be visible when the strip is displayed in Alarm Review. If the strip is included in an alarm report, the comment will be printed in the report.

If you want to...	Do this...
Use the electronic caliper in strips to measure intervals, such as R-to-R	**To Make a Measurement** 1. Click on the strip once to fix the first point of the caliper to the strip. 2. Drag the cursor and release to fix the second point and display the measurement. **To Adjust Measurements** Horizontally: • Place the cursor on the right or left vertical line. A right/left arrow appears. Click on this arrow and drag the line to the desired position. Vertically (for example, to move the measurement away from the waveform): • Place the cursor between the vertical lines. Click above or below the measurement. The measurement is removed when another action is taken in the strip window. Therefore, to print the strip with the measurement, first make the measurement, then print the strip.
Print a 30 second strip report of a single strip (from Alarm Review, Wave Review, or Event Review)	Click the **Print** button to the right of the strip.

If you want to...	Do this...
Make a recording of the strip	If a 4-channel recorder is available on your system, indicate whether to send the recording to the 2 Channel or 4 Channel recorder by clicking on the appropriate radio button then click on **Record**. You will get a recording with 30 seconds of stored waveform. *Note*—If a 4-channel recorder is not available on your system the 2-channel and 4-channel radio buttons do not display in this window.
Clear the strip from the screen (not applicable for Event Review)	Click the **Close** button.

Alarm Review

Overview

The Alarm Review Window allows you to view stored alarms and saved strips. The records are divided as follows:

- 50 records -- 40 stored alarms and 10 saved strips.
- 150 records -- 120 stored alarms and 30 saved strips.

Stored Alarms

Stored alarms are configured alarms that are automatically added to alarm history when the alarm is generated. Each stored alarm has:

- The date and time of the alarm.
- The alarm text.
- Vital signs associated with the alarm strip.
- A 30-second compressed wave, with 10 seconds pre-event, and 20 seconds post-event.

When the number of stored alarms reaches maximum capacity, the oldest alarm strip (#40 or #120) is automatically discarded and the new alarm is saved as #1.

Note—If an alarm has occurred and the monitoring device was turned off prior to the storage of the alarm, the data for that alarm cannot be retrieved.

Saved Strips

Saved strips are waves that you manually save from the Wave Review, Event Review Window, or from the patient sector. You can view saved strips in a separate group (USER SAVED STRIPS). The most recent strip is displayed first. Each saved strip has:

- The time and date.
- A 30-second compressed wave. Strips saved from Wave Review or Event Review have 15 seconds before/after the center of the strip as it was in the review window. Strips saved from the patient sector have 10 seconds before the save action was taken and 20 seconds after.

When the number of saved strips reaches maximum capacity, the oldest saved strip (#10 or #30) is automatically discarded and the new strip is saved.

Managing Alarms/Strips

You can manage alarms/strips by:

- Deleting alarms/strips manually. See page 6-13.
- Inhibiting the automatic storage of individual alarms on a per patient basis via the Record/Store Window. This feature is configurable. See “Recording/Storing Alarms” on page 4-36.

Using Alarm Review

The table below describes how to use the Alarm Review Window.

If you want to...	Do this...
Select the alarm(s) or saved strip(s) for viewing	Select a specific type or all alarms or saved strips for viewing by selecting a group at the top right of the window.
Change the timeline duration	Click the down arrow next to the **Time Duration** box at the bottom right of the window and select a time from the drop-down list that displays. Choices are 12 hours, 24 hours, 48 hours or All Available.
View the alarm(s) in a tabular display.	Click in the **Tabular Display** checkbox. A check mark in the box causes a single alarm strip to display along with a list of alarms on the bottom of the window. You can select another alarm strip to display by selecting the alarm from the alarm list on the bottom of the window, by clicking the **Next** or **Previous** buttons.
Display an alarm that occurred at a specific time	Click on the time line or use the arrow buttons. The double arrows go back/forward by a page (5 or 10 alarms). The single arrows go back/ forward by one alarm.

If you want to...	Do this...
View uncompressed waves for an alarm or saved strip	Click on the the alarm then click on the **Strip Window** button. The strip displays, with up to 4 waves for viewing and printing in an uncompressed format for the alarm. Use the arrow keys to scroll backward and forward. In half-screen windows, you can display one strip. In full-screen windows you can display two strips.
Re-label the alarm	1. From the alarm strip, place your cursor on the alarm type at the top of the screen. A popup list is displayed. 2. Choose an alarm type by clicking on a type in the list. For example, you may want to relabel an alarm from IRREGULAR HR to ATRIAL FIB. (The current label is the last label in the list.) When you re-label an alarm the alarm is marked with “Re-labeled to [new label]” for identification. Re-labeling an alarm has no effect on future alarm calls. The alarm label is just changed on the strip and in Alarm Review.
Make a recording of the alarm	If a 4-channel recorder is available on your system, indicate whether to send the recording to the 2 Channel or 4 Channel recorder by clicking on the appropriate radio button then click on **Record**. You will get a recording with 30 seconds of stored waveform. *Note*—If a 4-channel recorder is not available on your system the 2-channel and 4-channel radio buttons do not display in this window.

If you want to...	Do this...
Send a page to a clinician-worn receiver	If paging is available on your system, click the **Page** button to send a page to the clinician assigned to this patient. The waveforms and parameters currently displayed in the Alarm Review window are sent to the clinician's receiver. Six seconds of waveforms are provided; 4 seconds preceding the alarm and 2 seconds after. See Chapter 8, "Alarm Paging" for additional information on paging. *Note*—When a page is sent the alarm time displayed on the receiver is the time the page was sent not the time the alarm occurred.

If you want to...	Do this...
Delete alarms	You can delete an alarm from within the Alarm Review Window, from within an alarm strip or from the tabular display. **Alarm Review Window** To delete alarms from Alarm Review: 1. Mark the alarm(s) for deletion by clicking on the alarm then clicking the **Delete Alarm** button. When you click the Delete Alarm button a wastebasket icon appears on the right side of the alarm. *Note*—You can cancel the deletion of an alarm by clicking on the **Delete Alarm** button again. 2. Delete the alarms (no undoing), by clicking the **Delete Alarms** button. **Alarm Strip** To delete alarms from the Alarm Strip click the **Delete** button on a strip then click the **Close** button. The strip and alarm will be deleted. (You cannot undo the delete in this case.) **Tabular Display** To delete alarms from a tabular display: 1. Mark the alarm(s) for deletion by right mouse clicking on the alarm in the alarm list then selecting **Delete** from the pop-up list that displays. When you select Delete the word “Delete” displays on the right side of the alarm. *Note*—You can cancel the deletion of an alarm by right mouse clicking on the alarm and selecting **Delete** again. 2. Delete the alarms (no undoing) by clicking the **Delete Alarms** button.

If you want to...	Do this...
Print a report	You can print a report from within the Alarm Review Window, from a strip or from within a tabular display. **Alarm Review Window** To print from the Alarm Review Window: 1. Select the alarm(s) clicking on the alarm then clicking on the **Print** button. When you click this button a printer icon appears on the right side of the alarm. *Note*—You can select a maximum of 12 alarms to be printed at one time. To print more than 12 alarms, select the first 12 and print; then select the next 12 and print. 2. Click **Print** at the top right of the window. You get a report of the selected alarms, with primary and secondary 25 mm/s waves. There are four alarms per page; each shows approximately the first 10 seconds of the 30-second strip (8 seconds pre-event, and 2 seconds post-event). **Alarm Strip** To print a report of the displayed alarm strip, click on the **Print** button to the right of the strip. You will get a report of the strip just as it appears on the screen, for example, with the size you chose and with caliper measurements if you used them.

If you want to...	Do this...
	Tabular Display To print a report from a tabular display: 1. Right mouse click on the alarm in the alarm list then select **Print** from the pop-up list. The word Print displays to the right of the alarm marking the alarm for inclusion in the report. 2. Select any additional alarms by repeating Step 1. 3. Print a report of the selected alarms by clicking the **Print** button on the top of the window. The report will contain up to four strips per page, with the oldest strip first. Each strip will have up to four waves.
Use the electronic caliper	**To Make Multiple Measurements and Save as Comment on Alarm Strip** You can make multiple measurements and save them as a comment on the strip. 1. Click on the checkbox to the left of the **E-Caliper** field. Caliper Measurements is selected when a checkmark displays. 2. Make the first measurement (see "Using Strips in Review Windows" on page 6-6 for instructions). 3. Assign a label to the measurement by clicking on a measurement in the **Caliper Measurements** listbox. Choices are: PR, QRS, QT, RR and QTC. 4. The measurement displays in the Comment field for this strip. 5. Continue until all desired measurements are made. *Note*—The QTC measurement is automatically calculated from the QT and RR intervals.

If you want to...	Do this...
Change the wave size	Click on the cal bar and select the size of the wave you want.
Change the wave speed	From the alarm strip, change the speed to 6.25 mm/s, 12.5 mm/s, 25 mm/s, or 50 mm/s by clicking on the speed from the Speed drop-down list on the bottom of the window. When you select a different speed the window re-displays with the selected speed.
Add comments	From the alarm strip, enter text in the **Comment** field on the upper left side of the window then click the **Close** button. The comments you enter are tied to the strip and will appear on the strip in Alarm Review and in the Alarm Reports.

The following alarm types are available from the pop-up list:

SINUS RHYTHM	SV TACHY	IDIOVENTRICULAR
SINUS BRADY	JUNCTIONAL RHYTHM	(AVR)ACCEL IDIOVENT
SINUS TACHY	1º AV BLOCK	V-TACH
SINUS PAUSE/ARREST	2º AV BLOCK TYPE I	V-FIB
ABBERENT PAC	2º AV BLOCK TYPE II	ATRIAL PACED
ATRIAL TACHY	3º AV BLOCK	AV PACED
ATRIAL FLUTTER	BUNDLE BRANCH BLOCK	VENT PACED
ATRIAL FIB	LBBB	PAC
WIDE QRS SVT	RBBB	ABERRANT SVT

Fast Alarm Review

Fast Alarm Review enables the clinician to quickly silence and view the alarm wave and take immediate action on the alarm. This capability is configurable for all red and yellow alarms, all red alarms only, or is disabled (default).

If enabled, clicking on the Silence/Review button for an active alarm silences the alarm and opens a Patient Window with the strip for that alarm. (Clicking anywhere in the sector, except on a button, silences the alarm without displaying the strip.)

Note—If there is an application window open for any patient, when the Silence/Review button is clicked, the Fast Alarm Review strip overlays it.

The alarm strip contains 15 seconds of unannotated waves that proceeded the alarm. About 10 seconds are displayed on the screen; arrows enable viewing of the other 5 seconds. The strip can have up to four waves (the first four waves that are available in the Patient Window).

When Fast Alarm Review is open, the following buttons are available:

Button	Action
Close[1]	Dismisses Fast Alarm Review and shows the window that was originally open, or if none open, shows the Main Screen.

Button	Action
Delete	Deletes the alarm (it will not be stored) and closes the window.
Record	Produces a 15-second recording of the alarm.
Print	Prints the Fast Alarm Review screen.
Page	If paging is available on your system, sends a page to the clinician assigned to this patient. The waveforms and parameters currently displayed in the Fast Alarm Review window are sent to the clinician's receiver. Six seconds of waveforms are provided; the 4 seconds preceding the alarm and 2 seconds after. See Chapter 8, "Alarm Paging" for additional information on paging. *Note*—When a page is sent the alarm time displayed on the receiver is the time the page was sent not the time the alarm occurred.
Patient Window[1]	Removes Fast Alarm Review and displays the Patient Window *for that patient*. (This changes the focus from the previously displayed bed.)
Main Screen[1]	Closes all open windows and returns to the Main Screen. *Note*—All navigation controls in applications are set to defaults.

[1]When the button is clicked, if the alarm was set up to be stored in Alarm Review, it will be stored.

As in the Wave Review and Event Review, when the strip is displayed, you can make a single caliper measurement and display different waves. If you then print the alarm strip, the printout will contain the waves and measurements that are on the screen.

Note—Recording from Fast Alarm Review is independent of the recording settings in the Record/Store application. For example, you can inhibit the recording of a type of alarm in the Record/Store application, and then record the alarm on an individual basis from Fast Alarm Review. Storage of alarms is controlled by the Record/Store application — alarms cannot be stored from Fast Alarm Review.

Trend Review

Overview

The Trend Review window allows you to see a patient's averaged physiological parameters collected over time from a bedside monitor or telemetry transmitter in either graphic or tabular format. Trend data is available for up to the last 24 hours (48 hours if option purchased). All parameters that are stored can also be trended.

Note—The only arrhythmia trends available for M3 monitors are HR and PVC rate.

Note—The Information Center uses only centigrade as the unit measure for temperature. For IntelliVue Patient Monitors if your bedside is set up to use fahrenheit as the unit measure the Information Center Trend Review window will display the fahrenheit numeric but label it as centigrade. Bedsides connected to the Information Center should always set temperature configuration to centigrade. Refer to your bedside documentation for information on configuring temperature.

Trend Review with Graphic Display

The Trend Review window with graphic display organizes the trends into trend groups that allow quick access to ‘typical’ trends. Each group can contain up to five trend graphs. Each trend graph can have up to two parameters. One trend has the left axis, and the other has the right axis. The data (parameter name, unit, trend plot, scales and values) for each parameter is in a separate color.

In half-screen operation, you can display up to two trend graphs in a group at one time. You can cycle through the other graphs. In full-screen operation, all five trend graphs are presented at one time.

There are several different trend presentations, depending on the characteristics of the parameter. Different types of trends can be mixed in a trend graph. The table below describes how the Information Center displays different parameters.

Parameter	Display
Continuous	The central displays single-value continuously monitored parameters, such as heart rate with a single line plot and triple-value periodic parameters, such as invasive blood pressure with three lines of the same color.
Aperiodic	The presentation of aperiodic, non-continuous, parameters depends on the number of values to be shown. Aperiodic parameters are presented as discrete graphic data points with an 'X' indicator. Triple-value aperiodic parameters (for example, NBP) appear as an 'X' at the mean value with arrow indicators at the systolic and diastolic values. Aperiodic parameters are not averaged and are always displayed as exact values. If more than one aperiodic value falls into the same column, the latest value is shown. Counts (for example, PVC Count, Normal Beat Count, etcetera.) and % arrhythmia measurements (% Bigeminy, % Paced, etcetera) are displayed in bar chart form/histogram. Rates (Paced Rate, S-S Rate, V-V Rate, etcetera) are displayed in graphic form as two trend lines.
Multiple	Multiple parameters, such as ST, are presented as separate curves, each in a different color. The same colors are used to display the parameter names and corresponding values.
Histograms	Discrete events, such as PVC count, are presented as histograms.

The table below describes how to use the Trend Review with graphic display.

If you want to...	Do this...
Change the trend group displayed in the Trend Review window	With a check in the Trend Groups checkbox, select a group from the **Trend Group** drop-down list. The trend graphs are grouped into sets of up to five each. Each trend graph can have up to two parameters.
Select a different trend graph parameter to display	With a check in the Trend Groups checkbox, select the parameter from the **Parameter** drop-down list. The parameters that are available depend upon the selected trend group.
Remove the current graph trend and replace parameters you select	Uncheck the **Trend Groups** checkbox then select the parameters from the parameter drop-down list.
See parameter values for a point in a trend for example, where the trend line shows a change in the patient's status	Move the **Navigator** cursor bar by using the arrows or clicking on the trend graph.
Change the trend scale	Click on the axis then select a different scale from the pop-up list that displays. Selecting **Optimum** ensures that to all parameter data within the current duration is visible.
Change the time period for a trend	Select the number of hours from the **Time** drop-down list. Choices are 1, 4, 8,12, and 24 hours.
Print a report	Click the **Print** button on the top right of the window.

Trend Review with Tabular Display

The Trend Review window with Tabular Display displays parameter data in rows and columns suitable for charting purposes. You select tabular display by clicking in the **Tabular Display** checkbox. A checkmark in the checkbox removes the bottom trend graph and displays a table on the bottom of the Trend Review window. The table includes:

- Up to 140 rows of averaged data points for the specified parameters.
- Up to 17 columns of time indicators spaced per the selected time resolution.
- Parameter label for each displayed parameter is always in black.
- A highlighted column corresponding to the nearest minute for the current time focus. In addition a shaded gray rectangle appears in the trend graph area corresponding to the number of minutes of tabular data being displayed and the duration of the timeline.

Note—For most parameters the value displayed in the tabular trend is the ***median*** of the valid parameter one-minute average values for the given interval. For triple-valued pressure parameters, the median of the mean is used to determine which parameter to display for all three values. For ST parameters, the value displayed is the value corresponding to the maximum absolute value over the interval. For P, S, and V rates, the minimum and maximum within the interval is displayed.

The table below describes how to use the Trend Review with tabular display

If you want to...	Do this...
Expand the number of rows displayed in the table	Click the up arrow to the left of the table. When you click the up arrow the graphic display on the top of the window is removed and the number of tabular rows displayed increases.
Move the tabular display backward or forward in time	Use the horizontal scroll bar on the bottom or use the right and left arrow buttons.
Change the time period	Select a time interval from the **Timeline Duration** drop-down lists to the right of the table.

If you want to...	Do this...
Change the time resolution for the tabular trends	Select a different number of minutes from the **Time Resolution** drop-down list. The number of minutes available depend on the hour selected in the Timeline Duration.
Add a parameter to the tabular table	Select a parameter from the **Parameter** list to the right of the table.

Event Review

Overview

The Event Review Window provides an overview of the frequency and duration of specific events (for example, V-Tach), along with a strip showing the waves for the event. The strip area is at the top of the window; the event occurrence area, with up to five event bars is at the bottom.

Up to ten event groups can be configured in Unit Settings for a Information Center. All groups are available for selection. Event Review groups the events into sets of up to five events. Events include:

- Alarms generated from the central or bedside.
- Arrhythmia events for example, R-on-T.

Note—The events that are available are dependent on your monitoring device.

Cursor/Event Information

The Event Review Window provides the following information whenever the event cursor matches the onset of an event:

- The time and date corresponding to the position of the event cursor.
- The name of the event, the duration of the event (if applicable) and the actual value and name of the parameter (if applicable) that violated the event limit.
- The event count to the right of each event bar reads “X/Y”, where (X) is the number of events at and to the left of the event cursor and (Y) is the total number of such events on the screen. For example, 3/5 tells you that there are a total of 5 events in that row, and 3 of the events occurred before or at the time of the cursor bar.

Event Bars

The Event Review Window provides event bars to show the duration from the detection of the event to when the event was acknowledged (silenced).

Event bars are color coded to represent the severity of the event. The color of the event indicates the severity.

Color	Severity
Red	*** Life threatening alarms.
Yellow	** Limit violation alarms.
Cyan	All INOP conditions and non-alarming events including arrhythmia events.
Blue	User saved strips.

Note—Gray stripes indicate that the analysis of a specific event was not reliable for a certain period of time (for example, if the signal was not available or of insufficient quality).

Using Event Review

The table below describes how to use the Event Review Window.

If you want to...	Do this...
Select specific events	When you enter the Event Review Window from Main Screen, the event cursor is positioned at the time of the most recently collected data. To select specific events: • Click the left and right cursor arrows. Each time you click the cursor arrow, the cursor jumps to the onset of the next (or previous) event. • Click on the event navigator to displays a strip corresponding to the event at that time. • Toggle specific event types on and off by clicking on the event label to the left of the event bar. When event label is off (greyed-out) the event navigator left and right cursor arrows ignore all of these types of events *Note*—The displayed strip corresponds to the location of the event cursor. The strip automatically updates when you move the event cursor. You can also scroll the strip (and the event cursor moves correspondingly).
Save a strip and add a comment	You can save a strip in Alarm Review by clicking on **Save**. A box will appear that allows you to enter a comment. This comment is associated with the time shown on the strip, and does not display when you scroll the strip window. However, the comment is visible from the Alarm Review Window.
Change the strip wave size	Click on the cal bar and select the size of the wave you want.

If you want to...	Do this...
Change the strip wave speed	Change the speed to 6.25 mm/s, 12.5 mm/s, 25 mm/s, or 50 mm/s by clicking on the speed from the Speed drop-down list on the bottom of the strip window. When you select a different speed the window re-displays with the selected speed.
Change the event timeline duration	Select the number of hours from the **Time** drop-down list. Choices are 1, 4, 8,12, and 24.
Make a recording of the strip	If a 4-channel recorder is available on your system, indicate whether to send the recording to the 2 Channel or 4 Channel recorder by clicking on the appropriate radio button then click on **Record**. You will get a recording with 30 seconds of stored waveform. *Note*—If a 4-channel recorder is not available on your system the 2-channel and 4-channel radio buttons do not display in this window.
Use the electronic caliper	1. With the strip displayed, click on the checkbox to the left of the E-**Caliper** field. Caliper Measurements is selected when a checkmark displays. 2. Make the first measurement (see "Using Strips in Review Windows" on page 6-6 for instructions). 3. Assign a label to the measurement by clicking on a measurement in the **Caliper Measurements** listbox. Choices are: PR, QRS, QT, RR and QTC. 4. The measurement displays in the Comment field for this strip. 5. Continue until all desired measurements are made. *Note*—The QTC measurement is automatically calculated from the QT and RR intervals.

Reports

From Event Review, you can print four types of reports:

- 30 second strip report -- you can print a report of a single strip by clicking the **Print** button to the right of the strip.
- Event Review Window report -- you can print a report of the Event Review window by clicking the **Print** button on the top right of the window. The Information Center prints a report of the waves you are viewing along with the event bars on the bottom. The Event Review Window uses this format for both half screen and full screen operation.
- Strip Report -- you can create a report based on selected strips. See “Strip Reports” below.
- Event Summary Report-- you can print a report based on selected events. See “Event Summary Report” below.

Strip Reports

To print a Strip Report, perform the following steps:

Step	Action
1	Display the first strip.
2	Click in the **Strip Report** checkbox.
3	In the small window that displays, enter a comment or select a pre-set comment.
4	Click **Save User Strip** if you want to save this strip in Alarm Review. *Note*—Selecting the strips for this report does not save the strips.
5	Click **OK** -- the Report List will be displayed.
6	Click on the next wave area of interest then click **Add**.
7	Repeat Steps 3 through 5 for each wave area of interest.

Step	Action
8	You can make changes to any strip (for example, add a caliper measurement) by clicking on the strip in the Report List. Make the changes, and then click **Add**.
9	To print the report, click **Print**. *Note*—If you want to remove a strip before printing the report, highlight that strip, then click Remove.

The report will contain all of the selected strips sorted by time. The strips will also appear on the report just as they did on the screen (with caliper measurements, at the same speed, with the same waves, etc.). Once you print the report, the list is cleared.

Event Summary Report

For dual-display systems, to print a Event Summary Report, perform the following steps:

Step	Action
1	Click the **Summary Report** button.
2	Select the events to be included in the report by clicking on the event in the event bar then clicking the **Add** button. Repeat for each event to be included in the report. A table with the selected events displays on the bottom of the window. You can remove a previously selected event from the event table by clicking on the event in the table then clicking the **Remove** button. *Note*—Clicking on an event in the event table displays the event in a strip window. Clicking in an area on the event bar that has no events then clicking the **Add** button causes a strip window to display for the selected time. The event is added to the Summary Report table as a blue event and labeled as “User Defined Event”
3	Click **Print**. You will get a report of all of the selected events.

The Event Summary Report contains:

- A graphic trend of HR for the most recent 24 hours.
- A graphic trend of PVC for the most recent 24 hours.
- A tabular trend for HR (max, median, min) for the most recent 24 hours.
- A tabular trend of event counts for each of the event group entries for the displayed event group for the most recent 24 hours.
- An event strip containing the event specification and duration for each entry in the Summary Report.

Wave Review

Overview

The Wave Review Window allows you to view up to four continuous waves that have been stored for a patient. Wave Review Window includes:

- A lead label for each displayed wave.
- Navigator selections for Event, Trend or Timeline.
- A red rectangle in the wave area indicating the corresponding wave strip selection.
- A square-wave pattern for any wave that is invalid or not accessible for the given time period (see “No Data/Invalid Data” on page 6-32)
- A label change indicator if the stored wave changed for the specified time period.
- A scale change indicator if the wave changed scaled during the specified time period.

Note—The Stored Wave Window, accessible from the All Controls Window allows you to select the waves for storage for a patient.

Navigation Choices

The Wave Review Window contains two components: the actual full disclosure waves in the top part and navigation in the bottom part.

You can use the navigation area to select a focus for the waves. The choices are:

- **Trends**
  Use the Trend navigator to display a single trend graph and scan the trend for significant changes. The choices available to you in the Trend Navigator depend on whether or not you have Trend Groups selected in the Trend Review window (see “Trend Review” on page 6-19). With Trend Groups selected in Trend Review window you can select the trend group you would like to see. With Trend Groups not selected in the Trend Review window, you can select parameters to trend by selecting from the **Parameter** drop-down lists. Use the top Parameter drop-down list to change the left parameter. Use the bottom Parameter drop-down list to change the right parameter. Moving the cursor by clicking in the trend area displays the waves for that time period.

- **Events**
  Use the Events navigator to look at waves for events of interest. The Event navigator has bars for each event code. The event bars have different colors depending on level of severity:
  - Red = life-threatening alarms
  - Yellow = limit violation alarms
  - Cyan = all INOP conditions and non-alarming events including arrhythmia events

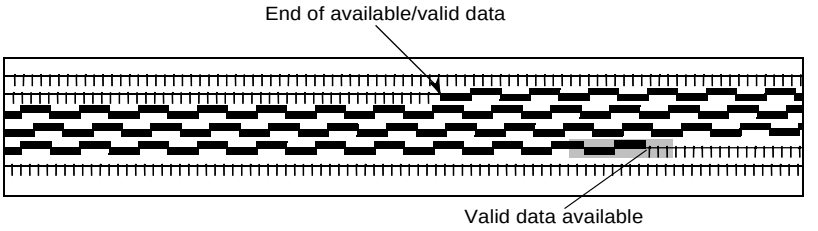
  Moving the cursor by clicking in the event area displays the waves for that event. To change the Event Group, select a different group from the **Event Group** drop-down list.

- **Timeline**
  You can use the Timeline at the bottom of the window to navigate. The timeline indicates the time and date (indicated on the first time stamp or when the day boundary is crossed). The timeline has 3-6 ticks depending on the current time period selected. A shaded area with a vertical bar with arrows in the timeline corresponds to the currently displayed waves. This shaded area depends on the number of minutes of wave being displayed and the duration of the timeline.

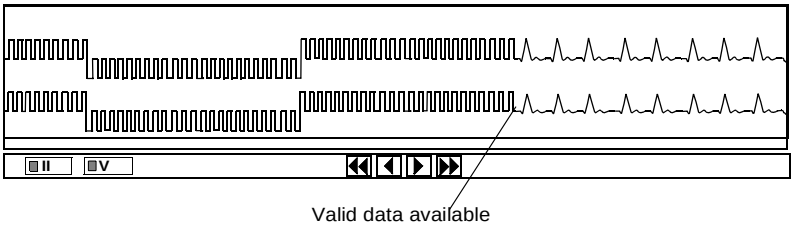
No Data/ Invalid Data

If the data is unavailable (for example monitoring is suspended) or invalid (for example, an INOP condition), a black or green square wave is displayed.

If you get a strip and there is no valid data available, the message “No Data From Bed” is displayed in the strip. (This may result from turning off the monitoring device or placing it in standby.)



However, if there is any valid data available in the previous/next minute, a square wave is displayed in the strip. Scroll back/forward to get to the wave data.



Using Wave Review

The table below describes how to use the Wave Review Window.

If you want to...	Do this...
View waves for an event	To see waves for an event of interest (for example, an episode of VTACH), move the Navigator cursor bar by using the arrows or clicking on the event line. To view all waves or waves in combination with trends place the cursor over Navigator and click on your choice.
Display/hide waves for selected wave label	Click the respective wave label on the right of the window.
Change the displayed waves size	Click the Up and down arrows to the right of the waves. When you click the Up and Down arrows the Information Center redraws all the displayed waves, changing the wave size up or down.
View the waves greater/less detail	Change the amount of detail shown by clicking on the **Wave Duration** field on the top right of the window and selecting the number of minutes from the drop-down list. The larger the number of minutes the less detail shown. Choices are 1 minute, 6 minutes, 12 minutes, 30 minutes and 60 minutes.

If you want to...	Do this...
Change the timeline duration	Select the number of hours from the **Time** drop-down list on the bottom left of the window. Choices are 1, 4, 8,12, and 24.
Get a strip to view waves in greater detail	Move the cursor to the part of the wave you want and click. A strip window displays. In half screen operation most of the wave window will be replaced by the strip window. Full screen operation: the strip window will cover part of the waves. The strip can have up to four waves.
Make a recording of the wave strip	If a 4-channel recorder is available on your system, indicate whether to send the recording to the 2 Channel or 4 Channel recorder by clicking on the appropriate radio button then click on **Record**. You will get a recording with 30 seconds of stored waveform. *Note*—If a 4-channel recorder is not available on your system the 2-channel and 4-channel radio buttons do not display in this window.
Save a strip and add a comment	You can save a strip from Wave Review by clicking on **Save**. A box will appear that allows you to enter a comment. This comment is associated with the time shown on the strip, and does not display when you scroll the strip window. However, the comment is visible from the Alarm Review Window if you display that strip.
Change the strip wave size	Click on the cal bar and select the size of the wave you want.

If you want to...	Do this...
Change the strip wave speed	Change the speed of the strip wave to 6.25 mm/s, 12.5 mm/s, 25 mm/s, or 50 mm/s by clicking on the speed from the Speed drop-down list on the bottom of the strip window. When you select a different speed the window re-displays with the selected speed.
Use the electronic caliper	1. With the strip displayed, click on the checkbox to the left of the **E-Caliper** field. Caliper Measurements is selected when a checkmark displays. 2. Make the first measurement (see "Using Strips in Review Windows" on page 6-6 for instructions). 3. Assign a label to the measurement by clicking on a measurement in the **Caliper Measurements** listbox. Choices are: PR, QRS, QT, RR and QTC. 4. The measurement displays in the Comment field for this strip. 5. Continue until all desired measurements are made. *Note*—The QTC measurement is automatically calculated from the QT and RR intervals.

Reports

From Wave Review, you can print four types of reports:

- 30 second strip report -- you can print a report of a single strip by clicking the **Print** button to the right of the strip.
- Wave Review Window report -- you can print a report of the Wave Review window by clicking the **Print** button on the top right of the window.
- Strip Report -- you can create a report based on selected strips (for example, when doing a Swan insertion).
- Duration Report -- you can print a report or make a recording of waves for a specific length of time. See "Duration Report" below.

Strip Reports

To print a Strip Report of multiple strips, perform the following steps:

Step	Action
1	Display the first strip.
2	Click in the **Strip Report** checkbox.
3	In the small window that displays, enter a comment or select a pre-set comment.
4	Click **Save User Strip** if you want to save this strip in Alarm Review. *Note*—Selecting the strips for this report does not save the strips.
5	Click **OK** -- the Report List will be displayed.
6	Click on the next wave area of interest then click **Add**.
7	Repeat Steps 3 through 5 for each wave area of interest.
8	You can make changes to any strip (for example, add a caliper measurement) by clicking on the strip in the Report List. Make the changes, and then click **Add**.
9	To print the report, click **Print**. *Note*—If you want to remove a strip before printing the report, highlight that strip, then click Remove.

The report will contain all of the selected strips sorted by time. The strips will also appear on the report just as they did on the screen (with caliper measurements, at the same speed, with the same waves, etc.). Once you print the report, the list is cleared.

Duration Reports

To print or record a Duration Report, perform the following steps:

Step	Action
1	Specify where you want the report to begin by right clicking on the area of the wave then selecting **Start** from the pop-up menu that displays (a marker will display on the wave indicating the desired **Start** time).
2	Specify where you want the report to end by right mouse clicking on that area of the wave then selecting **Stop** from the pop-up menu that displays (a marker will display on the wave indicating the desired stop time).
3	For recordings, if a 4 channel recorder is available on your system, indicate whether to print the recording on the **2 Channel** or **4 Channel** recorder by right mouse clicking on the wave then selecting the appropriate recorder from the pop-up list that displays.
4	To print a recording of the specified wave duration, right mouse click in the wave then select **Record** from the pop-up list.
5	To print a report of the specified wave duration, right mouse click in the wave then select **Print** from the pop-up list.

ST Review

Overview

The ST Review displays up to 12 ST "**snippets**" (a sample of the patient's ECG beats for a given time) and ST elevation/depression values, in combination with trends or events. ST Review allows you to examine the data for a significant episode in detail. You can view individual ST snippets, compare snippets against each other or against a selected baseline.

The ST values are displayed and trended at the Information Center.

For bedside monitored patients adjust measurement points and alarm limits at the bedside. Bedside monitored patients need to turn ST on to make data available in the ST Review window (see "Enabling ST Review for Bedside Monitors" on page 7-5).

For telemetry monitored patients adjust measurement points and alarm limits on the Information Center.

The bottom portion of the window provides navigation based on Trends or Events for all monitoring devices.

Note—ST is not measured or trended when there is a LEADS OFF INOP.

Navigation Choices

You can use the navigation area on the bottom part of the ST Review Window to select a focus for the ECG waves. For all navigators, a solid color line is shown for each ST cursor and the baseline ST measurement (if set). Red is used for the baseline; green for ST Cursor 1; gold for ST Cursor 2; cyan for ST Cursor 3; purple for ST Cursor 4 (ST Cursor 3 and 4 available in dual-display systems only).

The choices are:

- **Trends**
  Use the Trend navigator to display a single trend graph and scan the trend for significant changes. The choices available to you in the Trend Navigator depend on whether or not you have Trend Groups selected in the Trend Review window (see "Trend Review" on page 6-19). With Trend Groups selected in Trend Review window you can select the trend group you would like to see. With Trend Groups not selected in the Trend Review window, you can select parameters to trend by selecting from the

Parameter drop-down lists. Use the top Parameter drop-down list to change the left parameter. Use the bottom Parameter drop-down list to change the right parameter. Moving the cursor by clicking in the trend area displays the waves for that time period.

- **Events**
  Use the Event navigator to display the events and look at ECG waves for events of interest. The event bars have different colors depending on level of severity:
  - Red = life-threatening alarms
  - Yellow = limit violation alarms
  - Cyan = all INOP conditions and non-alarming events including arrhythmia events

  To see data for an event of interest (for example, an episode of V-TACH), move the cursor in the event area. You can change the time focus by using the arrow buttons. To view a different Event Group, with Event selected as the navigator, select the event from the **Event Group** drop-down list.

- **Timeline**
  The timeline navigator at the bottom of the display indicates the time and date. You can click on the timeline to see waves for a different period of time or change the time focus by using the arrow buttons. The timeline as 3-6 ticks depending on the time duration. You can change the time duration by selecting a different time from the **Time** drop-down list on the bottom of the window.

- **ST Topology**
  Use ST Topology navigator to view a color depiction of ST changes over time. When you select ST Topology a color bar displays on the bottom of the window showing changes in ST values. A progression of ST depression or elevation across multiple leads across time is indicated by a band of color that shifts from one lead to another. The top color (red) corresponds to any ST value that is equal to or greater than the maximum positive ST value. The bottom color (blue) corresponds to any ST value that is less than or equal to the maximum negative ST value. Any values in between are shading slightly red for positive values and slightly blue for negative values. An ST value near 0.0 mm is mapped to a black color. If an ST lead is not available at a specific time, it displays in the color bar as white.

You can adjust the maximum ST values by using the up and down arrows next to the color bar. When you change the ST maximum by using the up and down arrows the colors re-display with the new setting.

All measured ST leads are displayed over time from top to bottom. Right mouse click on the strip to see the ST leads measured at that point in time as well as the exact lead the cursor is currently positioned on. The lead order is always chest leads (V6 to V1 or V,MCL) followed by limb leads (III, aVF, II, aVR, I, aVL).

Using the ST Cursor Buttons

You can move one ST Cursor at a time by clicking in the **ST Cursor** radio button. When you select a time on the navigator or use the arrow buttons, it is this single ST cursor that is moved. Each time an ST cursor is moved, the corresponding ST snippets for that time are displayed in the ST Review window.

You can display the ST snippets and their values by clicking the **ST Cursor** button. Multiple ST snippets/values may be highlighted at the same time. When multiple ST values are shown, they are always displayed top-down: ST1, ST2, ST3, ST4, ST-baseline. When exactly two values are shown, a difference between the values is displayed.

Using ST Review

The table below describes how to use the ST Review Window.

If you want to...	Do this...
Set a new baseline for reference	1. Use the Navigators to find the time you want to use as a baseline. 2. Review the ECG snippets. 3. Click on **Set Baseline**.
Display the baseline value in the Navigator	Click the **Show Baseline** button.
Superimpose the current measurement points (ISO and ST) on to the ST segment	Click in the **Measurement** checkbox.

If you want to...	Do this...
Move one ST Cursor at a time	Click on the **ST Cursor** radio button. When you select a time on the navigator or use the arrow keys, it is this single ST cursor that is moved. Each time an ST cursor is moved, the corresponding ST snippets for that time display in the ST Review window.
Display the ST snippets and their values	Click the **ST Cursor** button. Multiple ST snippets/values may be highlighted at the same time. When multiple ST values are shown, they are always displayed top-down: ST1, ST2, ST3, ST4, ST-baseline. When exactly two values are shown, a difference between the values is displayed. For systems with Dual displays 4 cursor buttons are available.
Print a report	Click the **Print** button generates a printout with the contents of the screen.
Change the size of ST wave	Click on the calibration bar then select the wave size from the pop-up list that displays.
Change the speed of the ST wave	Select a speed (25. 0 or 50.0 mm/s) from the **Speed** drop-down list on the right side of the window The window re-displays with the selected speed.
See a moving indicator of ST changes over time (dual-display systems only)	1. Using the Timeline, Trend, or ST Topology as the Navigator, select at least two ST cursors to display. 2. Click on the **Animate** radio button. 3. Click and hold the right or left single arrow button. The ST Review window superimposes ECG snippets moving in time backward or forward respectively.

12-Lead Review

Overview

Depending on your system, you can use the 12-Lead Review Window to view 10-second retrospective review of the 12 EASI derived ECG waves for EASI enabled bedside monitors and telemetry or to see the results of 12 Lead Captures performed at a wired IntelliVue Patient Monitor.

Note—EASI derived 12-lead ECG's and their measurements are approximations to conventional 12-lead ECG's and should not be used for diagnostic interpretations.

12-Lead Review with 12 Lead Captures

When the data is captured using a standard 10-wire lead set 10 seconds of the wave data along with the ECG analysis interpretation statements and measurements can be reviewed in the 12-Lead Review. See the *Philips Interpretive Cardiograph Physician's Guide* (M1700-92908) for a complete list of the interpretation statements.

When the data is captured using EASI leads 10 seconds of the wave data and interval measurements may be reviewed in the 12-Lead Review. Interpretation statements are not available when the capture is performed using EASI lead placement.

Using this Window

The table below describes how to use the captured 12-Lead Review Window.

If you want to...	Do this...
Select a particular capture for display	On the bottom of the 12-Lead Review window click on the tabs labeled with dates and time to display a capture for a particular time.
Switch to a continuous view	If EASI wave storage is available on this system, navigate to a continuous view by unchecking the **Captured 12 Leads** checkbox.
Hide the statements	If interpretation statements are available, hide the statements by unchecking the **Statements** checkbox.

If you want to...	Do this...
Export the data to a networked machine or to the Information Center floppy drive	For systems with the 12 Lead Export feature available, click the **Export** button. The 12-Lead Review Export window displays. See “12-Lead Export Window” on page 6-46 for information on using the export feature.
Delete the currently viewed 12 Lead capture	Click the **Delete** button.
Change the wave layout	Click on the wave layout on the top right side of the window then select wave layout (3x4, 6x2, or 12x1) from the list that displays. In 3x4 layout an additional rhythm lead displays.
Change the rhythm lead	Click on the the rhythm lead label (for 3x4 only) on the bottom left of the window then select a lead from the list that displays (I, II, III aVR, aVL, aVF, V1, V2, V3, V4, V5, V6).
Change the wave size	Click the cal bar and select the size of the wave you want.
Change the wave speed	Clicking on the speed on the bottom right of the window and select the speed from the list that displays (25 mm/s or 50 mm/s). When you select a different speed the window re-displays with the selected speed.
Print a report	Click the **Print** button. The 3x4 or a 6x2 format prints in landscape layout and the 12x1 format prints in portrait layout. The information contained in the 12-Lead Window prints along with the following additional information: • Size: mm/mV • Speed: mm/s • Patient’s name and medical record number • Bandwidth

EASI Derived 12-Lead Review

The 12-Lead Review window provides 10 second retrospective review of the 12 EASI derived ECG waves. You can navigate within the window by using the arrow buttons to the right of the window or by using the Navigator on the lower portion of the window. You can page forward or backward by either 1-second intervals or by 10-seconds intervals.

Navigation Choices

The EASI derived 12 Lead Review allows you to view waves using the following navigation choices:

- **Trends**
  Use the Trend navigator to display a single trend graph and scan the trend for significant changes. The choices available to you in the Trend Navigator depend on whether or not you have Trend Groups selected in the Trend Review window (see “Trend Review” on page 6-19). With Trend Groups selected in Trend Review window you can select the trend group you would like to see. With Trend Groups not selected in the Trend Review window, you can select parameters to trend by selecting from the **Parameter** drop-down lists. Use the top Parameter drop-down list to change the left parameter. Use the bottom Parameter drop-down list to change the right parameter. Moving the cursor by clicking in the trend area displays the waves for that time period.

- **Events**
  You can display the Events and look at waves for events of interest. The Event navigator has bars for each event code. The event bars have different colors depending on level of severity:
  - Red = life-threatening alarms
  - Yellow = limit violation alarms
  - Cyan = all INOP conditions and non-alarming events including arrhythmia events

  To see data for an event of interest, move the Navigator cursor bar by using the arrow buttons or clicking on the event line. Moving the cursor by clicking in the event area displays the waves for that event. To change the Event Group, select a different group from the Event Group drop-down list.

  Note—For IntelliVue Patient Monitors, non-arrhythmia yellow alarms appear in All Alarms and in Yellow Alarms but not in Bed Alarms.

- **Timeline**
  You can click on the timeline to see waves for a different period of time. The timeline indicates the time and date. The timeline has 3-6 ticks depending on the current time period selected.

Using This Window

The table below describes how to use the EASI derived 12-Lead Review Window.

If you want to...	Do this...
Navigate to a 12-lead captures view	For systems with 12-lead captures available, navigate to a captured view by clicking in the **Captured 12 Leads** checkbox.
Export the 12 lead data to a networked machine or to the Information Center floppy drive	For systems with the 12 Lead Export feature available, click the **Export** button. The 12-Lead Review Export window displays. See “12-Lead Export Window” on page 6-46 for information on using the export feature.
Change the wave layout	Click on the wave layout on the top right side of the window the select wave layout (3x4, 6x2, or 12x1) from the list that displays. In 3x4 layout an additional rhythm lead displays.
Change the rhythm lead	Click on the the rhythm lead label (for 3x4 only) on the bottom left of the window then select a lead from the list that displays (I, II, III aVR, aVL, aVF, V1, V2, V3, V4, V5, V6).
Change the wave size	Click the cal bar and select the size of the wave you want.

If you want to...	Do this...
Change the wave speed	Change the speed to 25 mm/s, or 50 mm/s by clicking on the speed on the bottom right of the window and selecting the speed from the list that displays. When you select a different speed the window re-displays with the selected speed.
Print a report	Click the **Print** button. The information contained in the 12-Lead Window prints along with the following additional information: • Size: mm/mV • Speed: mm/s • Patient's name and medical record number • EASI bandwidth

12-Lead Export Window

Use 12 Lead Export window to export the 12 lead data to a networked machine or to the Information Center floppy drive.

Note—The data that is accepted at the time of export is determined by the receiving system.

After clicking the **Export** button in the 12 Lead Review window, perform the following steps to export the data:

Step	Action
1	Type a 1- to 32-character name of the person initiating the export in the **Operator** field.
2	Type a 1- to 32-character physician's name in the **Physician** field.
3	Select a maximum of 4 medications by clicking in the checkbox next to the **Medication** name.
4	Select a maximum of 4 diagnostic items by clicking in the checkbox next to the **Diagnosis** name.
5	Select as destination to which to export the data by selecting the location from the **Destination** drop-down list.

Step	Action
6	Verify that you have correct patient selected and demographic information is correct then click the **Send** button to initiate the export. *Note*—Timestamps between the Information Center and the receiving device may not match due to differences in timestamp location for the receiving device.
7	You can check the status of the export in the Transfer Status window by clicking the **Transfer Status** button from the All Controls window.

The following additional data is exported to the Destination location:

- Demographic data including patient name, medical record number, date of birth, gender, height, and weight

  Important: For patients where 12 leads are captured and exported, the patient should be admitted with name, medical record number, gender, and date of birth.

- Acquisition type (whether monitoring conventional 12 lead or EASI 12 lead) label.

- Hospital name.

Export Data to Holter System

Overview

For Information Centers connected to the M3154 Database Server the Information Center provides the ability to export ECG waveform data from the Information Center to an Zymed Holter for Windows™ - Model 2010 with version 2.0 software or higher. This allows a clinician to order holter analysis on ECG data acquired by the Information Center thereby eliminating the need to have the patient monitored separately by patient-worn holter monitor prior to the analysis.

The patient must be admitted before you can export their data to the holter system. You can only initiate one data export at a time. If you initiate a data export while one is in progress the Information Center presents you with a dialog box where you can choose to terminate the export in progress or allow the export in progress to continue.

You can send up to 48 hours of stored data. The time it takes to export the data to the holter system can vary and could take several minutes depending upon the amount of data that was requested.

Note—If your patient will be changing between standard and EASI lead placement you should perform an export of data before changing the type of monitoring.

Task Summary

To export a patient's ECG data to a holter system for analysis perform the following steps:

Step	Action
1	Click the **All Controls** button from the task bar on the bottom of the window. The All Controls window displays
2	Under Configuration and Support click the **Holter Export** button. The Holter Export window displays.
3	Select the patient for which you are exporting data by selecting the name from the drop-down list on the top left of the Holter Export window.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>If you would like to have a physician’s name appear on the holter report, type a 1- to 19-character physician’s name in the Physician field.</td></tr>
<tr><td>5</td><td>If you would like to have an explanation for requesting this export appear on the holter report, type a 1- to 23-character explanation in the Test Reason field.</td></tr>
<tr><td>6</td><td>Specify the amount of data you want to send to the holter system for analysis. The choices that are available for selection depend upon the total amount of ECG data currently stored for this patient.</td></tr>
<tr><td>7</td><td>Click the Export button to send the data to the holter system. If an export of data is already in progress a dialog box displays.
<table>
<tr><th>If you want to</th><th>Then</th></tr>
<tr><td>Cancel the export in progress</td><td>1.Click the Stop Export button. The export in progress stops and you return to the Holter Export window.
Note—If you are not sure who initiated the export do not click the Stop Export button unless you are certain the data does not need to be sent.
2. Click the Export button. The export you initiated continues.</td></tr>
<tr><td>Continue the export already in progress</td><td>1.Click the OK button. The export in progress continues and you return to the Patient Window.
2. Try the export again later by repeating Steps 1 through 8.</td></tr>
</table></td></tr>
</table>

Step	Action
8	You can check the status of the transfer in the Transfer Status window by clicking the **Transfer Status** button in the All Controls window.

Changing the Waves that are Stored

Overview

You can select the waves that are stored for a patient in the data review applications.

You can select the waves for Wave Review, and you can select the waves for alarms automatically stored in Alarm Review as well as waves for user-saved strips. Waves are changed in the Stored Waves Window.

Task Summary

Change the stored waves by performing the following steps:

Step	Action
1	On the Patient Window for the appropriate sector, click on the **All Controls** button, then on **Stored Waves**.

Step	Action
2	There are two tabs: Click **Continuous Waves** to select the waves stored in full disclosure (Wave Review) and for strips saved to Alarm Review from Wave Review and Event Review. Click **Alarm Waves** to select the waves saved in Alarm Review as well as strips saved by the action of the patient sector button (if configured). *Note*—If Primary or Secondary is a wave in one of the other selections, that wave is only stored once.
3	Select each wave by clicking on the parameter in the list. *Note*—Clicking the **Unit Settings** button changes the settings to the unit defaults. Clicking the **Restore Settings** button reverts to the settings that were in place before any changes were made.

Note—This application affects the stored waves. To change the waves that are displayed from the IntelliVue Patient Monitor, CMS or V24 and V26 bedside monitor, you must change the system waves. The waves that are displayed from M3 monitors are fixed.

Scheduled Reports

Overview

The Scheduled Reports windows allow you to schedule and print patient reports on demand or on a regularly scheduled basis. The patient must be admitted before any reports can be scheduled and initiated. Access the Scheduled Reports windows by clicking **Scheduled Reports** on the All Controls window.

From the Scheduled Reports window you can set up and print the following reports for a patient by selecting the appropriate tab on the top of the window:

- All Reports (see page 6-52)
- Trend Report (see page 6-54)
- Alarm Report (see page 6-56)
- Event Report (see page 6-57)
- Wave Report (see page 6-58)
- Summary Report (see page 6-60)

All Reports

Use this window to generate one or more reports to be printed on a scheduled basis for the currently selected patient.

Note—To see the current settings for a particular report click on the appropriate report tab on the top of the window. You can then customize the settings and print the report from the window that displays.

Perform the following steps to schedule reports for the current patient:

Step	Action
1	Select the reports to print for this patient by clicking in the checkbox next to the report name. A checkmark in the checkbox selects the report for printing.
2	Indicate the time for which you want reports to start by specifying the time in the **Start Time** field. Specify the hour by clicking on the hour in the **Start Time** then clicking on the up and down arrows until the desired time displays. Specify the minutes by clicking on the minutes in the **Start Time** then using the up and down arrows until the desired minutes display. Minutes are specified in 15 minute increments. *Note*—You can also specify start time by clicking on the hour or minutes then typing the time using the keyboard.
3	Indicate how often you want the reports to occur by selecting a time from the **Frequency** drop-down box.
4	If you would like to print the selected reports now click **Print Report Now** button. Click the **Unit Settings** button to cancel any changes made in this window and return the scheduled reports settings back to unit defaults.

Trend Report

Use the Trend Report window to set up and print a Trend Report for the current patient. The amount of data that the Trend Report will contain depends on the time frequency specified in the All Reports window. For example, if the time frequency is 8 hours the report will only show data for the previous 8 hours.

Perform the following steps to set up and print a Trend Report for this patient:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** drop-down list. Select **Unlimited** if you want to print all possible trend data regardless of length. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the trend group for this report from the **Trend Group** drop-down list.

Step	Action
3	Specify whether you want the report to print in tabular or graphical format by clicking on the appropriate **Report Type** radio button. Click **Tabular** if you want to print the trend data in rows and columns suitable for charting purposes. The tabular Trend Report contains: • Time labeled columns • Parameter label for each row • Parameter average value for each trend corresponding to time column (aperiodic values show as the latest value for that column) • Date and time of time cursor at top of display • Highlighted row indicating time cursor. Click **Graphic Trend** if you want to print the report with the 5 graphic trends from the Trend Group. The graphic Trend Report contains: • Parameter label(s) for each trend line • Parameter value(s) for each trend corresponding to current time cursor position • Date and time of time cursor at top of display • Vertical line time cursor indicator • Parameter scale indicators (same as scale on display at time of print request) • Time line
4	For tabular reports specify the trend interval by selecting the time from the **Trend Interval** drop-down list.
5	If you would like to print the Trend Report now click **Print Report Now** button. You can click the **Unit Settings** button to cancel any changes made for this patient and return the Trend Report settings back to unit defaults.

Alarm Report

Use the Alarm Report window to set up and print a Alarm Report for the current patient. The amount of data that the Alarm Report will contain depends on the time frequency specified in the All Reports window. For example, if the time frequency is 8 hours the report will only show data for the previous 8 hours.

Perform the following steps to set up and print a Alarm Report for this patient:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** drop-down list. Select **Unlimited** if you want to print all possible alarm data regardless of length. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the alarm group for this report from the **Alarm Group** drop-down list.
3	Specify whether you want an alarm report or strip report by clicking on the appropriate **Report Type** radio button.
4	If you would like to print the Alarm Report now click **Print Report Now** button. You can click the **Unit Settings** button to cancel any changes made for this patient and return the Alarm Report settings back to unit defaults.

Event Report

Use the Event Report window to set up and print a Event Summary Report for the current patient. The Event Summary Report contains:

- A graphic trend of HR for the most recent 24 hours.
- A graphic trend of PVC for the most recent 24 hours.
- A tabular trend for HR (max, median, min) for the most recent 24 hours.
- A tabular trend of event counts for each of the event group entries for the displayed event group for the most recent 24 hours.
- For the selected event group, the most recent strips of of each event type.

Perform the following steps to set up and print a Event Report for this patient:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** drop-down list. Select **Unlimited** if you want to print all possible event data. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the event group for this report from the **Event Group** drop-down list. The report will print all events configured for this event group.
3	If you would like to print the Event Report now click **Print Report Now** button. You can click the **Unit Settings** button to cancel any changes made for this patient and return the Event Report settings back to the unit defaults.

Wave Report

Use the Wave Report window to set up and print a Wave Report for the current patient.

Perform the following steps to set up and print a Wave Report for this patient:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** drop-down list. Select **Unlimited** if you want to print all possible wave data regardless of length. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Specify whether you want a wave report, a strip report or a 12 lead report by clicking on the appropriate **Report Type** radio button. **Wave Report** prints a compressed full disclosure wave report. The waves that the report will contain depend on the waves selected in the **Wave Report Settings** field and whether waves have been stored for the given time interval. **Strip Report** prints a periodic sample of the full disclosure waves for this patient. The waves that appear depend on what was stored for the specified time interval. The time between each strip on the report is determined by the time specified in the **Strip Interval** field. Each strip is approximately 6 seconds. **Twelve Lead** prints a report of the EASI wave data stored for this patient. This report is a single page report containing a single 12-lead derivation of the EASI waves for this patient at time of the report.
3	If you selected Wave Report in Step 2, specify the waves (1 to 4) to be included in the report by clicking in the appropriate checkbox(s) in the **Wave Report Settings** field. The waves available here correspond to the waves selected in the **Stored Waves** window.
4	If you selected Wave Report in Step 2 indicate the number of minutes of waves to compress per page by selecting the minutes from the **Minutes per Page** drop-down list.

Step	Action
5	If you selected Strip Report in Step 2 indicate what the time interval between strips should be by selecting a time from the **Strip Interval** drop-down list.
6	If you would like to print the Wave Report now click **Print Report Now** button. You can click the **Unit Settings** button to cancel any changes made for this patient and return the Wave Report settings back to unit defaults.

Summary/ Unit Report

Use the Summary Report window to set up and print either an individual patient report or a unit report for all patients currently admitted and assigned to this Information Center.

Perform the following steps to set up and print a Summary Report:

Step	Action
1	Specify whether to print a **Patient Report** or a **Unit Report** by clicking on the appropriate radio button in the **Report Type** field. A Patient Report prints a report for the current patient and contains: • Patient name and ID • Bed label • Care group status • Height, weight, sex, age, patient type and paced setting • Screen notes • Current vital signs (latest 1 minute average value), rhythm status and ectopic status • Active alarms and INOP text • Any deviations of this patient's current settings as compared to the unit settings • A 6 second 25 mm/sec sample strip of the first two stored waveforms for this patient at time of report. Unit Report prints a multi-page report for all patients currently admitted and assigned to this Information Center. For each patient the report contains: • Patient name and ID • Bed label • Care group status • Height, weight, sex, age, patient type and paced setting • Screen notes • Current vital signs (latest 1 minute average value), rhythm status and ectopic status • Active alarms and INOP text • Any deviations of this patient's current settings as compared to the unit settings • A 6 second 25 mm/sec sample strip of the first two stored waveforms for this patient at time of report.

Step	Action
2	If you are printing a unit report specify whether to print the report in **Compact** format or **One Page Per Patient** format by clicking on the appropriate radio button in the **Unit Report Settings** field. In Compact format, the report does not include the wave sample and all patient information is packed into the fewest number of pages. In One Page Per Patient format the wave sample is included and each patient report appears on a single page.
3	If you would like to print the Summary Report now click **Print Report Now** button. You can click the **Unit Settings** button to cancel any changes made for this patient and return the Summary Report settings back to the unit defaults.

Information Center Web Access

Overview

The Information Center Web access option provides ‘patient window-like’ web viewing of near-realtime waves, parameters and alarms without controls for patients across care units using standard PC browsers. It provides the current alarm and INOP states for the patient, but does not provide an alert notification function. It also allows for web viewing of all Information Center Review Windows of all retrospective data for patients across care units that are on separate database servers. The hospital’s LAN infrastructure or intranet serves as the connection between the Database Server and the remote workstation. You can view data formatted for Web access, using one of the following supported browsers:

- Microsoft Internet Explorer, version 4.0, Service Pack 1, or higher.
- Netscape Navigator (revision 4.7 or higher).

For information on setting up the system, please see the Information Center Service Manual.

Note—The Information Center Web can only be used when the M3154 Database Server is operable and the Information Center Web functionality is enabled.

Warning

Web Access should not be used for primary monitoring. Near real-time information is delayed slightly from the primary monitoring data. The delay is generally minimal. Always refer to your primary monitoring source (bedside monitor or Information Center) for current real-time data.

Intended Use

The Information Center Web application is intended for read-only viewing of patient's physiologic data, at remote locations via the hospital's HIS LAN web access (hospital intra/internet). Including review of existing Alarm, Event, Wave, Trend, and ST segment (adults) to gain information for treatment, to monitor adequacy of treatment, or to exclude causes of symptoms. The Information Center Web is a retrospective application that provides access to near real-time physiologic data or alarms, and is not intended to support real-time event annunciation or triage of real-time clinical situations. All access to data is read-only.

The clinical use of the information provided by the Information Center Web is to supplement information gathered through other means.

Note—You must use the 25 mm/s annotation (0.2s), rather than a ruler, on an image on the Information Center Web screen or in printed reports from the Information Center Web to make accurate measurements on waveforms.

Accessing the Information Center Web

The method of accessing the Information Center Web depends on how your system is set up. Once the connection to the Database Server is made, the Information Center Web log-on screen is displayed. The functionality of Information Center Web applications is comparable to the Multilead ECG/12-Lead ECG, Alarm Review, Event Review, Trend Review, Wave Review, ST Review, 12-Lead Review and Captured 12-Lead Review applications on the Information Center.

Access the Information Center Web by performing the following steps:

Step	Action
1	Log on to your account, and access the Information Center Web Logon screen, using the URL supplied by your system administrator.
2	On the log-on screen: In the **User Name** field, enter your first and last name. In the **Password** field, enter the password supplied by your system administrator.

Step	Action
3	The Patient List is displayed, containing all beds in the clinical units for which you have access and are being actively monitored by an Information Center. If the patient has been admitted to the central, the name and Medical Record Number are displayed along with the bed label. Click on the patient or bed you want. Before you view retrospective data, verify that the patient name displayed is the one you chose.
4	Before you view retrospective data, verify that the patient name displayed is the one you chose. The bed label and patient name/ Medical Record Number (if available) is displayed at the top the window (and is displayed at the top of all other application windows).
5	Select the application from the list at the left. Navigation buttons appear on each application to enable you to view the desired data. The applications are equivalent to the Data Review applications at the central, with the same specifications, such as maximum number of alarms available, number of hours of waveform data, etc. See the pages that follow for instructions on individual applications.
6	To select a different patient, click on **Patient List** to get the list of all beds on the Database Server or on the Unit to get a list of beds in a specific unit.
7	To end the session, click on **Logout**, at the left.

Notes on Use

- Controls at the top of the review windows allow you to view data in various ways. After changing a setting, you must click the **Update** button to have it take effect.
- Settings selected in one application persist for other applications. That is, if you select a time focus in Trend Review, when you go to ST Review, the data will have the same time focus. The setting remains until you change it or select another patient.
- If more waves or parameters than can be displayed on one page exist the **More Data** button displays on the right side of the window. Click the button to see the next page of waves or parameters.
- To print all of the content in a report, in the File menu, go to Page Setup, and change both the Left and Right margins to 0.2", and select "Landscape" when printing.
- The browser controls, such as Back, Refresh, Save, Print, and Stop operate as they normally do with other web applications.
  Note—To refresh the application window, right-click in the window, and click **Refresh** on the popup menu.

Multilead ECG

This screen displays a snapshot view of all available ECG leads, based on the monitoring device. To retrieve the latest data, click the **Update** button.

If the patient is monitored by EASI ECG, the 12 derived leads will be shown.

Note—This may take a few seconds while the data is collected.

You can change the format, if desired, by clicking either **International** or **Cabrera**.

Alarm Review

The default is ALL ALARMS. You can click on the alarm filter to select the specific group of alarms to view, for example, RED ALARMS.

- The alarms will appear in chronological order in a tabular list with the number and count for that alarm type, date/time of the alarm and alarm text.
- Click on the date/time of each alarm to view the alarm strip; use the arrow keys to view the entire strip.
- Click **Previous Alarm** or **Next Alarm** to move back and forth sequentially within the list of alarms or use the tabular list.

Trend Review

Click on the trend group label to access the available trends for the group, then on the trend you want. Click on an individual parameter to display the trend for that parameter

- Click on the **Duration** control to bring up a list of time spans (All available, 24, 12, 8, 4, or 1 hour). “All Available” shows a trend covering all data stored in the database for the selected parameter(s).
- Click on a trend to change the time focus (indicated by the vertical cursor).

Displaying Data in Tabular Format

You can display the trend information for continuous measurements in a tabular format by selecting **All Parameters**, at the bottom of the Trend Review screen.

- The data for the most recent hour is displayed when you enter the screen.
- To select data for a different one-hour period, click on the appropriate button at the top of the screen.
- The data samples are displayed at a one-minute resolution.
  Note—The cell will be blank if during the one-hour period, there is no data available (for example, if the parameter was turned off).
- To display a trend plot for a parameter at a specific time, click on the parameter name in the leftmost column. This brings up Trend Review with the trend plot for that parameter and time.
- Tabular review time duration can be changed by clicking one of the time buttons at the top of the display (there are always 24 buttons – one for each hour)

Event Review

The Event Review screen displays the pre-configured event groups.

- To get greater detail for an event, click on (or near) the event marker itself. (To make selection of the event easier by zooming in to a shorter time period, change to a shorter duration.)
- You will get the Start Time, End Time, and text of the event, as well as a scrollable waveform strip at the selected time. You can then select a different time by clicking on the timeline.

Wave Review

The Wave Review screen displays a 30-minute compressed waveform; each segment has 2 minutes of data.

- To see the segment in detail, click on it. You will get a strip with up to four waves at 25 mm/s with beat labels and parameters.
- To select a different time, click on the timeline.

ST Review

The ST Review screen displays a trend plot and all available ECG wave segments. The number of leads displayed depends on the monitoring device.

- When this application is accessed, the trends displayed are the ones selected in Trend Review. If no trend has been selected, the default plot is Heart Rate. The time focus and plot duration were the ones selected in another Information Center Web application. If none have been set, the defaults are the current time and “All Available”.
- To change the time focus, click anywhere on the trend plot. The ECG waves will reflect the new time.
- To change the trends, click on **Left Parameter** or **Right Parameter**, and select from the list.
- To set a baseline for a reference ST, click on **Set Baseline**. Then, to observe ST changes between the baseline and another point in time, select another time focus. The baseline waves will be superimposed over the waves for the new time focus, and the ST values will show the values for the baseline, the new time focus, and the delta value.
- You can change the format, if desired, by clicking either International or Cabrera.

12-Lead Review

The 12-Lead Review screen displays a retrospective review of the 12 EASI derived ECG waves for EASI enabled bedside monitors and telemetry when you click the **12-Lead Review** button on the left side of the window or the results of 12 Lead Captures performed at an IntelliVue Patient Monitor when you click the **Captured 12-Lead** button on the left side of the window.

- Controls for layout, wave speed, wave size (x1/2, x1, x2) and International/Cabrera are on the top of the window.

7
ST for Bedside Monitors

This chapter describes the use of ST Review for bedsides at the Information Center. For ST monitored bedside patients refer to your bedside user documentation for information on ST monitoring. For ST monitored telemetry patients refer to your telemetry user's manual. This chapter includes the following sections:

Overview

The Information Center allows you to review the ST waves and ST trends in the ST Review window for ST monitored bedside patients.

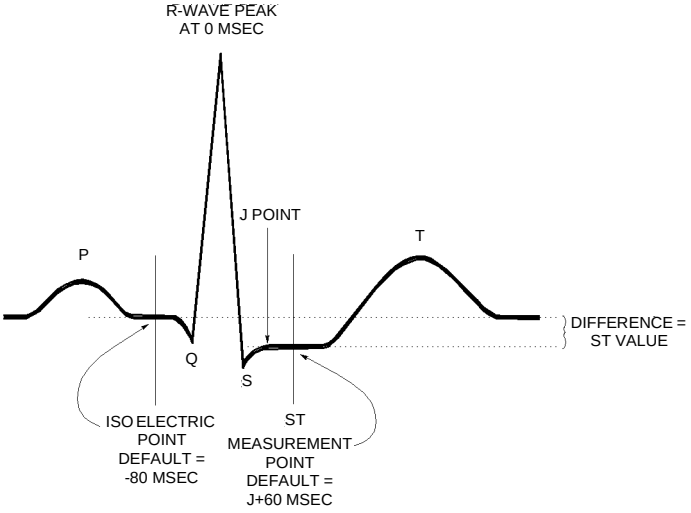
The ST/AR ST algorithm is only available for adult monitored patients who are using ST monitoring at their bedside or are monitored in the diagnostic bandwidth at the bedside monitor. With EASI monitoring, ST analysis is performed on up to 12 leads and an additional value of ST index is calculated and displayed. Assessment of EASI-derived 12-lead ST measurements is recommended for adult patient that meet the following parameters:

- Ages: 33 to 82 years
- Heights: 147 to 185 cm (58 to 73 in)
- Weights: 53 to 118 kg (117 to 261 lbs)
- Height to Weight Ratios: 1.41 to 2.99 cm/kg (0.25 to 0.54 in/lb)

All ST analysis and ST alarms for bedside monitors will be performed by the bedside monitor. Refer to you the documentation that comes with your bedside monitor for information on setting up ST monitoring at the bedside. ST analysis at the Information Center has no impact on the analysis performed at the bedside. In addition, when using EASI monitoring at the bedside you can additionally get 12 lead ST and ST Index using the Information Center ST/AR ST algorithm. This information is for ST review and does not generate alarms.

The Measurement

The ST measurement for each beat complex is the vertical *difference* between two measurement points. The **isoelectric point** provides the baseline for the measurement and the **ST point** provides the other measurement point. It is positioned with reference to the J-point. A positive value indicates ST segment elevation; a negative value indicates depression.



Information Center's ST/AR ST Algorithm

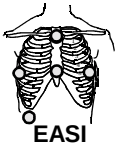
The Information Center ST/AR ST algorithm analyzes ECG signals to classify the heart beats. Only beats classified as normal or Supraventricular (atrially paced) are used to calculate ST elevations and depressions.

The ST/AR ST algorithm processing includes special ST filtering, beat selection and statistical analysis, calculation of ST segment elevations and depressions, and lead reconstruction and wave generation.

Displayed ST Data

ST data displayed in the Patient Sector and Patient Window is based on ST measurements acquired by the bedside monitor. For bedside generated data you can view ST data in ST Review, Trend Review, and Event Review windows. For Information Center generated data you can view ST data in ST Review and Trend Review.

EASI ST Analysis



The Information Center generated ST values presented in the patient sector and Patient Window for EASI derived leads is "STindx". STindx is a summation of three ST segment measurements, using the leads that can indicate ST segment changes in the different locations of the heart:

- anterior lead V2
- lateral lead V5
- inferior lead aVF

Enabling ST Review for Bedside Monitors

Overview

The ST Setup Window allows you to turn ST Monitoring on to make data available in the ST Review window. The ST Review window displays ECG beats and ST segment values for patients monitored by bedsides. The ST Review window is for review purposes only. You would turn ST on if you are doing ST analysis at the bedside monitor.

When ST analysis is off at the bedside you can only turn ST on at the Information Center if you are using a diagnostic bandwidth setting for ECG monitoring. However, you will not have ST analysis or ST alarms unless ST monitoring is also on at the bedside monitor. You should adjust ST measurement points and ST alarms at the bedside. Refer to your bedside documentation for instructions.

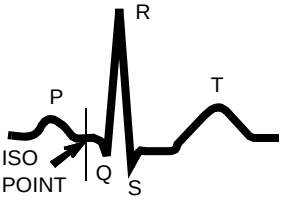
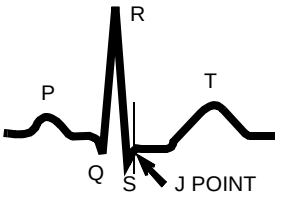
Adjusting Measurement Points

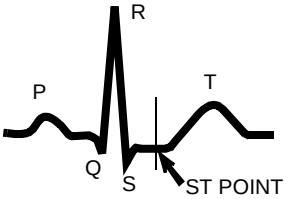
To more closely reflect how you have adjusted measurements points at the bedside monitor, the ST Setup Window allows you to turn on ST and to adjust the ST measurement points. This adjustment only effects the Information Center ST analysis it has no impact on ST analysis performed at the bedside monitor.

There are three measurement cursors:

- The ISO measurement cursor positions the isoelectric point in relation to the R-wave peak.
- The J-point cursor positions the J-point in relation to the R-wave peak. The purpose of the J-point is to correctly position the ST measurement point.
- The ST measurement cursor positions the ST point a fixed distance from the J point.

To enable and use ST Review for bedsides perform the following steps:

Step	Action
1	Turn ST monitoring on at the bedside and adjust the ST measurement points for monitoring and alarming. Refer to your bedside documentation for instructions.
2	Turn ST monitoring on at the Information Center by performing the following: a. From the All Controls window click on the **ST Setup** button. b. From the ST Setup window click the **ST On** button to turn ST monitoring on at the Information Center.
3	If you need to adjust the ISO (isoelectric) point, position the bar in the middle of the flattest part of the baseline (between the P and Q waves or in front of the P wave) and use the arrow keys to make the adjustment. 
4	Adjust the J point, if necessary, by positioning the bar at the end of the QRS complex and the beginning of the ST segment. 

Step	Action
5	Adjust the ST point, if necessary, by using the J point as an "anchor" and using either J + 60 or J + 80 so that the bar is at the midpoint of the ST segment. 
6	Access the ST Review window by clicking the **ST Review** button on the All Controls window. The ST Review window displays. The top portion of the window contains the Information Center-generated ST snippets. The bottom portion of the window contains the bedside-generated trended ST parameter measurements along with the STindx value for EASI users. See "ST Review" on page 6-38 for information on using the ST Review window and establishing a ST reference beat (baseline).

CANNOT ANALYZE ST INOP

The ST alarms are not generated by the Information Center they are generated by the bedside monitor. The Information Center could generate the INOP "CANNOT ANALYZE ST". The INOP is generated when ST is turned on at the Information Center but not at the bedside and the ECG filter is not set to Diagnostic at the bedside. The calculation of STindx does not occur and the INOP CANNOT ANALYZE ST displays at both the Information Center and the bedside. Refer to your bedside user manual for information on bedside generated ST alarms.

ST Data Summary

The table below details where ST related data is available when ST is turned on at the Information Center and on at the bedside.

Data	At Information Center	At Bedside
ST measurement adjustment	Adjusts Information Center ST measurement only.	Adjusts bedside ST measurement only.
ST Alarm limit adjustment	N/A	Yes
ST Alarms	ST Alarms and INOPs are generated by the bedside are displayed at the Information Center.	ST Alarms and INOPs are generated and displayed at the bedside.
ST Parameters from Information Center	In ST Review only.	N/A
ST Parameters from bedside	Yes	Yes
STindx	Yes (EASI only)	N/A
ST Snippet Review	Reviews Information Center generated ST snippets only.	Reviews bedside generated ST snippets only.
ST parameters in Trend Review	Information Center displays both bedside ST parameters and Information Center generated STindx.	Bedside shows only bedside generated parameters.

8
Alarm Paging

This chapter describes the using the integrated Data Critical Statview™ paging system with the Information Center. It includes the following sections:

Introduction

The integrated Data Critical Statview™ paging system is available (in limited geographies) for Information Centers connected to the M3154 Database Server. The paging system provides the clinician with secondary notification of patient alarms and wave snippets on a small paging device (receiver). Specifically, it provides automatic alarm and manual paging on any admitted patient to a clinician-worn receiver.

Warning

The paging system is a secondary alarm notification system. It is not for primary notification of alarms, physiological, or demographic data. Clinicians using the paging system must remain within monitoring distance of the primary alarm notification device. The primary alarm notification device is the bedside monitor if there is one. If there is no bedside monitor the primary alarm notification device is the Information Center.

At the Information Center you can:

- Assign caregivers (clinicians) to receivers and patients to caregivers.
- Specify which alarms will generate an automatic page.
- Send a text only message to the clinician-worn receiver.
- Manually send a page to a clinician-worn receiver from Fast Alarm Review, Alarm Review, and the Patient Window.

The paging system acquires patient alarm data from the bedside or the telemetry monitoring system and relays it to the receiver. From the receiver the clinician can scroll through patient information such as name, bed number, alarm condition, heart rate, and primary ECG wave form.

Depending on how your system is set up, if the alarm has not been silenced at the Information Center after a pre-configured period of time (5-120 seconds) the paging system sends out another page. This page includes all of the information from the initial page, with an added indication on the receiver that it is a reminder page and not a new alarm (see the StatView Receiver User's Guide for information on using the StatView receiver). By default the system sends this reminder page only once, but it can be configured to re-send the page every 'n' seconds until the alarm is silenced.

Setting Up Caregivers and Receivers

Overview

Typically, the first step in the setting up the paging system is assigning caregivers (clinicians) to receivers. This is done at installation but on occasion you may need to set up additional caregivers to receivers, for example, if you needed to add a new receiver.

Task Summary

To assign caregivers to receivers perform the following steps:

Step	Action
1	On the All Controls Window click on the **Paging Controls** button. The Caregiver Administration window displays.
2	Click on **Caregiver Setup (Add/remove)**. The Caregiver Setup window displays.
3	Click on **Add Caregiver**. The Add Caregiver window displays.
4	Enter the caregiver's name in the **Name** field. Be sure the name you specify in this field is unique. *Note*—If a receiver is not assigned to a specific caregiver, then by default that receiver will receive all alarm notifications.
5	Enter the 7-digit serial number for this clinician's receiver in the **Receiver Number** field. *Note*—You can find the serial number on the label on the back of the receiver.

Step	Action
6	The Information Center's unit name displays in the **Unit** field. This is a required field. If this clinician's receiver will be assigned to a different unit, specify that unit in the **Unit** field. You can specify up to a 6-character unit name. Be sure the name you specify in this field exactly matches the unit name and is no longer than 6 characters for the new Information Center. *Note*—If the unit name is changed, the clinician's receiver will only be displayed at the Information Center for the unit you specify here.
7	Click on the **Add** button to assign the receiver to the caregiver entered in Step 5. *Note*—You can cancel changes you make by clicking the **Reset** button before you hit the Add button.
8	Assign additional caregivers to the receivers, if desired, by repeating Steps 5 through 7.
9	When you are done making caregiver/receiver assignments you can return to the All Controls window by clicking the **All Controls** button on the bottom of the screen.

Removing Receivers

Overview

You can remove a receiver from the system, for example for receivers that are being repaired.

Task Summary

To remove a receiver perform the following steps:

Step	Action
1	On the All Controls window click on the **Paging Controls** button. The Caregiver Administration window displays.
2	Click **Caregiver Setup (Add/Remove)**.
3	Click the **Remove** button for the receiver you wish to delete. The Paging system removes the receiver number and caregiver name you selected from the list.
4	Remove additional receivers, if desired, by repeating Step 3.
5	When you are done removing receivers from the list return to the All Controls window by clicking the **All Controls** button on the bottom of the screen.

Changing a Caregiver/Receiver Assignment

Overview

You can change the caregiver currently assigned to a receiver, for example during shift changes.

Task Summary

To change the caregiver currently assigned to a receiver perform the following steps:

Step	Action
1	On the All Controls window click on the **Paging Controls** button. The Caregiver Administration window displays with a list of caregiver/receiver assignments.
2	Click on **Change Name** for the receiver for which you wish to assign a different caregiver.
3	Enter the caregiver's name in the **New Name** field.
4	Click the **Change** button. The Paging system assigns the name specified in Step 3 to this receiver.
5	Click **Back to Caregiver Administration** to return to the Caregiver Administration window.
6	Change additional caregiver/receiver assignments, if desired, by repeating Steps 3 through 5.
7	When you are done changing caregiver/receiver assignments you can return to the All Controls window by clicking the **All Controls** button on the bottom of the screen.

Assigning Patients to Caregivers

Overview

You can assign admitted patients to a caregiver(s) receiver from the Admit window when admitting a patient or when updating patient information or from the All Controls window by selecting Paging Controls.

Note—If an admitted patient has no assigned caregivers, ALL of the caregivers currently setup will receive alarms for that patient.

Warning

Should you lose connection to the Database Server the paging system will not be available. When the connection is restored all patient assignment to caregiver/receivers will have been lost. You will need to re-assign all patients to caregivers/receivers. All caregiver/receiver assignments, however, remain intact in the event of loss of power.
When connection to the Database Server is lost the messages "operating on local DB" and "paging is not available" display on top of the screen. See "If Connection to the M3154/M3169 Database Server is Lost" on page 10-23 for additional information.

Task Summary

From the Admit Window

To assign a patient to a caregiver when admitting a patient or when updating patient information in the Admit window, perform the following steps:

Step	Action
1	From the Admit window, admit the patient on the Information Center by entering the patient information then clicking the Admit button.
2	From the Admit window click the **Assign Pager** button from the task bar on the bottom of the screen.
3	Click **Add an Assignment**. The Paging system displays a list of current caregiver/receiver assignments for this unit.

Step	Action
4	Click the **Assign** button for the caregiver/receiver you wish to assign to this patient. The Paging system assigns the caregiver you selected to this patient.
5	Assign additional caregivers to this patient, if desired, by repeating Step 3. *Note*—The transmitter requires up to 3 seconds to send the alarm event information to each caregiver. In other words, when multiple caregivers are assigned to a particular patient there will be a lag time between when the first caregiver receives the page and when the last caregiver receives the same page.
6	When you are done assigning caregivers, return to the All Controls window by clicking the **All Controls** button on the bottom of the screen.

From the All Controls Window

To assign a patient to a caregiver from the All Controls window perform the following steps:

Step	Action
1	From the All Controls window click the **Paging Controls** button. The Caregiver Administration window displays with a list of current caregiver/receiver assignments.
2	Click **Patient Assignment** for the caregiver/receiver you wish to assign to this patient.
3	Select the patient's name from the list on the right side of the screen. You can select more than one patient to assign to this caregiver by holding down the **Ctrl** key and selecting more than one name from the list.

Step	Action
4	Click the **Assign** button. The Paging system assigns the patient(s) selected in Step 3 to this caregiver.
5	When you are done assigning caregivers to patients return to the All Controls window by clicking the **All Controls** button on the bottom of the screen.

Automatic Alarm Paging

Overview

If paging is available on your system, a third column will appear in the Record/ Store Alarms window where you can specify which alarms will generate an automatic page for a patient.

Task Summary

To specify which alarms will generate automatic pages perform the following steps:

Step	Action
1	On the Patient Window click on the **All Controls** button.
2	On the All Controls Window click on the **Record/Store/Page** button under Alarm Management and Setup. The Record/Store/Page window displays.

Step	Action
3	Under the Page column specify which alarms will generate an automatic alarm for this patient by clicking on the appropriate check box to the left of the alarm. A check mark in the box selects the alarm for automatic paging. No check mark in the Page box for an alarm does not turn off the alarm it only prevents the automatic page for an alarm from being sent to the receiver. *Note*—You can return to the default settings for the unit by clicking the **Unit Setting**s button.
4	When you are done specifying alarms click the **All Control**s button to return to the All Controls window.

INOPs The INOPs that automatically generate a page to the receiver for a patient depend on how your system was set up. They can be configured by your Philips service representative or bio-medical engineer.

Manual Paging

You can initiate a manual page from the Information Center by clicking on the **Page** button from Fast Alarm Review, Alarm Review, or the Patient Window. When you click on the Page button from any of the above applications a page is sent to the caregiver (clinician) assigned to this patient.

Note—When a manual page is sent to the receiver the alarm time displayed on the receiver is the time the manual page is initiated **not** the time the alarm occurred.

When you initiate a page from	the following data is sent
Patient Window	The last 6 seconds of the first waveform and associated parameters currently displayed in the Patient Window. *Note*—Manual pages initiated from the Patient Window within 1 minute of the previous manual page for the same bed are not sent to the pager.
Fast Alarm Review	The waveforms and parameters currently displayed in the Fast Alarm Review window. Six seconds of waveforms are provided; the 4 seconds preceding the alarm and 2 seconds after.
Alarm Review	The waveforms and parameters currently displayed in the Alarm Review window. Six seconds of waveforms are provided; 4 seconds preceding the alarm and 2 seconds after.

Sending Text Messages

Overview

The integrated Data Critical Statview™ paging system allows you to send text messages to the clinician worn receiver. This feature is useful for notifying staff members of meetings or for relaying other textual information.

Task Summary

To send a text message to a receiver perform the following steps:

Step	Action
1	From the All Controls window click the **Paging Controls** button. The Caregiver Administration window displays.
2	Click **Send Page** for the receiver to which you wish to send a message. The Send a Page window displays.
3	Click inside the text box and type a message of up to 150 characters. Do not use the { or | characters.
4	When you are done typing your message click the **Send** button to send the message to the receiver. The Send a Page Results window displays indicating that the message was sent.
5	Send additional text messages to receivers, if desired, by clicking on **Caregivers** on the top of the window then repeating Steps 2 through 4.
6	When you are done sending text messages click the **All Control** button on the bottom of the screen to return to the All Controls window.

9
Information Center Configuration

This chapter provides the configuration items for which you can change factory set defaults to accommodate the needs of your unit. It contains the following sections:

Information Center Unit Settings Menus

Overview

The Information Center comes with factory set defaults that govern how your system operates. You do not need to spend a lot of time setting up the system because this has been configured for you. The Information Center does, however, provide unit settings menus that contain configuration items for which you can change the factory set defaults to accommodate the needs of your unit. The Information Center provides the following unit settings menus:

Menu	Use to...
Arrhythmia Alarms Unit Settings	Change the arrhythmia alarm default settings (limits and on/off status). See "Arrhythmia Alarms Unit Settings" on page 9-6 for a list of available configuration choices.
Record/Store Alarms Unit Settings	Change the default settings for recording or storing alarms. See "Record/Store/Page Alarms Unit Settings" on page 9-10 for a list of available configuration choices.
ST Unit Settings	Change the ST measurement point defaults and set all leads on or off. Change the ST alarm limit default settings and set all alarms on or off. See "ST Unit Settings (telemetry)" on page 9-13 for a list of available configuration choices.
Trend Groups Unit Settings	Change the trend groups configured for an Information Center. You can configure up to ten trend groups per Information Center. Each group can contain up to ten parameters, presented two at a time, in trend charts. See "Trend Groups Unit Settings" on page 9-15 for a list of available configuration choices.

Menu	Use to...
Event Groups Unit Settings	Change the event groups configured for an Information Center. You can configure up to ten event groups for an Information Center. See “Event Groups Unit Settings” on page 9-22 for a list of available configuration choices.
Stored Waves Unit Settings	Change the default settings for the wave(s) that are stored in Wave Review and Alarm Review. See “Stored Waves Unit Settings” on page 9-27 for a list of available configuration choices.
Scheduled Reports	Change the default settings for scheduling unit reports. See “Scheduled Reports Unit Settings” on page 9-29.
Recording Unit Settings	Change the number of seconds pre and post context for alarm and delayed recordings as well as recording speed (M3150). Change the recordings destination (M3150, M3151).
Volume Control Unit Settings	Change the default level of the alarm sound. See “Volume Control Unit Settings” on page 9-40 for configuration choices.
Telem Freq Unit Settings	Review the current RF Frequency settings and tune in new transmitters. See “Telemetry Frequency Unit Settings” on page 9-41.

Accessing the Unit Settings Menus

You can access any of the Information Center unit settings menus by performing the following steps:

Step	Action
1	On the Patient Window click on the **All Controls** button.
2	On the All Controls Window click on the **Unit Settings** button under Configuration and Support.
3	On the Unit Settings box click on the button associated with the group for which you want to change settings. For example, clicking on the **Arrhyth Alarms** button accesses the unit settings menu and settings for arrhythmia alarms or clicking on the **Trends Groups** button displays the unit settings menu and settings for Trend Groups.
4	Enter a password in the **Password** field.
5	Click on the **OK** button. The Information Center displays the unit settings menu associated with the button you selected in Step 3.

Using the Unit Settings Menus

The Information Center unit settings menus provide the following options to assist you in using the menus:

Option	Description
Store Settings	Click on this button to save any changes you make to configuration settings.
Factory Defaults	Click on this button to display factory set defaults.
Unit Settings	Click on this button to display the current settings for an Information Center.
New Group	This option is available for the Trend Groups and Event Groups Unit Settings menus. Use this option to add a new group. You can configure up to ten trend or event groups for an Information Center. If the maximum of ten has been reached you need to delete a group before adding a new one.
Delete Group	This option is available for the Trend Groups and Event Groups Unit Settings menus. Use this option to delete a group for an Information Center.

When you make changes to the unit settings for Arrhythmia Alarms, ST Alarms, ST Setup, or Stored Waves the changes do not take effect on currently monitored patients but will take effect once the patient is discharged. All other changes take effect immediately.

Printing the Unit Settings

If the Print button is enabled on the Unit Settings windows, you can print a report of the settings for that window (if a printer is available).

Arrhythmia Alarms Unit Settings

Alarms Page 1

Item	Default	Choices	User Choice
HR High Limit	**Adult:** 120 b/min **Pediatric:** 160 b/min **Neonatal:** 200 b/min	20 to 300 b/min	
HR Low Limit	**Adult:** 50 b/min **Pediatric:** 75 b/min **Neonatal:** 100 b/min	15 to 295 b/min	
Smart HR Limits at Patient Connection	Off	On or Off	
Note—this item automatically assigns HR Smart Limits (see page 4-33)			
Inside the Unit Settings			
High Smart Limit is HR	+20 b/min	0 to +50 b/min	
Note—See page 4-33.			
Low Smart Limit is HR	-20 b/min	0 to -50 b/min	
Note—See page 4-33.			
Outside the Unit Settings			
High Smart Limit is HR	0 b/min	0 to +50 b/min	
Note—See page 4-33.			
Low Smart Limit is HR	0 b/min	0 to -50 b/min	
Timeout Period, first level	3 min	0, 1, 2, 3, 4, 5 min	

Item	Default	Choices	User Choice
Timeout Period, second level	10 min	0, 1, 2, 3, 4, 5, 10, 15 min	
Analysis Mode	Multi-lead	Multiple Lead Single lead Arrhythmia Off	
Asystole >=	**Adult/Pedi:** 4 sec **Neonate:** 3 Sec	2.5 - 4 sec in 0.5 sec. intervals	
V-Tach HR	**Adult:** 100 b/min **Pediatric:** 120 b/min **Neonatal:** 150 b/min	20 to 300 b/min	
V-Tach >=	5 PVCs	3 to 99 PVCs	
Extreme Tachy Difference	20 b/min	0 to 50 b/min	
Extreme Tachy Max	**Adult:** 200 b/min **Pediatric:** 220 b/min **Neonatal:** 240 b/min	150 to 300 b/min	
Extreme Brady Difference	20 b/min	0 to 50 b/min	
Extreme Brady Min	**Adult:** 40 b/min **Pediatric:** 40 b/min **Neonatal:** 50 b/min	15 to 100 b/min	
Alarm Reminder - Red	On	On or Off	
Alarm Reminder - Yellow	On	On or Off	
INOP Reminder	On	On or Off	

Alarms Page 2

Note—If you have a basic arrhythmia capability configured, only the settings for the basic yellow alarms are applicable (see “Levels of Arrhythmia Analysis” on page 5-3).

Item	Default	Choices	User Choice
Non-Sustain VT	On	On or Off	
Vent Rhythm	On >14 PVCs	On or Off 2 to 99 PVC	
Run PVCs	On	On or Off	
Pair PVCs	On	On or Off	
R-On-T PVC	On	On or Off	
Vent Bigeminy	On	On or Off	
Vent Trigeminy	On	On or Off	
PVC Rate	On **Adult:** >10 PVCs/min **Pediatric:** >5 PVCs/min **Neonatal:** >5 PVCs/min	On or Off 1 to 99 PVCs/min	
Multiform PVC	On	On or Off	
Pacer Not Capture	On	On or Off	
Pacer Not Pace	On	On or Off	
Pause >	On **Adult/Pedi:** 2.0 sec **Neonate:** 1.5 sec	On or Off 1.5 - 2.5 in 0.25 sec. intervals	
Missed Beat	On	On or Off	

Item	Default	Choices	User Choice
SVT	On **Adult:** ≥ 180 b/min **Pediatric:** ≥ 200 b/min **Neonatal:** ≥ 210 b/min	On or Off 20 to 300 b/min	
SVT Run >	On 5 SVs	On or Off 3 to 99 SVs	
Irregular HR	On	On or Off	
Some ECG Alrms Off INOP	On	On or Off	

Record/Store/Page Alarms Unit Settings

Note—If paging is available on your system, a third column displays in the Record/Store Unit Settings window where you can specify the alarms which will generate an automatic page for a patient. If paging is not available on your system the Page column does not display in this window.

Red Alarms

Item	Default	Choices	User Choice
Asystole	**Store:** On **Record:** On **Page:** On	**Record:** On or Off **Page:** On or Off	**Record:** **Page:**
V-fib/tach	**Store:** On **Record:** On **Page:** On	**Record:** On or Off **Page:** On or Off	**Record:** **Page:**
V-tach	**Store:** On **Record:** On **Page:** On	**Record:** On or Off **Page:** On or Off	**Record:** **Page:**
Extreme Tachy	**Store:** On **Record:** On **Page:** On	**Record:** On or Off **Page:** On or Off	**Record:** **Page:**
Extreme Brady	**Store:** On **Record:** On **Page:** On	**Record:** On or Off **Page:** On or Off	**Record:** **Page:**
All Red Non-Arrh.	**Store:** On **Record:** On **Page:** On	**Record:** On or Off (If Off, no recordings are generated, regardless of the bedside setting. If On, only the alarms set to be recorded by the bedside will generate recordings.) **Page:** On or Off	**Record:** **Page:**

Yellow Alarms

If you have basic arrhythmia capability configured, the settings for the basic yellow alarms are applicable (refer to “Levels of Arrhythmia Analysis” on page 5-3).

Item	Default	Choices	User Choice
HR	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Non-Sustain VT	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Vent Rhythm	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Run PVCs	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Pair PVCs	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
R-On-T PVC	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Vent Bigeminy	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Vent Trigeminy	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**

Item	Default	Choices	User Choice
All Yellow Non-Arrh. *Note*—If Record is Off, no recordings are generated, regardless of the bedside/ telemetry setting. If On, only the alarms set to be recorded by the bedside/telemetry will generate recordings	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
PVC Rate	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Multiform PVC	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Pacer Not Capture	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Pacer Not Pace	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Missed Beat	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
Pause	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
SVT	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**

Item	Default	Choices	User Choice
Irregular HR	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**
All ST Alarms	**Store:** On **Record:** On **Page:** On	**Store:** On or Off **Record:** On or Off **Page:** On or Off	**Store:** **Record:** **Page:**

ST Unit Settings (telemetry)

Item	Default	Choices	User Choice
Alarms/Leads/Parameters			
ST Alarms On	On	On or Off	
ST On	Off	On or Off	
Smart Limits at Patient Connection	Off	On or Off	
ST Point -Selection	J + 60	J + 60, J + 80	
ST Default Alarm Limit Settings			
Singlelead High	2.0 mm	-19.8 to 20.0 mm	
Singlelead Low	-2.0 mm	-20.0 to 19.8 mm	
Multilead High	1.0 mm	-19.8 to 20.0 mm	
Multilead Low	-1.0 mm	-20.0 to 19.8 mm	

Item	Default	Choices	User Choice
ST Smart Alarm Limit Settings			
Inside the Unit Settings			
Singlelead High ST	+1.0 mm	0.0 to +4.0	
Singlelead Low ST	-1.0 mm	0.0 to -4.0	
Multilead High ST	+1.0 mm	0.0 to+ 4.0	
Multilead Low ST	-1.0 mm	0.0 to -4.0	
Outside the Unit Settings			
Singlelead High ST +	0.0 mm	0.0 to + 4.0	
Singlelead Low ST	0.0 mm	0.0 to -4.0	
Multilead High ST +	0.0 mm	0.0 to + 4.0	
Multilead Low ST	0.0 mm	0.0 to -4.0	

Trend Groups Unit Settings

The list on the next pages contains the parameter choices for trend group configuration. This list is followed by a table that provides the factory set defaults. See Appendix A, “Trend Definitions” for definitions of the Trend Parameters.

None
HR
PULSE
RESP
%SpO2[1]
%SpO2[1]
%SpO2, %SpO2[2]
ABP
ABP SYS
ABP DIAS
ABP MEAN
PAP
PAP SYS
PAP DIAS
PAP MEAN
PAWP
CO
CCO
CVP
NBP
NBP SYS
NBP DIAS
NBP MEAN
P1
P1 SYS
P1DIAS
P1 MEAN
P2
P2 SYS
P2 DIAS
P2 MEAN
P3
P3 SYS
P3 DIAS
P3 MEAN
P4
P4 SYS
P4 DIAS
P4 MEAN
ART
ART SYS
ART DIAS
ART MEAN
Ao
Ao SYS
Ao DIAS
Ao MEAN
ICP
CPP
LAP
RAP
IUP
UAP
UAP SYS
UAP DIAS
UAP MEAN
UVP
ST-I
ST-II
ST-III
ST-aVL
ST-aVF
ST-aVR
ST-V_1
ST-V_2
ST-V_3
ST-V_4
ST-V_5
ST-V_6
ST-V
STindx[3]
ST-MCL
ST: I, II, III, aVR, aVL, aVF
ST: I, II, III
ST: II, aVF, V
ST: I, aVL, V
ST: V, MCL
ST: aVR, aVL, aVF
ST: V1, V2, V3[3]
ST: II, III, aVF
ST: V4, V5, V6[3]
ST: aVL, I, aVR
ST: II, aVF, III
ST: V1, V2, V3, V, MCL[3]
PVC COUNT
SVPB COUNTSV COUNT
PAUSE COUNT
PACED BEAT COUNT
PVC PAIR COUNT
PVC RUN COUNT
PACED RUN COUNT
SVPB RUN COUNT
PACER NOT CAPTURE COUNT
PACER NOT PACE COUNT
R-ON-T COUNT
MAX PVC RUN
% BIGEMINY
% TRIGEMINY
% PACED
% ATRIAL PACED
% VENT PACED
% AV PACED
% IRREGULAR HR
% POOR SIGNAL

NN SD[4]	MULTIFORM COUNT	SaO2
PVC RATE	V-V RATE	SvO2
pNN50[5]	PACED RATE	AWRR
V-V RATE MIN	S-S-RATE	PIP
V-V RATE MAX	Tblood	TV
PACED RATE MIN	T1	EtCO2
PACED RATE MAX	T2	IMCO2
S-S RATE MIN	T1-T2	tcpCO2
S-S RATE MAX	Tskin	FIO2
ATRIAL PACED BEAT	Tcore	tcpO2
COUNT	Trect	AWP
VENT PACED BEAT COUNT	Tesoph	AWF
AV PACED BEAT COUNT	Tnaso	AUX
NORMAL BEAT COUNT	Tven	BIS
ALL BEAT COUNT	Tart	
V? RUN COUNT		

[1]The first setting can be either continuous SpO2 monitoring (bedside monitors or telemetry) or intermittent SpO2 monitoring (telemetry only). The second setting is for telemetry only.

[2]The left parameter is continuous SpO2 monitoring (bedside monitors or telemetry), and the right parameter is intermittent SpO2 monitoring (telemetry only).

[3]Available only with EASI ECG capability.

[4]Standard Deviation of NN RR intervals where RR intervals are less than 4 seconds.

[5]A measure of Heart Rate Variability (HRV); Percent of NNN beat sequences with changes of R_R intervals greater than 50 msec.

.

The following trends are available for patients monitored by M3 bedside monitors:

HR	P2 (M4 only)	ST-I
PULSE	P2 SYS (M4 only)	ST-II
RESP	P2 DIAS (M4 only)	ST-III
%SpO2	P2 MEAN (M4 only)	ST-aVL
ABP	ART	ST-aVF
ABP SYS	ART SYS	ST-aVR
ABP DIAS	ART DIAS	ST-V
ABP MEAN	ART MEAN	ST-MCL
PAP	Ao	ST: I, II, III, aVR, aVL, aVF
PAP SYS	Ao SYS	ST: I, II, III
PAP DIAS	Ao DIAS	ST: II, aVF, V
PAP MEAN	Ao MEAN	ST: I, aVL, V
PAWP	ICP	ST: V, MCL
CVP	CPP (M4 only)	ST: aVR, aVL, aVF
NBP	LAP	ST: II, III, aVF
NBP SYS	RAP	ST: aVL, I, aVR
NBP DIAS	IUP	ST: II, aVF, III
NBP MEAN	UAP	
P1	UAP SYS	
P1 SYS	UAP DIAS	
P1DIAS	UAP MEAN	
P1 MEAN	UVP	

Item	Default	User Choice
VITAL SIGNS	**Left Parameter** HR %SPO2, %SPO2 ABP PAP T1 **Right Parameter** NBP RESP None CVP Tblood	
ARRHYTHMIA	**Left Parameter** HR PVC COUNT PVC RUN COUNT IRREGULAR HR % PACED **Right Parameter** % POOR SIGNAL None None None None	

Item	Default	User Choice
ST CHANGES	**Left Parameter** STindx ST: II,aVF,III ST: V1,V2,V3,V,MCL ST: V4,V5,V6 ST: aVL,I,aVR **Right Parameter** HR None None None None	
PACED	**Left Parameter** HR % PACED % VENT PACED % ATRIAL PACED % AV PACED **Right Parameter** None None None None None	

Item	Default	User Choice
RESPIRATORY	**Left Parameter** HR %SpO2 EtCO2 RESP TV **Right Parameter** None None None AWRR FIO2	
HEMO	**Left Parameter** HR ABP PAP CO CVP **Right Parameter** None NBP PAWP SVO2 LAP	

Item	Default	User Choice
RR IRREGULARITY	**Left Parameter** HR pNN50 NN SD % IRREGULAR HR % POOR SIGNAL **Right Parameter** None None None None None	

Event Groups Unit Settings

The following is a list of parameter choices for event group configuration. The table on page 9-22 provides a list of factory set defaults.

Note—Slow is defined as <60 b/min, Fast is >120 b/min, Run is ≥ 2 beats, Long>8.0 seconds.

Defined Events

None	RUN P EVENT	MULTIFORM PVC EVENT
SOME ECG ALRMS OFF	FAST RUN P EVENT	VENT RHYTHM EVENT
ALARMS OFF[1]	FAST LONG RUN P EVENT	PAIR SVPB EVENT
PAIR V EVENT	SLOW RUN P EVENT	USER SAVED STRIPS
RUN V EVENT	SLOW LONG RUN P EVENT	VENT BIGEMINY EVENT
FAST RUN V EVENT	RUN SVPB EVENT	VENT TRIGEMINY EVENT
LONG RUN V EVENT	FAST RUN SVPB EVENT	ASYSTOLE EVENT
PAIR V? EVENT	MISSED BEAT EVENT	VFIB/TACH EVENT
RUN V? EVENT	PACER NOT CAPTURE EVENT	PATIENT BUTTON
FAST RUN V? EVENT	PACER NOT PACED EVENT	PAUSE
LONG RUN V? EVENT	R-ON-T PVC EVENT	

Only the first two events can be viewed for patients monitored by M3 bedside monitors.

[1]ARRHYTHMIA OFF, ALL ARRH ALRMS OFF, and ALARMS SUSPENDED trigger the ALARMS OFF event.

Alarm Defined Events

YLW ALARMS
ALL ALARMS
ARRHY ALARMS
RED ARRHY ALARMS
YLW ARRHY ALARMS
BED ALARMS
RED BED ALARMS
YLW BED ALARMS
ST ALARMS (Tel)
***ASYSTOLE
***VFIB/VTACH
***V-TACH
***EXTREME BRADY
***EXTREME TACHY
**NON SUSTAIN VT
**VENT RHYTHM
**PAIR PVCs
**R-ON-T PVC
**MULTIFORM PVCs
**PACER NOT CAPT
**PACER NOT PACE
**MISSED BEAT
**SVT
**HR HIGH
**HR LOW
**RESP LOW
**RESP HIGH
**ST I HIGH
**ST I LOW
**ST II HIGH
**ST II LOW
**ST III HIGH
**ST III LOW
**ST aVF HIGH
**ST aVF LOW
**ST aVL HIGH
**ST aVL LOW
**ST aVR HIGH
**ST aVR LOW
**CCO HIGH
**ST V HIGH
**ST V LOW
**ST MCL HIGH
**ST MCL LOW
**PULSE HIGH
**PULSE LOW
**P1 HIGH
**P1 LOW
**PAP WEDGE
**P2 HIGH
**P2 LOW
**P3 HIGH
**P3 LOW
**P4 HIGH
**P4 LOW
**ABP HIGH
**ABP LOW
**CVP HIGH
**CVP LOW
**LAP HIGH
**LAP LOW
**PAP HIGH
**PAP LOW
**ICP HIGH
**ICP LOW
**IUP HIGH
**IUP LOW
**NBP HIGH
**NBP LOW
**ART HIGH
**ART LOW
**RAP HIGH
**RAP LOW
**Ao HIGH
**Ao LOW
***APNEA
**CPP LOW
**AWRR HIGH
**AWRR LOW
**CCO LOW
**EtCO2 LOW
**EtCO2 HIGH
**tcpCO2 LOW
**tcpCO2 HIGH
**tcpO2 LOW
**tcpO2 HIGH
**FIO2 LOW
**FIO2 HIGH
**PLETH LOW
**PLETH HIGH
**CPP HIGH
**BLOODT HIGH
**BLOODT LOW
***VENTILATOR DISCONNECT
***VENTILATOR FAILURE
**HEATING PWR
***P1 DISCONNECT
***P2 DISCONNECT
***P3 DISCONNECT
***P4 DISCONNECT
***ABP DISCONNECT
***CVP DISCONNECT
***LAP DISCONNECT
***PAP DISCONNECT
***ICP DISCONNECT
***IUP DISCONNECT
***NBP DISCONNECT
***ART DISCONNECT
**T1 HIGH
**T1 LOW
**T2 HIGH
**T2 LOW
**IMCO2 HIGH
***RAP DISCONNECT
***Ao DISCONNECT
**VUELINK/OTHER ALARM
**RUN PVCs
**PAUSE

**SPO2 LOW	**UAP HIGH	**Tesoph HIGH
**SPO2 HIGH	**UAP LOW	**Tesoph LOW
**SVO2 LOW	***UVP DISCONNECT	**Tnaso HIGH
**SVO2 HIGH	***UAP DISCONNECT	**Tnaso LOW
**VENT BIGEMINY	**Trect HIGH	**Tart HIGH
**VENT TRIGEMINY	**Trect LOW	**Tart LOW
**PVC RATE	**Tcore HIGH	**Tven HIGH
**IRREGULAR HR	**Tcore LOW	**Tven LOW
**UVP HIGH	**Tskin HIGH	**MULTI-ST1
**UVP LOW	**Tskin LOW	**BIS HIGH
		**BIS LOW

[1]Only available with telemetry EASI ECG.

The following alarm events are NOT available for patients monitored by M3 bedside monitors:

***all invasive pressure DISCONNECT except P1, P2, ABP, ART, and Ao

**P3 and **P4	**HEATING PWR	**tcpCO2 and **tcpCO2
**IUP and **CPP	**T2	**FIO2
**PAP WEDGE	**VUELINK/OTHER ALARM	**PLETH
**BLOODT	**SVO2	**IMCO2
***VENTILATOR DISCONNECT	**MULTI ST	**BIS
***VENTILATOR FAILURE	**EtCO2	**PAUSE

***P2 DISCONNECT and **PAP WEDGE are available for patients on M4 monitors.

Item	Default	User Choice
LIFE THREATENING	***ASYSTOLE ***V-FIB/TACH ***EXTREME TACHY ***EXTREME BRADY ***V-TACH	
DYSRHYTHMIAS	FAST RUN V EVENT FAST RUN SVPB EVENT **PVC RATE MISSED BEAT EVENT VENT RHYTHM EVENT	
VENTRICULAR ALARMS	***V-TACH **NON SUSTAIN VT **RUN PVCs **PAIR PVCs **R-ON-T PVC	
DISCHARGE	**HR HIGH **HR LOW **SpO2 LOW **NBP LOW **PVC RATE	
PACER INSERTION	**HR LOW **NBP LOW **MISSED BEAT **PVC RATE **IRREGULAR HR	

Item	Default	User Choice
PACED	**HR HIGH **HR LOW **MISSED BEAT **PACER NOT PACE **PACER NOT CAPT	
ALL ALARMS	RED ARRHY ALARMS YLW ARRHY ALARMS BED ALARMS ALARMS OFF NONE	

Stored Waves Unit Settings

The following is a list of parameter choices for Wave Review/saved strips, and the stored waves for alarms. The table below provides a list of set defaults.

None	PLETH	P4	RAP
PRIMARY WAVE*	CO2	ABP	Ao
SECONDARY	AWP	CVP	UAP
WAVE*	AWF	LAP	UVP
ECG1	P1	PAP	
ECG2	P2	ICP	
ECG3*	P3	ART	
RESP			

*Tracks the primary and secondary waves selected at the bedside or, for telemetry, on the Patient Window.

**ECG3 is valid for M3 and M4 monitors only.

Note—The following waves from VueLink modules are not stored: IMCO2, FIO2, etN2O, inN2O, etAGT, inAGT, O2, AGENT

Continuous Waves page

The waves selected will be the default waves saved in full disclosure (Wave Review) and in strips saved to Alarm Review from Wave Review, Event Review.

Item	Default	User Choice
Wave Selection 1	PRIMARY WAVE	
Wave Selection 2	SECONDARY WAVE	
Wave Selection 3	ECG2	
Wave Selection 4	RESP	

Note—If PRIMARY or SECONDARY is a wave in one of the other selections, that wave is only stored once.

Alarm Waves page

The waves selected will be the default waves for alarms stored in Alarm Review and the action of the patient sector button (if configured).

Item	Default	User Choice
Wave Selection 1	PRIMARY WAVE	
Wave Selection 2	SECONDARY WAVE	
Wave Selection 3	ECG2	
Wave Selection 4	RESP	

Note—If Primary or Secondary is a wave in one of the other selections, that wave is only stored once.

Scheduled Reports Unit Settings

Overview

The Scheduled Report Unit Settings menus allow you to set up and scheduled reports that will print on a regular basis for all admitted patients in the unit. From the Scheduled Reports Unit Settings window you can change the settings for the following reports by clicking on the appropriate tab on the top of the window:

- All Reports
- Trend Report
- Alarm Report
- Event Report
- Wave Report
- Summary Report

Note—You can print reports for specific patients on demand or set up the reports to print on a regularly scheduled basis for a particular patient by selecting **Scheduled Reports** from the All Controls window. Patients must be admitted before you can setup and schedule the reports. See Chapter 6, Patient Data Review, in your *Information Center Instructions for Use* for information for setting up and printing reports for a specific patient.

Printing Behaviors

Reports are printed according to the time specified in the All Reports Unit Settings Window (see “All Reports” on page 9-31). However, the following general printing behaviors apply:

- If there are a large number of reports to be printed at the same time, some reports may be printed a few minutes ‘late’.
- If the printer is not available at the scheduled time (for example if there are other print jobs in the queue or there is a printer problem, etcetera.) then the Information Center will periodically re-try to print the reports. If the ‘next’ scheduled time arrives and the first scheduled report still has not been successfully printed, then the first report is deleted and and the next report is printed.
- When the time is set back to accommodate daylight savings time, the subsequent scheduled report will contain an extra hour to cover the time period. When time is set forward, the same period of time may be covered

in two reports (for example, a one hour scheduled report would print twice with the same data once labeled as 1:00 am and again labeled as 2:00 am).

- Scheduled reports will start on the nearest time interval that occurs after a report scheduled for printing. For example, if at 2:15 pm, scheduled reports are configured to start at 8:00 am with a frequency of once every 4 hours, then a scheduled reports will start being produced at 4:00 pm the same day.

All Reports

Use the All Reports Unit Settings window to specify one or more reports to be printed on a regularly scheduled basis for the all the admitted patients in this unit. All reports for one patient are printed sequentially followed by the next patient.

Reports are sorted by bed label.

Step	Action
1	Select the reports by clicking in the checkbox next to the report name. A checkmark in the checkbox selects the report for printing.
2	Indicate the time for which you want reports to start by specifying the time in the **Start Time** field. Specify the hour by clicking on the hour in the **Start Time** then clicking on the up and down arrows until the desired time displays. Specify the minutes by clicking on the minutes in the **Start Time** then using the up and down arrows until the desired minutes display. Minutes are specified in 15 minute increments. Reports will be printed per the time you specify in the **Start Time** field. However, if there are a large number of reports to be printed at the same time, some reports may be printed a few minutes 'late'. *Note*—You can also specify start time by clicking on the hour or minutes then typing the time using the keyboard.

Step	Action
3	Indicate how often you want the reports to occur by selecting a time from the **Frequency** drop-down box. Choice are: • Every Hour • Every 2 Hours • Every 6 Hours • Every 8 Hours (default) • Every 12 Hours • Every 24 Hours *Note*—The amount of data that the reports will contain depends on the time Frequency you specify here. For example, if the time frequency is 8 hours the reports you select in Step 1will only show data for the previous 8 hours.
4	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.

Trend Report Unit Settings

The amount of data that the Trend Report will contain depends on the time Frequency specified in the All Reports Unit Settings window. For example, if the time frequency is 8 hours the report will only show data for the previous 8 hours.

Perform the following steps to set up the Trend Reports unit setting:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** (default is 5) drop-down list. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the trend group for this report from the **Trend Group** (default is VITAL SIGNS) drop-down list.

Step	Action
3	Specify whether you want the report to print in tabular (default) or graphical format by clicking on the appropriate **Report Type** radio button. Click **Tabular** if you want to print the trend data in rows and columns suitable for charting purposes. The tabular Trend Report contains: • Time labeled columns • Parameter label for each row • Parameter average value for each trend corresponding to time column (aperiodic values show as the latest value for that column) • Date and time of time cursor at top of display • Highlighted row indicating time cursor. Click **Graphic Trend** if you want to print the report with the 5 graphic trends from the Trend Group. The graphic Trend Report contains: • Parameter label(s) for each trend line • Parameter value(s) for each trend corresponding to current time cursor position • Date and time of time cursor at top of display • Vertical line time cursor indicator • Parameter scale indicators (same as scale on display at time of print request) • Time line
4	For tabular reports specify the trend interval by selecting the time from the **Trend Interval** (default is 60 Minutes) drop-down list.
5	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.
6	If you would like to print the unit Trend Reports now click **Print Report Now** button.

Alarm Report Unit Settings

The amount of data that the Alarm Report will contain depends on the time frequency specified in the All Reports Unit Settings window. For example, if the time frequency is 8 hours the report will only show data for the previous 8 hours.

Perform the following steps to set the Alarm Reports unit settings:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** drop-down list (default is 5). When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the alarm group for this report from the **Alarm Group** drop-down list (default is ALL ALARMS).
3	Specify whether you want an alarm report or strip report (default) by clicking on the appropriate **Report Type** radio button.
4	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.
5	If you would like to print the unit Alarm Reports now click **Print Report Now** button.

Event Report Unit Settings

The Event Summary Report contains:

- A graphic trend of HR for the most recent 24 hours.
- A graphic trend of PVC for the most recent 24 hours.
- A tabular trend for HR (max, median, min) for the most recent 24 hours.
- A tabular trend of event counts for each of the event group entries for the displayed event group for the most recent 24 hours.
- An event strip containing the event specification and duration for each entry in the Summary Report.

Perform the following steps set the Event Summary Reports unit settings:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** (default is 5) drop-down list. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Select the event group for this report from the **Event Group** drop-down list (default is LIFE THREATENING). The report will print all events configured for the event group you specify.
3	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.
4	If you would like to print the unit Event Reports now click **Print Report Now** button.

Wave Report Unit Settings

Perform the following steps to set up the Wave Report unit settings:

Step	Action
1	Specify the maximum number of pages this report should contain by selecting the number of pages from the **Maximum Pages** (default is 5) drop-down list. When you specify a specific number of pages the report will stop when that number of pages is reached regardless of whether there is more data or not.
2	Specify whether you want a wave report, a strip report (default) or a 12 lead report by clicking on the appropriate **Report Type** radio button. **Wave Report** prints a compressed full disclosure wave report. The waves that the report will contain depend on the waves selected in the **Wave Report Settings** field and whether waves have been stored for the given time interval. **Strip Report** prints a periodic sample of the full disclosure waves for this patient. The waves that appear depend on what was stored for the specified time interval. The time between each strip on the report is determined by the time specified in the **Strip Interval** field. Each strip is approximately 6 seconds. **Twelve Lead** prints a report of the EASI wave data stored for this patient. This report is a single page report containing a single 12-lead derivation of the EASI waves for this patient at time of the report.
3	If you selected Wave Report in Step 2, specify the waves (1 to 4) to be included in the report by clicking in the appropriate checkbox(s) in the **Wave Report Settings** field. The waves available here correspond to the waves selected in the **Stored Waves** window.
4	If you selected Wave Report in Step 2, indicate the number of minutes of waves to compress per page by selecting the minutes from the **Minutes per Page** drop-down list.

Step	Action
5	If you selected Strip Report in Step 2, indicate what the time interval between strips should be by selecting a time from the **Strip Interval** drop-down list.
6	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.
7	If you would like to print the Wave Report now click **Print Report Now** button.

Summary Report Unit Settings

Use the Summary Report window to set up and print either an individual patient reports or a unit report for all patients currently admitted and assigned to this Information Center.

Perform the following steps to set up Summary Report unit settings:

Step	Action
1	Specify whether the summary reports will be Patient Reports or a Unit Reports (default) by clicking on the appropriate radio button in the **Report Type** field.
2	For Unit Reports specify whether to print the report in **Compact** format or **One Page Per Patient** format by clicking on the appropriate radio button in the **Unit Report Settings** field. In Compact format, the report does not include the wave sample and all patient information is packed into the fewest number of pages. In One Page Per Patient format the wave sample is included and each patient report appears on a single page.
3	Click the **Store Settings** button to store any changes made in this window and set the unit defaults.
4	If you would like to print the Summary Report now click **Print Report Now** button.

Recording Unit Settings

Item	Default	Choices	User Choices
4-Channel Recorder			
Recorder Speed	25mm/s	12.5, 25, 50 mm/s	
Send Recordings to	Device name that is configured in Set Recording Destination	Device names for all centrals on the IntelliVue Clinical Network configured with recorders	
Note—Allows you to send all recordings to a central different from the recorder specified at installation.			
2-Channel Recorder			
# Pre-Event, seconds (delayed and alarm recordings)	10	4 to 20	
Note—Refers to the number of seconds of stored waves before the alarm was detected/delayed recording requested.			
# Post-Event, seconds (delayed and alarm recordings)	2	2 to 20	
Note—Refers to the number of seconds of waves after the alarm was detected/delayed recording requested.			
Recorder Speed	25mm/s	6.25, 25, 50 mm/s	

Send Recordings to	Device name that is configured in Set Recording Destination	Device names for all centrals on the IntelliVue Clinical Network configured with recorders	
Note—Allows you to send all recordings to a central different from the recorder specified at installation.			

Volume Control Unit Settings

Item	Default	Choices	User Choices
Current Volume	6	1 to 10, with 10 being the loudest.	
Note—Use this field to adjust the alarm tone volume.			
Test Volume While Setting	On	On or Off	Not applicable -- is used in this window only, and does not affect the Volume Control Window.
Unit Settings	Default: 6 Minimum: 1	1 to 10, with 10 being the loudest.	
Note—The Minimum volume is the quietest that a user can adjust the volume in the Volume Control Window. *Important*—Be sure the minimum setting is still audible in your care unit -- in some environments, a setting of 1 is barely audible.			

Telemetry Frequency Unit Settings

Introduction

Use the Telemetry Frequency Window to initiate learning when you replace or purchase a new transmitter or to turn on/off Radio Frequency INOP messages. The sections below describe each of these functions.

Learning a New Transmitter Code

The telemetry transmitter was designed with an internal identification code so only a specific receiver can acquire its signal. This prevents another patient's ECG from being picked up by the wrong receiver.

If you replace or purchase a new transmitter, you must initiate learning of the correct transmitter code.

Perform the following steps to initiate learning:

Step	Action
1	Access the Telemetry Frequency Window by clicking on the **Telem Freq** button on the Unit Settings Window.
2	Enter a password in the **Password** field.
3	Click on the telemetry transmitter from the displayed list.
4	Click on the **Learn Xmit Code** button.
5	Press the patient button on the transmitter within 10 seconds. If you do not press the patient button within 10 seconds repeat the procedure.

Note—This feature is not for routine monitoring and you should only use it under the direction of service personnel.

Radio Frequency (RF) Trouble Shooting

The Telemetry Frequency Window provides an option (RF INOP) that can assist in troubleshooting performance associated with the RF link from the transmitter to the receiver. When the RF INOP option is on, the Information Center collects certain data and displays it on the Main Screen as a soft inop (text but no sound). This provides service personnel with information on the quality of the channel.

The message format is:

##HHH/LLL(SSS)NNN

Where	Indicates
##	This is an RF measurement
HHH	RSSI+ value
LLL	RSSI- value
SSS	signal noise
NNN	noise value, or blank if no period of noise exists

Enabling the RF INOP

You enable this option by ensuring that there is a check in the **RF INOP** checkbox on the Telemetry Frequency Window for the transmitter in question. When enabled the RF INOP is of lowest priority and is overwritten by any other active system INOP or alarm. During normal clinical use, the RF INOP should be turned off.

10
Information Center Safety and Specifications

This chapter provides information on Information Center safety and specifications. It includes the following sections:

Regulatory and Safety Specifications

Declaration

CE 0123

The M3290A Information Center Software Release E complies with the requirements of the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices and carries CE-marking accordingly.

The Information Center Software complies with the applicable portion of ANSI/AAMI EC-13.

The NT Workstation and UPS comply with IEC 60950, CISPR 22 Level A, and CISPR 24. They carry CE-marking to the European Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). They are not suitable for installation in the Patient Care Vicinity (Patient Environment).

Note—The display is not provided as part of the Information Center. Displays are ordered separately.

For specifications on the Philips Recorder, see “Specifications for the Philips 2-Channel Recorder” on page 10-17 “Specifications for the M3160A 4-Channel Recorder” on page 10-18.

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Avoiding EMI

If electromagnetic interference (EMI) should be encountered, there are a number of things that can be done to mitigate the situation.

- Eliminate the source. Possible sources of EMI can be turned off or moved away to reduce their strength.
- Attenuate the coupling. If the coupling path is through the patient leads, the interference may be reduced by moving and/or rearranging the leads. If the coupling is through the power cord, plugging the M3150/M3151/ M3154/M3169 into a different circuit may help.
- Add external attenuators. If EMI becomes an unusually difficult problem, external devices such as an isolation transformer or a transient suppressor may be of help. A Philips Medical Systems Customer Engineer can assist in determining the need for external devices.

Information Center Software Specifications

Display

- Up to 16 patient sectors, with up to 24 waveforms per screen single or dual displays. Up to 32 waves can be displayed on dual displays with two main screens.
- Sweep speed is 25 mm/s and 12.5 mm/s depending on configuration.
- Display formats are:
  4 patients — 4 x 1, 2 x 2
  6 patients — 6 x 1, 3 x 2
  8 patients — 8 x 1, 4 x 2 (when all sectors are on one display)
  12 patients
  – 6 x 2 when all sectors are on one display
  – 3 x 2 x 2 when sectors are on two displays
  16 patients
  – 8 x 2 when all sectors are on one display
  – 4 x 2 x 2 when sectors are on two displays
- Waveforms are 3.3 seconds in length in a dual-column format and 7.0 seconds in length in a single-column format (at 25 mm/s speed -- waves at 12.5 mm/s are twice as long).
- Number of waves in Patient Window: up to 4 (single display); up to 11 (dual display).
- Number of parameters in Patient Window: up to 12

Note—Philips Medical Systems (or its designees) will not install or support displays not supplied by Philips Medical Systems with Information Center purchases and cannot guarantee their compliance with ANSI/AAMI EC-13 (ECG Aspect Ratio or 25mm/s specifications), or the EMC Directive.

M3150 Information Center

Features

The M3150 Information Center provides real-time waveform monitoring and alarms at a central location for up to 16 patients. The standard M3150 Information Center includes the following features:

- NT Workstation, keyboard, and mouse.
- Philips 2-channel Recorder.
- UPS.
- Displays up to 16 patients.
- Up to 24 waves on a single main screen (up to 32 waves on dual display with two main screens).
- Configurable resting display.
- Audio alarm annunciation.
- ST/AR enhanced multi-lead ST segment and arrhythmia analysis.
- If not connected to M3154 Database Server: stores 50 30-second alarm/strip records, up to 4 waves per record; if connected to M3154 Database Server: database stores 150 alarm/strip records, up to 4 waves per record.
- If not connected to M3154 Database Server: 1 hour of wave review storage, up to 4 waves per patient; if connected to M3154 Database Server: database stores 24 hours of data.
- 24 hour trends, events, and ST review.
- 24 hour EASI 12-lead full disclosure
- Philips Monitoring Network (SDN) connectivity and Philips IntelliVue Clinical Network connectivity.

Options

Options for the M3150 Information Center include:

- Second display capability for full screen Patient Window and application window, or 2 main screens.
- If not connected to M3154 Database Server: storage for 150 thirty-second alarm and saved strip records, up to 4 waves per record (50 is standard).
- If not connected to M3154 Database Server: 24-hour wave review and event review storage, up to 4 waves per patient (1 hour is standard).
- 48-hour wave review and event review, trend review and ST review storage, up to 4 waves per patient.
- 48 hour EASI Full Disclosure
- Export Data to Holter System

- 12-Lead Analysis/Export
- Remote slave display(s).
- Several display sizes are available.
- Up to three strip chart recorders.
- Trackball.
- Laser printer printed reports.

Important—If the remote slave display is a different size from the main display, the slave display will not meet the 25 mm/s sweep speed specification. See the *Philips Information Center Service Manual*.

M3151 Information Center Client

Features

The Information Center Client provides real-time waveform monitoring at a hallway location for up to 16 patients being monitored by a primary Information Center on the IntelliVue Clinical Network system. The standard M3151 Information Center Client includes the following features:

- NT Workstation, keyboard, and mouse.
- Philips 2-channel Recorder.
- UPS.
- Displays up to 16 patients who are monitored by an Information Center on the IntelliVue Clinical Network.
- Up to 24 waves on a single main screen (up to 32 waves on dual display with two main screens).
- Configurable resting display.
- Alarm silencing (if Full Control access).
- Accesses real-time waveforms and parameters; accesses data stored by the Database Server.
- Configurable Full Control, Read-Only, or No access to patient data controls.
- IntelliVue Clinical Network connectivity.

Options

Options for the M3151 Information Center Client include:

- Second display capability for full screen Patient Window and application window, or 2 main screens.

- Several display sizes are available.
- Trackball.
- Laser printer printed reports.
- Up to three strip chart 2-channel recorders.

Important—If the remote slave display is a different size from the main display, the slave display will not meet the 25 mm/s sweep speed specification. See the *Philips IntelliVue Information Center Service Manual* for more information.

M3154 Database Server

Features

The M3154 Database Server provides database storage for the IntelliVue Clinical Network. Patient monitoring data from all Information Centers on the IntelliVue Clinical Network are received and stored by the Server. Any Information Center and Client on the IntelliVue Clinical Network can access stored data for any patient for review (unless configured for no access). The M3154 Database Server includes the following features:

- Server with CD-ROM and diskdrive, external modem, keyboard, and mouse.
- Windows NT server operating system software.
- Philips application software.
- UPS.
- Up to 8 Information Centers and up to 8 Information Center Clients per IntelliVue Clinical Network.
- Up to 8 LaserJet printers per IntelliVue Clinical Network.
- Up to 96 patients per IntelliVue Clinical Network.
- 32 transfer patients per IntelliVue Clinical Network.
- Stores up to 24 hours of monitoring data for each patient, with 4 waves per record, accessible at connected centrals in Wave Review, Trend Review, Event Review, and ST Review.
- 150 30-second alarm records and saved strips, accessible at connected centrals in Alarm Review.
- Patient data is stored on the Database Server until patient discharge. Data may be transferred from unit to unit within one Database Server or data may be transferred across Database Servers in a Large Network Database Server System.

Options

Options for the M3154 Database Server include:

- Patient Data Transfer/Web access via the hospital's internet/intranet.
- 48-hours of data storage (24 hours is standard).
- Export Data to Holter System
- Integrated Data Critical Statview™ paging system (available in limited geographies)
- Multiple switch configurations

M3169 Small Database Server

Features

The M3169 Small Database Server provides database storage for the IntelliVue Clinical Network. Patient monitoring data from all Information Centers on the IntelliVue Clinical Network are received and stored by the Server. Any Information Center and Client on the IntelliVue Clinical Network can access stored data for any patient for review (unless configured for no access). The M3169 Database Server includes the following features:

- Server with CD-ROM and diskdrive, keyboard, and mouse.
- Windows NT 4.0 workstation.
- Philips application software.
- UPS.
- Up to 3 Information Centers and up to 3 Information Center Clients per IntelliVue Clinical Network.
- Up to 4 LaserJet printers per IntelliVue Clinical Network.
- Up to 48 patients per IntelliVue Clinical Network.
- Stores up to 48 hours of monitoring data for each patient, with 4 waves per record, accessible at connected centrals in Wave Review, Trend Review, Event Review, and ST Review.
- 150 30-second alarm records and saved strips, accessible at connected centrals in Alarm Review.

Options

Options for the M3169 Database Server include:

- 48-hours of data storage (24 hours is standard).
- 12-Lead Analysis/Export
- Multiple switch configurations

Release E Hardware Performance Requirements

The Information Center software is designed to operate on qualified hardware components that are standard computer products. These include equipment from both Philips Medical Systems and equipment purchased by suppliers other than Philips Medical Systems.

The tables below list components that comprise an Information Center along with features and requirements for proper operation of the Information Center software. These requirements are not exhaustive and are primarily intended to indicate the types of features that are required for successful Information Center software performance.

Note—Components provided by Philips Medical Systems with Information Center purchases have been extensively tested and validated for system performance. Software (e.g., BIOS, drivers, NT service packs) not supplied by Philips Medical Systems as part an Information Center system are not approved or supported by Philips Medical Systems for use with the Information Center and IntelliVue Clinical Network/Database Server systems.

System Component	Archetypical Performance Requirements
System	Meet IEC 60950 regulatory requirements for ITE equipment
	CE-marking to the Low Voltage Directive (LVD) and EMC Directive

System Component	Archetypical Performance Requirements
NT Workstation	Compatible with IBM (86) type PC
	Qualified with MicroSoft Windows NT™ 4.0
	400+ MHz Pentium II
	384 MB RAM
	15 GB hard disk drive
	4x CD ROM drive operational vertically and horizontally
	Video adapter for 1280x1024, 256 color video @ 60 Hz non-interlaced refresh rate
	Configurable up to 2 simultaneous display outputs
	802.3 network controller with 10Base-T with RJ45 connector
	16 bit. wav file compatible audio with power of at least 1.0 watts RMS, 4 ohms
	External audio output (external controls not permitting 0 audio volume)
	1 PCI expansion slot available for SDN Interface Card
	1 Parallel printer interface
	2 Serial interfaces
	3.5” floppy disk drive
	Requires less than 150W and 200VA as configured

System Component	Archetypical Performance Requirements
NT Server (M3154)	HP NetServer LC2000 or equivalent
	Qualified with MicroSoft Windows NT™ Server 4.0
	400+ MHz Pentium II
	384 MB of ECC (error correcting) RAM
	10+ GB RAID-5 disk drive(s) (depends on configuration)
	4x CD ROM drive
	Video adapter for 1280x1024, 256 color video @ 60 Hz non-interlaced refresh rate
	802.3 network controller with 10Base-T with RJ45 connector
	1 Parallel printer interface
	2 Serial interfaces
	3.5” floppy disk drive

System Component	Archetypical Performance Requirements
NT Server (M3169)	Compatible with IBM (86) type PC
	Qualified with MicroSoft Windows NT™ Workstation 4.0
	1.0+ GHz Pentium II single processor
	384 MB of ECC (error correcting) RAM
	40 GB disk drive
	4x CD ROM drive
	Video adapter for 1280x1024, 256 color video @ 60 Hz non-interlaced refresh rate
	802.3 network controller with 10Base-T with RJ45 connector
	1 Parallel printer interface
	2 Serial interfaces
	3.5” floppy disk drive
Keyboard	PS/2 Qwerty keyboard
Mouse	PS/2 2 button mouse
Trackball	PS/2 2 button trackball
	WinNT compatible
Keyboard/Mouse Switch	PS/2 compatible

System Component	Archetypical Performance Requirements
Small CRT Color Video Display Medium CRT Color Video Display Large Color Flat-panel Display Large CRT Color Video Display	1280x1024 60Hz non-interlaced capability
	Less than 15% total linearity error
	Viewable width of 1280 dots: • Medium Display: 308 mm • Large Display: 381 mm
	Red, Green, & Blue Video Inputs: -0.7 V p-p
	Vertical & Horizontal Multi-Sync Inputs: 5 V TTL
	Video-Cable Connector: HD 15 Male
Video Splitter	300 MHz bandwidth (1280x1024, 60 Hz video)
Speaker	Unpowered stand alone speaker
	Shielded for use with video display monitors
	6m cable compatible with PU audio output
Printer (HP LaserJet 2200 printer recommended)	8 pages per minute
	Parallel/IntelliVue Clinical Network interface
	250 sheet paper capability
External Modem	Compatible with WinNT 4.0 RAS service
	ISA or PCI computer bus interface
	57600 baud capability
Uninterruptible Power Supply	Compatible with Workstation/Server Processing Unit
	Minimum capacity of 600VA, 250W / 1000VA, 670W
	Holdup time of 5 minutes for 50% load
	Able to report low battery condition and receive shutdown command from computer's serial port

ECG Performance Disclosure/Specifications

Characteristic	Performance Disclosure/Specification (in italics)
Heart Rate Averaging Method	Two different methods are used: a. Normally, heart rate is computed by averaging the 12 most recent RR intervals. b. If each of 3 consecutive RR intervals are greater than 1200 milliseconds (i.e. rate less than 50 b/min) for adult and pediatric patients and greater than 750 milliseconds (i.e., rate less than 80 b/min for neonatal patients, then the 4 most recent RR intervals are averaged to compute the HR.
Heart Rate Meter Accuracy and Response to Irregular Rhythm	Provides correct heart rates (80, 60, 120, 90 b/min) using test waveforms as indicated in ANSI/AAMI EC13 Sec. 3. 1. 2. 1 (5).
Response Time of Heart Rate Meter to Change in Heart Rate	For a rate increase, the average time to reach the specified heart rate using test waveforms as indicated in ANSI/AAMI EC13 Sec. 3. 1. 2. 1 (6) is 8.6 seconds. For a rate drop, the average time is 8.2 seconds.
Time to Alarm for Tachycardia	The ranges of time to alarm using test waveforms as indicated in ANSI/AAMI EC13 Sec. 3. 1. 2. 1 (7) are 6.4 to 9.3 seconds.
Pacemaker Pulse Rejection Capability	Rejects pace pulses using test waveforms as indicated in ANSI/AAMI EC13 Sec. 3. 1. 4 (with amplitude from +/- 2 to +/- 700 mV, width from 0.1 to 2.0 ms).

Characteristic	Performance Disclosure/Specification (in italics)
Range and Accuracy of Heart Rate Meter	Meets the ANSI/AAMI EC13 Section 3.2.7 recommended minimum range and accuracy. Heart rate range is 15 - 300 b/min with accuracy of ± 1% of the range for Adult and Pediatric patients. Heart rate range for Neonates is 15 - 350 with accuracy of ± 1% of the range. (Note: for rates equal to or less than 15, the displayed heart rate is 0).
Alarm Limit Range	Meets the ANSI/AAMI EC13 Section 3.2.8.1 standard. Lower alarm limit is 15 -295. Upper alarm limit is 20 - 300.
Resolution of Alarm Limit Settings	Meets the ANSI/AAMI EC13 Section 3.2.8.2 standard. The resolution is ± 5 b/min.
Alarm Limit Accuracy	Meets the ANSI/AAMI EC13 Section 3.2.8.3 standard. Error less than ± 10% or ± 5b/min
Time to Alarm for Cardiac Standstill	Meets the ANSI/AAMI EC13 Section 3.2.8.4 standard: maximum alarm time <10 seconds, using the test waveforms as indicated.
Time to Alarm for Low Heart Rate	Meets the ANSI/AAMI EC13 Section 3.2.8.5 standard: maximum alarm time <10 seconds, using the test waveforms as indicated.
Time to Alarm for High Heart Rate	Meets the ANSI/AAMI EC13 Section 3.2.8.6 standard: maximum alarm time <10 seconds, using the test waveforms as indicated.
Alarm Silencing	The time required for reactivation of a latched, silenced alarm is 3 minutes
ECG Waveform Display Time Base Accuracy	0.8%. *Meets the ANSI/AAMI EC13 Section 3.2.9.6 standard: maximum error = +/-10%.*
Channel Width	40 mm. *Meets the ANSI/AAMI EC13 Section 3.2.9.7(a) standard: minimum = 30mm.*

Characteristic	Performance Disclosure/Specification (in italics)
Trace Width	0.3 mm. *Meets the ANSI/AAMI EC13 Section 3.2.9.7(b) standard: maximum = 1.0mm.*
Aspect Ratio	0.4s/mV. *Meets the ANSI/AAMI EC13 Section 3.2.9.7(f) standard: 0.4s/mV.*
Input Signal Reproduction Accuracy: Overall Error	-2.9%. *Meets the ANSI/AAMI EC13 Section 3.2.9.8(a) standard: maximum = +/- 20%.*
Frequency Response: Sinusoidal	0.67 to 40 Hz (3 db down). *Meets the ANSI/AAMI EC13 Section 3.2.9.8(b) standard: 0.67 to 40 Hz (3 db down).*
Frequency Response: Triangular	0 to 25% reduction. *Meets the ANSI/AAMI EC13 Section 3.2.9.8(b) standard: 0 to 25% reduction.*
Impulse Response: (for waves marked with ST bandwidth)	Displacement = 0.08 mV, slope = 0.11 mV/s. *Meets the ANSI/AAMI EC13 Section 3.2.9.8(c) standard: displacement maximum = 0.1 mV; slope maximum = 0.30 mV/s.*
Pacemaker Pulse Display Capability	Minimum = 0.2 mV RTI. *Meets the ANSI/AAMI EC13 Section 3.2.9. 12 standard: minimum = 0.2 mV RTI.*

Specifications for the Philips 2-Channel Recorder

CE

Declaration

The M1276A option 201 Philips 2-Channel Recorder complies with the requirements of the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices. The Philips 2-Channel Recorder complies with IEC 60950, CISPR 22 Level A, and CISPR 24.

This device is not suitable for installation in the Patient Care Vicinity (Patient Environment).

Temperature Range

Operating: 5 to 40^{o}C (41 to 104^{o}F).
Storage: -10 to 70^{o}C (-40 to 158^{o}F).

Humidity Range (non-condensing)

15% to 80% RH at 40^{o}C (104^{o}F).

AC Input Power Source Requirements

The 2-Channel Recorder can be operated from an AC source of 100 to 240V AC +/- 10%, 50 to 60 Hz.

Maximum power consumption is 30W.

Specifications for the M3160A 4-Channel Recorder

This device is not suitable for installation in the Patient Care Vicinity (Patient Environment).

Temperature Range

Operating: 5 to 40^{o}C (59 to 86^{o}F).

Humidity Range (non-condensing)

20% to 80% RH at 30^{o}C (86^{o}F).

AC Input Power Source Requirements

The Philips 4-Channel Recorder can be operated from an AC source of 100 to 240V AC +/- 10%, 50 to 60 Hz.

Maximum power consumption is 70W.

Installation Information

Warning

Installation and setup must be performed by an Philips Medical Systems service representative or designee.

Environment

Follow the instructions below to ensure a completely safe electrical installation. The environment where the Information Center will be used should be reasonably free from vibration, dust, corrosive or explosive gases, extremes of temperature, humidity, and so on. For a cabinet mounted installation, allow sufficient room at the front for operation and sufficient room at the rear for servicing with the cabinet access door open.

The Information Center operates within specifications at ambient temperatures between 15ºC and 30ºC. Allow at least 2 inches (5 cm) clearance around the instrument for proper air circulation.

Caution

The Information Center is not suitable for installation in the Patient Care Vicinity (Patient Environment).

Archetypical Input Power Source Requirements

M3150, M3151
200 watts

Grounding Information Center and Recorder

To protect hospital personnel, the cabinets of the Information Center and the Philips Recorder must be grounded. Accordingly, the hardware is equipped with detachable 3-wire cables which ground the instrument to the power line ground (protective earth) when plugged into appropriate 3-wire receptacles. If an adequate number of 3-wire receptacles are not available, consult the hospital electrician.

Warning

Do not use a 3-wire to 2-wire adapter with this instrument.
Do not use a power strip.

Condensation

Make sure that during operation, the instrument is free of condensation. Condensation can form when equipment is moved from one building to another, thus being exposed to moisture and differences in temperature.

Explanation of Symbols

The symbols used on the Information Center and the Philips Recorder are explained below.

Symbol	Description
	Attention, consult accompanying documents.
	This icon displays next to the bed label in the Patient Sector to indicate that the patient is telemetry monitored. If the transmitter is “docked” at TeleMon, the icon has a box around it.
	This icon displays next to the bed label in the Patient Sector to indicate that the M3 or IntelliVue Patient Monitor is connected to a wireless IntelliVue Clinical Network.
	This symbol displays next to a numeric in both the Main Screen and Patient Window to indicate that alarms are off for that parameter. If alarms are suspended, this symbol displays next to all numerics.

Symbol	Description
	This icon displays in the Patient Sector to indicate that a conflict exists between patient information at the Information Center and the bedside monitor. Go to the Admit Window for this patient and resolve the conflict.
	This symbol identifies the date of manufacture.
LOT XXXXXX	The manufacturing batch code.
	Fragile, handle with care
	Keep dry
	Consult instructions for use
REF	Catalog number
SN	Serial number

During Power Transitions/Loss

During hospital generator power transitions, an uninterruptible power supply (UPS) allows the system to continue to process and collect data. However, the display becomes blank until the transition to generator power is complete and line power is available for the display.

If power is not restored within 90 seconds, the system begins to shut down. After 120 seconds, the PC shuts down, and the UPS beeps every five seconds until power is restored.

Important—If power is restored between 90 and 120 seconds, you get the message “It is now safe to turn off your computer”, click on Restart to reboot the system. When this message is displayed, you must click on **Restart**.

If power is restored after 120 seconds, the computer is automatically restarted.

If the central is connected to the telemetry mainframe (and the mainframe is not connected to a UPS), following a power cycle, arrhythmia alarms are automatically ON. Therefore, any arrhythmia alarms (including HR) that had been turned off are turned back on when the mainframe is powered up.

If Connection to the M3154/M3169 Database Server is Lost

Local Database Mode

The M3154/M3169 Database Server provides database storage for Information Centers (M3150, M3151) connected to the IntelliVue Clinical Network. Server failure rarely occurs. However, in the event that access to the Database Server is lost, the following steps will take place automatically:

1. All M3150 Information Centers and M3151 Information Center Clients on the network will temporarily stop monitoring.
2. A warning message “operating on local DB” displays at the top of the screen notifying the user that the connection to the DB (Database) Server has been lost, and service should be notified.
3. The centrals will automatically be reconfigured to be in a “Local Database” mode.
4. Monitoring in this mode will be restored within 5 minutes of the loss of the Database Server.

In Local Database mode, data cannot be retrieved or stored on the Database Server, but data will be stored on the local central database. When in Local Database mode the Information Center will operate on its last known unit settings not the last known setting for a patient.

When in Local Database mode, the following applications will *not* be available:

- Review data for overview beds.
- Discharge with save to the transfer list (the user can save to the Transfer List locally, but this data will not be available once the server is re-connected).
- Storage to the Database Server of alarms, waves, events, trends, ST snippets.
- Event Review, Wave Review, ST Alarms, ST Setup, Unit Settings (except for Telemetry Frequency).
- Managing Patients functions (admit/discharge/sector setup) across centrals. Permanent changes to equipment (any assign or change equipment actions) performed while the Database Server is unavailable will be lost when access is restored. Changes to Care Groups (setup, assignment) performed while the Database Server is unavailable will be lost when access is restored.
- Synchronization of time.

- Adding/changing device configuration.
- Paging.
- Export Data to Holter System

When the server becomes available again, the following will happen:

1. On all centrals, in the system message area, the following message will be displayed: “To Restore Normal Operation - Press ‘Restart Network’ in Patient Window”.
2. Click **Restart Network** on the Patient Window.
3. Once the **Restart Network** button is clicked, a box will appear with directions for restarting the network. Since restarting the network will stop all central monitoring for 3 to 5 minutes, the restart can be planned for the optimal time.
4. Any applications that were changed while the server was unavailable will revert to their previous settings. This means that any admit, discharge, or transfer setting changes or equipment changes made while in Local Database mode will not be available when the database server is restored.
5. When connection to the IntelliVue Clinical Network is restored, M3151 Information Center Clients reboot automatically.

Important—When the network is reconnected:

- All Patient Census information will be restored from the Database Server. This means that any admit, discharge, or transfer setting changes or equipment changes made while in Local Database mode will not be available when the database server is restored.
  When connection to the Database Server is restored verify that all patient equipment, admit, discharge or transfer setting changes and alarm settings are accurate.
- For paging, the patient assignment to a caregiver/receiver is lost and will need to be re-entered. However, all caregiver receivers will receive alarm pages based upon the unit settings until patient assignments are made.
- Trend and alarm data stored while on the local database will be lost.
- All patient settings will be restored from the Database Server.
- When connection to the Database Server is restored verify that all patient equipment, admit, discharge or transfer setting changes and alarm settings are accurate.

Please see the Service Manual for more details.

Remote Diagnostics

The message “Remote diagnostics in progress - see User’s Guide” will be displayed when your system is being accessed remotely. This may cause some delay in the system response for applications utilizing the IntelliVue Clinical Network.

Maintenance

Before commencing monitoring on a patient:

- Check for any mechanical damage.
- Check all the external leads, input data connections and accessories.
- Check all the functions of the instrument which will be needed to monitor the patient, and ensure that the instrument is in good working order.

Do not use the Information Center for any monitoring procedure on a patient if you identify features which demonstrate impaired functioning of the instrument. Contact the hospital biomedical engineer, or the Philips Medical Systems service engineer.

We recommend that full performance checks be done by qualified service personnel after every repair or upgrade. See your Information Center Service Manual for additional information.

All checks which require the instrument to be opened must be made by qualified service personnel. Safety and maintenance checks can also be made by Philips Medical Systems personnel. Your local Philips Medical Systems office will be glad to give you information about service contracts.

Warning

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

Note—At this time, Philips Medical Systems will make available on request, and in English only, component part lists, descriptions, calibration instructions or other information which will assist the user's appropriate qualified technical

personnel to repair those parts of the equipment which are classified by Philips Medical Systems to be repairable.

A
Trend Definitions

This appendix provides definitions of the trend parameters.

Trend Graphs	Definition	Type
HR	Average Heart Rate over one minute.	Line
Pulse	Average Pulse Rate over one minute.	Line
RESP	Average Respiration Rate (RR) over one minute.	Line
%SpO2	Average %SpO_2 (oxygen saturation from pulse oximetry) over one minute. The first setting can be either continuous SpO_2 (bedside or telemetry) or intermittant telemetry SpO_2.	Line
%SpO2	Average %SpO2 over one minute. The second parameter is for telemetry SpO2 only	Line
%SpO2, %SpO2	Average %SpO2 over 1 minute. The left parameter is continuous (bedside or telemetry), and the right parameter is intermittant telemetry SpO2	Line
%SpO2_2	Average %SpO_2 2 (oxygen saturation from pulse oximetry) over one minute.	Line
%SpO2L	Average left-sided %SpO_2 (oxygen saturation from pulse oximetry) over one minute.	Line
%SpO2R	Average right-sided %SpO_2 (oxygen saturation from pulse oximetry) over one minute.	Line
ABP	Average value for Arterial Blood Pressure systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line

Trend Graphs	Definition	Type
ABP SYS	Average value for Arterial Blood Pressure systolic pressure over one minute.	Line
ABP DIAS	Average value for Arterial Blood Pressure diastolic pressure over one minute.	Line
ABP MEAN	Average value for Arterial Blood Pressure mean pressure over one minute.	Line
PAP	Average value for pulmonary artery pressure systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
PAP SYS	Average value for pulmonary artery pressure systolic pressure over one minute.	Line
PAP DIAS	Average value for pulmonary artery pressure diastolic pressure over one minute.	Line
PAP MEAN	Average value for pulmonary artery pressure mean pressure over one minute.	Line
PAWP	Aperiodic Value for pulmonary artery wedge pressure placed on graph at time of measurement	Plot pts
CO	Aperiodic Value for cardiac output placed on graph at time of measurement	Plot pts
CCO	Average value for continuous cardiac output averaged over one minute.	Line
CVP	Average value for central venous pressure mean pressure over one minute.	Line
NBP	Aperiodic value for non-invasive blood pressure systolic, diastolic and mean pressures over one minute. Graph will contain 3 values for each entry.	Plot pts

Trend Graphs	Definition	Type
NBP SYS	Aperiodic value for non-invasive blood pressure systolic pressure at time of measurement.	Line
NBP DIAS	Aperiodic value for diastolic pressure at time of measurement.	Line
NBP MEAN	Aperiodic value for mean pressure at time of measurement.	Plot pts
P1	Average value for pressure 1 systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
P 1 SYS	Average value for pressure 1systolic pressure over one minute.	Line
P 1 DIAS	Average value for pressure 1diastolic pressure over one minute.	Line
P 1 MEAN	Average value for pressure 1 mean pressure over one minute.	Line
P2	Average value for pressure 2 systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
P 2 SYS	Average value for pressure 2systolic pressure over one minute.	Line
P 2 DIAS	Average value for pressure 2 diastolic pressure over one minute.	Line
P2 MEAN	Average value for pressure 2 mean pressure over one minute.	Line
P3	Average value for pressure 3 systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line

Trend Graphs	Definition	Type
P 3 SYS	Average value for pressure 3 systolic pressure over one minute.	Line
P 3 DIAS	Average value for pressure 3 diastolic pressure over one minute.	Line
P 3 MEAN	Average value for pressure 3 mean pressure over one minute.	Line
P4	Average value for pressure 4 systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
P 4 SYS	Average value for pressure 4 systolic pressure over one minute.	Line
P 4 DIAS	Average value for pressure 4 diastolic pressure over one minute.	Line
P 4 MEAN	Average value for pressure 4 mean pressure over one minute.	Line
ART	Average value for arterial pressure systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
ART SYS	Average value for arterial pressure systolic pressure over one minute.	Line
ART DIAS	Average value for arterial pressure diastolic pressure over one minute.	Line
ART MEAN	Average value for arterial pressure mean pressure over one minute.	Line
Ao	Average value for aortic systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line

Trend Graphs	Definition	Type
Ao SYS	Average value for aortic systolic pressure over one minute.	Line
Ao DIAS	Average value for aortic pressure diastolic pressure over one minute.	Line
Ao MEAN	Average value for aortic mean pressure over one minute.	Line
ICP	Average value for intracranial pressure mean pressure over one minute.	Line
CPP	Average value for cerebral perfusion pressure over one minute.	Line
LAP	Average value for left atrial pressure mean pressure over one minute.	Line
RAP	Average value for right atrial mean pressure over one minute.	Line
IUP	Average value for inter-uterine pressure mean pressure over one minute.	Line
UAP	Average value for umbilical artery pressure systolic, diastolic and mean pressures over one minute. Graph will contain 3 graphic trend lines.	Line
UAP SYS	Average value for umbilical pressure systolic pressure over one minute.	Line
UAP DIAS	Average value for umbilical pressure diastolic pressure over one minute.	Line
UAP MEAN	Average value for umbilical pressure mean pressure over one minute.	Line
UVP	Average value for umbilical venous pressure mean pressure over one minute.	Line

Trend Graphs	Definition	Type
ST-I	Average of four - 15 second ST segment values.	Line
ST-II	Average of four - 15 second ST segment values.	Line
ST-III	Average of four - 15 second ST segmentvalues.	Line
ST-aVL	Average of four - 15 second ST segment values.	Line
ST-aVF	Average of four - 15 second ST segment values.	Line
ST-aVR	Average of four - 15 second ST segment values.	Line
ST-V1	Average of four - 15 second ST segment values. (Only available with EASI ECG capability)	Line
ST-V2	Average of four - 15 second ST segment values.(Only available with EASI ECG capability)	Line
ST-V3	Average of four - 15 second ST segment values. (Only available with EASI ECG capability)	Line
ST-V4	Average of four - 15 second ST segment values. (Only available with EASI ECG capability)	Line
ST-V5	Average of four - 15 second ST segment values. (Only available with EASI ECG capability)	Line
ST-V6	Average of four - 15 second ST segment values. (Only available with EASI ECG capability)	Line
ST-V	Average of four - 15 second ST segment values.	Line
ST-indx	Average of four - 15 second ST segment values. (Only available with EASI ECG capability). ST-index is the sum of the absolute value of ST-II, ST-V2 and ST-V5.	Line
ST-MCL	Average of four - 15 second ST segment values.	Line

Trend Graphs	Definition	Type
ST-I, II, III, aVR, aVL, aVF	Average of four - 15 second ST segment values. Produces 6 line graphs.	Line
ST-I, II, III	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-II, aVF, V	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-I, aVL, V	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-V, MCL	Average of four - 15 second ST segment values. Produces 2 line graphs.	Line
ST-aVR, aVL, aVF	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-V1, V2, V3	Average of four - 15 second ST segment values. Produces 3 line graphs. (Only available with EASI ECG capability)	Line
ST-II, III, aVF	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-V4, V5, V6	Average of four - 15 second ST segment values. Produces 3 line graphs. (Only available with EASI ECG capability)	Line
ST-aVL, I, aVR	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-II, aVF, III	Average of four - 15 second ST segment values. Produces 3 line graphs.	Line
ST-V1, V2, V3, V, MCL	Average of four - 15 second ST segment values. Produces 3 line graphs. (Only available with EASI ECG capability).	Line

Trend Graphs	Definition	Type
PVC Count	Total number of beats labeled “V” in one minute.	Bar
SV Count	Total number of beats labelled “S” and “N” in one minute.	Bar
SVPB Count	Total number of beats labelled “S” in one minute.	Bar
Pause Count	Total number of asystole, pause, missed beat events in one minute.	Bar
Paced Beat Count	Total number of “P” beat labels (paced beats) in one minute.	Bar
PVC Pair Count	Total number of ventricular pairs (2 V’s in a row) in one minute.	Bar
PVC Run Count	Total number of PVC runs (3 or more V’s in row) in one minute.	Bar
Paced Run Count	Total number of Paced runs (3 or more “P” in a row = run) in one minute	Bar
SVPB Run Count	Total number of SVPB runs (3 or more “S” in a row = run) in one minute	Bar
Pacer Not Capture Count	Total number of Pacer Not Capture (No QRS for 1.75 x the average R-R interval with Pace Pulse (paced patient only) in one minute.	Bar
Pacer Not Pace Count	Total number of Pacer Not Pace (No QRS and No Pace Pulse for 1.75 x the average R-R interval (paced patient only) in one minute.	Bar
R on T Count	Total number of R on Ts (For HR <100, a PVC with R-R interval <1/3 the average interval followed by a compensatory pause of 1.25 x average R-R interval or 2 such Vs without a compensatory pause occurring within 5 min. of each other. (When HR >100, 1/3 R-R interval is too short for detection.) in one minute.	Bar

Trend Graphs	Definition	Type
Max PVC Run	The longest PVC run (largest number of V's in a run) in the last minute.	Bar
% Bigeminy	% of Ventricular Bigeminy Rhythm (N, V, N, V, N beat labels) in one minute	Bar
%Trigeminy	% of Ventricular Trigeminy Rhythm (N, N, V, N, N, V,N beat labels) in one minute.	Bar
% Paced	% of Paced Beats ("P" beats) in one minute.	Bar
% Atrial Paced	% of Paced Beats ("P" beats) with a Pace Pulse > 150 msec before the QRS in one minute.	Bar
% Vent Paced	% of Paced Beats ("P" beats) with a Pace Pulse < 150 msec before the QRS in one minute.	Bar
% AV Paced	% of Paced Beats ("P" beats) with 2 pace pulses (one > 150 msec and one < 150 msec) before the QRS in one minute.	Bar
% Irregular HR	% of R-R intervals which vary from the previous R-R interval by more than 12.5% in one minute.	Bar
% Poor Signal	% Poor Signal identified in one minute.	Bar
NNSD	Standard Deviation of NN R-R intervals where R-R intervals are less than 4 seconds averaged in one minute	Bar
PVC Rate	Average of the PVC count in one minute.	Line
pNN50	% of NNN beat sequences with changes of adjacent R-R intervals greater than 50msec in one minute. A measure of heart rate variabilty (HRV).	Bar
V-V Rate Min	Minimum heart rate of runs of beats labeled "V" in one minute	Line

Trend Graphs	Definition	Type
V-V Rate Max	Maximum heart rate of runs of beats labeled “V” in one minute	Line
Paced Rate Min	Minimum heart rate of runs of beats labeled “P” in one minute	Line
Paced Rate Max	Maximum rate of runs of beats labeled “P” in one minute	Line
S-S Rate Min	Minimum heart rate of runs of beats labeled “S” in one minute	Line
S-S Rate Max	Maximum heart rate of runs of beats labeled “S” in one minute	Line
Atrial Paced Beat Count	Total number of “P” beats with detected pace pulse > 150 msec before QRS in one minute.	Bar
Ventricular Paced Beat Count	Total number of beats labeled “P” with detected pace pulse < 150 msec before QRS in one minute.	Bar
A-V Paced Beat Count	Total number of beats labeled “P” with a detected pace pulse < 150 msec before QRS and a detected pace pulse > 150 msec before QRS in one minute.	Bar
Normal Beat Count	Total number of beats labeled “N” in one minute	Bar
Ventricular Beat Count	Total number of beats labeled “V” in one minute	Bar
SVPB Beat Count	Total number of beats labeled “S” in one minute	Bar
All Beat Count	Total number of beats in one minute	Bar
V? Run Count	Total number of runs (> or =3 beats with labels “V” or “?”) in one minute.	Bar
Multiform Count	Total number of multiform “V” in one minute.	Bar

Trend Graphs	Definition	Type
V-V Rate	Two trend lines which include V-V Rate Min and V-V Rate Max.	Line
Paced Rate	Two trend lines which include Paced Rate Min and Paced Rate Max.	Line
S- S Rate	Two trend lines which include S-S Rate Min and S-S Rate Max.	Line
Tblood	Average blood temperature value (from cardiac output module) over one minute.	Line
T1	Average temperature 1 value over one minute.	Line
T2	Average temperature 2 value over one minute.	Line
T1-T2	Average temperature difference value over one minute (applies to all temp source combinations from IntelliVue Patient Monitor)	Line
Tskin	Average skin temperature value over one minute.	Line
Tcore	Average core temperature value over one minute.	Line
Trect	Average rectal temperature value over one minute.	Line
Tesoph	Average esophageal temperature value over one minute.	Line
Tnaso	Average nasal temperature value over one minute.	Line
Tven	Average venous temperature value over one minute.	Line
Tart	Average arterial temperature value over one minute.	Line
SaO2	Average or aperiodic value of oxygen saturation value over one minute	Line
SvO2	Average venous oxygen saturation over one minute.	Line

Trend Graphs	Definition	Type
AWRR	Average airway respiration rate over one minute.	Line
PIP	Average peak inspiratory pressure value over one minute.	Line
TV	Average tidal volume value over one minute.	Line
EtCO2	Average end-tidal carbon dioxide value over one minute.	Line
IMCO2	Average inspired minimum carbon dioxide value over one minute.	Line
tcpCO2	Average transcutaneous carbon dioxide value over one minute.	Line
FIO2	Average fraction of inspired oxygen value over one minute.	Line
tcpO2	Average transcuntaneous oxygen value over one minute.	Line
AWP	Average airway pressure value over one minute.	Line
AWF	Average airway flow value over one minute	Line
AUX	Average value from auxiliary Vuelink module over one minute.	Line
BIS	Average Bispectral Index value over one minute.	Line

B
Event Definitions

Defined Events

Defined events are arrhythmia events and other defined events such as alarms off or patient button. Arrhythmia events use the ST/AR arrhythmia analysis beat labelling, rate calculation and some settings. Arrhythmia events do not require the arrhythmia alarm to be active.

“N” = Normal beat

“V” = Ventricular beat

“P” = Paced beat

“S” = Supraventricular premature beat

“?” = Insufficient information to classify beat

The duration of the defined event bars is dependent on the length of the event. If the event is active for 5 minutes event duration is 5 minutes. For example an event such as Pair V Event is a short event - two Vs are detected and the event is complete. An event such as Ventricular Bigeminy the bar extends until the event is over, therefore showing you the duration of the ventricular bigeminy.

Events	Definition
Some ECG Alarms off	One or more ** level Arrhythmia alarms have been manually turned off.
Alarms off	NO ARRHYTHMIA, ALL ARRH ALRMS OFF, and ALARMS SUSPENDED trigger the ALARMS OFF event.
Arrhythmia Event	Any of the following arrhythmia events:
Pair V Event	Two beats labelled as “V”

Events	Definition
Run V Event	Two or more beats
Fast Run V Event	Two or more beats labelled as “V” with a V rate of ≥120b/min
Long Run V Event	Two or more beats labelled as “V” which lasts > 8 seconds
Pair V? Event	Two beats labelled as “V” and “?”
Run V? Event	Two or more beats labelled as “Vs” and “?” with a V rate of 60-120b/min
Fast Run V? Event	Two or more beats labelled as “Vs” and “?”with a V rate of >120b/min
Run P Event	Two or more beats labelled as “P” with a P rate of 60-120b/min
Fast Run P Event	Two or more beats labelled as “P” with a P rate of ≥120b/min
Fast Long Run P	Two or more beats labelled as “P” with a P rate of > 120b/min which lasts > 8 seconds
Slow Run P Event	Two or more beats labelled as “P” with a P rate of <60 b/min
Pair SVPB Event	Two beats labelled as “S”
Run SVPB Event	Two or more beats labelled as “S”
Fast Run SVPB Event	Two or more beats labelled as “S” with S rate >120 b/min
Missed Beat Event	No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only)

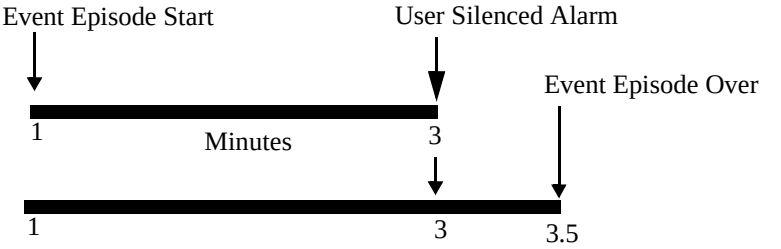
Events	Definition
Pause	No QRS detected for x seconds. Choices of >1.5 to 2.5 seconds.
Pacer Not Capture Event	No QRS for 1.75 x the average R-R interval with Pace Pulse (paced patient only)
Pacer Not Paced Event	No QRS and Pace Pulse for 1.75 x the average R-R interval (paced patient only)
R-on-T PVC Event	R-ON-T detected.
Multiform PVC Event	Multiform PVCs detected
Ventricular Rhythm Event	A dominant rhythm of adjacent Vs > vent rhythm limit and ventricular HR < V-Tach HR limit
Ventricular Bigeminy	A dominant rhythm of N, V, N, V (N=supraventricular beat, V=ventricular beat)
Ventricular Trigeminy	A dominant rhythm of N, N, V, N, N, V (N=supraventricular beat, V=ventricular beat)
Asystole Event	No QRS detected for x seconds. Choices of > 2.5 to 4 seconds
Vfib/Vtach Event	A fibrillatory wave (sinusoidal wave between 2-10 Hz) for 4 consecutive seconds
Patient Button	If the patient activates the patient button on the telemetry transmitter and the button is active.

Alarm Defined Events

Alarm defined events include arrhythmia alarms as well as other measurement alarms. Alarm defined events are defined by the alarm settings for arrhythmia and other measurements.

The duration of the alarm event bars is dependent on the length of episode and the user's response to the alarm. In other words the length of the event bar reflects the length the alarm message was displayed. If the event is short in duration, the alarm message will be displayed until the user responds (latched alarms) or until the event is over (non-latched alarms). If the episode is long in duration the message continues until the event is over and the event bar is longer, even if the user responds.

For example, a short run of VTACH, user responds in 3 minutes.



Events	Definition
YLW Alarms	All yellow alarms - both arrhythmia, ST and bedside generated alarms
All Alarms	All alarms - Red and Yellow arrhythmia, ST and bedside generated alarms
Arrhythmia Alarms	All alarms - Red and Yellow arrhythmia
RED ARRHY ALARMS	Red arrhythmia alarms
YLW ARRHY ALARMS	Yellow arrhythmia alarms
BED ALARMS	Any Red or Yellow bedside generated alarm
RED BED ALARMS	Any Red bedside generated alarm

Events	Definition
YLW BED ALARMS	Any Yellow bedside generated alarm
ST Alarms (Tel)	Yellow ST Alarms for Telemetry
***ASYSTOLE**	No QRS detected for x seconds. Choices of > 2.5 to 4 seconds
***VIFIB/VTACH**	Fibrillatory wave (sinusoidal wave between 2-10 Hz) for 4 consecutive seconds
***VTACH**	Consecutive PVCs >= V-Tach Run limit and HR > V-Tach HR limit
***EXTREME BRADY**	Heart Rate less than the Extreme Brady limit. This is set as difference from the HR Low limit.
***EXTREME TACHY**	Heart Rate greater than the Extreme Tachy limit This is set as difference from the HR High limit.
NON SUSTAIN VTACH	A run of Vs having HR > V-Tach HR limit, but lasting for less than the V-Tach Run limit
VENT RHYTHM	A dominant rhythm of adjacent Vs > vent rhythm limit and ventricular HR < V-Tach HR limit
RUN OF PVCs	Run of PVCs greater than 2
PAIR PVCs	Two consecutive PVCs between non-PVCs
R-ON-T PVC	For HR <100, a PVC with R-R interval <1/3 the average interval followed by a compensatory pause of 1.25 x average R-R interval or 2 such Vs without a compensatory pause occurring within 5 min. of each other. (When HR >100, 1/3 R-R interval is too short for detection.)
VENT BIGEMINY	A dominant rhythm of N, V, N, V, N (N=supraventricular beat, V=ventricular beat)

Events	Definition
****VENT TRIGEMINY**	A dominant rhythm of N, N, V, N, N, V, N, N (N=supraventricular beat, V=ventricular beat)
****PVC RATE**	PVCs within one minute exceeded the PVCs / min limit
****MULTIFORM PVCs**	The occurrence of two differently shaped Vs, each occurring at least twice within the last 300 beats as well as each occurring at least once within the last 60 beats
****PACE NOT CAPT**	No QRS for 1.75 x the average R-R interval with Pace Pulse (paced patient only)
****PACE NOT PACE**	No QRS and Pace Pulse for 1.75 x the average R-R interval (paced patient only)
****MISSED BEAT**	No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only)
****PAUSE**	No QRS detected for x seconds. Choices of >1.5 to 2.5 seconds. Note: M3/M4- No beat detected for 1.75 x average R-R interval for HR <120, or no beat for 1 second with HR >120 (non-paced patient only)
****SVT**	Run of SVPBs >= SVT Run limit and SVT Heart Rate > SVT HR limit
****IRREGULAR HR**	Consistently irregular rhythm (irregular R-R intervals)
****HR HIGH**	Heart Rate greater than the upper HR limit
****HR LOW**	Heart Rate lower than the lower HR limit
****RESP HIGH**	Respiration Rate greater than the upper RR limit

Events	Definition
****RESP LOW**	Respiration Rate lower than the lower RR limit
*****Apnea**	Respiration has stopped for longer than the set apnea time.
****SPO2 HIGH** ****SPO2 LOW**	SpO2 greater than the upper SpO2 limit SpO2 lower than the lower SpO2 limit
****SVO2 HIGH** ****SVO2 LOW**	SvO2 greater than the upper SvO2 limit SvO2 lower than the lower SvO2 limit
****ST I HIGH** ****ST I LOW** ****ST II HIGH** ****ST II LOW** ****ST III HIGH** ****ST III LOW** ****ST aVF HIGH** ****ST aVF LOW** ****ST aVL HIGH** ****ST aVL LOW** ****ST aVR HIGH** ****ST aVR LOW** ****ST V HIGH** ****ST V LOW** ****ST V1 HIGH** ****ST V1 LOW** ****ST V2 HIGH** ****ST V2 LOW** ****ST V3 HIGH** ****ST V3 LOW** ****ST V4 HIGH** ****ST V4 LOW** ****ST V5 HIGH** ****ST V5 LOW** ****ST V6 HIGH** ****ST V6 LOW** ****ST MCL HIGH** ****ST MCL LOW**	ST greater than the upper ST limit ST lower than the lower ST limit

Events	Definition
****PULSE HIGH** ****PULSE LOW**	Pulse greater than the upper Pulse limit Pulse lower than the lower Pulse limit
****NBP HIGH** ****NBP LOW**	NBP greater than the upper NBP limit NBP lower than the lower NBP limit
****CPP HIGH** ****CPP LOW**	CPP greater than the upper CPP limit CPP lower than the lower CPP limit
****AWRR HIGH** ****AWRR LOW**	awRR greater than the upper awRR limit awRR lower than the lower awRR limit
****EtCO2 HIGH** ****EtCO2 LOW**	EtCO2 greater than the upper EtCO2 limit EtCO2 lower than the lower EtCO2 limit
****FiO2 HIGH** ****FiO2 LOW**	FiO2 greater than the upper FiO2 limit FiO2 lower than the lower FiO2 limit
****IMCO2 HIGH**	imCO2 greater than the upper imCO2 limit
****tcpO2 HIGH** ****tcpO2 LOW**	tcO2 greater than the upper tcO2 limit tcO2 lower than the lower tcO2 limit
****tcpCO2 HIGH** ****tcpCO2 LOW**	tcCO2 greater than the upper tcO2 limit tcCO2 lower than the lower tcO2 limit
****<Temp Label>HIGH** ****<Temp Label>LOW**	<Temp Label> greater than the upper <Temp Label> limit <Temp Label> lower than the lower <Temp Label> limit
****<PRESS LABEL> HIGH** ****<PRESS LABEL>LOW**	<Press Label> greater than the upper <Press Label> limit <Press Label> lower than the lower <Press Label> limit

Events	Definition
***P1 DISCONNECT ***P2 DISCONNECT ***P3 DISCONNECT ***P4 DISCONNECT ***ABP DISCONNECT ***PAP DISCONNECT ***IUP DISCONNECT ***ARTDISCONNECT ***UAP DISCONNECT	The pressure is non-pulsatile and the mean pressure is continuously less than 10mmHg (1.3kPa). This alarm occurs only with arterial pressures (P, ABP, ART, AO, UAP, PAP).numeric flashes, red alarm lamp, alarm tone.
***VENTILATOR DISCONNECT	Ventilator Disconnected from patient. (availability depends on Vuelink Device))
**CCO HIGH **CCO LOW	CCO greater than the upper CCO limit CCO lower than the lower CCO limit
**BIS HIGH **BIS LOW	BIS greater than the upper BIS limit BIS lower than the lower BIS limit
**VUELINK OTHER ALARM	Type of alarm depends on Vuelink Device.

C

ST/AR Configuration Reporting

This appendix provides a list of the 7-character encoded ST/AR configuration parameters that display as part of the alarm information on alarm strip recordings. This information can assist user in identifying problems in the operation of STAR arrhythmia analysis as well assist in interpreting the results obtained by the algorithm.

These items are coded into a 7 character string, as follows:

Character	Identifies
First	ST/AR's revision.
Second	Patient category, pacing mode and analysis level.
Third and Fourth	• Classification mode (single or multi-lead) • Detection mode (auto or manual) • User specified lead label (manual detection mode only) • User specified minimum threshold (150-350uV) (manual detection mode only) • Algorithm minimum detection threshold (150-350uV) (manual detection mode only)
Fifth	Number of active classification and detection channels EASI mode/EASI coefficient set
Sixth	ECG hardware source and lead set in use (3-wire, EASI, etc.)
Seventh	Source of Asystole, Pause, Missed Beat, PNP or PNC alarm (detection or beat interval)

First Character Codes

The first character identifies the ST/AR revision.

STAR revision	First Character
Release E	4

Second Character Codes

The second character identifies the patient category, pacing mode and analysis level.

Patient Type	Paced Mode	Arrhythmia Level	Second Character
Neo	True	Cardiotach	0
		Basic	1
		Enhanced	2
	False	Cardiotach	3
		Basic	4
		Enhanced	5
Ped	True	Cardiotach	6
		Basic	7
		Enhanced	8
	False	Cardiotach	9
		Basic	B
		Enhanced	C

Patient Type	Paced Mode	Arrhythmia Level	Second Character
Adult	True	Cardiotach	D
		Basic	F
		Enhanced	G
	False	Cardiotach	H
		Basic	J
		Enhanced	K

Third and Fourth Character Codes

The third and fourth character identifies the:

- Classification mode (single or multi-lead)
- Detection mode (auto or manual)
- User specified lead label (manual detection mode only)
- User specified minimum threshold (150-350uV) (manual detection mode only)
- Algorithm minimum detection threshold (150-350uV) (manual detection mode only

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Note

Use the Multi/Manual/Lead I entries as a guideline in determining the appropriate expanded values for each Lead listed in the table below.

Classification Mode	Detection Mode	User Specified Detection Lead	User Specified Detection Threshold	Algorithm Minimum Detection Threshold	Third And Fourth Character
Multi	Auto	N/A	N/A	150	00

Classification Mode	Detection Mode	User Specified Detection Lead	User Specified Detection Threshold	Algorithm Minimum Detection Threshold	Third And Fourth Character
	Manual	Lead I	150	150	10
				350	11[a]
			200	200	12
				350	13[b]
			250	250	14
				350	15[c]
			300	300	16
				350	17[d]
			350	350	18
				350	19[e]
		Lead II	150 - 350	150 - 350	20 - 29
		Lead III	150 - 350	150 - 350	30 - 39
		Lead AVR	150 - 350	150 - 350	40 - 49
		Lead AVL	150 - 350	150 - 350	50 - 59
		Lead AVF	150 - 350	150 - 350	60 - 69
		Lead V1	150 - 350	150 - 350	70 - 79
		Lead V2	150 - 350	150 - 350	80 - 89
		Lead V3	150 - 350	150 - 350	90 - 99
		LV4	150 - 350	150 - 350	B0 - B9

Classification Mode	Detection Mode	User Specified Detection Lead	User Specified Detection Threshold	Algorithm Minimum Detection Threshold	Third And Fourth Character
		Lead V5	150 - 350	150 - 350	C0 - C9
		Lead V6	150 - 350	150 - 350	D0 - D9
		Lead V	150 - 350	150 - 350	F0 - F9
		Lead MCL1	150 - 350	150 - 350	G0 - G9
		Lead MCL2	150 - 350	150 - 350	H0 - H9
		Lead MCL3	150 - 350	150 - 350	J0 - J9
		Lead MCL4	150 - 350	150 - 350	K0 - K9
		Lead MCL5	150 - 350	150 - 350	L0 - L9
		Lead MCL6	150 - 350	150 - 350	M0 - M9
		Lead MCL	150 - 350	150 - 350	N0 - N9
Single	Auto	N/A	N/A	150	01
	Manual	Lead I	150 - 350	150 - 350	P0 - P9
		Lead II	150 - 350	150 - 350	R0 - R9
		Lead III	150 - 350	150 - 350	S0 - S9
		Lead AVR	150 - 350	150 - 350	T0 - T9
		Lead AVL	150 - 350	150 - 350	V0 - V9
		Lead AVF	150 - 350	150 - 350	W0 - W9
		Lead V1	150 - 350	150 - 350	X0 - X9
		Lead V2	150 - 350	150 - 350	Y0 - Y9

Classification Mode	Detection Mode	User Specified Detection Lead	User Specified Detection Threshold	Algorithm Minimum Detection Threshold	Third And Fourth Character
		Lead V3	150 - 350	150 - 350	Z0 - Z9
		Lead V4	150 - 350	150 - 350	b0 - b9
		Lead V5	150 - 350	150 - 350	c0 - c9
		Lead V6	150 - 350	150 - 350	d0 - d9
		Lead V	150 - 350	150 - 350	f0 - f9
		Lead MCL1	150 - 350	150 - 350	g0 - g9
		Lead MCL2	150 - 350	150 - 350	h0 - h9
		Lead MCL3	150 - 350	150 - 350	j0 - j9
		Lead MCL4	150 - 350	150 - 350	k0 - k9
		Lead MCL5	150 - 350	150 - 350	m0 - m9
		Lead MCL6	150 - 350	150 - 350	n0 - n9
		Lead MCL	150 - 350	150 - 350	p0 - p9

a. User specified lead is not active

b. User specified lead is not active

c. User specified lead is not active

d. User specified lead is not active

e. User specified lead is not active

Fifth Character Codes

The fifth character identifies the number of active classification and detection channels and EASI mode/EASI coefficient set.

EASI Mode	Active Classification Channels	Active Detection Channels	Fifth Character
Standard (non-EASI) electrode placement	0	0	0
		1	1
		2	2
	1	0	3
		1	4
		2	5
	2	0	6
		1	7
		2	8
EASI placement for Conventional 12-Lead derivation	0	0	9
		1	B
		2	C
	1	0	D
		1	F
		2	G
	2	0	H
		1	J
		2	K

Sixth Character Codes

The sixth character identifies the ECG hardware source and lead set in use (3-wire, EASI, etc.).

ECG HW Source	Lead Set	Sixth Character
unknown	unknown	0 or z
	3w	1
	4w	2
	5w	3
	10w	4
M1401 Telemetry	unknown	5
	3w	6
	4w	7
	5w	8
	10w	5
ECG A module	unknown	9
	3w	B
	4w	9
	5w	C
	10w	9

ECG HW Source	Lead Set	Sixth Character
ECG/resp A module	unknown	D
	3w	F
	4w	D
	5w	G
	10w	D
ECG B module	unknown	H
	3w	J
	4w	H
	5w	K
	10w	H
ECG/resp B module	unknown	L
	3w	M
	4w	L
	5w	N
	10w	L
M3000A Measurement Server	unknown	P
	3w	R
	4w	P
	5w	S
	10w	P

ECG HW Source	Lead Set	Sixth Character
M2600 Telemetry	unknown	T
	3w	V
	4w	P
	5w	W
	10w	P
M3001A Measurement Server	unknown	b
	3w	c
	4w	b
	5w	d
	10w	f

Seventh Character Code

The seventh character identifies the Source of Asystole, Pause, Missed Beat, PNP or PNC alarm (detection or beat interval).

Event Source	Seventh Character
N/A	0
look_ahead	1
look_back	2
look ahead beat rejection	3

D
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