

Displaying Data from a Specific Time

You can display data taken at any time in the past 24/72 hours. If no trend data is available for the time you select, data closest to this time is displayed.

1. Press **Skip To** on the Disclosure screen to display the Skip To popup (fig. 73).

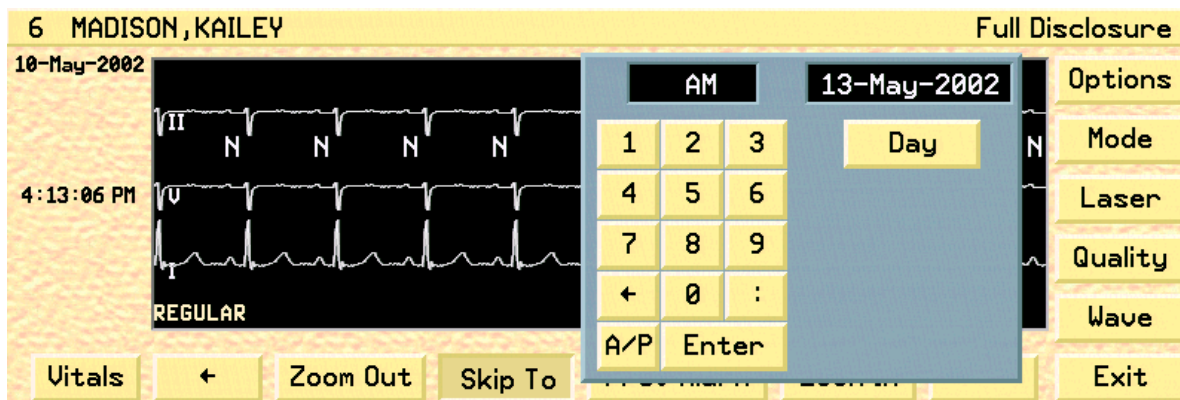


Fig. 73. Skip To Popup

2. On the popup keypad, enter the desired time: use **A/P** to set a.m. or p.m.

Note: If using a 24-hour time setup, you do not need to specify a.m. or p.m. You must, however, use the colon (:) to separate the hour and minutes in the Skip To popup.

3. Press **Enter** to execute the command or press **Skip To** a second time to cancel.

Note: If using 72-Hour Full Disclosure, you will also be required to specify the date.

Displaying Data from an Earlier or Later Time

Use the arrow buttons—left for earlier and right for later—to move the displayed waveform. Continuously pressing the left or right arrows will quickly scroll through the available full disclosure screens.

Displaying Vital Statistics

Press the **Vitals** buttons to display the patient's vital statistics, as well as the primary and secondary arrhythmia leads and rhythm indicator (page 70), from the first valid sample in the disclosure screen.

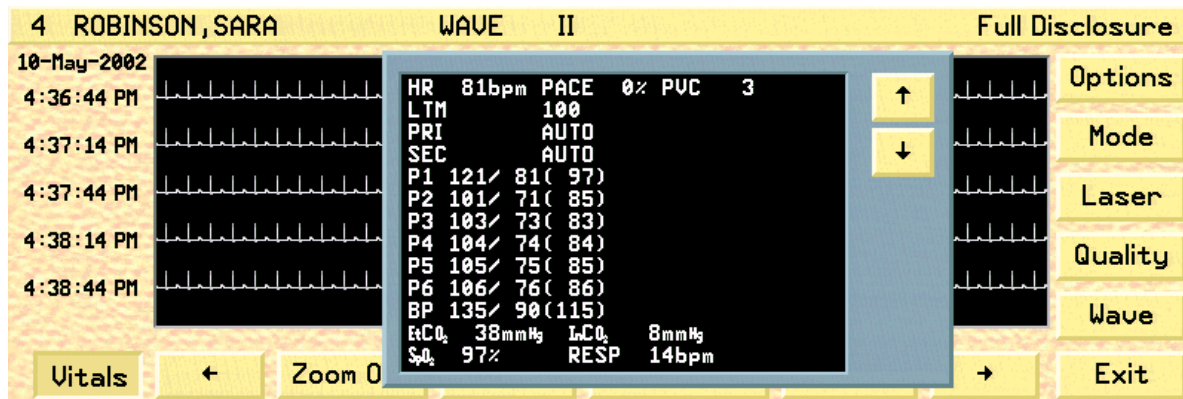


Fig. 74. Full Disclosure Vitals Popup

Viewing the Previous Alarm

Press the **Prev Alarm** button to display the previous alarm.

Storing a Disclosure Waveform Segment as a History Event

To store a 20-second waveform segment in Full Disclosure as a history event:

1. Highlight a wave segment to store. If it is longer than 20 seconds, the center 20-second segment is stored.

If the waveform is fully zoomed in, there is no need to highlight a segment. The 7 seconds of zoomed-in data is stored.

1. Press the **Options** button to display the Options Popup (fig. 75).

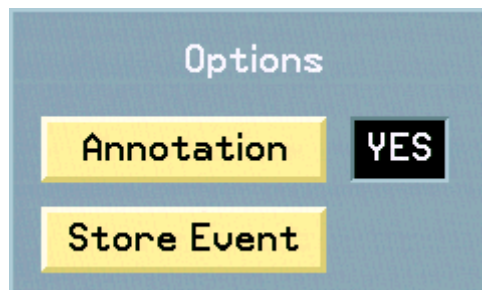


Fig. 75. Full Disclosure Options Popup

2. Press **Store Events** in the popup.

Full Disclosure stores are automatically set to Archive.

Printing Full Disclosure

You can print disclosure reports in 1, 2, 4, 8, 12, or 16 hour report, 24/72-hour report, 24/72-hour summary report, zoomed-in report formats, and 24/72-hour quality reports. These reports may be annotated with alarm violations and beat annotations.

Note: With the 72-Hour Full Disclosure option enabled, you can also print a 24, 48, and 72-hour report, summary, and quality reports.

Note: On laser strips, the Heart Rate value represents the average of the 10, one second, Heart Rates that are stored for the 10 seconds of printed data. Each stored Heart Rate is the running 6 beat average from the Arrhythmia analysis. See “Arrhythmia Analysis” on page 51 for details on Arrhythmia processing.

1. Press **Laser** on the Full Disclosure screen to display the Print popup (fig. 76).

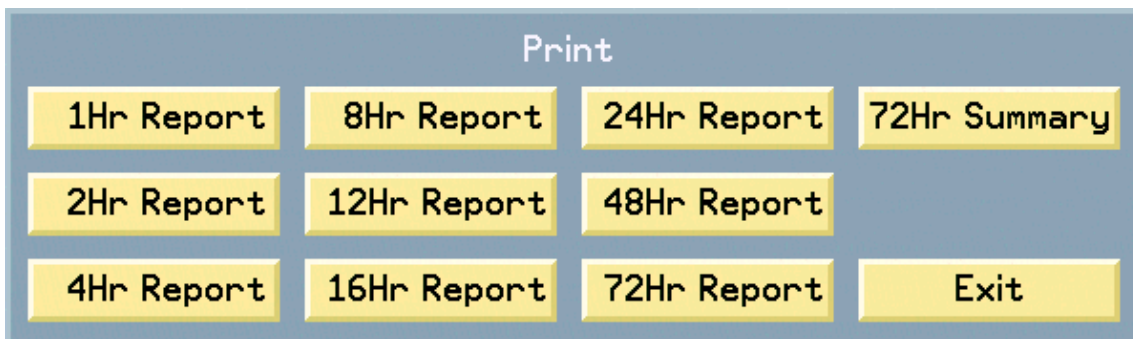


Fig. 76. Full Disclosure Report Popup

2. Select the button corresponding to the type of report you wish to print.

Note: You can only print hourly reports and summaries while in Zoomed-Out Full Disclosure mode. Zoomed-In Full Disclosure allows you to print the full disclosure segment as it is displayed on the screen.

One Hour Disclosure Report

This report prints from 15 minutes to one hour of waveforms to a page, depending on the number of waves selected.

- **One waveform in the disclosure screen:** one hour of data is printed on a page (one minute per line).
- **Two waveforms in the disclosure screen:** 30 minutes of waveforms are printed on a page.
- **Three waveforms in the disclosure screen:** 20 minutes of waveforms are printed on a page.
- **Four waveforms in the disclosure screen:** 15 minutes of waveforms are printed on a page.

The highest Priority alarm for each minute is printed to the right side. If alarms are turned off for the patient, the waveform is shaded in gray.

Arrhythmia state is indicated by BED (bedside source), CEN (central source) and OFF.

2 hr report

The 2 hour report prints the currently displayed hour and previous hour of disclosure data on multiple pages in the format defined above.

4 hr report

The 4 hour report prints the currently displayed hour and previous 3 hours of disclosure data on multiple pages in the format defined above.

8 hr report

The 8 hour report prints the currently displayed hour and previous 7 hours of disclosure data on multiple pages in the format defined above.

12 hr report

The 12 hour report prints the currently displayed hour and previous 11 hours of disclosure data on multiple pages in the format defined above.

16 hr report

The 16 hour report prints the currently displayed hour and previous 15 hours of disclosure data on multiple pages in the format defined above.

Cancel

Pressing the cancel button closes the print popup and no reports are printed.

24/72-Hour Disclosure Report

This report is similar to the one hour report and is printed at the Central Station even if requested at a PatientNet Viewer (also known as an IRVS or RVS).

24/72-Hour Summary Report

This report prints summary graphs of all data trended during the last 24/72 hours and the total number of alarm violations. It leaves space for physician signature and notes.

The data reported depends on the parameters selected for the past 24/72 hours.

The event is listed on the second page if archived, or a report was set.

It is printed at the Central Station even if requested at a PatientNet Viewer.

Zoomed-In Disclosure

Zoomed-in disclosure reports can be printed at either the Central Station or a PatientNet Viewer. To print zoomed in waves:

1. Press the mouse button and hold while you highlight (light gray) the segment of a waveform to zoom in.
2. Press **Laser** to print all waves in the shaded time period.

Quality Reports

Pressing this button displays the 24 (or 72) Hr Quality popup which allows you to print a detailed Quality report for either a particular patient or a summary Quality report for all patients that are on the central station.

Note: This button is disabled when Laser Access is set to No in the system configuration screen

Patient Button

The 24 hour (or 72-hour) quality report prints the time duration for specific alarm and history events that are stored in full disclosure over the past 24 (72) hours for the selected patient. The Date and Time formats on the report match the date and time formats that are configured on the system.

1. The 24-hour (72-hour) quality report prints the following alarm events:
 - each lead off alarm duration(s), the average duration leads were off, number of times the lead off alarm was triggered, and total time the lead off alarm was active
 - alarms off duration(s), the average duration alarms were off, number of times alarms were set to off, and total time alarms were off
 - low battery alarm duration(s), the average duration of the low battery alarm, number of times the low battery alarm was triggered, and total time the low battery alarm was active
 - no signal alarm duration(s), the average duration of the no signal alarm, number of times the no signal alarm was triggered, and total time the no signal alarm was active

All Patients Button

The All Patients button prints the summary 24 (72) hour quality report for all patients on the Central Station.

Note: This button is not displayed on the PatientNet Viewers.

The All Patients button prints the following:

- the average duration leads were off, number of times the lead off alarm was triggered, and total time the lead off alarm was active
- the average duration alarms were off, number of times alarms were set to off, and total time alarms were off
- the average duration of the low battery alarm, number of times the low battery alarm was triggered, and total time the low battery alarm was active
- the average duration of the no signal alarm, number of times the no signal alarm was triggered, and total time the no signal alarm was active

Data Loss

You may see “DATA LOSS” displayed on the zoomed-in Full Disclosure window and on corresponding printouts. When this occurs, the waveform may appear to be “cut off.” The cause of this phenomenon is a very small gap in the data stream. All data and alarms are processed properly during a “data loss.”

This page is intentionally left blank.

TREND DATA

The Trend function tracks monitored parameters up to twenty-four hours (or an optional 72 hours) for patients whose alarms are set to **ON** on the Patient Settings screen. You choose which parameters to trend and then customize the data to be shown on the screen and in printed reports. You can also mark specific events on the trend graph.

Trend settings are made on the Trend screen. Display this screen by pressing the **View** button, selecting the patient, and then clicking the **Trend** button on the View menu bar. The Trend screen is displayed (fig. 77).

CAUTION: Trend data is not collected if a patient's alarms have been set to **OFF** or 3-minute **ALARM OFF**, or if the bedside device does not send NIBP elapsed time. If a new reading is identical to the previous reading, it will not be stored.

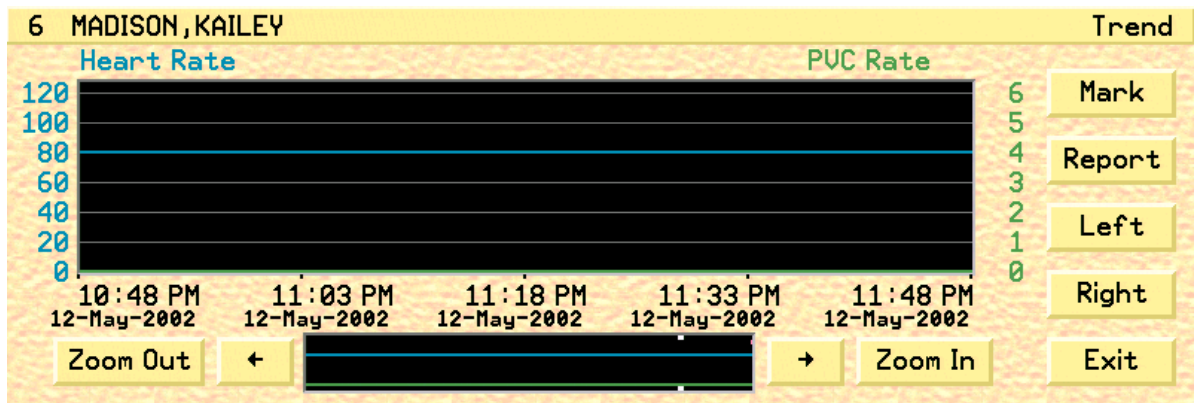


Fig. 77. Trend Screen

The small window at the bottom shows trend data for the entire 24/72 hour period. The brackets indicate the segment shown in the larger window above.

The left trend parameter, left trend data line (in both windows), and measurement units for left trend data are shown in one color; those on the right are shown in a different color.

TREND DATA

Selecting Trend Parameters to View

You can display two of the following parameters at a time on the trend graph

Table 18. Trend Graph Parameters

Device Type	Trend Parameter
Ambulatory Patients	• HR (heart rate) • PVC rate • ST Level* • ST Slope* • % Paced†
Bedside Monitored Patients	• HR (heart rate) • PVC rate • ST Level* • ST Slope* • P₁ (sys, dia, and mean) • P₂ (sys, dia, and mean) • P₃ (sys, dia, and mean) • P₄ (sys, dia, and mean) • P₅ (sys, dia, and mean) • P₆ (sys, dia, and mean) • BP (sys, dia, and mean) • EtCO₂ • InCO₂ • T₁ • T₂ • Resp Rate • SpO₂ • % Paced†

Device Type	Trend Parameter
Ventilator Patients	• RR Setting • RR Observed • V_t Setting • V_t Observed • Minute Volume • Spontaneous Minute Volume • PEEP/CPAP • Peak Flow • Peak Inspiratory Pressure • O₂% • I:E Ratio • MAP (Mean Airway Pressure) • Pressure Support • Plateau Pressure • SpO₂
* Available only if ST analysis is enabled. † Available only if Pacer processing is enabled.	

To display the parameters you have chosen:

1. Press the **Left** button on the Trend screen. A popup appears listing all available parameters for the selected patient (fig. 78).

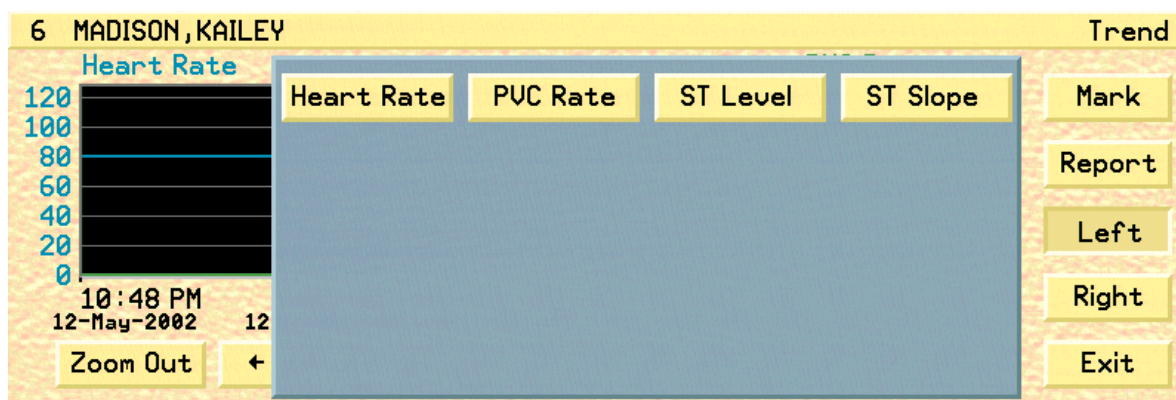


Fig. 78. Trend Parameter Popup

2. Press a parameter button on the popup. The parameter, measurement units, and trend data appear on the Trend screen.
3. Repeat for the right parameter using the **Right** button.

TREND DATA

Adjusting the Time Span of the Displayed Trend Data

The time span of the trend graph can be adjusted from one to 24 (72) hours, and if less than 24 (72) hours, can be moved to a later or earlier time. The time span is shown along the y-axis of the trend graph.

To adjust the length of the time span:

1. To lengthen the time span shown in the graph, press **Zoom Out** repeatedly to a maximum of 24 (72) hours.
2. To shorten the time span, press **Zoom In** repeatedly to a minimum of one hour.

To move the time span earlier or later, press the right or left arrow button to adjust the time shown.

Marking Trend Data

To identify events on the displayed trend graph and printed reports, press the **Mark** button on the Trend screen. A tick mark appears on the Trend screen window and in printed reports.

Printing Trend Data

You can print a 24-hour (or 72-hour) summary report of all trended data or a current snapshot of the displayed parameters. The 24-hour (72-hour) summary report is a multiple-page laser printout of all trend graphs. The snapshot report is printed from the strip chart recorder and consists of the two graphs of the two parameters displayed on the Trend screen. For both formats, all marks placed with the **Mark** button and all alarm ticks are printed above each trend graph.

1. Press the **Report** button on the Trend screen to display the Report popup (fig. 79).

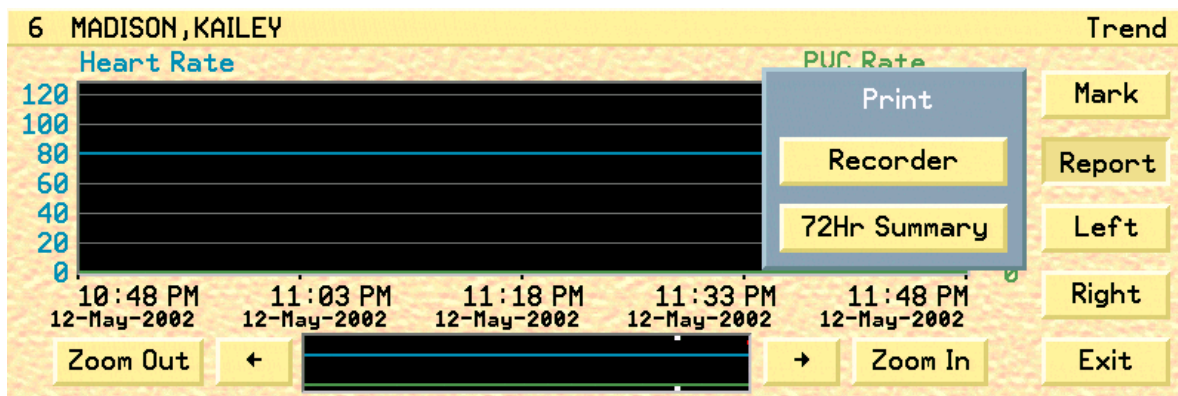


Fig. 79. Trend Report Popup

2. To print a snapshot from the strip recorder, press **Recorder** on the popup.
3. To print a 24-hour summary report on the laser printer, if one is enabled, press **24 Hr Summary**, or press **72 Hr Summary** for a 72 hour report.

Trend List

For bedside monitored and ambulatory patients you can view and print in list form the same trend information shown in the trend graph screen.

Press the **List** button on the View screen to display the List Trends window (fig. 80), which contains data collected in the past 24/72 hours. Data older than 24/72 hours is automatically deleted. Data older than 12 hours is in red text.

Ambulatory patient data is presented in a single column. Bedside monitored patient data is organized in two columns (use the **Pg Right/Pg Left** button to switch between the two columns).

4 ROBINSON, SARA

Trend List

(01 minute)

Time	Day	HR	PVC	%Paced	SpO ₂	BP	P1	Alarms
10:58A	MON	81	---	---	97	---/---[---	121/ 81[97]	
10:57A	MON	81	---	---	97	---/---[---	121/ 81[97]	
10:56A	MON	81	---	---	97	---/---[---	120/ 80[97]	
10:55A	MON	81	---	---	97	---/---[---	121/ 81[97]	
10:54A	MON	81	---	---	97	---/---[---	121/ 81[97]	
10:53A	MON	81	---	---	97	---/---[---	121/ 81[97]	
10:52A	MON	81	---	---	97	---/---[---	120/ 80[97]	
10:51A	MON	81	---	---	97	---/---[---	121/ 81[97]	

←

→

Laser

Pg Up

Skip To

↑

Settings

↓

Report

Pg Dn

Exit

Fig. 80. Trend List screen

CAUTION: Trend data is not stored for patients whose alarms are set to OFF. If a patient's alarms are OFF, dashes replace values in the trend list.

Displaying Data from a Specific Time

You can display data taken at any time in the past twenty-four or seventy-two hours. If no trend data is available for the time you select, data closest to this time is displayed.

1. Press **Skip To** on the List Trends screen.
2. On the popup keypad, enter the desired time; use **A/P** to set a.m. or p.m. if not in 24-hour mode.
3. Press **Enter** to execute the command or press **Skip To** a second time to cancel.

Selecting a Time Interval for Trend Data Display

Trend data in the list is shown by default at intervals of one minute. To select a different interval, press the **Settings** button and choose 1, 5, 10, 15 or 30 minutes, or 1, 2, 3 or 4 hours on the popup (fig. 81).

CAUTION: All alarms and NIBP measurements are displayed regardless of the time setting. If more than one alarm occurs at the same time, the alarm of highest priority is displayed. Select the **NIBP Only** or **No Alarms** button to prevent NIBP measurements and alarms from being displayed in the list.



Fig. 81. Trend Settings Popup

Printing a Trend List Report

For ambulatory patients, the printed trend list report contains HR, PVC, % paced and alarms. For bedside monitored patients, reports contain HR, alarms, and a set of other trend parameters that you select.

Bedside Monitored Patients:

1. Press **Report** to display the Report Configuration screen (fig. 82).
2. Select from All, BP, T1/T2, SpO₂, PVC, P1/P2, P3/P4, P5/P6, Resp, CO₂, and % paced. As you press the appropriate buttons, your choices appear in the Selected for Report window.

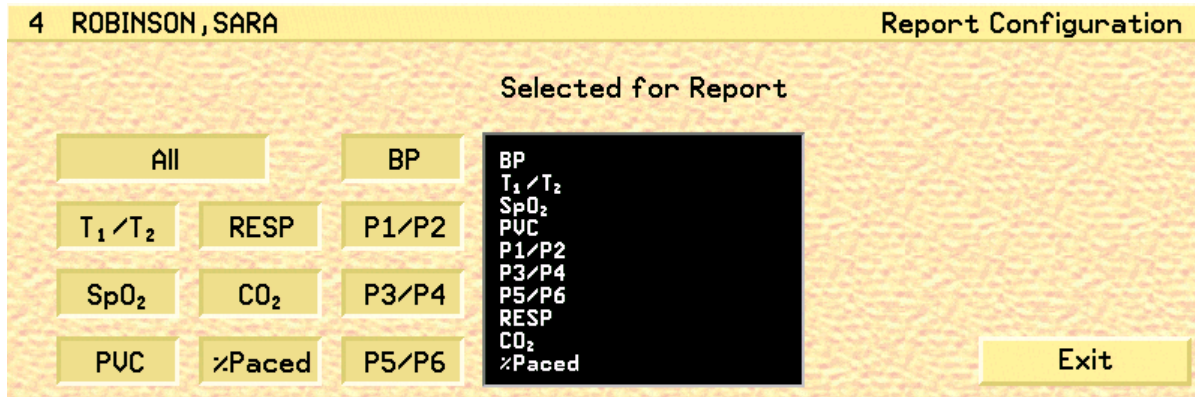


Fig. 82. Report Configuration screen

Note: Your report choices can be configured to be kept at the time of discharge. See your system administrator for details.

3. When you are finished making your selections, press **Exit**.
4. Press the **Record** or **Laser** button on the List Trends screen to display the Trend List Output popup (fig. 83).



Fig. 83. Trend List Output popup

5. On the popup, make one of the following selections:
 - Up To** to print the highlighted entry and more recent trend entries
 - All** to print all trend entries
 - After** to print the highlighted trend entry and older trend entries
 - Cancel** to cancel the print request

Ambulatory Patients

Follow steps 4 and 5 above.

TREND DATA

This page is intentionally left blank.

ST ANALYSIS

PatientNet performs ST analysis on ambulatory and bedside monitored patients as described in this section. Arrhythmia processing and ST Analysis is not performed when the device type is a ventilator.

Enabling ST Analysis

To enable ST analysis:

1. Press **Setup** on the Main screen and select the patient.
2. Set **Process** to ST and make further ST settings as instructed in this section. **Process** can be set to ST, None or Pacer. See “Pacemaker Processing” on page 95 for pacer information.

WARNING: While the ST algorithm has been validated for accuracy in detecting ST changes, the clinical significance of ST changes can be determined only by a physician.

The Central Station performs ST analysis on patients with ECG waveforms whose alarm source is set to Central, Arrhythmia is ON and ST is enabled.

For bedside arrhythmia source patients, the Central Station does not process arrhythmias, but does display and print digital ST data if the bedside device transmits it.

WARNING: For ambulatory patients connected to DT-4500 transceivers undergoing ST analysis, program the transceiver to 0.05 Hz frequency response. Otherwise, unpredictable and inaccurate ST analysis will result.

Viewing ST Analysis Data

ST information is shown on the ST Analysis screen. Press the **View** button on the Main screen and then **ST** on the View screen to display the ST Analysis screen.

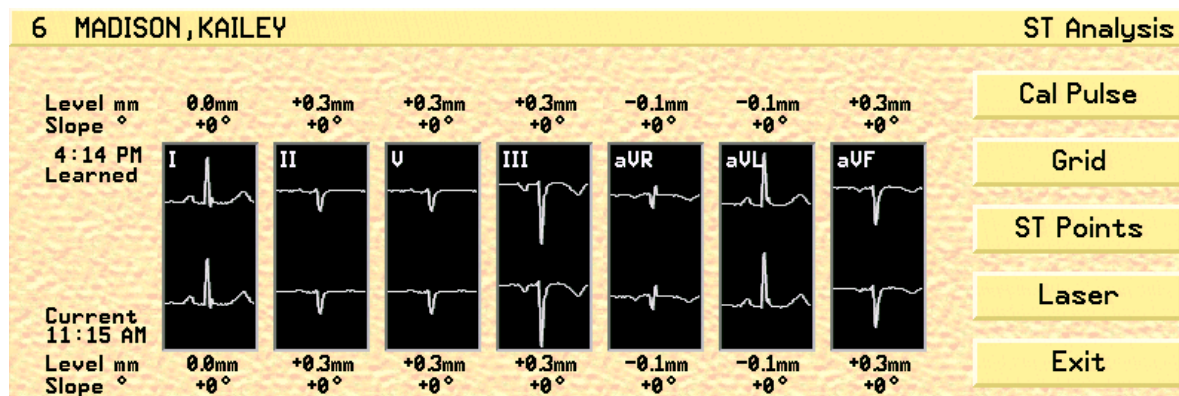


Fig. 84. ST Analysis Screen

ST ANALYSIS

The ST Analysis screen shows current and learned ST templates for up to seven leads, including derived leads (III, aVR, aVL, aVF) for central arrhythmia source patients. ST analysis is always performed on augmented leads regardless of whether they are displayed, so you can review augmented lead ST data at a later time.

An ST template is the current 16 or 32 beat average of the last 16 or 32 normal beats for the lead. ST templates are updated every time the 16 or 32 beat average is updated. (See “Selecting an Average Beat for ST Template Generation” on page 172.)

If an elevation or depression violation occurs on a lead, the ST level is shown in flashing red.

Note: The DT-4500 Ambulatory Transceiver supports 3, 4, and 5-wire at this time.

ST Measurement

Viewing Current ST Measurements

To view the current isoelectric point and ST start and end points for all available leads:

1. On the ST Analysis screen toggle the **ST Points** button to display hash marks at current ST measurement points.
2. Toggle the **Grid** button to turn gridlines on the templates on or off.

Measuring the ST Segment

You can set or change a patient’s ST measurement points on one of the three leads.

Press **ST Config** on the Patient Settings screen to display the ST Configuration screen. (If ST Analysis is disabled for the selected patient, a popup asks if you want to enable ST Analysis. Choose Yes.)

Set individual ST measurement points as shown below.

Isoelectric (ISO) Point

1. To have the system determine the ISO, toggle **Auto ISO button** to **On**.
2. To set the ISO yourself, first toggle **Auto ISO** button to **Off** and then perform *one* of the following:
 - a. Press the arrow buttons under **ISO** to change the isoelectric point. ISO values range from 5 to 250 ms before Q point, in 5 ms increments. The default is Q point minus 30 ms.
 - b. Click and drag the white vertical line on the large ST template to the desired location. Notice that the value in ISO window changes as you move the line.

ST Segment Starting Point

Use the arrow buttons under **ST Start** or move the green slide bar to set the start point of the ST segment between 0 and 295 ms past the J point. The default is J point plus 40 ms.

ST Segment End Point

Use the arrow buttons under **ST End** or move the orange slide bar to adjust the ST end point between 5 and 300 ms past the J point in 5 ms increments. The default is J point plus 80 ms. The ST end point must be greater than the ST start point.

System Defaults

To revert to system defaults for ST points and the isoelectric point, press **Defaults** on the ST Configuration screen.

CAUTION: Verify that ST start and end points are accurate and reset them if necessary before performing ST analysis on a patient.

Measuring ST Elevation and Depression

The ST level is the difference between the waveform voltage at the isoelectric point and the end point of the ST segment, and is expressed on the waveform in millimeters. ST elevation is above the isoelectric point; ST depression, below.

You can measure the ST elevation/depression by means of a calibration pulse.

1. Press **ST** on the View screen to display the ST Analysis screen.
2. Press **Cal Pulse** repeatedly to scroll through the following. Your choice appears on the templates.
 - calibration pulse to the left of the ST segment
 - no calibration pulse
 - calibration pulse centered over the template

The size of the calibration pulse depends on the ECG wave size chosen in the Patient Data Entry screen (see page 74) as follows:

ECG Size (mm/mv)	Calibration Pulse Size (mv)
2.5, 5 or 10	1
20	0.5
40	0.25

Configuring ST Alarms

This section includes ST alarm configuration instructions. For ST alarm information other than configuration, see “Alarm Management” starting on page 105.

ST alarm settings are made on the ST Alarm Config screen (fig. 85).

Press the **ST Config** button on the Patient Settings screen then the **ST Alarm** button on the ST Configuration screen to display this screen.

6 MADISON, KAILEY ST Alarm

Minimum Episode Duration: 60 (up/down arrows)

Min Gap Between Episodes: 60 (up/down arrows)

HR Cutoff: 120 (up/down arrows)

More ↓ Elev Depr All Leads

I	+2.0	-1.0
II	+2.0	-1.0
III	+2.0	-1.0
U	+2.0	-1.0
U1	+2.0	-1.0
U2	+2.0	-1.0
U3	+2.0	-1.0
U4	+2.0	-1.0

ST elevation threshold: +10 (up/down arrows)

ST depression threshold: -10 (up/down arrows)

Beat Avg: 32

ST Ref: Lrn

Defaults

Exit

Fig. 85. ST Alarm Config screen

Setting the ST Elevation and Depression Thresholds

When a patient’s ST elevation exceeds the ST elevation threshold or falls below the ST depression threshold, an ST alarm is generated. Set thresholds as follows:

1. Highlight a lead in the list; the **More** button displays additional leads in the list.
2. Press the **Elev** button.
3. Use the arrow buttons to the right of the vertical bar to adjust the ST elevation threshold from -10 mm to +10 mm in 0.5 mm increments. The value you select appears in the *second* column of the blackboard. The default is +2.0 mm.
4. Set the ST depression threshold.
5. Press the **Depr** button.
6. Use the arrow buttons to the right of the vertical bar to adjust the ST depression threshold from -10 mm to +10 mm in 0.5 mm increments. The value you select appears in the *third* column of the blackboard. The default is -1.0 mm.

CAUTION: When ST Ref is set to Lrn (See “Reference Level For ST Measurement” on page 172.), the elevation threshold must be set to a positive value and the depression threshold must be set to a negative value.

7. If you wish to use these ST elevation and depression threshold settings for all leads in the list, press the **All Leads** button.

Minimum Episode Duration

For central arrhythmia source patients you can establish a minimum time the ST condition must exist before it is classified as an episode and triggers an alarm.

1. Press the **ST Config** button on the Patient Settings screen.
2. Press the **ST Alarm Config** button on the ST Measurement Configuration screen.
3. Use the arrow buttons under **Minimum Episode Duration** field to select a minimum time. The range is 30 to 300 seconds in 15-second increments.

Minimum Period Between Episodes

To distinguish occurrences as independent episodes from segments of the same episode, you can establish a minimum time period (gap) between episodes. Suppose an ST level rises above the elevation threshold and is classified as an episode, then drops to normal before rising again above the threshold level. If the duration of the normal period reaches or exceeds the minimum gap you set, the system calls a second episode. If it is less than the minimum gap, it will not be called as a second episode.

To set the minimum gap between episodes:

1. Press **ST Config** on the Patient Settings screen.
2. Press **ST Alarm** on the ST Measurement Configuration screen.
3. Press the arrow buttons under **Min Gap Between Episodes** to scroll through the options. The range is 30 to 300 seconds in increments of 15 seconds.

Setting Heart Rate Cutoff on ST Analysis

Since the accuracy of ST readings diminishes as the patient's heart rate increases, you may wish to stop ST analysis at a pre-determined heart rate. To set a cutoff for ST analysis:

1. Press **ST Config** on the Patient Settings screen.
2. Press the **ST Alarm** button.
3. Use the arrow buttons under **HR Cutoff** to select a cutoff heart rate from 20 to 300 beats per minute, in increments of 10, for all leads.

ST analysis stops when the patient heart rate reaches this value and a flashing red "Heart Rate Over HR Cutoff" appears in the ST Analysis screen.

4. If you do not wish to set a limit, select **Off**. ST analysis is then performed regardless of patient heart rate.

Selecting an Average Beat for ST Template Generation

To select a rate for the arrhythmia software to generate a new ST template (options are every 16 beats or every 32 beats):

1. Press **ST Config** on the Patient Settings screen.
2. Press the **ST Alarm** button.
3. Toggle the **Beat Avg** button to select **16** or **32**. 32 is the default.

Reference Level For ST Measurement

The ST level can be measured from zero or can be measured relative to the learned ST template (Lrn). To select the ST reference for the highlighted lead, press the **ST Alarm** button then toggle **ST Ref** to **Zero** or **Lrn**. **Lrn** is the default.

ST Trends

For central arrhythmia source patients, ST level and slope data are trended and available in the Trend screen.

For bedside arrhythmia source patients, ST level and slope data are trended and made available if data is available from the bedside monitor.

See “Trend Data” starting on page 159 for further information on trending.

ST Disclosure

ST episode alarms are designated in Full Disclosure (page 147) as medical alarms.

ST History

For central source patients with ST enabled, ST episodes are stored as ST history events if the alarm is set to STORE on the Alarm Config screen.

Such stored events include:

- 20-second waveforms for up to 7 leads
- current ST templates for each surface ECG lead along with their time stamps
- learned ST templates for each surface ECG lead along with their time stamps
- location of ST measurement points for learned and current templates

For bedside arrhythmia source patients, the ST level and slope data appear in the Vitals popup and strip or laser printouts if it is available from the bedside monitor.

ST Printing

Laser Printing ST Analysis Information

To print real-time ST analysis information on the laser printer, press **Laser** on the ST Analysis screen. The patient's demographic information and ST parameters are printed with the ST analysis data.

If grid and/or ST points are selected when you press Laser, they are also printed. If the Cal Pulse is displayed when you press Laser, a one-mv calibration pulse is printed on the left side of the template.

Strip Recording

For central arrhythmia source patients with ST enabled, ST templates are printed preceding the Waveform data.

For bedside arrhythmia source patients, ST data is printed preceding the waveform data and under the waveform data in laser prints.

Printing and Recording ST Episodes

Real-time ST

ST templates are printed at the start of the waveform data. The ST information is printed before the waveform data, and before the bedside data (if any).

ST in History

ST episode alarms are stored in a patient's history file if alarms are set to STORE. See page 145 for details and instructions on printing ST history events.

Learning

The arrhythmia software "learns" ECG morphology for each lead and generates an ST template called the learned template. A re-learn deletes previously stored templates and creates new templates.

During the learning or relearning process, which takes 30 to 250 beats, "LEARNING" appears in the patient information block. See "Learn and Relearn Considerations" on page 70.

This page is intentionally left blank.

REMOTE VIEWING STATIONS

The RVS (PatientNet Viewer) and IRVS (Interactive-PatientNet Viewer) are monitors that display data on any patient on the network (from up to ten Central Stations simultaneously) on their own Main screens.

You can enter information and make changes on the IRVS, but not on the RVS. The RVS is for viewing purposes only.

The Main screens of the PatientNet Viewer and Interactive-PatientNet Viewer resemble the Central Station Main screen, except for the presence of a **Network** button on the PatientNet Viewer or Interactive-PatientNet Viewer screen, and the absence of a **Setup** button on the PatientNet Viewer. See table 19, “Differences between the Central Station and PatientNet Viewers,” on page 179.

16 Channel Mode (optional)

If your system has the **16 channel** option, the full Main screen shows 16 channels, but the split screen shows only 8 channels at a time. The split screen also has a **First 8/Last 8** button. Toggle this button to show the 8 channels not currently in view.

16 channel alarm indicators. In split screen if an alarm not set to Remote Alert occurs on a hidden channel, the alarm type and room number are displayed in flashing red in the status line. Alarm messages alternate if there are more than one.

Time out. The split screen reverts to the full screen automatically if no key strokes occur for 2 to 15 minutes (**Time out** must be enabled and the time set by the system administrator).

Security Function

The Interactive-PatientNet Viewer has a security function that allows the touch screen monitor to be locked when the Viewer is not in use. The security function is activated when the monitor is not touched for the set time out period (2-15 minutes). Once the security function is activated, the Touch Off button flashes the text “**Security**”, and the touch screen is locked.

To reactivate the touch screen:

1. Touch the monitor just under the System button on the right side of the main screen.
2. Slide the finger across the screen, towards the **Security/Touch Off** button, from right to left.
3. The Security button will stop flashing, the **Touch Off** button text is displayed, and the touch function is enabled.

Note: The Security Function must be enabled and the screen time out set by the system administrator. See your system administrator for details.

REMOTE VIEWING STATIONS

Network Patient Information

PatientNet Viewer and Interactive-PatientNet Viewer operations are performed on the Network Patient Information screen (fig. 86), displayed when you press the **Network** button on the PatientNet Viewer or Interactive-PatientNet Viewer main screen.

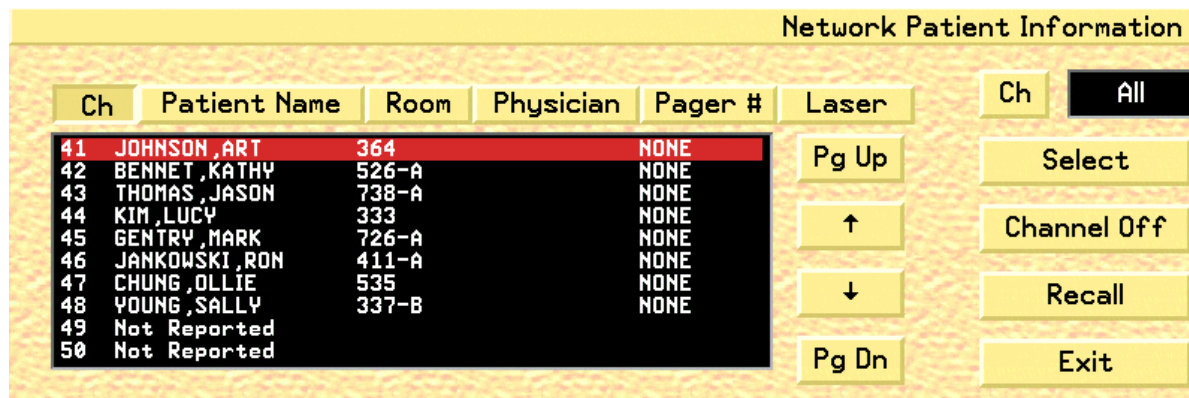


Fig. 86. Network Patient Information screen

Locating a Patient

You can find a patient in window list according to channel number, patient name, room number, physician, or pager number. Pressing **Ch**, **Room**, or **Pager #** sorts the list numerically. Pressing **Patient Name** or **Physician** sorts the list alphabetically. You can also sort patients by the **Nurse Unit**.

To add a patient to the Main Screen:

1. Highlight the patient you wish to add.
2. Select a waveform area.
3. Click the **Select** button.

Removing a Patient from the PatientNet Viewer/Interactive-PatientNet Viewer

To remove a patient from a channel on the Main screen:

1. Press **Ch** (not available on the PatientNet Viewer) in the upper right corner to select the channel containing the patient to be removed. **All** on the Interactive-PatientNet Viewer shows all channels on the network.
2. Highlight the patient to be removed and press **Channel Off**.

Printing at the PatientNet Viewer and Interactive-PatientNet Viewer

All printing requests made at the Interactive-PatientNet Viewer or PatientNet Viewer are printed at the Interactive-PatientNet Viewer or PatientNet Viewer, including full disclosure requests. Full disclosure strips print at whichever system—the patient's Central Station or the PatientNet Viewers—is configured for the printing.

Printing the Network Census Report

From the Network screen, you can print the Network Census Report, which displays patient information for all channels that are on the network. The report columns are sorted according to the sort settings on the Network Screen.

The Patient Column displays the following data:

- **Patient Name**
- **Not Reported**, for channels that are not on the patient network
- **Not Admitted**, for channels that have been discharged from the network

Remote Alert

Remote Alert lets you configure a PatientNet Viewer (also known as an IRVS or RVS) to display alarming patients automatically even if they are not currently on display at that PatientNet Viewer or Interactive-PatientNet Viewer. Setup of Remote Alert requires you to assign the patient to the PatientNet Viewer or Interactive-PatientNet Viewer and also to enable the patients alarms.

Configure Remote Alert at the PatientNet Viewer or Interactive-PatientNet Viewer on the **Automatic Reporting to RVS/IRVS**, displayed by pressing **System** on the Main screen then **Assign IRVS** or **Assign RVS** on the Passcode screen.

Enabling Patients and Alarms for Remote Alert

1. Enable the *patient* for Remote Alert. *This is done at the PatientNet Viewer or Interactive-PatientNet Viewer.*
 - a. Press the **Ch** button (not available on the PatientNet Viewer) to display all channels on the network or on a particular pod.
 - b. Highlight the patient using the arrow buttons or the **Pg Up** and **Pg Dn** buttons.
 - c. Select the desired **Report** button settings:

Report	
YES	activates Remote Alert for alarms enabled in step 2 below
NO	inactivates Remote Alert
2. Enable each individual *alarm* for Remote Alert. *This is done on the patient's Central Station.* For each alarm you wish to enable for Remote Alert, highlight the alarm on the patient's Alarm Config screen and set the **Assign** button to ON (see page 113).

Note: If either the Interactive-PatientNet Viewer, PatientNet Viewer, or Central Station are not configured correctly, then the Remote Alert will not perform properly.

How Remote Alert Displays an Alarming Patient

The system assigns the alarming patient to an empty channel on the PatientNet Viewer (RVS) or Interactive-PatientNet Viewer (IRVS). If there are no empty channels, then the alarming patient replaces the patient who has been displayed longest on the RVS/IRVS. In a 16 channel Interactive-PatientNet Viewer in split screen mode the alarming patient may be placed in a channel not currently visible. In this case the **First 8** or **Last 8** button (as appropriate) flashes red.

Central Station and PatientNet Viewers Differences

Table 19. Differences between the Central Station and PatientNet Viewers.

	Central Station	PatientNet Viewers		
		SiteLink	IRVS	RVS
Communication	sends data to IRVS and RVS; receives data from IRVS	sends and receives data from Central Station	sends and receives data from Central Station	receives data from Central Station
Patient Channels	8	8	8 or 16	8 or 16
Configurable Data Block View Screen Wave button	configurable updates Central Station and IRVS waves	configurable updates Central Station and IRVS waves	configurable updates Central Station and IRVS waves	not configurable does not update Central Station and IRVS waves
Volume Control	adjustable	adjustable	adjustable	- alarms not adjustable unless Alarm Control is enabled - medical alarm slider goes from Max to Off
Default buttons	yes	yes	no	no

Note: Not all of the above parameters are adjustable. Some of the parameters are enabled or disabled in the Administrator's screens. See your System Administrator for details.

REMOTE VIEWING STATIONS

Table 20. Differences in Screen and Button availability

	Central Station	PatientNet Viewers		
		SiteLink	IRVS	RVS
Network Patient Information Screen	no	No	yes	yes
ST Configuration screen	yes	yes	yes	no
Main Screen				
Setup button	yes	yes	yes	no
Network button	no	yes	yes	yes
History Screen				
Archive	yes	yes	yes	no
Event	yes	yes	yes	no
Erase	yes	yes	yes	no
Passcode Screen				
Assign IRVS/ RVS button	no	Sitelink	Assign IRVS	Assign RVS
OpenNet button	yes	yes	no	no
Shift Test button	only on page popup	only on page popup	only on page popup	no
Measure Screen				
Clear button	yes	yes	yes	no
Caliper buttons	yes	yes	yes	no
Full Disclosure				
Mode button	yes	yes	yes	no
System Setup Screen	yes	yes	no	no

USING THE RETROSPECTIVE VIEWER

Note: This function is only available on systems with the Retrospective Viewer option enabled.

The Retrospective Viewer allows you to access patient demographics, full disclosure, history, trends, and vital signs once a patient is discharged. The discharged patient files, however, are read-only and cannot be modified.

To access the Retrospective Viewer:

1. Click the **System** button at the top of the screen to display the Passcode screen.
2. Enter your passcode with the number pad and click **Enter** to display the System Setup screen (fig. 87).



Fig. 87. System Setup Screen

3. Click the **Retrospective Viewer** button on the System Setup screen to display the Retrospective Viewer (fig. 88).

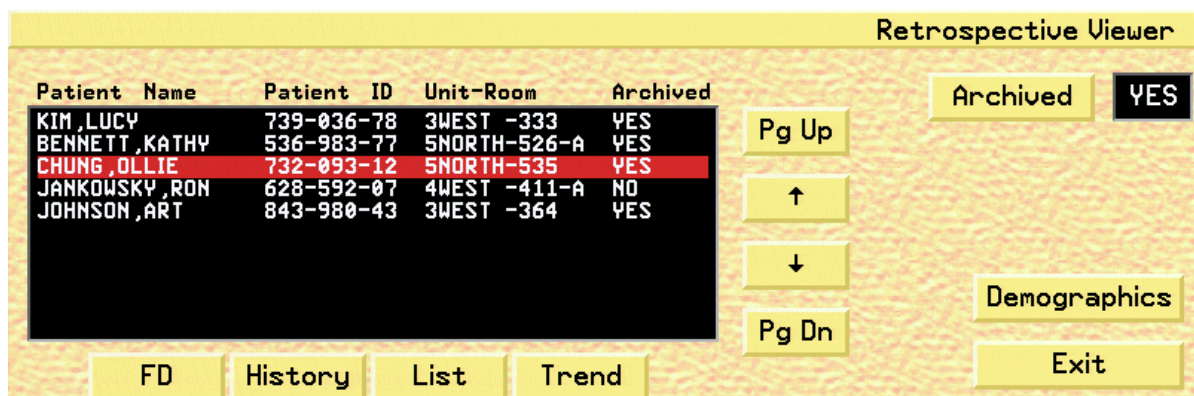


Fig. 88. Retrospective Viewer

4. Click on the **Pg Up**, **Pg Dn**, **Up**, and **Down** arrows to navigate through the list of discharged patients, which are displayed in the blackboard.

USING THE RETROSPECTIVE VIEWER

5. Click on the **Up** and **Down** arrows to highlight and select a patient for viewing.
6. Click the **Archived** button to toggle between Yes and No.
 - Selecting **Yes** will prevent the selected patient data from being deleted from the system. The maximum number of archived files is dependent on the system in use.

On **16 channel Central Stations**, you can have up to 16 discharged patients in the Retrospective Viewer, with 8 of those patients being saved in the Archive.

On **8 channel Central Stations**, you can have up to 24 discharged patients in the Retrospective Viewer, with 16 of those being saved in the Archive.
 - Selecting **No** means that the file is no longer archived and places it back in the rotation queue and will eventually be deleted before being used for a newly admitted patient.
7. Click the **Demographics** button to display the demographics screen (fig. 89) for the selected patient.

7 CHUNG, OLLIE		Retrospective	View Data
Patient Name	CHUNG, OLLIE	Pg Up	Laser
Nursing Unit	5NORTH	↑	
Room/Bed	535	↓	
Patient ID	732-093-12	Pg Dn	Exit
Date of Birth	05/20/18		
Sex (M/F)	M		
Physician	WILLIAMS		
Physician Group	WESTERN		

Fig. 89. Retrospective Viewer - View Data Demographics Screen

8. Click on the **Pg Up**, **Pg Dn**, **Up**, and **Down** arrows to navigate through the selected patient's demographic data, which is displayed in the blackboard.
9. Click the **Laser** button to print the demographic data.
10. Click the **Exit** button to return to the Retrospective Viewer.
11. On the Retrospective Viewer (see Figure 88 on page 181), click the **FD**, **History**, **List**, and **Trend** buttons to view the selected patient's stored data on the corresponding screens.
12. Click the **Exit** button to return to the System Setup screen.

WMTS TRANSCEIVERS

Note: The information in this section is only applicable for Wireless Medical Telemetry Service (WMTS).

About Transceivers

Wireless Medical Telemetry Services (WMTS) Remote Transceivers provide the link between the patient and the Central Station through the newly approved 608 - 614 MHz Medical Telemetry frequency band. The ambulatory and bedside device transceivers communicate data to the Central Station through the Access Point transceiver. In addition, the transceivers are capable of receiving control commands for self-use or connection transfer.

The PatientNet ambulatory transceiver is the DT-4500. This transceiver is worn by the patient and usually carried in a gown pocket or pouch, and used with a 3, 4, or 5-wire leadset connected to the electrodes on the patient. The DT-4500 is IPX7 compliant, so it can be submerged in 1m of water for up to 30 minutes.

The DT-7000 and DT-7001 are the PatientNet bedside-device transceivers and are physically connected to bedside monitors (other manufacturers' bedside monitors and NPB 7200 series ventilator).

The DR-10000 Access Point transceiver collects data from the ambulatory and bedside transceivers, sends that data to the Central Station, and transmits control data to the transceiver devices.

WARNING: Remove transceivers from patients before MRI and CAT scan procedures, and store the transceivers outside the room where such equipment is located. Close proximity to MRI or CAT scan equipment may result in damage to transceivers.

Programming Transceivers

Before a transceiver can be used with the PatientNet System, it must first be programmed with a Network Number and Monitor I.D. number to match the corresponding Central Station. Consult your facility's system administrator to perform these functions.

WARNING: When programming the DT-4500 through the External Serial Device (I/O) connector, it must be disconnected from the patient. The accessory connector shall be kept covered when not in use with the supplied protective cover. Failure to follow these instructions could lead to excessive voltages and currents being applied to the patient, resulting in cardiac arrest.

The corresponding Central Station must also be programmed to this Network Number and Monitor Identification number.

If you have any questions about the programming status, contact your system administrator.

Displaying Transceiver Status

You can view transceiver status on the Central Station, but not on the PatientNet Viewers (also known as the IRVS and RVS).

1. Press **System** on the Main screen.
2. Press **OpenNet** button on the Passcode screen to display the OpenNet Status screen (fig. 90).

OpenNet Transceiver Status														
Ch	Module	ID	Device ID	Batt	LL	RA	LA	Ua	Ub	Uc	Freq Resp	Link	Device Type	Version TX RF
65	0	3	9.5	0	0	0	-	-	-	0.5Hz	OK	4	Wire	1.2 55.123
66	0	3	9.5	0	0	0	-	-	-	0.5Hz	OK	3	Wire	1.2 55.123
67	0	3	9.5	0	0	0	-	-	-	0.5Hz	OK	Pass 2	1.2 55.123	
68	0	3	9.5	0	0	0	-	-	-	0.5Hz	OK	3	Wire	1.2 55.123
69	0	3	9.5	0	0	0	-	-	-	0.5Hz	OK	Pass 2	1.2 55.123	
70	0	3	9.5	0	0	0	0	-	-	0.5Hz	OK	5	Wire	1.2 55.123
71	0	3	9.5	0	0	0	0	-	-	0.5Hz	OK	5	Wire	1.2 55.123
72	0	3	9.5	0	0	0	0	-	-	0.5Hz	OK	5	Wire	1.2 55.123

Assign TX Program AT Program IT Exit

Fig. 90. OpenNet Status screen

Your System Administrator enables or disables the **Assign TX**, **Program AT**, and **Program IT** buttons. Check with your System Administrator for more information.

The columns in the OpenNet Status screen are described below.

Ch	channel number
Module ID	Transceiver ID that the channel is currently set to
Device ID	Device ID of the transceiver from which the channel receives data
Batt	battery voltage of the ambulatory transceiver
LL	left leg electrode impedance value
RA	right arm electrode impedance value
LA	left arm electrode impedance
Va	chest electrode impedance value
Vb, Vc	miscellaneous electrode impedance value
Freq Resp	frequency response programmed into each transceiver
Link	link between the transceiver and the Central Station: OK: the Central Station is receiving data from the transceiver OFF: the Central Station is <i>not</i> receiving data
Device Type	transceiver or bedside monitor associated with the channel
Version TX	the download firmware version currently in the transceiver
Version RX	the RF Module firmware version currently in the transceiver
Ch	channel number

Impedance Values

The DT-4500 Ambulatory Transceivers electrode impedance values, which are displayed on the OpenNet Transceiver Status screen, indicate the *quality* of the signal connection and are not the *actual* impedance values that are measured by the system. The electrode impedance values range from 100 to 200 (optimal). The typical values range between 180 and 200.

If the electrode's impedance value is greater than the defined Quality Threshold value, then its LED is illuminated. The DT-4500 stores the Quality Threshold value and uses this value to determine whether or not the electrode LED should be illuminated when the Attendant Present buttons are pressed. See Figure 91 on page 190 for details on the DT-4500 Buttons and LED indicators.

Note: A Lead Off alarm will occur when an electrode's impedance value drops to 150 (150 is the default Loose Lead Threshold value).

User Warnings, Cautions, and Notes

Before operating the WMTS transceivers, read and follow all warnings and cautions presented in this section.

Warnings

1. Do not use the output of the DT-4500 as a synchronization source for cardiac defibrillation. Delays in presentation of the R-Wave may be as much as 40 milliseconds.
2. Do not monitor pacer patients with a 3 wire leadset when reliable pacer detection is required. Pacer pulse detection can be erratic when only a single vector is monitored. Always use a 5 wire leadset when reliable pacer detection is required.
3. The DT-4500 is a type BF patient applied device. It is not suitable for direct cardiac application, for use in the operating room, or during cardiac surgery. Use in these environments could cause hazardous voltages and currents being applied to the patient's heart, resulting in cardiac arrest.
4. Only authorized type BF devices can be plugged into the accessory connector of the DT-4500 when it is applied to the patient. The accessory connector must be kept covered when not in use with the supplied accessory connector cover. Failure to follow these instructions could lead to hazardous voltages and currents being applied to the patient resulting in cardiac arrest.
5. Total submersion of the patient worn transceiver and/or patient leadset/antenna may severely limit its transmission range causing loss of patient monitoring. When subjecting the patient and transceiver to submersion, he/she should be carefully monitored to ensure that there is no signal loss.
6. Use only VitalCom Power Supply Part Number 395005 with the DT-7000/DT-7001.

7. **The DT-7000/DT-7001 is not designed as a patient contact device. Per FCC rules, the DT-7000/DT-7001 must reside more than 20 cm (7.9 inches) from the patient.**

Cautions

1. **Any changes or modifications to the device that are not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.**
2. **Electromagnetic interference or power overload, due to electrosurgical or diathermy instruments, may damage the device.**

Notes

1. This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules and CISPR 11. These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses, and radiates radio frequency energy, and, if not installed and used in accordance with the instructions contained in this manual, may cause harmful interference to radio and television communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference, then the user is encouraged to try to correct the interference by one or more of the following measures:

- Move the DT-4500, the bedside device with a DT-7000 or DT-7001, or the device being interfered with, to increase the separation between the two.

Note: Do not attempt to move fixed antennas as this can negatively impact the PatientNet System's operation.

- Connect the equipment into an outlet on a different circuit.
 - Contact your technical service representative for assistance.
2. To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables. Connecting this device to peripheral devices that do not comply with the CLASS B requirement or using an unshielded peripheral data cable could result in harmful interference to radio or television reception.
 3. The DT-4500, DT-7000, and DT-7001 should be disposed of at the end of their useful life per applicable regulations.

Ambulatory Transceiver (DT-4500)

The DT-4500 transceiver is a battery-operated ambulatory transceiver worn by the patient and used with a 3, 4, or 5-wire leadset that is connected to electrodes on the patient. The transceiver is available to patients who are not confined to a bed, but still require constant monitoring of their ECG waveforms.

Operating Instructions

Push Button Function and Use

See Figure 91 on page 190 for an image of the DT-4500 controls and LED indicators.

External Serial Devices (I/O) Connector

The External Serial Device (I/O) connector allows an external serial device or programming cable to connect and maintain a logical communication link between the DT-4500 and the Central Station. See page 183 for details on programming the DT-4500 through the I/O connector.

ECG Leadset Connector

The ECG leadset connector allows the ECG leadset to attach to the DT-4500 and maintain a logical communication link between the DT-4500 and the Central Station. See page 195 for details on attaching the ECG leadset to the DT-4500 through the ECG leadset connector.

Remote Record

When depressed, the Remote Record function button will initiate a strip chart recording at the Central Station.

Nurse Call

When depressed, the Nurse Call function button will initiate a Nurse Call Alarm at the Central Station.

Attendant Present / Procedure Alarm Silence (PAS) Unlock Button

The **Attendant Present/PAS Unlock Buttons** consists of two buttons that are located on either side of the transceiver (See Figure 91 on page 190). The Attendant Present push buttons have three functions. Each function is initiated based on how long the buttons are pressed.

- 1. Lead Quality**

Pressing both Attendant Present buttons simultaneously will illuminate the LEDs for each lead that has a minimum level of quality.

- 2. Initiating an Attendant Present Alarm**

Once the transceiver is in the Power-On Mode, pressing the Attendant Present buttons will activate the **Attendant Present** function and initiate an Attendant Present Alarm at the Central Station.

- 3. Unlocking the PAS button**

The PAS button must be unlocked or enabled prior to initiating the Procedure Alarm Silence button. In the “locked” position, the PAS button is disabled.

To “unlock” the PAS button, press, and hold (for about two seconds), the Attendant Present buttons until the Procedure Alarm Silence Status Indicator LED begins flashing. Once the LED indicator starts flashing, the PAS button is in the “unlocked mode” and functional.

Note: The PAS button must be pressed while the LED is still flashing. If it is pressed after the LED has stopped flashing, then the PAS button will automatically be “re-locked”.

Procedure Alarm Silence (PAS) Button

Depressing the PAS button, while the PAS Status Indicator LED is flashing, informs the clinicians at the Central Station area that the attending nurse will be performing a procedure to the patient that may cause inadvertent false alarms at the Central Station (i.e. changing lead wires, electrodes, etc.)

Once the PAS button is pressed, the following events occur at the Central Station.

1. A timer is displayed in the fourth patient block configurable field that displays the length of Procedure Alarm Silence time remaining on the transceiver.

CAUTION: All non-level one alarms are ignored while the PAS alarm is active.

2. "PA SILENCE" is denoted in Full Disclosure for the duration of the PAS period.

Once the PAS button is pressed, the DT-4500 enters the PAS Mode with the following indications:

1. The active time is set for 120 seconds and begins counting down.
2. The active time is transmitted to the Central Station.
3. The PAS Status LED indicates the time remaining through its flash speed. The LED flash speed increases as the PAS time remaining decreases from 120 seconds to 0 seconds.
4. The attendant can reset the PAS active time to 120 seconds by pressing both Attendant Present buttons again.

The Procedure Alarm Silence alarm remains active until one of the following conditions occur:

1. The transceiver no longer sends the procedure alarm silence indicator to the Central Station.
2. A level one alarm is detected and triggered at the Central Station
3. The patient tile alarm text area is clicked on. All alarms are set to ON once this area is clicked.
4. The attendant presses the PAS button while PAS is active. This will automatically cancel the 120 second PAS at the Central Station, and will re-enable the audible alarm tone.

Note: The PAS feature can be disabled by the System Administrator.

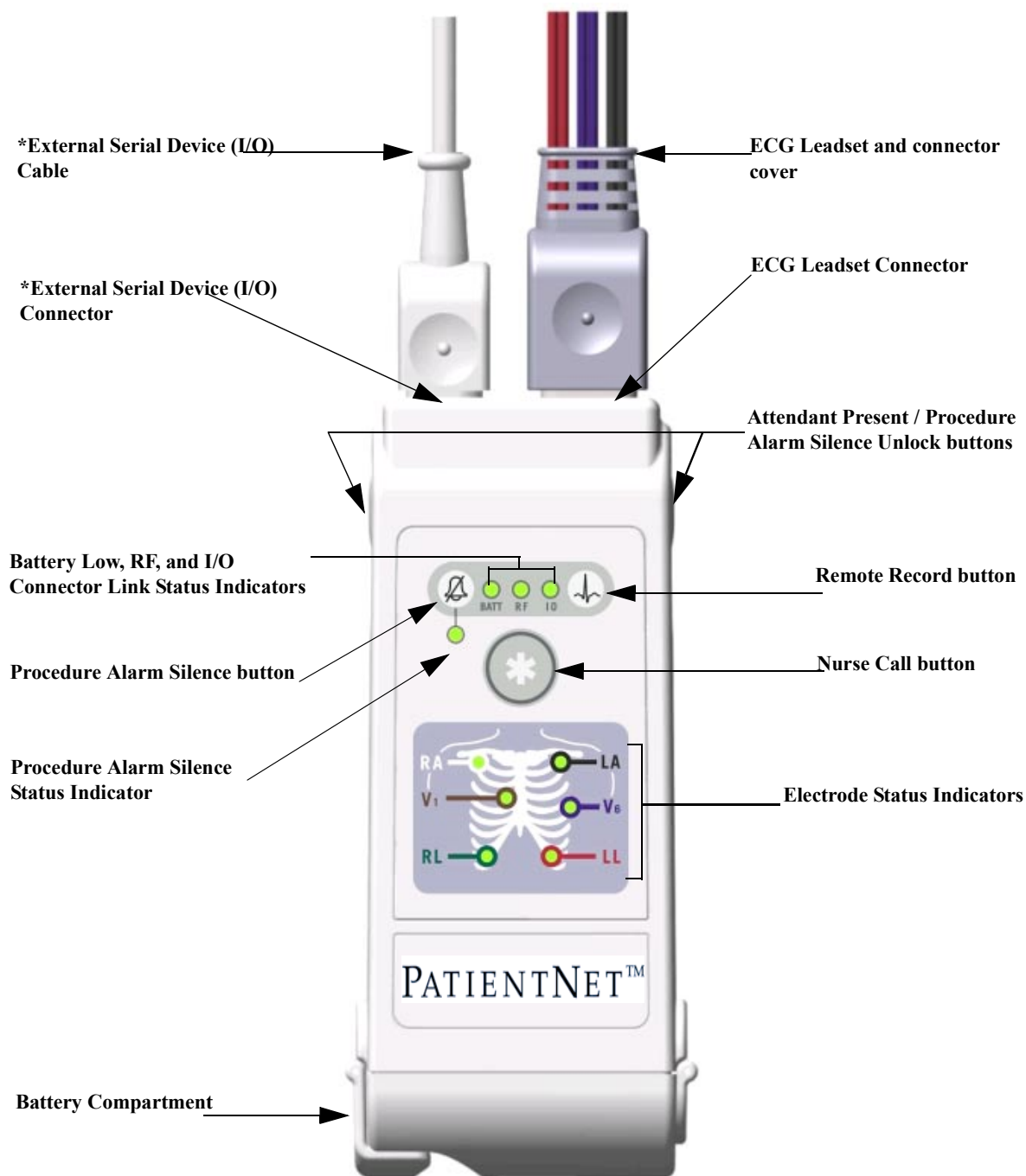


Fig. 91. DT-4500 Controls and LED Indicators

Note: *The External Serial Device (I/O) Cable must be removed and the Connector must be covered whenever the DT-4500 is connected to the patient.

LED Indicators Function

Upon Power-On, all LED indicators are illuminated for a brief period. After the specified time period, only those LEDs displaying positive (or negative) transceiver functions, as described in each section below, remain illuminated.

Procedure Alarm Silence Status Indicator

The Procedure Alarm Silence Status Indicator is illuminated when the PAS function is active. The LED flashes while the Procedure Alarm Silence button is unlocked or the PAS active time is running low. The PAS button can only be pressed and activated during this unlocked phase. Refer to the section on “Procedure Alarm Silence (PAS) Button” on page 189 for more information.

External Serial Devices (I/O)

The External Serial Device (I/O) LED is illuminated when an external serial device is connected, detected and maintaining a logical communication link.

Note: When illuminated, be sure that the device is not connected to the patient.

Low Battery (BATT)

The Low Battery (BATT) LED is illuminated while the battery voltage remains good; however, the LED flashes when the battery voltage falls below a predetermined value. When the battery power falls below a predetermined value, then the transceiver will automatically power itself off.

RF link (RF)

The RF link indicator is illuminated while there is RF communication between the DT-4500 transceiver and the Central Station. The LED flashes if there is communication between the DT-4500 transceiver and the Access point, but not the Central Station.

Electrode Status Indicators (RA, LA, RL, LL, V₁)

Each ECG electrode wire is named, color coded (Table 21), and represented by an LED indicator. Each LED is illuminated with a solid light when the electrode is fully active, and is off when no electrode signal is present.

Table 21 Electrode Colors

Electrode Name	Wire Color
RA	White
LA	Black
RL	Green
LL	Red
V1	Brown

The Quality Threshold value has a default setting. If the electrode's impedance value is greater than the default, then its LED is illuminated. The DT-4500 stores the Quality Threshold value and uses this value to determine whether or not the electrode LED should be illuminated when the Attendant Present buttons are pressed. See "Impedance Values" on page 185 for details.

Note: The V6 indicator will be available in future releases; therefore, the V6 LED will not illuminate when the Attendant Present buttons are pressed.

Cleaning

This section provides cleaning and maintenance instructions for DT-4500 transceivers.

Read and follow all precautions when cleaning transceivers.

WARNING: No claims are made concerning the sterility of the DT-4500 Ambulatory Transceivers.

CAUTION: Do not sterilize any part of the transceivers. Gas sterilization, autoclaving, liquid immersion, and other sterilization methods can cause serious damage to the devices that may not be obvious to the user.

Note: DO NOT use abrasive cleaners.

Cleaning the Chassis

The following applies to cleaning the DT-4500.

- The DT-4500 can be cleaned with the patient cable attached, however please ensure that the cleaning agents used to clean the DT-4500 are compatible with the cleaning agents listed for the ECG cable on page 194, or else ensure that the ECG cable does not come into contact with the cleaning agents for the DT-4500.
- To clean around the ECG connector, remove the ECG cable from the unit.

CAUTION: Prior to cleaning the battery compartment and transceiver chassis, remove the battery from the unit.

1. Remove the battery from the transceiver and inspect the battery compartment after each use. Close the battery door.

CAUTION: Prior to rinsing the DT-4500, make sure that the battery compartment door is properly closed and sealed.

2. Transceivers can be cleaned with a gauze pad or cloth moistened with one of the following agents:
 - Soap and Water
 - Quaternary Ammonium
 - Glutaraldehyde 2%
 - Dilute Chlorine Bleach (Sodium hypochlorite), 10% solution, freshly made in past 24 hours
 - Isopropyl Alcohol 70%
 - Ethyl Alcohol
3. Use a cloth moistened with distilled water to rinse away the cleaning solution.
4. Dry thoroughly with a lint-free cloth.

Note: Once a month, or whenever the DT-4500 is submersed or subjected to a stream of liquid, remove the accessory connector cover and remove any moisture that may have collected inside.

Cleaning the Battery Compartment

CAUTION: When cleaning the battery compartment, use only soap, water, or alcohol. Do not use any other cleaning agents inside the battery compartment as they may damage the battery compartment.

CAUTION: Make sure to rinse all cleaned surfaces with distilled water to remove any cleaning agent residue. Dry off the battery contact leads. Ensure that the battery compartment is dry before inserting the battery into the unit.

Under normal operation, the battery compartment should not require frequent cleaning. If the battery compartment does require cleaning, then use the following instructions.

1. Remove the battery from the battery compartment.
2. Clean the transceiver with a gauze pad or cloth moistened with one of the following agents:
 - Water
 - Soap
3. Use a cloth moistened with distilled water to rinse away the cleaning solution.
4. Dry thoroughly with a lint-free cloth. Allow the battery compartment to air dry completely prior to closing the compartment door.

Cleaning the ECG Leadsets

The transceiver ECG Leadsets are manufactured by Affinity Medical.

Contact your technical support representative for additional leadsets.

Warnings

1. **Do not use leadsets which exhibit signs of wear or damage such as cracking or degradation of the connectors or cable insulation.**
2. **Do not sterilize using steam or gamma radiation. Damage to the leadsets will result.**

Cautions

1. **To increase the life of the leadsets, do not pull on the leadsets to disconnect. Pull gently by grasping the connectors.**
2. **Do not immerse the leadsets in water or other liquid to clean. Immersion may cause damage to the leadsets.**
3. **Repeated exposure to EtO sterilization will shorten the effective life of the leadset. The leadsets should be sterilized only when indicated by specific patient or hospital requirements.**

Cleaning

1. Wipe the leadset with a solution of soap and water.
2. Use a cloth moistened with distilled water to rinse away the cleaning solution.
3. Dry thoroughly with a lint-free cloth.

Disinfecting

Use hospital-approved disinfecting procedures such as those recommended by AAMI or AORN.

1. Wipe the leadset with a fresh 10% solution of chlorine bleach and water or a 2% glutaraldehyde solution such as Cidex.
2. Use a cloth moistened with distilled water to rinse away the cleaning solution.
3. Dry thoroughly with a lint-free cloth.

Sterilization

Leadsets may be sterilized by EtO, when indicated. Use the hospital-approved procedure for EtO sterilization, such as those recommended by AAMI. The Leadsets are designed to remain effective after up to 10 exposures to EtO sterilization Cycles.

Use and Maintenance**Transceiver Storage**

Store the transceiver with the leadset attached and hanging freely. If that is not possible, then wrap the leadset loosely around the transceiver. Wrapping the leadset tightly around the transceiver can damage the wires.

Note: The DT-4500 Ambulatory Transceiver contains no user-serviceable parts. Thus, maintenance service is not needed.

Attaching and Removing a Leadset from the Transceiver

To attach, carefully grasp the leadset connector cover, holding it with the small knob facing upward, and push the leadset into the ECG lead wire connector. Make sure that the leadset is completely inserted into the connector and is flush with the DT-4500 chassis.

To remove the leadset, grasp hold of the sides of the leadset connector cover and pull straight out. If the leadset is difficult to remove, then you can slightly move the leadset cover side-to-side until it is released.

Internal Antenna

The DT-4500 transmits in the 608-614 MHz frequency range. The omnidirectional antenna is a part of the leadset system, with each lead wire paired with an antenna wire. Transceiver output power and system operation requirements are defined by the FCC. **Therefore, it is essential that the leadset provided not be modified or altered in any way.**

Installing and Removing a Battery

See “Specifications” on page 247 for acceptable batteries.

Note: Battery service life can be substantially improved by using nine-volt lithium batteries.

To install a 9V transceiver battery, first open the transceiver battery compartment by placing your thumb and forefinger on the compartment latch and flipping it open. Inspect the battery compartment and insure that there is no foreign object present that could block the battery contact or short the battery terminals. Next, place a 9V battery inside the compartment with the prongs touching the compartment contacts. The orientation of the battery prongs against the contacts does not matter, so long as the prongs and contacts are touching. Finally, close the battery compartment door by pressing it until the latch clicks into place and the compartment is secure.

To remove a battery, simply follow the installation steps listed above and discard the used battery per applicable regulations.

Warnings

1. ECG lead wires must be dressed and secured to the patient to prevent the possibility of them encircling the patient’s neck and causing strangulation.
2. When installing or replacing the battery, visually inspect the battery compartment and ensure that there are no foreign objects inside. A conductive object making contact with the battery contacts could cause the battery and battery compartment to overheat, resulting in burns to the patient and to the attendant removing the battery.
3. A foreign object blocking battery contact with the DT-4500 could prevent its operation resulting in failure to monitor the patient.
4. Always perform a battery check procedure after installing or replacing the battery.
5. Lithium Batteries may explode if mistreated. DO NOT recharge, disassemble, or dispose of batteries in fire.

Cautions

1. Transceivers should be carried securely in pouches or in a pocket of a patient’s gown. If the weight of the transceiver pulls on the wires, then the wires can be damaged or worn
2. Make sure that the wires are not twisted around each other; since, this can interfere with transmission and produce noise.
3. Make sure that the lead wires are not inadvertently pinched in the bed rails. This may cut the insulation or break the leadset.

Instrument Transceiver (DT-7000, DT-7001)

WARNING: When using a bedside device with the instrument transceiver (DT-7000/7001), the bedside device is the primary monitor and alarm source. Disabling alarms on the bedside device is not safe clinical practice.

The DT-7000 and DT-7001¹ send data and alarm information from bedside monitors and NPB 7200 series ventilators to the Central Station.

The transceivers support the bedside monitors shown in the PatientNet Customer Release Notes. See your system administrator for details.

Power to the DT-7000 is provided through one of the following:

- the AC power adapter, which provides continuous power
- the bedside monitor, which provides continuous power

Power to the DT-7001 is provided through one of the following:

- the AC power adapter, which provides continuous power
- the bedside monitor, which provides continuous power
- the internal battery, which is replaceable by qualified service technicians

Note: See your hospital's Service Department for battery replacement.

Operating Instructions

The DT-7000 and DT-7001 appearance and functionality are equivalent; however, only the DT-7001 is capable of using an internal battery as a power source.

Push Button Function and Use

See Figure 92 on page 200 for an image of the DT-7000/DT-7001 controls and LED indicators.

External Serial Devices (I/O) Ports

The External Serial Device (I/O) ports allow external serial devices or programming cables to connect and maintain logical communication links between the DT-7000/DT-7001 and the Central Station.

Note: *External Serial Device (I/O) Port 1 is currently functional. I/O Ports 2, 3 and 4 will be functional in future product releases.

1. The DT-7001 will be available in future releases. Please contact your sales representative for the device availability.

Remote Record

When depressed, the Remote Record function button will initiate a strip chart recording at the Central Station.

Nurse Call

When depressed, the Nurse Call function button will initiate a Nurse Call Alarm at the Central Station.

Power Button

Pressing the Power button either places the transceiver in or out of Standby Mode.

Attendant Present / Procedure Alarm Silence (PAS) Unlock Button

The Attendant Present push button has two functions. Each function is initiated based on how long the button is pressed.

Note: The LEDs are constantly illuminated when powered by an external source.

1. Initiating an Attendant Present Alarm

Once the transceiver is out of the Standby Mode, pressing the Attendant Present button will activate the **Attendant Present** function and initiate an Attendant Present Alarm at the Central Station.

2. Unlocking the PAS button

The PAS function must be enabled at the Central Station prior to initiating the Procedure Alarm Silence alarm at the DT-7000/DT-7001.

In the “locked” position, the PAS button is disabled.

To “unlock” the PAS button, press, and hold (for about two seconds), the Attendant Present button until the Procedure Alarm Silence Status Indicator LED begins flashing. Once the LED indicator starts flashing, the PAS button is in the “unlocked mode” and functional.

Note: The PAS button must be pressed while the LED is still flashing. If it is pressed after the LED has stopped flashing, then the PAS button will automatically be “re-locked”.

Procedure Alarm Silence (PAS) Button

Depressing the PAS button, while the PAS Status Indicator LED is flashing, informs the clinicians at the Central Station area that the attending nurse will be performing a procedure to the patient that may cause inadvertent false alarms at the Central Station (i.e. changing lead wires, electrodes, etc.)

Once the PAS button is pressed, the following events occur at the Central Station.

1. A timer is displayed in the fourth patient block configurable field that displays the length of Procedural Alarm Silence time remaining on the transceiver.

CAUTION: All non-level one alarms are ignored while the PAS alarm is active.

2. "PA SILENCE" is denoted in Full Disclosure for the duration of the PAS period.

Once the PAS button is pressed, the DT-7000/7001 enters the PAS Mode with the following indications:

1. The active time is set for 120 seconds and begins counting down.
2. The active time is transmitted to the Central Station.
3. The PAS Status LED indicates the time remaining through its flash speed. The LED flash speed increases as the PAS time remaining decreases from 120 seconds to 0 seconds.
4. The attendant can reset the PAS active time to 120 seconds by pressing both Attendant Present buttons again.

The Procedure Alarm Silence remains active until one of the following conditions occur:

1. The transceiver no longer sends the procedure alarm silence indicator to the Central Station.
2. A level one alarm is detected and triggered at the Central Station
3. The patient tile alarm text area is clicked on. All alarms are set to ON once this area is clicked.
4. The attendant presses the PAS button while PAS is active. This will automatically cancel the 120 second PAS at the Central Station, and will re-enable the audible alarm tone.

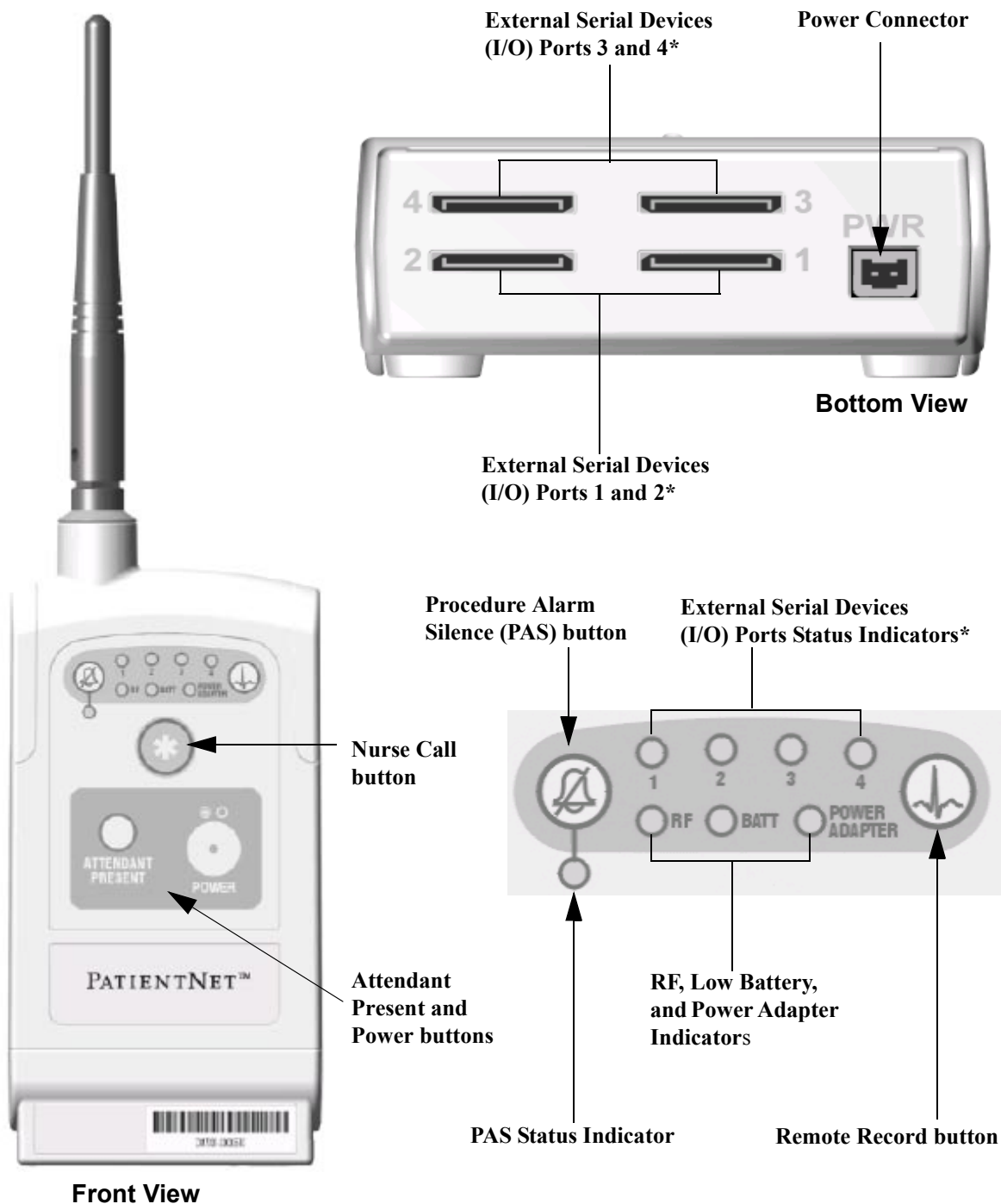


Fig. 92. DT-7000/DT-7001 Controls, I/O Ports, and LED Indicators

Note: *Only Port 1 of the External Serial Device (I/O) is functional. I/O Ports 2, 3 and 4 will be functional in future product releases.

LED Indicators Function

Once the transceivers exit Standby Mode, either by pressing the Attendant Present or Power buttons, all LED indicators are illuminated for a brief period. After the specified time period, only those LEDs displaying positive (or negative) transceiver functions, as described in each section below, remain illuminated.

Procedure Alarm Silence Status Indicator

The Procedure Alarm Silence Status Indicator is illuminated when the PAS function is active. The LED flashes while the Procedure Alarm Silence button is unlocked or the PAS active time is running low. The PAS button can only be pressed and activated during this unlocked phase. Refer to the section on “Procedure Alarm Silence (PAS) Button” on page 189 for more information.

External Serial Devices (I/O)

The External Serial Device (I/O) LEDs are labeled 1-4 and are each illuminated when there is an external serial device connected, detected, and maintaining a logical communication link to the corresponding I/O data port (fig. 92).

Low Battery (BATT)

Note: The Low Battery LED is only functional on the DT-7001.

The Low Battery (BATT) LED is illuminated while the battery voltage remains good; however, the LED flashes when the battery voltage falls below a predetermined value. When the battery power falls below a predetermined value, then the transceiver will automatically power itself off.

RF Link (RF)

The RF link indicator is illuminated while there is RF communication between the DT-7000 and DT-7001 transceivers and the Central Station. The LED flashes if there is communication between the transceivers and the Access point, but not the Central Station.

Power Adapter

The Power Adapter LED is illuminated when the transceiver is powered from an external power source that is connected to the Power Connector (fig. 92), and not one of the I/O ports.

Cleaning

This section provides cleaning and maintenance instructions for DT-7000 and DT-7001 transceivers.

Read and follow all precautions when cleaning transceivers.

WARNING: No claims are made concerning the sterility of the DT-7000 and DT-7001 Instrument Transceivers.

CAUTION: Do not sterilize any part of the transceivers. Gas sterilization, autoclaving, liquid immersion, and other sterilization methods can cause serious damage to the devices that may not be obvious to the user.

Note: DO NOT use abrasive cleaners.

Cleaning the Chassis

1. Transceivers can be cleaned with a gauze pad or cloth moistened with one of the following agents:
 - Soap and Water
 - Quaternary Ammonium
 - Glutaraldehyde 2%
 - Dilute Chlorine Bleach (sodium hypochlorite), 10% solution, freshly made in past 24 hours
 - Isopropyl Alcohol 70%
 - Ethyl Alcohol
2. Use a cloth moistened with distilled water to rinse away the cleaning solution.
3. Dry thoroughly with a lint-free cloth.

Use and Maintenance

Connecting to the Bedside Monitor

See Figure 92 on page 200 for an image of the DT-7000/DT-7001 controls and LED indicators.

Note: Before the transceiver is connected to the bedside monitor, the system administrator must program it with the bedside device specific software module.

1. Attach the transceiver to the bedside monitor by sliding the Device Hook over the Mounting Disk until the transceiver snaps into place. The Mounting Disk is provided with the transceiver and is attached to the bedside device through adhesive or hardware tools.
2. Connect the AC power adapter into the power port located on the bottom of the transceiver.
3. Plug the AC power adapter into the wall electrical outlet. If the AC power adapter is not used, the transceiver will operate either from its internal battery (DT-7001 models) or, on some bedsides, from connection to the bedside device.
4. Attach the host end of the I/O cable to I/O port 1 (Ports 2, 3 and 4 will be functional in future releases).
5. Attach the other end of the I/O cable to the bedside monitor.

This page is intentionally left blank.