

# EXHIBIT DD – Revised Service Manual

FCC ID# NMEAVTS1010



**Draft**

**Data Critical Corp.**

**AlarmView™**

*{Replace with AlarmView color logo}*

# **Wireless Data Network System Administrator's Manual**

The AlarmView™ System is intended for use with Nellcor™ NPB-290, NPB-295, N-395, and N-3000 Pulse Oximetry Monitoring Systems

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# AlarmView™ Wireless Data Network System Administrator's Manual

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# Using this Manual

## Procedures

As you work through this manual, steps to perform are numbered in sequence if there is more than one step in the procedure (single steps will be marked with a bullet). For example:

1. Turn monitor off or disconnect cable from transmitter.
2. Press On/Off button on transmitter.

## Cautions

Cautions alert you to actions or conditions necessary for the safe use of the equipment to prevent damage or malfunction.

 Cautions are identified by this symbol.

## Notes

Notes provide additional tips or hints to make it easier for you to work with the AlarmView System.

 Notes are identified by this symbol.

## For Basic Operations

This manual contains information on AlarmView system specifications, system configuration, programming, testing, maintenance, and troubleshooting. Only qualified personnel should service the AlarmView System.

You should also review the *AlarmView™ Wireless Data Networking System User's Guide* carefully to gain a complete understanding of AlarmView System daily operations not covered in this manual.

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# Safety Information

## System Warnings



Warnings alert you to potential serious outcomes (including death, injury, or adverse events) to the patient or user.

**Patient Monitoring** – The most reliable method of patient monitoring combines close personal surveillance with correct operation of monitoring equipment.

**Secondary Patient Monitoring System** – The bedside monitor and central station make up the patient monitoring system. Patient alarm conditions and notifications are primary functions of the patient monitoring system. **It is imperative that patient alarm conditions be monitored at the primary monitor or central station. The AlarmView System is not intended for use as the primary source for patient alarm notification.**

**Explosion Hazard** – Do not use AlarmView System in the presence of flammable anesthetics, skin cleaning agents, disinfectants or gases. Care must be taken when the device is used in oxygen-enriched environments (where room air contains 25% or more oxygen or nitrous oxide).

**Electrical Shock** – To reduce the risk of electrical shock, do not remove the cover of the AlarmView transmitter. Refer servicing to qualified personnel.

**Pacemaker Interference** – The programmer may cause interference with some pacemakers when used in close proximity. For patients with pacemakers, do not use the AlarmView programmer near a patient's chest area or place the programmer on a patient's chest.

**Radio Frequency (RF) Radiation Safety** – The transmitter is designed for use as a mobile device as defined by the Federal Communications Commission (FCC). Do not place the transmitter on a patient's or user's body. Ensure that the transmitter is located at least 20 cm from a patient or user's body. Location of the transmitter



closer than 20 cm to a person's body or head will void the user's FCC authority to operate the equipment.

**Transmitter Placement** – Do not place transmitter in any position where it might fall on and potentially harm patient. Do not lift transmitter or connected monitor by interface cable or power cord, as they may become disconnected and cause transmitter and/or monitor to fall on a potentially harm patient.

**Use During Defibrillation** – The AlarmView transmitter is not electrical shock-proof. When attached to a monitor that is attached to a patient during defibrillation or while an electrosurgical unit is in use, the transmitter may temporarily lose communication with the monitor and/or pages may be delayed.

**Transmitter Range** – Users are not notified when pagers are out of range of the transmitter. A range test must be performed (as indicated in this manual) to determine system boundaries.

**System Redundancy** – To provide redundancy, the AlarmView System should consist of at least two pagers. If one pager is not receiving pages for any reason, and the alarm is not silenced at the monitor, the second pager will be notified by a reminder page. If redundancy is not possible, caregivers should use extra vigilance in monitoring the patient and use the primary monitoring alarm.

**Site Surveys** – Each institution is responsible for surveying existing equipment and ensuring no interference risk exists when introducing additional devices.

**Transmission Bands** – Each institution is responsible for continued surveillance of transmission bands in the facility to prevent co-occupation of bands and cross-band interference.

**Environment** – Data Critical Corp does not assume responsibility for damage caused to the equipment by improper use or installation.

**Home Use** – The AlarmView System is not intended for home use.

**IEC Standards** – Verify proper operation and compliance with IEC standards of all instruments before clinical use. Connecting additional equipment to the signal port of the monitor constitutes configuring a medical system. Anyone who performs this task is responsible for ensuring that the system, all combinations of equipment, and accessories connected to the monitor's data interface comply with IEC Standard 60601-1-1 for electromedical equipment and IEC Standard 60601-1-2 electromagnetic compatibility, and are certified according to IEC Standard 950 for data processing equipment.

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# Section 1: AlarmView™ System Overview

## Introduction

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The AlarmView System is a complete, secondary patient monitoring system. AlarmView notifies caregivers of patient events using a wireless network that supplements the primary notification system.

AlarmView is installed in care units where Nellcor NPB-290, NPB-295, N-395, and N-3000 pulse oximetry monitors are used.

AlarmView is intended for use in hospitals and hospital-type facilities, such as surgical centers, subacute centers, special nursing facilities and sleep labs. Hospital use typically includes areas for general care, special procedure, intensive and critical care, and operating rooms. Intended patient population consists of all patients for whose physicians have ordered pulse oximetry monitoring.

AlarmView consists of the following three basic components.

1. Transmitter
2. Handheld Programmer
3. Pager

At each bedside, a transmitter connects to the data port on the patient monitor. The transmitter detects alarms identified by the monitor, and sends the information to one or more text pagers worn by caregivers within 10 seconds (for a single alarm response, multiple alarms within approximately 60 seconds).

The programmer is a handheld computing device running the Microsoft® Windows® CE Operating System. Proprietary AlarmView software used to configure the AlarmView system is pre-installed in the programmer.

The pager is worn by the caregiver responsible for the patient. It receives Alarm Pages in the form of text messages from the transmitter, and

displays immediate information about the patient and type of alarm. If an alarm continues unattended, a Reminder Page is sent to all pagers in the unit.

**!** Pager coverage is limited and designed to cover a care unit. Operating range from transmitter to pager is approximately 150 feet with no intervening structures (walls, columns, doors, floors, etc.). Coverage is not long range. Exact coverage area will be determined during initial installation and you can re-examine the coverage area at any time by performing a Transmitter Range Test as described in Section 5: Testing and Periodic Maintenance.

*{Insert system components diagrams  
(Figure 1-1 Nellcor Manual)}*

*AlarmView™ Wireless Data Network Components*

An AlarmView System includes up to 24 transmitters (one for each bedside oximetry monitor), up to 12 pagers, and one programmer. All transmitters and pagers within one system operate on the same radio frequency and baud rate. Pages will not be received if the pager is out of range. The system communicates as indicated in the functional diagram below.

*{Insert System Block Diagram  
(Figure 10-1 Nellcor Manual)}*

*AlarmView™ System Functional Diagram*

## List of Components

An AlarmView system consists of the following components.

Transmitter (up to 24)

Antenna (1 per transmitter, to 24)

Interface Cable (1 per transmitter, to 24)

- Transmitter Power Supply (1 per transmitter, to 24)
- Hospital-grade AC Power Cord (1 per transmitter, to 24)
- Handheld Programmer (1)
- Rechargeable AA Battery Pack for Programmer (1)
- Programmer Docking Station (1)
- AC Adapter Cord for Programmer Docking Station (1)
- Pager with Holder (up to 12)
- AlarmView System User's Guide
- AlarmView System Administrator's Manual (this manual)

## **System Features**

### **Transmitter**

The AlarmView Transmitter interfaces with a pulse oximetry monitor. Alarm settings and parameters are entered in the monitor – the transmitter itself does not screen or select alarms.

When the pulse oximeter goes into alarm, the transmitter detects the alarm from the monitor, then transmits that alarm to an assigned pager or pagers. The alarm is transmitted as a text message to the pager(s). Data relayed includes patient bed number, alarm type, and parameter values.

All transmitters and pagers in an AlarmView System operate on the same defined frequency and baud rate.

### **Top Panel**

{Insert graphic of top panel  
(Figure 1-2)}

*Transmitter Top View*

**On/Off** button is also used to initiate Test Pages, and to select **All Pagers** from the Transmitter.

### Front Panel

{Insert graphic of front panel  
(Figure 1-3)}

*Transmitter Front View*

**AC Indicator** is Off when not connected to AC power. Green when connected to AC power (battery is also charging).

**Transmitting Indicator** is Off when transmitter is not attempting to transmit. Amber when attempting to transmit, but cannot due to interference. Green when transmitting a page.



If Transmitting Indicator remains green for more than two seconds when sending a transmission, transmitter is malfunctioning and should be taken out of service. Contact Data Critical Corp. for repair or replacement.

**Communications Indicator** is Off when transmitter is turned off. Amber when transmitter is on, but either not connected to monitor or is unable to communicate with monitor. Green when communicating with monitor.

### Rear Panel

{Insert graphic of rear panel  
(Figure 1-4)}

Transmitter Rear View

**Monitor Input** and **Power Input** ports.

**Bottom Panel**

**Warning**

This symbol asks user to read the instructions before using the transmitter.

**Type B**

This symbol indicates that transmitter is not defibrillator-proof.

**Programmer**

The AlarmView Programmer is a handheld computing device (PDA) that is used to setup and change the configuration of the AlarmView transmitter. Data is exchanged between the transmitter and programmer via Infrared (IrDA) ports on both the programmer and transmitter.

**!** This programmer is to be used for the AlarmView System only. Programming that is not used for the AlarmView system has been disabled. Do not attempt to load, enable, or use other software with the programmer, as it may corrupt or damage system software.

Below is a picture of a typical programmer. Programmer may differ slightly from the one shown here. The function buttons are not used with the AlarmView System.

*{Insert programmer front view and side views  
Figures 1-6 and 1-7}*

*AlarmView™ Programmer Front View*

*Programmer Front & Side Views*

## Pager

The AlarmView Pager is worn by caregivers assigned to monitor patients. It is intended as an additional means of receiving patient alarm information.

Within seconds of detecting an alarm identified by the oximetry monitor, the transmitter sends an Initial Alarm Page to its assigned pager(s) only. Each transmitter can be programmed to send the Initial Alarm Page to one pager, two pagers, or all pagers.

Information communicated includes bed number, alarm type, and parameter values, such as pulse rate, heart rate, or respiration parameter that is outside alarm limits.

If the Initial Alarm Page is not acknowledged at the monitor or pager(s), the transmitter will follow up with a Reminder Page sent *once* to all pagers in the system.

Pagers are identified in the system using a 7-digit number unique to each pager called a Cap Code. The 7 digits correspond to the last six digits of the pager's serial number (located on the back of the pager), preceded by a zero.

For example, if a pager's serial number is 14045678, its cap code is 0045678.

Because basic pager operations vary in different models, functions such as turning pager on/off, setting tone or vibrate, contrast, backlight, and replacing batteries are not covered here. Refer to *Appendix A: Basic Pager Functions* in the *AlarmView System User's Guide*.



Replace pager batteries often. If pager batteries are low or depleted, the pager's range may be reduced or the pager may not correctly receive pages.



## Alarm Pages



The pager must be turned on to receive pages. Do not turn the pager off at any time when being used for alarm notification. Doing so may result in failure to receive notice of a patient alarm.

Alarm pages are prioritized into four (4) event levels (4=immediate, 3=high, 2=medium, 1=low).

The transmitter will send alarm pages to the pager in a format similar to the following example.

Bed: 1234
Low Sat
SPO2: 83%
PR: 70 bpm

The first line displays the bed number of the patient being monitored. The second line of the message will display the type of alarm. The majority of alarm types are listed in the table below. The third and fourth lines display the SpO2 percentage and pulse rate readings at the time of the alarm.



If the page is sent from a transmitter attached to a Nellcor N-3000 monitor with ECG and/or respiration capabilities, the last line of the message will display the pulse rate, heart rate, or respiration parameter that is outside alarm limits.

Below is a picture of a typical pager. Pager may differ slightly from the one shown here.

*{Insert graphic of generic pager  
(from cover of DAP User's Manual)}*

*AlarmView™ Pager*

## Section 2: System Specifications

Each hospital or healthcare facility can use up to 6 sets of AlarmView Systems, with 24 transmitters each, each set operating on its own channel.

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### Transmitter

Parameter	Setting
Physical Dimensions	5.25" x 1.5" x 3" (13.3 x 3.8 x 7.6 cm)
Battery Life	2 years of normal operation
Battery Operation	Approximately 45 minutes
Output Power	250 mW nominal 350 mW maximum
Frequency Range	450 MHz to 466 MHz
Nominal Range (no intervening structures)	Approx. 150 ft (46 m)
Input Voltage	+15V, 1.5 amps
Antenna Terminal Designed Impedance	50 ohms
Temperature Range (normal operation)	23°F to 113°F ( -5°C to 45°C) at 5% to 95% RH, non-condensing
Temperature Range (storage)	-4°F to 140°F ( -20°C to 60°C) at 5% to 95% RH, non-condensing
Altitude (normal operation)	0 ft to 10,000 ft (0 m to 3,048 m)
Mechanical Shock	IEC 68-2-27
Water Resistance (transmitter, not power supply)	IEC 529 Class IPXI
Radiated (radio-frequency electromagnetic fields)	Up to 3V/meter from 80 MHz to 1 GHz
Conducted (conducted-frequency electromagnetic energy)	Up to 3V/meter from 150 KHz to 80 MHz
FCC Compliant	FCC Part 90

## Programmer

Parameter	Setting
Operating System	Microsoft Windows® CE
Batteries (main)	4 AA NiMH (nickel metal-hydride) rechargeable battery pack
Rechargeable Battery Life	300 to 500 charge/discharge cycles
Batteries (backup)	1 3V coin battery included
Battery Operation	Program up to 24 transmitters, 3 times a day for 1 week
Temperature Range (normal operation)	23°F to 112°F (0°C to 40°C)
Number of Beds	Maximum 48
Number of Transmitters	Maximum 24
Number of Pagers	Maximum 12


## Pager

Parameter	Setting
Notification Tone	Audible Tone (8 sec) or Vibration (6 sec)
Received Data	POCSAG encoded
Single Alarm Response Time	Up to 10 seconds
Multiple Alarm Response Time	Up to 60 seconds
Battery	1 AA standard alkaline
Battery Operation	2 weeks normal operation
Frequency Range	450 MHz to 466 MHz
Nominal Range	150 ft (46 m)
Temperature Range (normal operation)	23°F to 113°F ( -5°C to 45°C) at 5% RH to 95% RH, non-condensing
Temperature Range (storage)	-4°F to 140°F ( -20°C to 60°C) at 5% RH to 95% RH, non-condensing

Altitude (normal operation)	0 ft to 10,000 ft (0 m to 3,048 m)
Water Resistance	IEC 529 Class IPXI
FCC Compliant	FCC Part 15

## **Electromagnetic Interference (EMI)**

AlarmView transmitter has been tested and found to comply with the limits for medical devices in the IEC 601-1-2:1993, EN 60601-1-2:1994, and Medical Device Directive 93/42/EEC. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation.

 It is possible that high levels of radio-frequency or conducted-frequency electromagnetic interference due to close proximity or strength of source may result in performance disruption of transmitter.

The Nellcor NPB-290, NPB-295, N-395, and N-3000 pulse oximetry monitors are not designed for use in environments in which the pulse can be obscured by EMI. Interference may cause measurements that seem inappropriate or monitor may not seem to operate correctly. The AlarmView System may generate alarms or error messages during these conditions.

The AlarmView System generates, uses, and can radiate radio-frequency energy and – if not installed and operated according to these instructions – may cause interference with other devices in vicinity.

Evidence of disruption may include erratic readings, Amber Tx LED, equipment ceasing to operate, or other incorrect functioning. If this occurs, survey the site to determine the source of disruption, and take the following actions to eliminate the source(s).

4. Turn equipment in vicinity off and on to isolate disruptive equipment.
5. Relocate or re-orient interfering equipment.

6. Increase distance between interfering equipment and this equipment.
7. Manage use of frequencies close to AlarmView System frequencies.
8. Remove devices that are highly susceptible to EMI.
9. Lower power from external sources within facility control (such as paging systems).
10. Label devices susceptible to EMI.
11. Educate clinical staff to recognize potential EMI-related problems.
12. Eliminate or reduce EMI with technical solutions (such as shielding).
13. Restrict use of personal communicators (cell phones, computers) in areas with devices susceptible to EMI.
14. Share relevant EMI information with others, particularly when evaluating new equipment purchases which may generate EMI
15. Purchase critical care equipment that complies with IEC 601-1-2 EMC Standards (3V/meter EMI immunity, limit interference level to 0.0014 V/meter)

Use the following chart to estimate protective distance.

Peak Power of Transmitter	Immunity of Medical Device		
	1 V/meter	2 V/meter	3 V/meter
2 watts	16.2 ft	8.1 ft	5.5 ft
2 watts	5.0 m	2.5 m	1.65 m

Contact Data Critical Corp. if additional assistance is needed to identify or resolve EMI conflicts.

## Section 3: Installation

### Setting Up Transmitter


Before first use of a transmitter or transmitters in a care unit, perform a Transmitter Range Test (See Section 5: Testing & Periodic Maintenance, "Transmitter Range Test: Surveying"). This will establish limits of unit coverage.

#### Connect Antenna

1. Connect antenna to antenna connector on top of transmitter. For best transmission, antenna must be pointing up.

*{Insert antenna connector  
Figure 5}*

*Antenna Connector*

 Range will be limited if antenna is not vertical.

#### Connect to AC Power

1. Connect power supply cord to power input port on rear panel of transmitter.

*{Insert power input port  
Figure 6}*

*Power Input Port*

2. Plug AC power cord into the other end of power supply. Use only hospital-grade power cord provided by Data Critical.
3. Plug AC power cord into a properly grounded AC outlet.

*{Insert photo of power supply and AC power cord}*

*Power Supply with Hospital-grade AC Power Cord*



Although transmitter can operate on its internal backup battery for a short period of time (up to 45 minutes under normal operation), always use AC power when possible.

Do not connect transmitter to an electrical outlet controlled by a wall switch. If power is accidentally turned off, transmitter will run on backup battery. Backup battery will only support normal operation for 45 minutes or less.

## **Connect to Monitor**

1. Connect modular RJ-45 plug end of interface cable to monitor input port on rear panel of transmitter.

*{Insert monitor input port (Figure 7)}*

*Monitor Input Port*

2. Connect pin connector end of interface cable to data port on rear of monitor.

A serial cable with a 15-pin (Male DB15) connector is required to connect to NPB-290, NPB-295, and N-395 monitors. A serial cable with a 7-pin (male 7 pin DIN) connector is required to connect to N-3000 monitor.

*{Insert monitor data port for N-395, same as NPB-290 and NPB-295 (Figure 8)}*

*NPB-290, NPB-295, and N-395 Monitor Data Port*

*{Insert monitor data port for N-3000 (Figure 9)}*

*N-3000 Monitor Data Port*

**!** A monitor that is not connected to AC power will not communicate with the transmitter – monitor port is disabled when not connected to AC power – so the AlarmView System will not transmit in case of a monitor power failure. The only exception is the Nellcor N-395 monitor, which will continue to communicate with the transmitter while operating on battery power.

Outlets used for the system should be on the hospital emergency circuit so that they are energized at all times.

## **Transmitter Placement**

1. Place transmitter on top of or beside pulse oximeter it is being used with.

To minimize possibility of the transmitter creating interference with the monitor, place transmitter at the rear of monitor. For best results with N-395 monitor, place transmitter to the right rear of monitor.

*{Insert transmitter placement}*

*Preferred N-395 Transmitter Placement*

## **Turning Transmitter On**

**!** The antenna must be connected to the transmitter before the transmitter is turned on. Turning the transmitter on without the antenna connected may damage the transmitter. Do not disconnect the antenna while the transmitter is turned on.

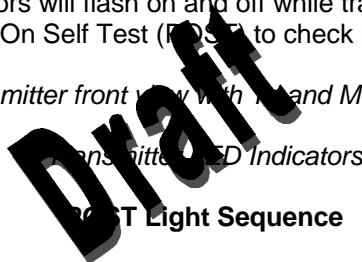
1. Check oximetry monitor to ensure it is on and functioning properly, and that alarm settings are appropriate.



2. Press **On/Off** button on top of transmitter.

Indicators will flash on and off while transmitter performs a Power-On Self Test (POST) to check its function.

*{Insert transmitter front view with Tx and Mode LED labels}*



**POST Light Sequence**

Stage	Stage Indication	Test	Failure Indication
1	Tx LED Green	Transmitter program flash memory check	Simultaneous flashing of Tx and Mode LEDs
2	Mode LED Green	External SRAM	Simultaneous flashing of Tx and Mode LEDs
3	Tx LED Amber	Operation of IrDA UART	Simultaneous flashing of Tx and Mode LEDs
4	Mode LED Amber	RF board synch lock	Alternate flashing of 1 Tx and 1 Mode LED
5	Mode LED Amber	Tx ID flash read	Alternate flashing of 2 Tx and 2 Mode LEDs
6	Mode LED Amber	Setup flash read	Alternate flashing of 3 Tx and 3 Mode LEDs

**!** Stage 6 Failure is indication of hardware failure, even if transmitter seems to recover (only exception is when installer has programmed new software into transmitter). In case of a Stage 6 failure, all

programming will be lost, and data will need to be reprogrammed into transmitter.

3. Mode LED is solid green when transmitter has established communication with monitor.

Tx LED will flash green when transmitter will send a Comm OK Page to assigned pager(s) to confirm communication between transmitter and monitor. The message will display:

Bed: 1234
Comm OK
All Pagers*

\*Last line All Pagers will be replaced with "Pager 1234" if one pager is assigned to transmitter, and "Pager 1234 5678." The 4 digits correspond to the last 4 digits of the assigned pager(s)' cap code.

4. Verify that page is sent to assigned pager(s) and that bed number is correct.

The transmitter will now send pages to the assigned pager(s) whenever it detects alarms identified by the monitor.

## **Turning Transmitter Off**

The transmitter can be turned off only when it is not communicating with the monitor. To turn the transmitter off:

1. Turn monitor off or disconnect interface cable from transmitter or monitor. Mode LED will be Amber.
2. Press **On/Off** button. Mode LED will be Off.



If you disable communications between the transmitter and monitor and do not turn off the transmitter, the transmitter will

send Communication Failure pages to assigned pagers at periodic intervals for up to one hour.

## **Operating Transmitter on Battery Power**

The transmitter has a rechargeable backup battery. It can operate on battery power for approximately 45 minutes (under normal operation) if it becomes disconnected from AC power.

The battery will automatically recharge when connected to AC power. Solid green AC LED indicates that the transmitter is connected to power, and that the internal battery is recharging. A fully discharged battery takes approximately 17 hours to return to full charge. The transmitter can be used while it is recharging.

## Section 4: Programming

### Using Programmer

For basic operations of the AlarmView programmer – including On/Off, adjusting contrast, backlight, setting date/time, and recharging or replacing main and backup batteries – refer to *Appendix B: Basic Programmer Functions* in the AlarmView System User's Guide.

**!** Recharge the main battery pack often. Ensure that the programmer has at least charged main batteries or a charged backup battery installed at all times, or programming and data in the programmer will be lost.

Proprietary AlarmView System Manager (SysMgr) software will be installed and running when you receive the programmer.

*{Insert SysMgr startup screenshot}*

*SysMgr Main Screen*

For all programming functions, use the stylus to tap the appropriate spot on the screen to perform the desired action.

**!** Use the stylus that came with the programmer or other stylus designed specifically for use with a handheld computer. Use of other pointed items such as pens and pencils may damage the programmer screen.

Tap **Start** button *{insert start button}* (upper left corner of screen) to access to AlarmView Install Program to view and change system configuration and parameters.

Tap **Keyboard** button *{insert keyboard button}* (lower right corner of screen) to toggle keyboard on and off. The keyboard will usually appear automatically when it is needed for programming.

Tap **Exit** button *{insert exit button}* (< in upper left corner of screen) to return to SysMgr Main Screen from submenus.

Tap **Scroll** buttons *{insert scroll buttons}* to move left and right to make tabs visible in submenus.

Tap **Down Arrow** to reveal pull-down menu choices.

## **Changing System Parameters**

AlarmView System parameters are set and transmitters are configured during your specific site during initial system installation.

Only Qualified personnel should use the AlarmView Install Program software to view and change system configuration and parameters that cannot be changed with the SysMgr program.

The Install Program has five main screens: **Password, Alarms, Pagers, Monitors,** and **Sys Inf** (system information), which are used to change the following parameters.

- ◆ Default program password (DCC)
- ◆ Bed Numbers (up to 48)
- ◆ Pager Cap Codes (up to 12)
- ◆ Alarm Pager Destinations (1, 2, or all pagers)
- ◆ Bed Number and Pager Assignments
- ◆ Transmission Frequency (MHz) and Baud Rate (bps)
- ◆ Global Pager Cap Code
- ◆ Reminder Page Delay Interval
- ◆ Survey Page Interval and Duration



Some of the above can also be accessed and changed through the SysMgr main program.

## Changing System Password

1. Turn on programmer. Programmer will display SysMgr software main screen.

*{Insert SysMgr screen with start button noted (Figure 6-2)}*

*Start button*

2. Tap **Start** button and tap **AlarmView Install Program** to select. Password screen will be displayed.

*{Insert password screen (Figure 6-3)}*

*Password Screen*

3. Tap **Keyboard** button to reveal Change Password button.

*{Insert change password screen (Figure 6-15)}*

*Change Password Screen*

4. Tap **Change Password** button. Enter Current Password screen will be displayed.

*{Insert enter current password screen (Figure 6-16)}*

*Enter Current Password Screen*

5. Enter current password using keyboard and tap **OK**. Factory default password is "DCC" (not case sensitive). Enter New Password screen will be displayed.

*{Insert enter new password screen}*

*Enter New Password Screen*

6. Enter new password using keyboard and tap **OK**.

The programmer is ready to respond to the new password.

## Changing Individual Transmitter Assignments

Transmitter assignments will change as transmitters and monitors are moved to different beds, as transmitters are moved to different monitors within a care unit, as pagers are changed, and as caregivers are assigned to different patients.

To view and change configuration of a transmitter, first retrieve the current parameters from the transmitter.

### Retrieving Transmitter Data

To check current transmitter values:

1. From SysMgr tap **Start** Button and tap Install Program. Install program password screen will be displayed.

*{Insert enter password screen (Figure 6-3)}*

*Password Screen*

2. Enter password and tap **OK**. Alarms screen is displayed.



If you tap cancel, or tap OK without entering the correct password, the programmer returns to SysMgr.

*{Insert alarms screen (Figure 6-4)}*

*Install Program Alarms Screen*

3. Turn transmitter on.
4. Aim infrared port on programmer directly at infrared port on front of transmitter and tap **CHECK** button.

*{Insert graphic of transmitter/programmer IR alignment}*

*Aligning Infrared Ports*



The programmer must be within 4 feet (1.2 meters) of the transmitter and the infrared ports must be aimed directly at each other.

5. When retrieval of transmitter data is successful, programmer will display "Transmitter Data Loaded" status message and values will be displayed in data fields.

*{insert alarms screenshot with transmitter data loaded status message and values in fields}*

*Transmitter Data Loaded Status Message*

**Changing Bed Number Assignment**

After successfully retrieving transmitter data, current values will appear in appropriate fields. One bed number is assigned to each transmitter. To change the bed number assigned to a transmitter:

1. From Alarms screen, double-tap current bed number in bed number field.
2. Tap **Keyboard** button and enter new bed number using keyboard characters.

**OR**

1. Tap **Down Arrow** in bed number field to show pull-down menu listing current bed numbers. Continue to tap Down Arrow to scroll through list.
2. Tap to select desired bed number from pull-down menu.



## Changing Pager Assignments

One, two, or all pagers can be assigned to each transmitter. To change alarm destination for pagers assigned to a transmitter:

1. From Alarms screen, tap button for **Assigned Pager** or **All Pagers**.
2. Tap **Pager** tab to move to pager selection screen.

*{insert pager selection screenshot (Figure 6-6)}*

### *Pager Selection Screen*

3. Tap **Down Arrow** in First Pager field and tap to select cap code for desired pager.
4. If another pager is desired, tap **Down Arrow** in Second pager field and select cap code for desired pager.
5. If all pagers is desired, tap button for **All Pagers**.



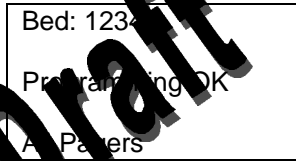
You can choose the All Pagers option from the Alarm screen or the Pagers screen.

## Assigning All Pagers from Transmitter

The All Pagers option can also be selected from the transmitter without using the programmer. Transmitter should be on, but not communicating with a monitor.

1. Turn transmitter on, but turn monitor off or disconnect interface cable. Mode LED should be Amber.
2. Turn on at least two pagers in system.

3. Press and hold transmitter **On/Off** button until an All Pagers confirmation message is received at pagers (approximately 5 seconds).



### Programming New Data into Transmitter

Bed number and pager assignment changes made in the previous steps should now be programmed into the transmitter.



Once data has been retrieved for a transmitter, it is easiest to change all values for that transmitter before sending changes back to transmitter.

1. Aim infrared port on programmer directly at infrared port on front of transmitter and tap **SEND** button. Programmer will display “Sending Program Data” status message.

*{Insert pager screen with “sending program data” message}*

*Sending Program Data Status Message*

2. When transmitter has been successfully programmed, programmer will display a “Programming Successful” status message.

*{Insert pager screen with “Programming Successful” message}*

*Programming Successful Status Message*

3. Tap **Exit** button (< in upper right corner) to return to SysMgr.

## Changing Survey Page Configuration

Prior to first use in a care unit, the effective range and coverage area of each transmitter should be tested by conducting a paging survey to ensure that the transmitter and pagers are performing as needed.

The programmer can be used to set the time between pages and the total number of pages to be sent for performing survey paging (the default is 100 pages, sent every 15 seconds).

To set interval between pages and total number of pages:

1. From SysMgr, tap **Start** button and tap Install Program.
2. Enter password. Alarms screen will be displayed.
3. Tap **Monitor** tab to display Monitor Configuration screen.

*{Insert monitor configuration screen (Figure 6-9)}*

### *Monitor Configuration Screen*



Monitor Type and Authorization fields are read-only values set at initial installation. You will not need to edit these values.

4. To change survey page time intervals, tap **Down Arrow** in the **sec** (seconds) field. Tap to select desired time interval from pull-down menu.
5. To change total number of survey pages, tap **Down Arrow** in the **times** field. Tap to select desired number of pages from pull-down menu.
6. Program survey page configuration into transmitter. Turn transmitter on and aim infrared port on programmer directly at infrared port on front of transmitter and tap **SEND** button. Programmer will display a "Sending Program Data" status message.

7. Wait for receipt of a "Programming OK" status message, then tap **Exit** button to return to SysMgr.

The complete Survey Page procedure is detailed in *Section 5: Testing and Periodic Maintenance*, "Transmitter Range Test," in this manual.

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## Changing Global System Parameters

An AlarmView System is defined by a common transmission frequency and a pager Global Cap Code. All transmitters and pagers within an AlarmView System must have the same Transmission Frequency (MHz), Baud Rate (bps), and Global Pager Cap Code.

The Reminder Page Delay Interval is also intended to be the same value for all transmitters in the system.



You can retrieve the current configuration from one transmitter, and change the parameters in the programmer once. **Then program the changes into all transmitters in the system one at a time.**

### Changing Frequency, Baud Rate, and Global Cap Code

1. From SysMgr, tap **Start** button and tap Install Program.
2. Enter password. Alarms screen will be displayed.
3. Tap Pagers tab to enter Pager configuration screen.

*{Insert pager configuration screen (Figure 6-8)}*

*Pager Configuration Screen*

4. Turn on any transmitter in system, and aim programmer infrared port directly at infrared port on front of transmitter.

5. Tap **CHECK** to retrieve current system configuration parameters.
6.
  - a. To change sending frequency, tap **Down Arrow** in the **MHz** field. Sending frequency is frequency transmitted from transmitter to pager.
  - b. To change baud rate, tap **Down Arrow** in the **bps** field. This program transmits baud rate to match pager receiving baud rate.
  - c. To change Global Cap Code, tap **All Pagers** and use keyboard to type in new Global Cap Code.
7. Aim programmer infrared port directly at infrared port on front of transmitter and tap **SEND** to program configuration changes into transmitter.
8. Repeat programming for every transmitter in system.
9. Tap **Exit** to return to SysMgr.

### Changing Reminder Page Interval

If initial page is not acknowledged at assigned pager(s) or at the monitor, a Reminder Page is sent to all pagers in the system. To change the delay interval for reminder page:

1. From SysMgr, tap **Start** button and tap Install Program.
2. Enter password. Alarm screen will be displayed.

*{Insert alarms screen with reminder interval highlighted (Figure 6-7)}*

#### *Alarms Screen Reminder Page Interval*

3. To send a reminder page after a certain interval, tap **Down Arrow** in the **Sec.** field.

4. Tap to select desired time interval from pull-down menu.
5. Aim programmer infrared port directly at infrared port on front of transmitter and tap **SEND** to program configuration changes into transmitter. ("Programming OK" message will be sent to pager(s) assigned to transmitter.
6. Repeat programming for every transmitter in system.
7. Tap **Exit** button to return to SysMgr.

## Section 5: Testing and Periodic Maintenance

All tests described in this section can be performed without disassembling the units in the AlarmView System. Tests should be conducted prior to initial installation, when adding a new unit to the system, and before returning equipment to service after repairs or routine maintenance.



If any component of the system fails to perform as specified, do not return it to use. Contact Data Critical Corp. regarding repair or replacement of the equipment.

### Testing System Safety

AlarmView safety tests meet the standards of, and are to be performed in accordance with, CAN/CSA-C22.2 No. 601.1 and UL 2601-1, Medical Electrical Equipment – Part 1: General Requirements for Safety, for instruments classified as Class 1 and Not Classified.



Equipment Needed is a Safety Analyzer that must meet , CAN/CSA-C22.2 No. 601.1 and UL 2601-1 specifications. Bio-Tek Instruments, Inc. or compatible.

## Earth Leakage Current

This test is in compliance with UL 2601-1 (earth leakage current). The applied voltage is 120 volts, 60 Hz for UL 2601-1 and CSA 601.4. Make all measurements with power switch in both the On and Off positions.

1. Connect transmitter power supply AC plug to electrical analyzer as recommended by analyzer operating instructions.
2. Connect transmitter power supply DC plug to transmitter DC input connector.
3. Do *not* connect equipotential terminal on analyzer to any metal on transmitter.
4. Analyzer leakage indication must not exceed values listed below.

### Earth Leakage Current Limits

AC Polarity	Neutral Wire (L2)	Leakage Current
Normal	Closed	300 $\mu$ A
Reversed	Closed	300 $\mu$ A
Reversed*	Open	1000 $\mu$ A
Normal	Open	1000 $\mu$ A

\* With AC polarity reversed and neutral wire (L2) open, the line wire (L1) is actually open

## Testing System Performance

## Communications Page

Each time a transmitter is turned on, or re-establishes communication with a monitor after having lost communication, the transmitter will automatically send a communications page (Comm OK Page) to all pager(s) assigned to the transmitter.

After setting up transmitter, connecting it to power and to a monitor), to send a Comm OK Page test:

1. Check monitor to ensure it is on and functioning properly.
2. Press **On/Off** button on top of transmitter.

Indicators will flash on and off while transmitter performs a Power-On Self Test (POST) to check its function.

Mode LED is solid green when transmitter has established communication with monitor.

Tx LED will flash green, and transmitter will send a Comm OK Page to assigned pager(s) to confirm communication between transmitter and monitor. The message will display:

Bed: 1234
Comm OK
All Pagers*

\*Last line All Pagers will be replaced with "Pager 1234" if one pager is assigned to transmitter, and "Pager 1234 5678." The 4 digits correspond to the last 4 digits of the assigned pager(s)' cap code.

3. Verify that page is sent to assigned pager(s) and that bed number is correct.

The transmitter will now send pages to the assigned pager(s) whenever it detects alarms identified by the monitor.



## Test Page

You should test the AlarmView system setup by conducting a Test Page when any changes affecting the system have occurred.

To perform a Test Page, the transmitter must be on and communicating with the monitor.

To send a test page:

1. Press **On/Off** button to turn transmitter on. Check to ensure that transmitter is communicating with monitor (both **AC Indicator** and **Communications Indicator** on transmitter are Green).
2. Turn on pager(s) assigned to transmitter.
3. To send a test page, press and release **On/Off** button again.

All pagers assigned to the transmitter will display the following page (if a patient is not connected to the sensor, dashes will be displayed for SpO2 and pulse rate):

Bed: 1234
Test Page
SPO2: 83%
PR: 70 bpm*


\* For the Nellcor N-3000 monitor, the last line of the test page will display heart rate (HR).

## Transmitter Range Test (Survey Paging)

Survey paging is used to determine the range and area of coverage of your system. An Transmitter Range Test (survey paging) will be performed at the time of initial system installation. Survey Paging should be conducted prior to first use of a transmitter added to a system, or when a transmitter has been moved to a new care unit.

The transmitter is placed in Test Range Mode, and it will send frequent pages from the transmitter to the assigned pager(s). Frequency of sent pages and the total number of survey pages can be set according to the procedure in *Section 4: Programming, "Changing Survey Page Configuration"* of this manual.

As survey pages are sent, personnel with assigned pager(s) will walk around the coverage area of the care unit to ensure that all pages are received.

 Because transmitters and pagers in one system operate on a single, defined frequency, if you exchange pagers or transmitters from different systems, you must change transmitter or pager system configurations. Refer to *Section 4: Programming, "Changing System Configuration"*.

To perform survey paging for a transmitter, transmitters should be turned on, but *not* communicating with monitors. You will need at least one transmitter and one pager.

To conduct a transmitter range test (survey paging):

1. Ensure that transmitter is connected to power and turned on, but not communicating with a monitor.
2. On programmer, from SysMgr main screen, tap **Service** to enter service program. Controls tab will be displayed.
3. To start survey paging, aim programmer infrared port directly at port on front of transmitter and tap **Test Range** button *{insert test*

*range button*}. Programmer will display “Survey Command Sent” status message and survey paging will begin.


4. Turn on pager(s) assigned to transmitter. Qualified personnel should be ready to walk the dimensions of the care unit. If you use more than one pager, keep them at least 4' apart to avoid interference.
5. To start survey paging, aim programmer infrared port directly at port on front of transmitter and tap **SVY** button (in upper left corner of screen). Programmer will display “Survey Command Sent” status message and survey paging will begin.

The transmitter will transmit a series of consecutively numbered pages (1, 2, 3, 4, etc.). Assigned pagers in survey will display the following message for each page:

Bed: 1234
Survey Page #xxx*

\* XXX is the number of the survey page in the sequence.

6. To stop transmitter before all survey pages are sent, press and release the **On/Off** button on transmitter once.
7. Walk slowly around the unit, observing the sequentially numbered pages. Pay special attention to elevator banks, columns, metal doors, double doors, and areas with plaster construction. Dead spots or out of range conditions will be identified by missing survey page numbers in the sequence. A corrupt or partial or incomplete page is the same as a missing page.

 If the system you are testing contains more than one transmitter, the transmitters should be able to detect each other to avoid corrupt or missing pages if transmitters attempt to send messages at the same time.
--

Turn on all transmitters, and ensure they are not communicating with monitors. When the transmitter you are testing sends a survey page, the other transmitters' Mode LEDs should flash Amber. This should be seen at regular intervals as the survey page continues.

If no dead spots are discovered and the transmitters can detect each other, the transmitter test is complete. Contact Data Critical Corp. if dead spots present a problem in functioning of care unit.

## **Periodic Maintenance**

### **Batteries**

#### **Transmitter**

At least every two years, the transmitter's internal battery should be tested. To check transmitter battery performance:

*{Placeholder for procedure to test battery performance from LL}*

#### **Programmer**

To recharge programmer main battery pack and replace programmer backup battery, refer to *Appendix B: Basic Programmer Functions in AlarmView System User's Guide*.



If main battery warning message is displayed, recharge main battery as soon as possible. If both backup battery and main batteries are depleted programmer software and data will be lost.

#### **Pager**

To replace pager batteries, refer to *Appendix A: Basic Pager Functions in AlarmView System User's Guide*.

## **Cleaning Procedures**

When necessary, clean the outer casing of the transmitter with a soft cloth, damp with a non-abrasive, commercial cleaner or 70% alcohol solution in water. Lightly wipe surfaces of transmitter.

Use a clean cloth designed for lenses to clean the pager and programmer screens. Use a damp cloth to dust their casings, and wipe dry immediately.



Do not spray, pour, or spill liquids on any part of AlarmView System components. Do not submerge any of the components in liquids.

If fluids are spilled in the equipment, take the equipment out of service for at least 24 hours. Check operation of equipment before returning to service.

## **Inspection and Testing**

At least every 2 years, inspect the transmitter, pagers, and programmer for mechanical and functional damage. Inspect safety labels to ensure they are legible.

If any system components appear to be damaged, or subjected to potential damage (such as being dropped or exposed to liquids), qualified personnel should test the system using the procedures in the *Administrator's Manual*.

## **Service**

Do not remove transmitter cover – there are no serviceable items inside. If any item or component of AlarmView System requires repair or service, contact Data Critical Corp.

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# Section 6: Troubleshooting

## Error Messages

For common system problems, an AlarmView transmitter may send error messages to the page(s) assigned to it. Below is a table of System Error Pages, along with probable causes, and recommended corrective actions.

**System Error Pages**

Message	Possible Cause	Corrective Action
Low Tx Battery/Connect AC Power to Transmitter  Transmitter's battery is running low (connect transmitter to AC power as soon as possible)	Transmitter is not connected to AC power.	Connect transmitter to power.
Tx Battery Low/Shutting Down  Transmitter operating on battery power has depleted battery charge and will shut down immediately.	Transmitter is not connected to AC power.	Connect transmitter to power.
Comm Failure Retrying  Communication has been lost between transmitter and monitor, the transmitter is attempting to	Communications between transmitter and monitor have failed.  Monitor is turned off or operating on battery power and transmitter is still on.	Check serial cable and cable connections between transmitter and monitor.  Reconnect or replace cable as required.  Connect monitor to

reestablish communication.		AC power.  Check monitor performance.
Comm Failure/Shutting Down  Transmitter has not been able to communicate with the monitor for about an hour and is shutting down.	Communications between transmitter and monitor have failed.  Monitor is turned off or operating on battery power and transmitter is still on.	Check serial cable and cable connections between transmitter and monitor.  Reconnect or replace cable as required.  Connect monitor to AC power.  Check monitor performance.

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The programmer may also display error messages related to its function. Below is a table of Programmer Error Messages, along with probable causes, and recommended corrective actions.

**Programmer Error Messages**

<b>Message</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Failed to Connect  Programmer was unable to retrieve or send information to/from transmitter.	Programmer infrared port not aligned with transmitter infrared port.  Transmitter turned off.  Programmer batteries are low.  Transmitter defective.  Programmer defective.	Re-align ports and try again.  Turn on transmitter.  Recharge programmer batteries.  Contact Data Critical Corp. regarding repair and/or replacement of transmitter or programmer.



<p>Please be sure the transmitter is turned on, the IR port is pointed directly at the transmitter, at a distance less than 4 ft. (1.2 m) and try again.</p>	<p>Programmer infrared port not aligned with transmitter infrared port.</p> <p>Transmitter turned off.</p> <p>Programmer batteries are low.</p> <p>Transmitter defective.</p> <p>Programmer defective.</p>	<p>Re-align ports and try again.</p> <p>Turn on transmitter.</p> <p>Recharge programmer batteries.</p> <p>Contact Data Critical Corp. regarding repair and/or replacement of transmitter or programmer.</p>
<p>Programming Failed</p> <p>Programmer was unable to send programming changes to transmitter.</p>	<p>Interference or ambient light noise.</p> <p>Programmer batteries are low.</p> <p>Transmitter defective.</p> <p>Programmer defective.</p>	<p>Re-align ports and try again.</p> <p>Recharge programmer batteries.</p> <p>Contact Data Critical Corp. regarding repair and/or replacement of transmitter or programmer.</p>
<p>Unable to Access Port Probably in Use</p>	<p>Programmer error.</p>	<p>Reboot programmer by inserting stylus in the reset button located on the back on the programmer.</p> <p>Contact Data Critical Corp. regarding repair and/or replacement of programmer.</p>
<p>You must select or get a bed number and one or more pagers</p>	<p>Programmer SEND button was pressed before selecting a bed number or pager numbers.</p>	<p>Follow procedure to select bed and/or pager numbers and tap SEND again.</p>

If you are unable to resolve system problems using the above guides, contact Data Critical Corp. Technical Support for assistance.

## **Getting System Information**

When speaking to a Data Critical Corp. representative, it may be necessary to access transmitter system information to troubleshoot problems. To obtain this information:

1. Turn on Programmer.
2. From SysMgr tap **Start** Button and tap Install Program. Install program password screen will be displayed.
3. Enter password and tap **OK**. Alarms screen is displayed.
4. Tap right scroll button to make the **SYS INF** tab visible.
5. Tap **SYS INF** tab.
6. Turn transmitter on.
7. Aim infrared port on programmer directly at infrared port on front of transmitter and tap **CHECK** button.
8. When retrieval of transmitter data is successful, programmer will display "Transmitter Data Loaded" status message.

*{Insert sys inf screen with loaded data in fields}*

*System Information Screen*

## **Determining Programmer Software Version**

When speaking to a Data Critical Corp. representative, it may be necessary to refer to your programmer software version to troubleshoot problems. To obtain this information:

1. Turn on programmer.
2. Tap **About** button (About button reads AlarmView Wireless Data Notification System on the top of screen). The About screen will display.

*{Insert SysMgr screenshot with about button identified}*

*About Button*

3. The programmer software version number is on the bottom line of the screen (vers 0.42 beta in example shown below).

*{Insert screenshot of about screen}*

*About Screen*

4. Click **OK** to exit and return to SysMgr.

## **Repairing and Replacing Parts**

If it is necessary to return an AlarmView System component to Data Critical Corp. for repair, contact Technical Services for shipping instructions.

Replacement parts are shown in the following table.

### **Replacement Parts**

Item No.	Description
1	AlarmView Transmitter
2	7" Transmitter Antenna
3a	Transmitter serial cable, with 15-pin adapter for Nellcor NPB-290, NPB-295, and N-395

3b	Transmitter serial Cable, with 7-pin adapter for Nellcor N-3000
4	AlarmView Pager
5	AlarmView Programmer
6	Transmitter Power Supply and Hospital-grade AC power cord
7	AlarmView System User's Guide
8	AlarmView Administrator's Manual

*{Insert diagram of the parts with corresponding numbers}*

*AlarmView System Replacement Parts*

## **Technical Support**

For technical advice, service, or information concerning any equipment in your AlarmView™ System, call Data Critical Corp. Technical Support toll free at 1-877-DCC-STAT (1-877-322-7828).

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## **Appendix A: Default Settings**

## Transmitter

Parameter	Setting
Global Cap Code	0000021
Alarm Severity	Send All Alarms
Reminder Interval	60 seconds
Survey Page Interval	15 seconds
Survey Page Duration	100 pages
Paging Baud Rate	512 bps
Paging Frequencies	
Bed Number	

## Pager

Parameter	Setting
Global Cap Code	0000021
Display	4 Lines
Notification Mode	Audible
Frequencies	On Back Label of Pager

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