



Ultraview[®] Care Network

Operations Manual

070-1001-17 Rev. A

Copyright 2003 Datex-Ohmeda, Inc.

All rights reserved. Contents of this publication may not be reproduced in any form without the written permission of Datex-Ohmeda, Inc. Products of Spacelabs Medical, a Division of Instrumentarium, Datex-Ohmeda, Inc. ("Spacelabs Medical") are covered by U.S. and foreign patents and/or pending patents. Printed in U.S.A. Specifications and price change privileges are reserved.

Spacelabs Medical considers itself responsible for the effects on safety, reliability and performance of the equipment only if:

- assembly operations, re-adjustments, modifications or repairs are carried out by persons authorized by Spacelabs Medical, and
- the electrical installation of the relevant room complies with the requirements of the standard in force, and
- the equipment is used in accordance with the operations manual.

Spacelabs Medical will make available, on request, such circuit diagrams, component part lists, descriptions, calibration instructions or other information which will assist appropriately qualified technical personnel to repair those parts of the equipment which are classified by Spacelabs Medical as field repairable.

Spacelabs Medical is committed to providing comprehensive customer support beginning with your initial inquiry through purchase, training, and service for the life of your Spacelabs Medical equipment.

CORPORATE OFFICES

U.S.A.

Spacelabs Medical
5150 220th Ave SE
Issaquah, WA 98029
Telephone: 425-657-7200
Telephone: 800-345-2700
Fax: 425-657-7212

AUSTRALIA

Datex-Ohmeda Pty Ltd
Unit 1, 149 Arthur Street
Locked Bag 356
Homebush, NSW 2140
Telephone: 61-2-9735-7222
Fax: 61-2-9764-2354

AUSTRIA & BELGIUM

Meda n.v.
Oeyvaersbosch 12
B-2630 Aartselaar
Belgium
Telephone: 32-3-870-1111
Fax: 32-3-870-1112

CANADA

Datex-Ohmeda Inc.
1093 Meyerside Drive, Unit 2
Mississauga, Ontario L5T 1J6
Telephone: 905-565-8572
Fax: 905-565-8592

CHINA

Datex-Ohmeda Pte Ltd
Shanghai Representative Office
Room 2509 Lippo Plaza
No. 222 Huaihai Road (M)
Shanghai 200021
Telephone: 86-21-5382-5657
Fax: 86-21-5382-1691

FRANCE

Spacelabs Medical
ZAC de Sans-Souci
1211 Chemin de la Bruyère
69760 Limonest
Telephone: 33 4 78 666 210
Fax: 33 4 78 432 658

GERMANY

Datex-Ohmeda GmbH
Dr. -Alfred-Herrhausen-Allee 24
D-47228 Duisburg
Telephone: 49-2065-691-0
Fax: 49-2065-691-236

INDIA

Datex-Ohmeda India Pvt. Ltd.
International Trade Tower
S 3 Level, Block E
Nehru Place
New Delhi 110019
Telephone: 91-11-621-6060
Fax: 91-11-621-3003

ITALY

Datex-Ohmeda S.p.A.
Via Cassanese, 100
20090 Segrate (MI)
Telephone: 39-02-216-931
Fax: 39-02-2692-6226

SPAIN

Datex-Ohmeda SL
Manuel Tovar, 26
28034 Madrid
Telephone: 34-91-3342600
Fax: 34-91-3581284

TAIWAN

Datex-Ohmeda Pte Ltd
Taiwan Representative Office
2/FI No. 85 Sec. 2
Chien-Kuo N. RD.
Telephone: 8862-2515-0457
Fax: 8862-2501-9136

THE NETHERLANDS

Datex-Ohmeda B.V.
De Wel 18 3871 MV
Hoevelaken
Telephone: 31-33-25-41-222
Fax: 31-33-25-41-223

Authorized EC Representative UNITED KINGDOM

Datex-Ohmeda Ltd
71 Great North Road, Hatfield
Herts AL9 5EN
Telephone: 44-1707-263-570
Fax: 44-1707-260-065



CAUTION:

- US Federal law restricts the devices documented herein to sale by, or on the order of, a physician.

About This Manual

Ultraview® Care Network Operations Manual documents a complete range of patient monitoring functions for critical care. While each module may monitor one or more vital sign parameters, the operation of individual parameters stays the same throughout the system. This CD-ROM manual is organized by operating functions rather than by specific products. Monitor and parameter functions are presented in the CD-ROM titled *Ultraview Care Network Operations Manuals (P/N 084-0701-xx)*.

Quick Information

At the beginning of each chapter you will find illustrations of the monitor keys that appear on all Ultraview monitors.

Brief troubleshooting information for each function is found at the end of each chapter. Troubleshooting tips suggest solutions to the most frequent problems.

Operating Instructions

Each vital sign chapter contains a clinical overview, a description of the screen display, operating instructions, error messages, and other pertinent information.

Product Compatibility

If your system does not contain a feature described in this manual:

- Your product may contain an earlier version of software. Refer to the original documentation that accompanied your system.
- Your system configuration, including options ordered, may be different from the configurations described in this manual. Refer to the notes in this manual describing features likely to be impacted by system configuration.

Before moving a component from one network to another, be certain that the component's software version is compatible with that required by the second network. If in doubt, have a qualified service person verify compatibility between the component and the network.

Use only Spacelabs Medical parts and accessories with your Spacelabs Medical components. Other parts may degrade performance or damage the components. Refer to the *Spacelabs Medical Supplies Products Catalog* for the part numbers and descriptions of additional parts and accessories.

Contents

Chapter	Page
System Introduction and Network Basics	
System Basics	1-2
Monitor Basics	1-3
Power Failure	1-4
Network Basics	1-8
Watching Alarms Remotely - Alarm Watch	1-9
Viewing Remote Parameters	1-9
Full Bed Review - UCW and Ultraview 1700 Only	1-11
Reviewing Remote Trends	1-12
Alarms Directory	
Directory of Keys	2-1
Directory of Keys	2-2
Alarms	
Overview	2-3
Default Alarm Limits	2-3
Setting Alarm Limits	2-4
Identifying Alarm Levels	2-4
Adjusting Alarm Tones/Key Tones	2-5
Controlling Alarms via the TONE RESET/ALM SUSPEND Key	2-6
Alarm Watch	2-7
Automatic Recording of an Alarm	2-10
Alarms Troubleshooting Guide	2-11
Admit/Discharge Directory	
Directory of Keys - Ultraview 1030/1050/1500/1600	3-1
Directory of Keys - UCW and Ultraview 1700	3-2
Admit/Discharge	
Overview	3-3
Entering New Patient Information	3-4
Changing Patient Information	3-9
Discharging a Patient	3-9
Admit/Discharge Troubleshooting Guide	3-10
Printing Directory	
Directory of Keys - Monitor Setup Level	4-1
Directory of Keys - Biomed Level	4-2
Directory of Keys - Clinical Level	4-3
Printing	
Overview	4-5
Bedside Printer Module	4-6
System Printer Module	4-6

Ultraview Care Network

Ultraview 1030/1050 Monitor Printers	4-7
PrintMaster	4-7
Printing Priorities	4-11
Selecting Print Duration	4-12
Printer Key Functions	4-13
Recording Alarms	4-14
Selecting Recording Destination	4-14
Printing via Monitors	4-14
Defining Preselected Recording Keys	4-16
Loading Paper	4-17
Paper Out Conditions	4-18
Record Vitals Report (Ultraview 1030/1050 Only)	4-19
Printing Troubleshooting Guide	4-21

Bedside/Transport Monitors Directory

Directory of Keys	5-1
Directory of Keys - UCW and Ultraview 1700 (Privileged Access)	5-2

Bedside/Transport Monitors

Overview	5-3
Display Detail	5-4
Identifying Special Applications	5-4
Bedside and Transport Monitor Features	5-5
Setting Up Priorities and Colors	5-7
Data Shuttle Option	5-10
Ultraview 1030/1050 Batteries	5-13
Wireless Network Interface	5-15
Outbound Parameters Menu	5-15
Ultraview 1030/1050 Connections	5-18
Ultraview 1030/1050 with Capnography (Option G or H)	5-21
Maternal Obstetrical Monitor - 94000	5-22
Bedside/Transport Monitor Troubleshooting Guide	5-27

Central Monitors Directory

Directory of Keys - UCW and Ultraview 1700	6-1
Directory of Keys - Privileged Access	6-2

Central Monitors

Overview	6-3
Display Detail	6-4
6-Trace Option	6-4
Central Monitor Features	6-5
System Clock	6-6
Screen Saver	6-7
Data Communications Watch	6-7
Central Monitors Troubleshooting Guide	6-9

Module Configuration Manager Directory

Directory of Keys - For Configurations With ECG	7-1
Directory of Keys - For Configurations Without ECG	7-2
Directory of Keys - For Telemetry Configurations	7-3

Module Configuration Manager

Overview	7-5
Display Detail	7-6
Setting User-Defined Default Values	7-7
Storing Changed Settings	7-7
Selecting Alarm Attributes	7-7
Parameter Configurations	7-8
Transferring User-Defined Settings	7-33
Retrieving User-Defined Settings	7-33
Restoring Factory Settings	7-34
Restoring User-Defined Settings	7-34

ECG Directory

Directory of Keys	8-1
Overview	8-3

ECG

ECG Setup	8-4
Display Detail	8-9
Selecting Adult or Neonate Mode	8-11
Monitoring Paced Patients	8-11
Setting and Adjusting Alarms	8-13
Selecting ECG Leads	8-14
Displaying Additional Waveforms	8-15
Checking the ECG Amplitude	8-15
Adjusting Waveform Size	8-15
Adjusting Sweep Speed	8-16
Adjusting Tones	8-16
Changing the Display Resolution	8-17
Selecting Primary and Alternate Heart Rate Source	8-17
Suspending/Resuming ECG Processing	8-18
Printing ECG Recordings	8-18
Restoring Default Settings	8-19
Power Failure	8-19
ECG Problem Solving	8-19
ECG Troubleshooting Guide	8-21

Arrhythmia Directory

Directory of Keys	9-1
-----------------------------	-----

Arrhythmia

Overview	9-3
Setting Up Arrhythmia Monitoring	9-4
Setting and Adjusting Alarms	9-6
Reviewing Arrhythmias	9-8

Ultraview Care Network

Display Detail	9-9
Controlling Arrhythmia Alarms	9-10
Clearing a Class or Event.	9-10
Merging Classes/Trends.	9-10
Plotting Arrhythmia Trend Graphs	9-12
Printing Arrhythmia Data.	9-13
Arrhythmia Problem Solving	9-14
Arrhythmia Troubleshooting Guide	9-16

ST Analysis Directory

Directory of Keys	10-1
-----------------------------	------

ST Analysis

Overview.	10-3
Display Detail	10-4
Setting Up ST Monitoring	10-5
Adjusting Alarms.	10-5
Selecting Leads for ST Alarms	10-7
Displaying Real-Time ST Trends	10-7
Reviewing ST Data.	10-8
Clearing ST Data	10-8
Viewing ST Trends	10-9
Selecting the ST Trend Timebase	10-9
Printing ST Data	10-10
ST Analysis Troubleshooting Guide	10-11

12-Lead Diagnostics Directory

Directory of Keys	11-1
-----------------------------	------

12-Lead Diagnostics

Overview.	11-3
Display Detail	11-4
Initiating a 12-Lead Report	11-4
Automatic Scheduling of 12-Lead Reports	11-5
Saving and Clearing 12-Lead Reports	11-5
Sending 12-Lead Reports.	11-5
Report Directory Display.	11-6
Patient Demographics	11-6

Respiration Directory

Directory of Keys - ECG	12-1
Directory of Keys - Respiration.	12-2
Directory of Keys - Varitrend 3	12-3

Respiration

Overview.	12-5
Setting Up Respiration Monitoring	12-6
Display Detail	12-6
Selecting Adult or Infant Mode	12-7
Setting and Adjusting Alarms	12-7

Turning Respiratory Waveform On/Off	12-8
Adjusting Waveform Size	12-8
Adjusting Sweep Speed	12-8
Adjusting Respiration Tone	12-8
Selecting Respiration Leads	12-8
Adjusting Respiration Sensitivity	12-9
Using the Cardiovascular Artifact Filter	12-9
Restoring User-Defined Settings	12-10
Recording Respiration Waveforms	12-10
Configuring Varitrend 3 Graphs	12-10
Printing Varitrend 3 Graphs	12-13
Respiration Troubleshooting Guide	12-14

NIBP Directory

Directory of Keys	13-1
-----------------------------	------

NIBP

Overview	13-3
Setting Up NIBP Monitoring	13-4
Display Detail	13-6
Setting and Adjusting Alarm Limits	13-7
Selecting Adult or Neonatal Mode	13-8
Displaying Heart (Pulse) Rate Data	13-8
Initiating a Manual Measurement	13-8
Setting Automatic Measurements	13-9
Stopping a Measurement in Progress	13-9
Recording Measurements	13-10
Reviewing Measurements	13-10
Recording Waveforms	13-10
Restoring User-Defined Settings	13-10
Status Messages	13-11
NIBP Troubleshooting Guide	13-12

SpO₂ Directory

Directory of Keys	14-1
-----------------------------	------

SpO₂

Overview	14-3
Setting Up SpO ₂ Monitoring	14-4
Dual SpO ₂ Monitoring	14-5
Display Detail	14-5
Ensuring Accurate Monitoring	14-6
Using the Sensorwatch Feature	14-6
Setting and Adjusting Alarm Limits	14-6
Selecting Data Averaging Period	14-7
Using SpO ₂ with Intra-Aortic Balloon Pumps	14-7
Adjusting Tone Volume	14-8
Modifying Waveform Display	14-8
Viewing Pulse Rate	14-8
Restoring User-Defined Settings	14-9

Ultraview Care Network

Suspending/Resuming SpO ₂ Processing	14-9
Recording SpO ₂ Waveforms	14-9
Error Messages	14-10
Sensors	14-12
SpO ₂ Troubleshooting Guide	14-13

Fetal Monitoring Directory

Directory of Keys	15-1
-----------------------------	------

Fetal Monitoring

Overview	15-3
Fetal Display Detail	15-3
Starting Operation	15-5
Ultrasound Monitoring	15-7
Uterine Activity	15-9
ECG Monitoring	15-10
Intrauterine Pressure Monitoring	15-11
Main Menu	15-13
Fetal Heart Rate Alerts	15-13
Bradycardia Alert	15-14
Tachycardia Alert	15-16
Recorder Operations	15-17
Module Configuration Manager	15-23
Telemetry Option	15-26
Mermaid Option	15-27

Temperature Directory

Directory of Keys	16-1
-----------------------------	------

Temperature

Overview	16-3
Setting Up Temperature Monitoring	16-3
Display Detail	16-4
Setting or Adjusting Temperature Alarm Limits	16-5
Recording Temperatures	16-5
Restoring User-Defined Settings	16-5
Temperature Troubleshooting Guide	16-6

Digital Telemetry Directory

Directory of Keys	17-1
-----------------------------	------

Digital Telemetry

General Telemetry Overview	17-3
Multiparameter Telemetry Overview	17-5
Intended Use	17-6
Transmitters	17-6
Selecting Options for the 90341 Lead Display	17-8
Cleaning	17-10
Digital Telemetry Receiver Module	17-10
Display Detail	17-12

Assigning a Telemetry Channel	17-14
Tuning a Telemetry Receiver	17-14
Entering Patient Information	17-15
Setting or Adjusting Alarm Limits	17-15
Acknowledging Signal Loss	17-15
Discharging a Patient	17-16
Setting Battery Status Alarms	17-16
Controlling Patient-Initiated Recordings	17-16
Telemetry Alarm Message Summary	17-16
Multiparameter Telemetry (NIBP)	17-17
Setting or Adjusting Alarm Limits	17-22
Displaying New or Previous Readings	17-22
NIBP Alarm Message Summary	17-22
NIBP Troubleshooting Guide	17-24

Pressure Directory

Directory of Keys	18-1
-----------------------------	------

Pressure

Overview	18-3
Setting Up Pressure Monitoring	18-4
Zeroing the Pressure Transducer	18-4
Display Detail	18-5
Setting and Adjusting Alarms	18-6
Adjusting Waveform Size	18-6
Selecting Numeric Display Size	18-6
Adjusting Sweep Speed	18-7
Displaying Waveforms with Scales	18-7
Freezing the Scaled Display	18-7
Changing the Waveform Scale	18-7
Selecting the Waveform Measurement Value	18-7
Storing Values for Trending	18-8
Recording Waveforms	18-8
Setting Artifact Rejection	18-8
Selecting a Filter Frequency	18-9
Restoring User-Defined Settings	18-9
Factory Default Pressure Alarm Settings	18-10
Invasive Pressure Troubleshooting Guide	18-11

Cardiac Output Directory

Directory of Keys	19-1
-----------------------------	------

Cardiac Output

Overview	19-3
Setup Procedure	19-4
Display Detail	19-5
Entering the Computational Constant	19-6
Entering Patient Height/Weight	19-6
Measuring Cardiac Output	19-6
Averaging Cardiac Output	19-7

Ultraview Care Network

Clearing Cardiac Output Curves	19-7
Storing Cardiac Output Curves	19-7
Stopping Curve Drawing and Acquisition	19-7
Selecting Index Normalization	19-8
Displaying Cardiac Index and Cardiac Output Values	19-8
Displaying Calculations Table	19-9
Editing Vital Sign Values	19-10
View Additional Table Data	19-10
Recording Cardiac Output Curves	19-11
Error Messages	19-11
Cables and Probes	19-12
Cardiac Output Troubleshooting Guide	19-13

\bar{SvO}_2

Directory of Keys	20-1
-----------------------------	------

SvO_2

Overview	20-3
Setting Up SvO_2 Monitoring	20-4
Display Detail	20-4
Preparing the Catheter	20-5
Performing Pre-insertion (in vitro) Calibration	20-6
Inserting the Catheter	20-7
Performing Light Intensity Calibration	20-7
Performing In Vivo Calibration	20-8
Displaying Intensity Data	20-8
Setting Alarm Limits	20-8
Setting the Light Intensity Alarm	20-9
Adjusting Trend Display	20-9
Obtaining Oximetry Calculations	20-10
Printing Oximetry Data	20-10
Storing or Reading Data	20-10
Correcting Out-of-Range Light Intensity	20-11
Correcting Insufficient Light Intensity	20-12
Correcting Calibration Errors	20-12
Correcting Optical Module Errors	20-12
Correcting SvO_2 Display Error	20-13
Ensuring Catheter Function	20-13
SvO_2 Troubleshooting Guide	20-14

Capnography Directory

Directory of Keys	21-1
-----------------------------	------

Capnography

Overview	21-3
Patient Connection	21-5
Display Detail	21-6
Setting Alarm Limits	21-8
Adjusting the Waveform Size	21-10
Turning the Waveform Display On/Off	21-10

Selecting a Unit of Measure	21-10
Selecting a Sweep Speed	21-10
Respiration Tone	21-10
Selecting a Text Format	21-11
Freezing the Waveform	21-11
Recording Waveforms	21-11
Calibrating the Sensors	21-11
Selecting Gas Compensation	21-13
Restoring Default Settings	21-13
Capnography Troubleshooting Guide	21-14

Multigas Directory

Directory of Keys	22-1
-----------------------------	------

Multigas

Overview	22-3
Warnings and Cautions	22-4
Analyzer Controls and Indicators	22-6
Multigas Setup	22-7
Patient Connection	22-8
Operation	22-10
Replacing the Water Trap	22-12
Replacing the Gas Analyzer Filter	22-12
Display Detail	22-12
Setting Alarm Limits	22-15
Waveform Display	22-17
Selecting a Text Format	22-17
Selecting a Unit of Measure	22-17
Selecting an Agent ID	22-18
Selecting Stand By Mode	22-19
Selecting a Pump Speed	22-19
Initiating a Calibration	22-19
Suspending Sampling	22-22
Multigas Troubleshooting Guide	22-23

BIS Directory

Directory of Keys	23-1
-----------------------------	------

BIS

Overview	23-3
Patient Preparation	23-6
Initialization	23-6
Normal Bedside Display Format	23-8
Remote View Display Format	23-11
Split Screen Display Format	23-12
Numeric Key Format	23-12
BIS Main Menu	23-13
Status Messages	23-16
Definitions	23-18
Care and Maintenance	23-19

Ultraview Care Network

EEG

Directory of Keys	24-1
Directory of Keys - Processing Off	24-2
Directory of Keys	24-3

EEG

Overview	24-5
Setting Up the EEG Module	24-6
Configuring the EEG Module	24-7
Initial Setup	24-7
Storing a Setup	24-12
Recalling a Setup	24-12
EEG Displays	24-13
EMG Display	24-19
Archiving EEG	24-20
Marking Events	24-21
Storing DSA/Trend Snapshots	24-21
Recalling DSA/Trend Snapshots	24-22
Erasing Snapshots	24-22
Printing EEG	24-22
Patient Preparation	24-23
Remote Monitors	24-28

Calculations Directory

Directory of Keys - Remote Calcs.	25-1
Directory of Keys - Clinical Calcs	25-2
Directory of Keys - Drug Dosage	25-3

Calculations

Overview	25-5
Setting Up Physiologic Calculations	25-5
Setting Up Drug Dosage Calculations	25-6
Accessing Calculation Data	25-6
Updating Data Between Monitors	25-6
Display Detail - Physiologic Calculations	25-6
Hemodynamic Calculations	25-10
Respiration Calculations	25-12
Oxygenation Calculations	25-13
Renal Calculations	25-15
Drug Dosage Calculations	25-16
Display Detail - Drug Dosage Calculations	25-17
Configurable Drug Names (UCW and Ultraview 1700 Only)	25-24

Trends Directory

Directory of Keys	26-1
Directory of Keys	26-2

Trends

Overview	26-3
Display Detail	26-4

Printing the Trend Display	26-5
Graphic Trends Features	26-6
Tabular Trends Features	26-7
Trends Troubleshooting Guide	26-8

Remote Keypad

Directory of Keys - UCW and Ultraview 1700	27-1
--	------

Remote Keypad

Overview	27-3
Setting Up the Remote Keypad	27-3
Setting Up the Receiver	27-4
Selecting a Parameter	27-5
Operating Menu Keys	27-5
Recording a Waveform	27-5
Programming Access Codes	27-6
Remote Keypad Troubleshooting Guide	27-7

Remote Display

Overview	28-1
Setting Up the Secondary Display	28-1
Copying Stored Values of the Primary Monitor	28-2
Restoring a Stored Value	28-2
Copying Primary Attributes to the Secondary	28-2
Resetting Default Values	28-3
Tracking or Locking Displays	28-3
Adjusting Scaled Display	28-4

Patient Data Logger Directory

Directory of Keys - Bedside only	29-1
--	------

Patient Data Logger

Overview	29-3
Display Detail	29-5
Data Printouts	29-6
Patient Data Logger Troubleshooting Guide	29-7

DNA Directory

Directory of Keys - UCW and Ultraview 1700	30-1
--	------

DNA

Overview	30-3
--------------------	------

Ultraview Care Network Product Specifications

System Safety Specifications	31-1
Equipment Classification	31-3
Equipment Maintenance Requirements	31-4
Ultraview Care Network Module Compatibility	31-4

Ultraview Care Network

Cleaning and Sterilization

Monitors	32-1
Accessories	32-1
TRU-CUFF Noninvasive Blood Pressure Cuffs	32-2
Cables and Lead Wires	32-3
Pulse Oximetry Sensors	32-4
Capnography Sensors	32-4
90518 Multigas Analyzer	32-5
Ultrasound Transducers	32-6

Diagnostic Messages

Symbols

System Introduction and Network Basics

This chapter gives an overview of the Ultraview Care Network products, provides basic system operating instructions, and describes network functions. Information regarding the operation of clinical information system products are contained under separate cover. Please refer to their respective operations manuals.

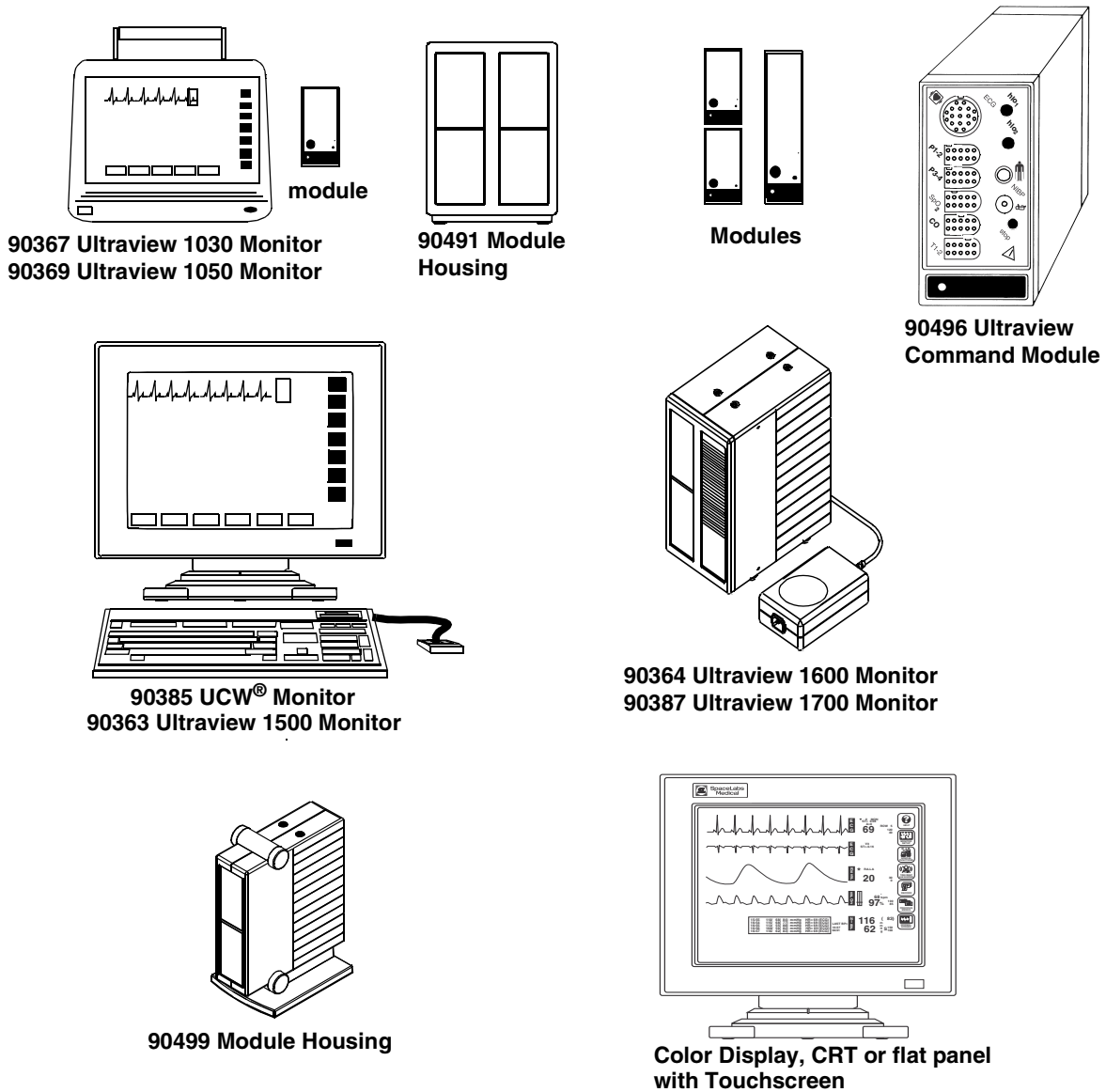


Figure 1-1: Ultraview Care Network Monitor Family



CAUTION:

- Federal law restricts these devices to sale by, or on the order of, a physician.

System Introduction and Network Basics

Contents

System Basics	2
Monitor Basics	3
Power Failure	4
Network Basics	8
Watching Alarms Remotely - Alarm Watch	9
Viewing Remote Parameters	9
Full Bed Review - UCW and Ultraview 1700 Only	11
Reviewing Remote Trends	12

System Basics

Ultraview Care Network monitors provide a consistent operator interface across all bedside and central monitoring environments. Monitors installed on a network provide access from monitor to monitor and enable you to control the remote data.

Networked monitors enable you to view waveforms and numeric values of patient parameters, review vital sign and ECG arrhythmia and ST history, and record patient data automatically during alarm events. Refer to *Network Basics* on page 1-8 for more information.

- Central stations display patient specific parameters, remote alarms, and alarm limits that are based on the setting of the bedside as determined by the primary caregiver. Refer to *Central Monitors* on page 6-3 for detailed information on the system capabilities.
- The Remote View feature enables you to monitor two patients simultaneously. Remote views of waveforms and numerics are nearly identical in display and function to the parameter at the originating monitor. Alarms, trends, menu keys, and recordings are accessible through a Remote View. Refer to *Viewing Remote Parameters* on page 1-9 and *Alarms* on page 2-3 for more information.
- The Full Bed Review feature enables you to view multiple parameters on a UCW and Ultraview 1700 bedside monitor from any other bedside or central monitor on the network. Refer to *Full Bed Review - UCW and Ultraview 1700 Only* on page 1-11 for more information.
- The Alarm Watch feature notifies you when an alarm occurs on any other monitor on the network. Refer to *Alarm Watch* on page 2-7 for more information.
- Vital signs trending provides minute-by-minute recording of parameter data for review and for documentation in the patient record. You select the format and interval for trending. Refer to *Trends* on page 26-3.
- Optional calculations features provide automatic calculation and trending of advanced clinical variables including hemodynamic, renal, oxygenation, ventilation calculations, and drug dosage. Refer to *Calculations* on page 25-5.

Monitor Basics

Ultraview Care Network monitors use modules to monitor various clinical parameters. For example:

- Electrocardiograph (ECG). Refer to *ECG* on page 8-3.
- Noninvasive Blood Pressure (NIBP). Refer to *NIBP* on page 13-3.
- Cardiac Output (CO). Refer to *Cardiac Output* on page 19-3.

Remote module housing units may be used with Ultraview Care Network monitors to house additional modules. The 90385 Universal Clinical Workstation (UCW[®]), 90363 Ultraview 1500, 90364 Ultraview 1600, and 90387 Ultraview 1700 monitors must use a remote module housing unit to house any of its modules.

- Each 90499 module housing holds up to two modules.
- Each 90491 module housing holds up to four modules.

An external power supply is needed whenever a module housing is used. A separate power supply is required for the 90491 and 90499 module housing.



WARNING:

- ***Due to the potential for electromagnetic interference, portable communication transmitters and cellular phones should not be operated within 3.5 feet (1.07 meters) of the patient, patient leads, or associated patient monitoring equipment.***
-
- ***All references to the Universal Clinical Workstation or UCW include the Universal Clinical Workstation-Independent Display (UCW-ID), and all the available features of the UCW-ID.***



Power Failure



WARNING:

- *In the case of a power failure, the remote module housing (90491 or 90499) provides +5 V of power to maintain data integrity.*
- *If the power is interrupted to the remote module housing but not to the monitor, the module will remain active and the following will occur:*
 - *Waveforms will go flat (as if the patient has no vital signs) or will be totally lost.*
 - *Parameter values will go to the minimum limit or ??? (except for non-invasive pressure, which will display the last value before the power failure).*
 - *Alarms may sound for low limit violations or for conditions such as Asystole, Leads Off, Loss of Signal, or Adapter Disconnected.*
- *If any of the above conditions occur, check to determine whether or not power has been interrupted to the remote module housing and reestablish AC power.*
- *Do not allow the Ultraview 1600, Ultraview 1700, or the 90499 module housing to be left turned ON without power applied for long periods of time or the memory backup batteries will be depleted.*

Modules are designed with default settings for alarms and various other parameter settings (for example, NIBP reading frequency) which you may adjust to meet the needs of your patients. When events occur that might cause the selected limits or values to return to the monitor default settings, the monitor may display a CHECK SETUP key in the ECG zone combined with a low priority alarm tone (refer to *Setting Alarm Limits* on page 2-4 for details on alarm priorities). To cancel the message and the alarm, simply touch the CHECK SETUP key on the screen.

The following describes the events that will cause the CHECK SETUP key to appear.

Event	Reason
Monitor power ON	Any time you power ON a monitor, all parameters are reset to their default values or to the values set the last time the monitor was in use. It is very important to review the parameter limits and/or their values and adjust them appropriately for the current patient.
When you insert an ECG module	Because the module values will come up with default settings, it is important to review and reset the limits and/or values for that particular patient.
An error is detected and the monitor resets	The monitor has detected an error that cannot be corrected through other means.

System Introduction and Network Basics



- *Check Setup is an optional feature on the ECG channel. Contact your system administrator if your system does not have this feature.*

Inserting Modules

Insert a module into the bedside monitor (Ultraview 1030/1050) or into the remote module housing as shown below.

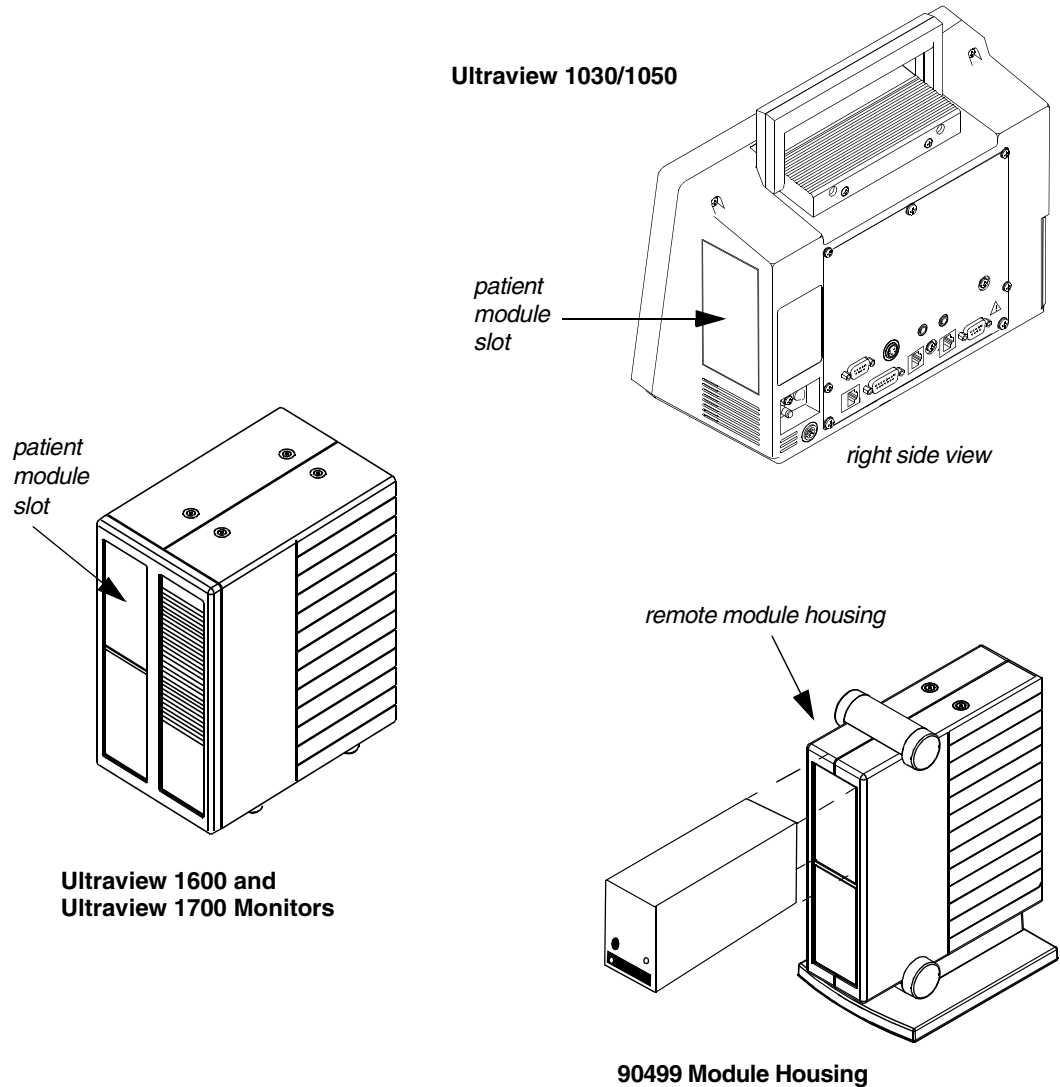


Figure 1-2: Ultraview Care Network module insertion

Patient Preparation

To prepare the patient for monitoring, attach the patient cable, and connect the patient cable to the module. Touch a parameter key, then touch the menu keys as needed to set up monitoring for a specific parameter.

Using the Monitor Screen

Ultraview Care Network monitors employ touchscreen technology for interaction with the system. To activate a menu or parameter key, simply touch the key on the screen.

Using the Screen Keys

The Ultraview Care Network monitors use keys on the screen to execute monitor functions. The monitor keys are located to the far right side of the screen and have standard functions regardless of the parameter being monitored. The menu keys appear along the bottom of the screen as menu items. The (physiological) parameter keys appear next to the parameter display. Some monitors (for example, the UCW) display these keys pictorially as icons, but the key names and functionality are the same for all Ultraview Care Network monitors.

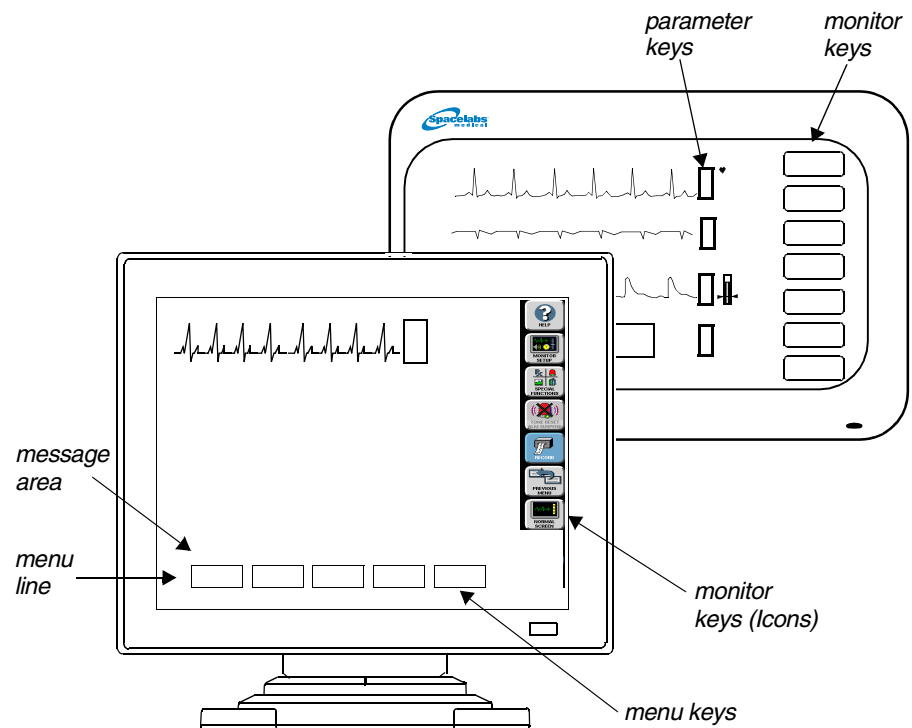


Figure 1-3: Screen keys

Menu and Parameter Keys

The menu and parameter keys appear on the monitor screen as displayed in Figure 1-3.

- Touch a parameter key to display a set of menu keys for that parameter
- Touch a menu key to control a monitoring function, for example, ALARM LIMITS

To obtain help about a menu key:

- 1 Touch HELP.
- 2 Touch the desired menu key.

Keys that are currently active appear in bold lettering. Inactive keys appear in dim lettering. When you touch an inactive key an error tone will sound.

Touch the HELP key, and then the key in question, to display a description of its function in the system message area above the menu line.

To customize your monitor:

- 1 Touch MONITOR SETUP.
- 2 Select any menu key.

Touch the MONITOR SETUP key to display a menu that enables you to adjust tones, enter patient data, modify the screen format, set time and date, adjust brightness, determine battery status (Ultraview 1030/1050 only), and specify printing characteristics.

The UCW and Ultraview 1700 enable you to display a digital clock, stopwatch, or timer in the lower right corner of the screen. Touch the clock to display the clock menu. The Ultraview 1030, 1050, 1500, and 1600 monitors display a digital clock at the bottom right of the screen. Refer to *Bedside/Transport Monitors* on page 5-3 and *Central Monitors* on page 6-3 for a detailed explanation of the functions that apply to your system.

To activate additional functions:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Select any menu key.

Touch the SPECIAL FUNCTIONS key to display a menu that enables you to view remote parameters, activate automatic notification of remote alarms, view trends of vital sign data and clinical and drug calculations, and use other optional network applications.

To temporarily silence alarm tones:

- 1 Touch TONE RESET/ALM SUSPEND once to silence for 45-seconds.
- 2 Touch TONE RESET/ALM SUSPEND again (within 45-seconds) to suspend alarms for 3-minutes (bedside only).

When you touch the TONE RESET/ALM SUSPEND key once during an alarm condition it will silence the alarms for 45-seconds at the unit where the key was touched (bedside or central). Touching the key again during the initial 45-second suspension will silence the alarms for 3-minutes at the bedside only. Refer to *Alarms* on page 2-3 for more details.

To record a parameter:

- 1 Touch RECORD once.
- 2 Select up to four flashing parameter keys.

You may use either a system printer or a printer module for recording patient data. Recordings of monitored data can be generated by touching the RECORD key and then touching up to four flashing parameter keys (depending on the printer capacity). Refer to *Printing* on page 4-5 for more details.

To change the screen display:

- 1 Touch PREVIOUS MENU to return to last menu.
- 2 Touch NORMAL SCREEN to remove the menu from the screen.

Touch the PREVIOUS MENU key to move back one menu level. From the Main Menu level, touch PREVIOUS MENU to remove the current menu from the display and close the application window.

Touch the NORMAL SCREEN key to close any active application window, and its menus, or to return to the basic display.

Using the Keyboard

A keyboard can be used for certain applications like Calculations and Admit/Discharge. An on-screen keyboard is provided for all local applications, but you may also use an external keyboard. Refer to *Using the On-Screen Keyboard* on page 3-5 for keyboard displays. Use the arrow keys and TAB key on the keyboard to move within an application window.

Using the Mouse

If your system is equipped with a mouse it may be used with selected functions in lieu of the keyboard or touchscreen. Click the left mouse button on a menu key to activate the key.

Network Basics

To aid in understanding the concept of a network operation, consider your need to communicate between beds in a single care unit. While you are in the care unit at a bedside monitor, you can view parameter waveforms from another bed and control those parameters just as if you were at that remote bedside.

Advanced networking allows remote access and interaction with Clinical and Drug Calculations, Tabular Trends, Graphic Trends, and parameters from remote beds. Standard networking allows the remote viewing of single parameters from bedside to bedside, and bedside to central. The Full Bed Review feature on the UCW and Ultraview 1700 allows remote viewing of the entire bedside monitor.

If you need to review information from another unit on the network, you can do so by specifying the unit as well as the bed. For example, if you have a need for frequent communication between your care unit and another care unit, those units would be designated as subnets on your networked system. This identification typically appears on the keys in the appropriate menus.

The following figure illustrates a possible network configuration.

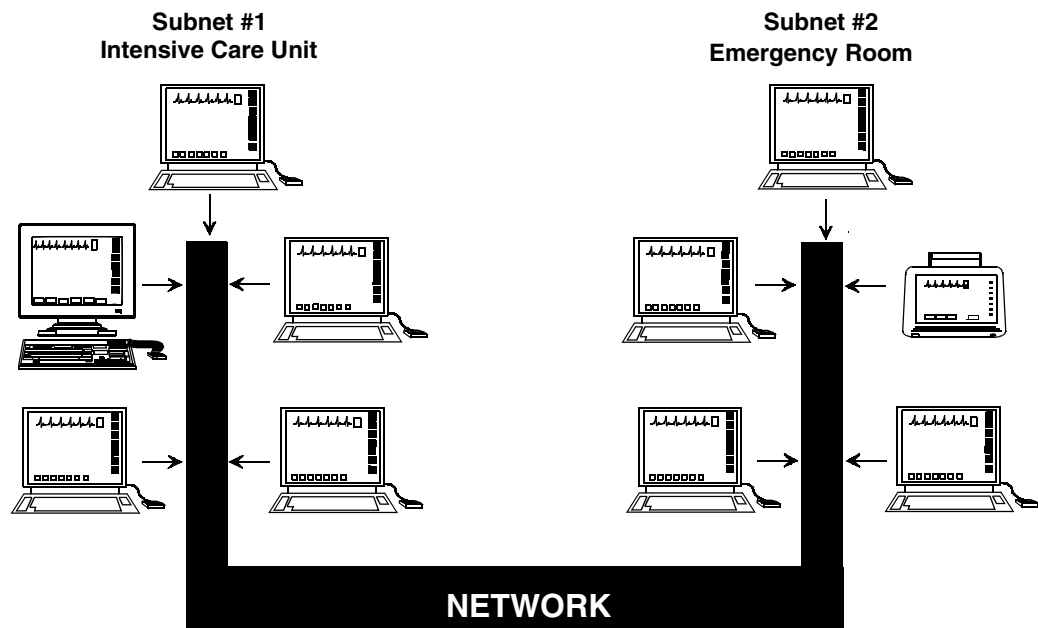


Figure 1-4: Network configuration

Although the presence of the network is invisible to you as you operate any monitor on the system, decisions were made during installation to configure the system according to your hospital's specifications. Typically, hospitals designate a system administrator for this task. This manual directs you to refer questions to that individual where system operation may differ according to the decisions made by your hospital.

Watching Alarms Remotely - Alarm Watch

To enable Alarm Watch:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Touch ALARM WATCH.
- 3a Select a bed or a subnet.
- 3b If you selected a subnet, then select a bed.
- 4 Touch ALARM WATCH ENABLE.

With the network Alarm Watch function enabled you will be notified of all alarms at all monitors. Once a monitor has been set up to Alarm Watch a bed, any alarm from that bed is reported.



WARNING:

- **The Alarm Watch function is not automatically enabled. You must first select the bed that the central or bedside monitor should Alarm Watch.**
- **Alarm conditions for parameters not currently displayed on the central monitor will only be reported at a central monitor when Alarm Watch is enabled at the central monitor.**

Refer to *Alarm Watch* on page 2-7 for more information.

Viewing Remote Parameters

To view remote parameters from a bedside monitor:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Touch REMOTE VIEW.
- 3a Select a bed or a subnet.
- 3b If you selected a subnet, then select a bed.
- 4 Select desired parameter.

Each parameter on a bedside monitor can be independently viewed (Remote View) on any other bedside or central monitor on the network. Remote views of parameters can be identical in display and function to the local bedside, with the addition of the patient name and bed identification label.

If enabled by your system administrator alarms and menu keys operate the same at the remote monitor as they do at the local bedside.

Bedside monitors can have parameters remotely viewed by up to 16 other devices.



- *Your network protocol may not enable you to make remote alarm limit changes or to remotely control a parameter. If you have a question regarding this function, ask your system administrator.*

To view remote parameters from a central monitor:

- 1 Touch MONITOR SETUP.
- 2 Touch SCREEN FORMAT.
- 3 Select the destination display zone.
- 4 Select a subnet or bed as appropriate.
- 5 Select a parameter and color.

Remotely viewed parameters occupy the lowest zone on the screen of a bedside monitor. On the central monitor each remote parameter is assigned a specific display position. Every Remote View zone is separated from other zones by a dividing line.

Ultraview Care Network

When a bedside monitor is set up to remotely view a parameter from another bedside, a one-second advisory tone sounds at the onset of the alarm condition. The remote alarm tones must be active at that bedside monitor.

Arrhythmia and ST segment review data can also be viewed from remote monitors if optional Arrhythmia and ST segment analysis software is part of your system.



WARNING:

- **Remote View and Alarm Watch are mutually exclusive functions on the bedside monitor. Selecting to remotely view a parameter at a bedside inactivates the Alarm Watch function at that monitor.**

When you need to control or continually observe a parameter from a remote monitor, use the Remote View function. When you wish to have remote notification of alarms, use the Alarm Watch function.



- *Your network protocol may not allow you to control remotely viewed parameters. If you have a question regarding this function, ask your system administrator.*

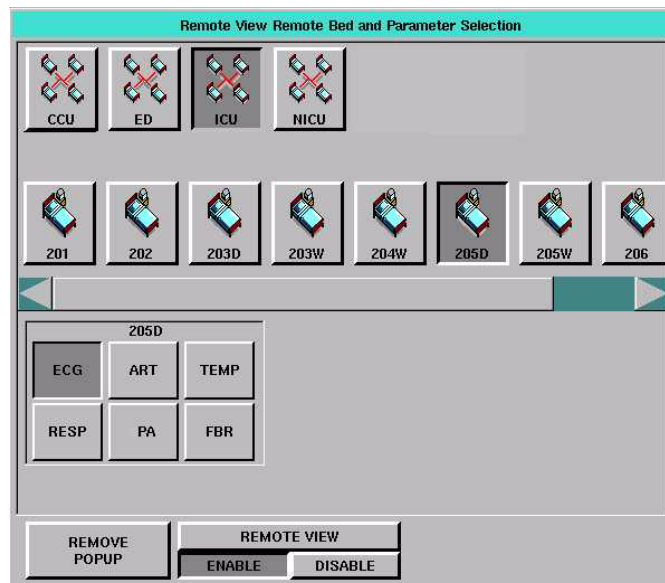


Figure 1-5: Remote View (UCW/ Ultraview 1700)

Full Bed Review - UCW and Ultraview 1700 Only

To activate Full Bed Review at a bedside monitor when a remote view is not displayed:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Touch REMOTE VIEW.
- 3 Select one of the subnet icons, then select a bed icon.
- 4a Touch the FBR key displayed after the last parameter icon for that bed.
-OR-
- 4b Select any parameter icon, then perform the steps in the following Quick Start.

To activate Full Bed Review when a remote parameter is already displayed:

- 1 Touch NORMAL SCREEN, if needed, to display all parameters.
- 2 Touch FBR displayed in the lower-left corner of the monitor.
- 3 Touch the flashing parameter key of the selected remote bed.

To activate Full Bed Review at a central monitor without parameters already displayed:

- 1 Touch MONITOR SETUP.
- 2 Touch SCREEN FORMAT.
- 3 Select one of the subnet icons, then select a bed icon.
- 4a Touch the FBR key displayed after the last parameter icon for that bed.
-OR-
- 4b Select any parameter icon, and select a display zone to assign that parameter to that display zone.
- 5 Follow the steps in the previous Quick Start.

To deactivate the Full Bed Review:

- 1 Touch NORMAL SCREEN.

The Full Bed Review (FBR) key allows you to view several parameters from another monitor at your bedside or central station monitor. The monitor at which the Full Bed Review is enabled will display all available parameters from the remote monitor within the limitations of the capabilities of the displaying monitor.

Whenever a bedside or central monitor is displaying another monitor's data, an FBR key appears in the lower left corner if no menus are displayed. Full Bed Review can be activated by touching this FBR key, then selecting one of the flashing parameter keys. If the monitor is not displaying another monitor's data, Full Bed Review can be activated by touching the FBR key that follows the last parameter icon for the selected bed.

If more parameters are available from the remote bedside than FBR can display, keys for these additional parameters are displayed as numeric keys along the bottom of the screen. Selecting any of these numeric keys causes the selected parameter to replace the lowest parameter.

The parameter keys displayed by FBR are interactive. To access the controls for a parameter, touch that parameter's key. Remote review of trended or calculated data for the selected monitor is available by touching the TRENDS/CALCS key found in the Special Functions menu.



- *Full Bed Review displays a single ECG lead if the remote bedside is configured to display ECG data using the Full View or Split View format.*

To deactivate the FBR feature, touch NORMAL SCREEN.

Reviewing Remote Trends

To display a trend from a remote monitor:

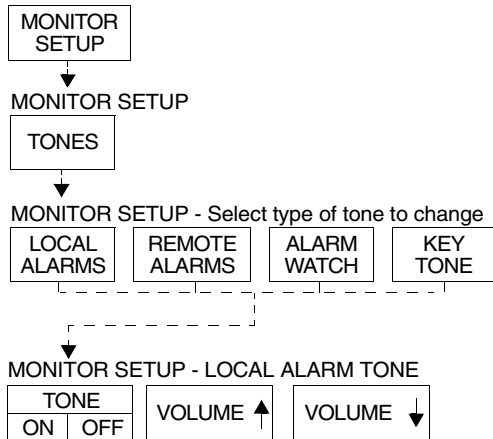
- 1** Touch SPECIAL FUNCTIONS.
- 2** Touch REMOTE TRENDS/
CALCS.
- 3a** Select a bed or a subnet.
- 3b** If you selected a subnet, then
select a bed.
- 4** Touch GRAPHIC TRENDS or
TABULAR TRENDS.

Retrospective vital sign review through either graphic or tabular trends provides minute-by-minute access to data from any monitor on the network.

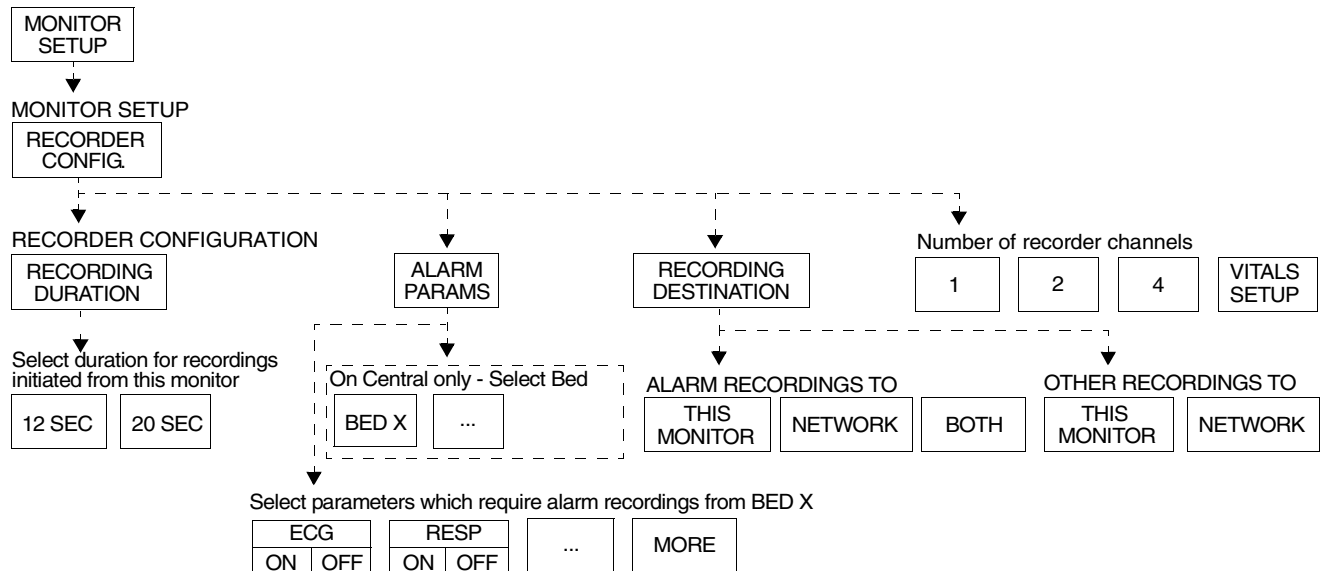
Alarms Directory

Directory of Keys

Adjusting Alarm Tones



Setting Up Automatic Alarm Recordings

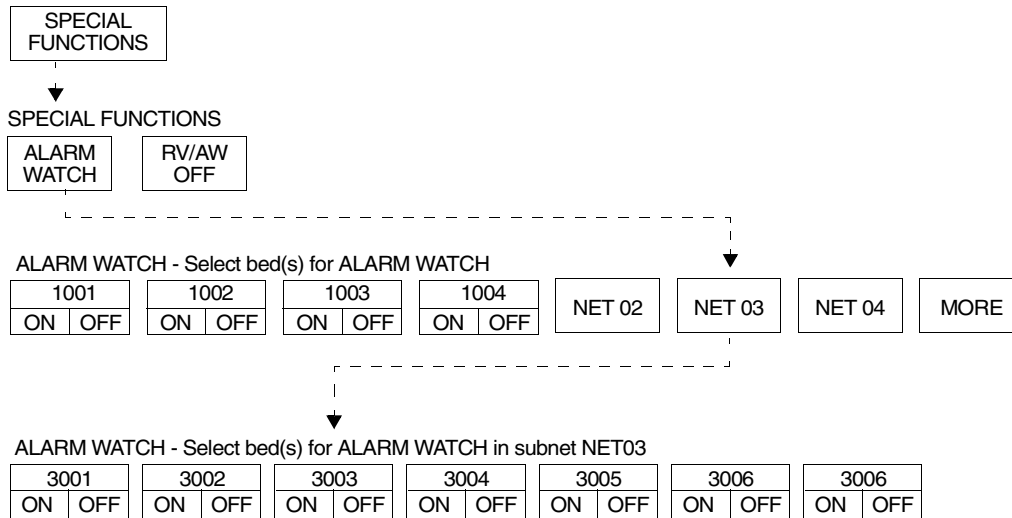


- Based on features purchased, more or fewer keys may appear here than on your menu screens.

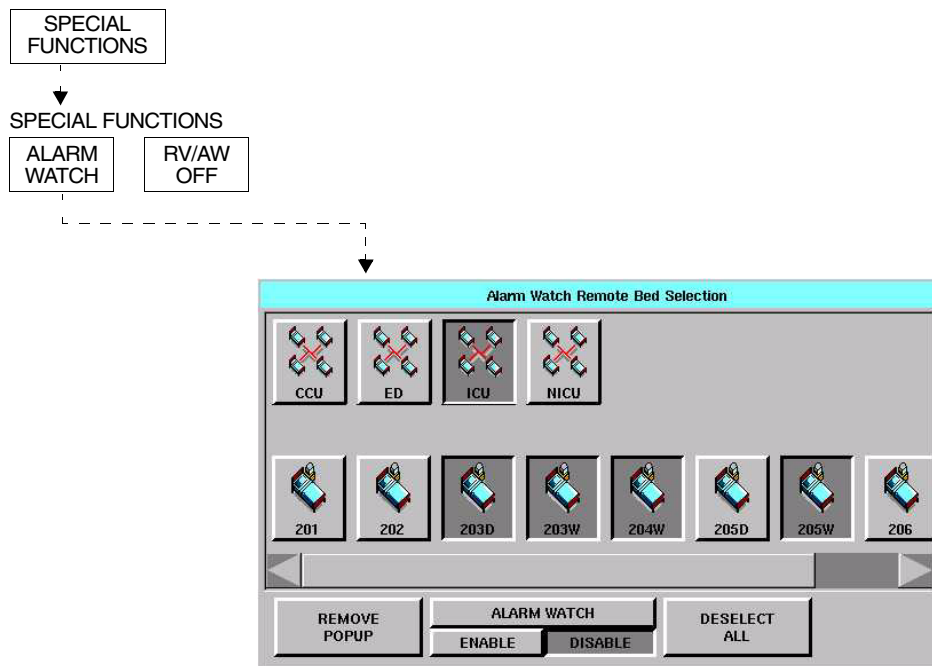
Alarms Directory

Directory of Keys

Setting Up Alarm Watch (1030/1050/1500/1600)



Setting Up Alarm Watch (UCW/Ultraview 1700)



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Contents

Overview	3
Default Alarm Limits.....	3
Setting Alarm Limits.....	4
Identifying Alarm Levels.....	4
Adjusting Alarm Tones/Key Tones	5
Controlling Alarms via the TONE RESET/ALM SUSPEND Key	6
Alarm Watch	7
Automatic Recording of an Alarm	10
Alarms Troubleshooting Guide	11

Overview

This chapter describes how to use the Alarm Watch feature, set alarm limits, silence and suspend alarms, set alarm tones, and specify parameters for automatic alarm recordings.

When a parameter goes into alarm on a local bedside monitor, the corresponding parameter key flashes on the screen, an alarm message is displayed, and an alarm tone sounds (unless tones are disabled). You can also choose to automatically record the parameter in alarm on a bedside or network printer. Networked monitors enable you to monitor alarm conditions at both the central and bedside monitors simultaneously through the Alarm Watch feature.



WARNING:

- **Alarm conditions for which you want to be alerted must be set to ON or enabled at the location where you want to be alerted, bedside or central. You can enable them from the local bed, remote bed, or central.**



- *Define your own default settings for alarm limits, alarm priorities, recordings, and other attributes with the Module Configuration Manager feature. Refer to Module Configuration Manager on page 7-5 for further details.*

Default Alarm Limits

Factory default alarm limit settings are activated whenever the monitor is powered ON, whenever a module is inserted, or when a parameter is enabled. You can modify these settings to meet your own protocols.

Refer to the *Alarm* section of the appropriate parameter chapter in this manual for details concerning setting or adjusting alarm limits for a specific parameter.

Setting Alarm Limits

To set alarm limits:

- 1 Touch a parameter key (ECG, TEMP, etc.).
- 2 Touch ALARM LIMITS.
- 3 Ensure ALARMS ON is set.
- 4 Select HI = or LO =.
- 5 Use arrow keys to adjust.

You can change parameter alarm limits by using the parameter’s Alarm Limits menu. The steps to the left illustrate the minimum procedure used to adjust high and low alarm limits for a parameter.



- Parameters may contain additional alarm limit features not listed here. Read the specific parameter chapter (for example, ECG or NIBP) in this manual for details.
- To set fetal alert limits, please refer to Fetal Monitoring on page 15-3 for further details.

Identifying Alarm Levels

Alarm conditions are visually and audibly prioritized as high, medium, or low.

Table 1: Bedside Alarms

Priority	Tone Type*	Visual	Tone Duration
High	Continuous tone, or 2 bursts of 5 tones every 15-seconds	Flashing key; message appears in red on color monitors	Until the alarm condition is resolved, the alarm is suspended, or the tone is reset
Medium	Intermittent tone (one second ON, one second OFF), or burst of 3 tones every 30-seconds	Flashing key; message appears in yellow on color monitors	Until the alarm condition is resolved, the alarm is suspended, or the tone is reset
Low	Intermittent tone (one second ON, four seconds OFF), or 1 tone every 30-seconds	Flashing key; message appears in yellow on color monitors	Until the alarm condition is resolved, the alarm is suspended, or the tone is reset

* The repetition rate for the tone bursts on the High, Medium, and Low levels may be adjusted for all monitors by your system administrator.



WARNING:

- Parameters shown in the ECG waveform zone in Enhanced Vital Signs mode do not alarm at the central station. Only parameters set via the Alarm Watch mode will alarm as set up by the system administrator.

Table 2: Alarm Watch and Remote View Alarms

Priority	Tone Type*	Visual	Tone Duration
High	Central continuous tone, or 2 bursts of 5 tones every 15-seconds Bedside one single tone	flashing key; message appears in red on color monitors	Central until the alarm condition is resolved or the tone is reset Bedside one-second
Medium	Central intermittent tone (one second ON, one second OFF), or burst of tones every 30-seconds Bedside one single tone	flashing key; message appears in yellow on color monitors	Central until the alarm condition is resolved or the tone is reset Bedside one-second
Low	Central intermittent tone (one second ON, four seconds OFF), or one tone every 30-seconds Bedside one single tone	flashing key; message appears in yellow on color monitors	Central until the alarm condition is resolved or the tone is reset Bedside one-second

* The repetition rate for the tone bursts on the High, Medium, and Low levels can be adjusted for all monitors by your system administrator.

Adjusting Alarm Tones/Key Tones

To set local alarm tones or key tones:

- 1 Touch MONITOR SETUP.
- 2 Touch TONES.
- 3 Select LOCAL ALARMS or KEY TONE.
- 4 Select TONES ON.
- 5 Use VOLUME↑ and VOLUME↓ keys to adjust.

To set alarm watch tones or remote view tones:

- 1 Touch MONITOR SETUP.
- 2 Touch TONES.
- 3 Select ALARM WATCH or REMOTE ALARMS.
- 4 Select TONES ON.
- 5 Use VOLUME↑ and VOLUME↓ keys to adjust.

You can turn the alarm tone ON or OFF and adjust the tone volume for local alarms, Remote View alarms, or Alarm Watch alarms. While you are adjusting tone volume, a tone sounds briefly as an example of the new level.

Alarm tones refer to the sound associated with an alarm condition. Key tones sound each time you touch a screen key.

Volume adjustments affect only the monitor where the adjustment is made. The tone volume of an alarm notification at a remote monitor must be adjusted at that monitor. It cannot be adjusted remotely. A visual alarm notification is displayed until the condition is resolved, even if you disable the alarm tones at that monitor.

Alarm Watch tones sound when the Alarm Watch feature is active and an alarm condition exists on a watched monitor. The Alarm Watch feature must be enabled via the Special Functions menu for the Alarm Watch tone to sound.

The Remote View alarm tone only sounds when a remotely viewed parameter goes into alarm.



WARNING:

- **Disabling alarm tones via Monitor Setup at a bedside or at a central monitor eliminates alarm tones for all alarm conditions at that monitor, even in the case of life-threatening events.**

Controlling Alarms via the TONE RESET/ALM SUSPEND Key

To silence an alarm tone for 45-seconds at any monitor, touch the TONE RESET/ALM SUSPEND key once.

To resume alarm tones at a central monitor, touch the TONE RESET/ALM SUSPEND key again.

To suspend all alarms at a bedside monitor for 3-minutes, touch the TONE RESET/ALM SUSPEND key again within 45-seconds.

Note: If alarms resume the second time the key is touched, your bedside monitor may be configured differently for this feature. Contact your system administrator for details.

To resume normal alarm operation at a bedside monitor within the 3-minute period, touch the TONE RESET/ALM SUSPEND or RESUME ALARMS (Ultraview 1030, 1050, 1500, and 1600 monitors) key again.

To suspend alarms at a bedside monitor when no alarm is sounding, touch the TONE RESET/ALM SUSPEND key once.

During an Alarm Condition

If you touch TONE RESET/ALM SUSPEND *once* at a monitor during an alarm condition:

- The alarm tone is silenced at that monitor for 45-seconds, but the alarm tone continues to sound at other monitors. If the alarm condition continues, the alarm tone resumes at that monitor at the end of the 45-second period. If another parameter goes into alarm during this period, or if the initial condition ends and then begins again, the alarm tone will again sound at that monitor.
- The message ALARM TONES SUSPENDED FOR 45-SECONDS is displayed only on that monitor.
- All flashing parameter keys continue to flash.

At a bedside monitor, when you touch the TONE RESET/ALM SUSPEND *again* within 45-seconds:

- All alarms and alarm recordings are suspended for 3-minutes. No alarms sound for any reason during this period, and no new alarm recordings are produced.



- *The ALM SUSPEND feature is only available at bedside monitors. If this feature has been disabled (set to OFF), the TONE RESET/ALM SUSPEND key does not suspend alarms.*

- A message is displayed to indicate that all alarms are suspended.
- Trend data may not be collected. This feature can be enabled or disabled only by your system administrator.

Normal alarm operation can be resumed within the 3-minute time period by touching the TONE RESET/ALM SUSPEND or RESUME ALARMS key again.



- *The ALM SUSPEND key is relabeled as RESUME ALARMS after the first key touch.*

In the Absence of an Alarm Condition



- *The TONE RESET/ALM SUSPEND key is relabeled as ALARM SUSPEND after the first key touch.*

Touching the TONE RESET/ALM SUSPEND key once when no parameters are in an alarm condition suspends the alarms at the bedside monitor. (Refer to *During an Alarm Condition* on page 2-6.)

To resume alarms at a bedside monitor, touch the TONE RESET/ALM SUSPEND key again.



- You cannot suspend alarms from a central monitor. However, you can silence alarm tones for 45-seconds. Touching this key has no effect if it is touched at the central monitor when no alarm is sounding.

Alarm Watch

To enable Alarm Watch:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Touch ALARM WATCH.
- 3a Select a bed or a subnet.
- 3b If you selected a subnet, then select a bed.
- 4 Ensure that the key for the desired bed(s) has the ON segment highlighted or is indented.
- 5 Touch ALARM WATCH ENABLE for the UCW and Ultraview 1700.

To disable Alarm Watch:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Select RV/AW OFF.

To de-select beds for Alarm Watch:

- 1 Touch SPECIAL FUNCTIONS.
- 2 Touch ALARM WATCH.
- 3a Touch the bed to de-select.
-OR-
- 3b Touch DESELECT ALL.

With the network Alarm Watch feature, you can be notified at a local bedside or central monitor of all alarms from a remote bed. The Alarm Watch feature defaults to its last setting when the monitor is turned ON. The local monitor displays the message ALARM WATCH ON when the Alarm Watch feature for a remote bed is active. On a central monitor, the message AW OFF also displays for each bed not selected for Alarm Watch.



- A central monitor can be configured with the Central Alarm Watch Manager to automatically Alarm Watch every bed it is currently monitoring. Contact your system administrator about this feature.

Refer to *Viewing Remote Parameters* on page 1-9 for more information. The listed limits for the number of devices that can remotely view a monitor apply to Alarm Watch-initiated remote views.

When a parameter from a monitor that is under Alarm Watch goes into alarm, a message such as ALARM WATCH – BED 28 ECG CHANNEL IN ALARM displays on the message line of the alarm-watching monitor. A one-time advisory tone sounds at the watching bedside or central monitor. The corresponding waveform appears in the lowest zone on the screen of the alarm-watching monitor, unless:

- another alarm-watched parameter is in alarm and its waveform already occupies that zone at the watching monitor,
-OR-
- a parameter is displayed in the lowest zone of the monitor and its parameter key has been activated displaying a menu.

When a waveform for an Alarm Watch parameter in alarm displays, the appropriate tone sounds at the bedside (once) and at the central monitors for the duration of the alarm.

Only one Alarm Watch waveform can be viewed at a time. When subsequent, concurrent alarms occur for one patient or other patients on Alarm Watch, a message displays and a one-second advisory tone sounds. Remember to enable Alarm Watch tones in the Monitor Setup menu to produce audible alarms.

If multiple alarms occur simultaneously, the messages displayed cycle from one to another every 3-seconds (up to a maximum of ten alarms) until all alarm conditions are resolved, or until you disable alarms at either the local monitor (through Remote View) or the remote monitor.



WARNING:

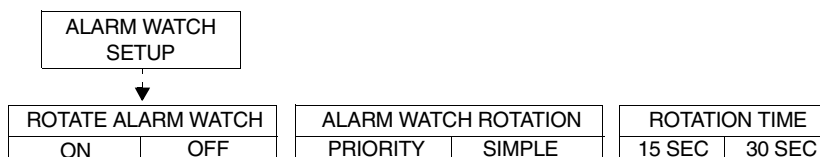
- **Using the Alarm Watch feature, you can watch for alarms from 32 other monitors. However, more than ten remote alarms cannot be reported simultaneously to any monitor using the Alarm Watch feature.**
- **Remote View and Alarm Watch are mutually exclusive features on bedside monitors. If you select to Remote View a parameter the Alarm Watch feature at that monitor is inactivated.**

To resume Alarm Watch, touch the ALARM WATCH or ALARM WATCH ENABLE (on the UCW and Ultraview 1700) key. Alarm Watch is resumed for all previously selected patients. You can also add patients for Alarm Watch. The ALARM WATCH ON message displays in the message zone whenever one or more remote beds are selected for Alarm Watch from that local monitor.

If your hospital protocol requires remote monitoring of all alarms, you can activate Alarm Watch during the setup of your bedside or central monitors. Alarm Watch remains ON as long as you do not power down the monitor. Refer to *Power Failure* on page 1-4 for further information.

Alarm Watch Rotation

On some monitors, your system administrator can configure the Alarm Watch feature to rotate the visible active alarms through the Alarm Watch display zone on the screen. Active alarms being monitored will rotate in and out of the display zone at an interval set by your system administrator. The Alarm Watch rotation time, signal tone, and rotation algorithm are set in the ALARM WATCH SETUP menu, accessed by touching the PRIVILEGED ACCESS key.



ROTATE ALARM WATCH — enables the system administrator to turn the rotation of alarms ON or OFF. If you select OFF, the ALARM WATCH ROTATION and the ROTATION TIME options are unavailable.

ALARM WATCH ROTATION — enables the system administrator to select either a rotation system allowing the higher priority alarms to rotate into the window more often (Priority) or a simple rotation system allowing all alarms equal time in the rotation regardless of the alarm priority.

ROTATION TIME — selects the interval between rotations in the Alarm Watch window.

Central Alarm Watch Manager

Your system administrator may have configured your central station monitor with the Central Alarm Watch Manager feature enabled. This feature automatically activates the Alarm Watch feature for all beds currently displayed on that central monitor.



- *When the Central Alarm Watch Manager is activated, it displays alarms for each bedside that has the Alarm Watch feature enabled. The central monitor continues watching for alarm conditions from the selected bedside monitors until you disable Alarm Watch for that bedside monitor or disable the Auto Alarm Watch feature altogether.*
- *The factory default is Auto Alarm Watch ON with access to the Auto Alarm Watch feature DISABLED.*
- *The Central Alarm Watch Manager must be set by a system administrator with a Biomed level of privileged access.*

Alarm Tone Manager

The Alarm Tone Manager provides two levels of managing alarm notifications.

- If this feature is ENABLED, it will not allow individual alarm tones to be permanently disabled.
- The system administrator can set a minimum volume for alarm tones ensuring that they are always at a safe and audible level.



- *The factory default for the Alarm Tone Manager is OFF, which inhibits access to the ALARM TONES keys in the Monitor Setup menu.*
- *The Alarm Tone Manager must be set by a system administrator with a Biomed level of privileged access.*

Automatic Recording of an Alarm

To select parameters for alarm recording and generate automatic recordings on a bedside recorder:

- 1 Touch MONITOR SETUP.
- 2 Touch RECORDER CONFIG.
- 3 Select RECORDING DESTINATION.
- 4 Select a destination for the alarm recording.
- 5 Touch PREVIOUS MENU.
- 6 Touch ALARM PARAMS.
- 7 Select parameter key(s) ON to initiate a recording in case of alarm. If the parameter key is OFF, no alarm recording is produced for that parameter in an alarm condition.

Touch the ALARM PARAMS key to display a menu of parameters that can initiate alarm recordings on a bedside recorder and on a network printer if the parameter goes into an alarm condition. Recording on a network printer is configuration-dependent. See your system administrator for details.

If alarm recordings are disabled for a parameter, no alarm recording is produced on either the bedside or network printer. However, the designated alarm tones are still generated and alarm messages are displayed.

Alarm recordings print the last 12- or 20-seconds (selectable under RECORDING DURATION) of a waveform or print until the alarm stops or is suspended, whichever is longer. To stop a recording at the bedside printer, touch STOP or UNIT OFF on the printer module.

When a bedside recorder is present in the monitor and is selected and online, an alarm recording is automatically directed to that recorder.

Use the key labeled OTHER ON/OFF for any new parameter not yet on the alarm parameters menu.



- *Spacelabs Medical strongly recommends verifying alarm parameter settings on the monitor once per shift and upon each admission.*
- *If a printer is not attached to the monitor, the recorder channel (1, 2, 4) keys do not appear in the menu.*

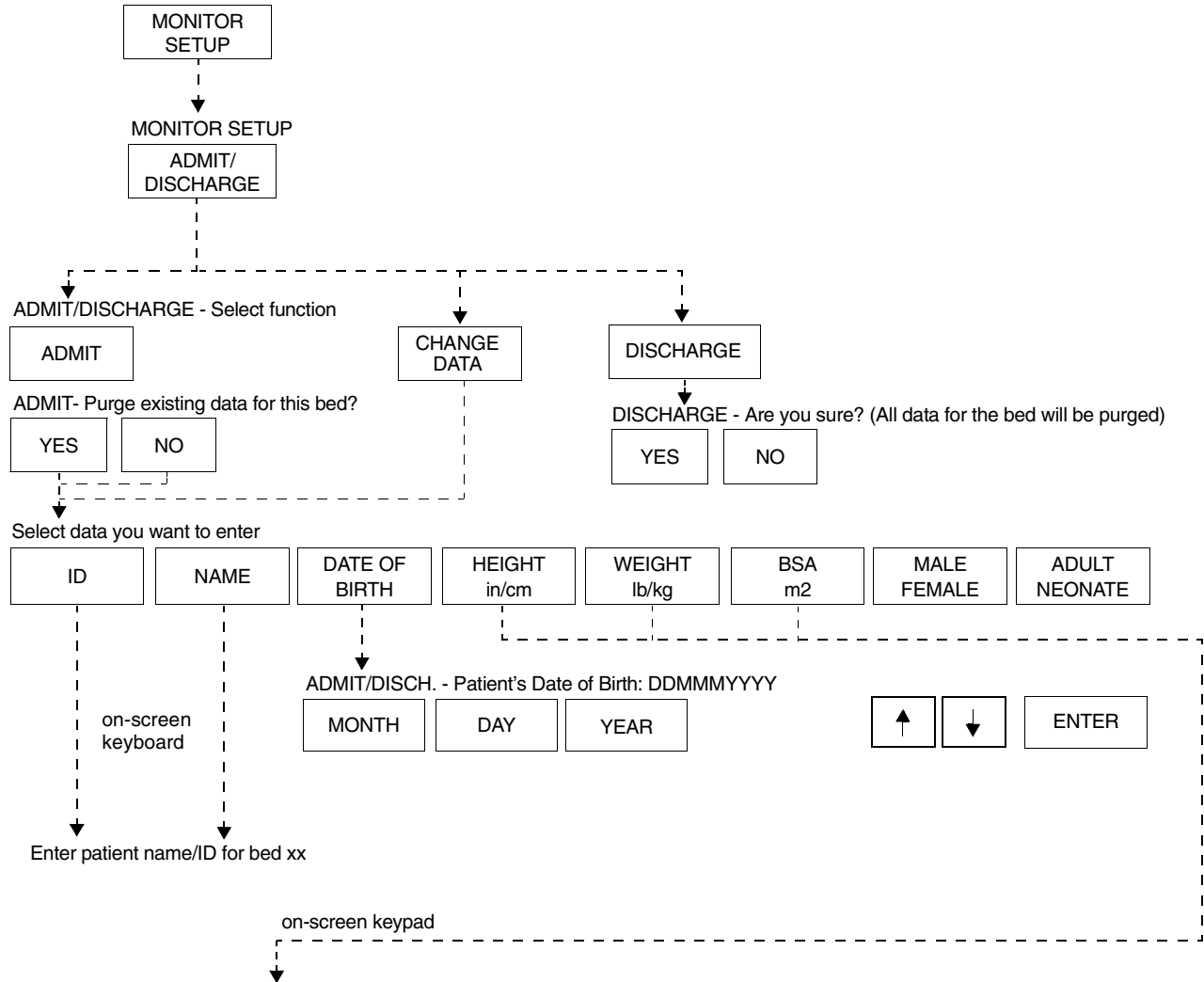
Alarms Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
Duplicate alarm recordings print at the bedside and system printer	<ul style="list-style-type: none"> Alarm recording directed to both bedside and network printers under the RECORDING DESTINATION key. 	<ul style="list-style-type: none"> Select THIS MONITOR or NETWORK for alarm recordings.
No alarm recordings are printed	<ul style="list-style-type: none"> Parameters for alarm recordings are set to OFF. Bedside printer is OFF. The alarms have not been directed to the bedside printer. ALARMS SUSPENDED for 3-minutes. System printer is not identified as one of two network printers. Printer is out of paper. 	<ul style="list-style-type: none"> Select parameters for alarm recordings from the Alarm Parameters menu or Record Alarm Parameters menu. Turn bedside printer ON. Ensure that THIS MONITOR or BOTH is selected. Ensure that alarms are not suspended. Have your system administrator verify configuration. Load paper into printer.
Alarms continue to violate after touching TONE RESET	<ul style="list-style-type: none"> More than one alarm may be in violation. 	<ul style="list-style-type: none"> Touch TONE RESET/ALM SUSPEND again.
No alarm notification occurs at a central monitor	<ul style="list-style-type: none"> The Alarm Watch function is not active. Parameters not displayed. 	<ul style="list-style-type: none"> Activate Alarm Watch for the desired beds at the central. Display the desired parameters using SCREEN FORMAT under MONITOR SETUP.
CANNOT INTERACT WITH ALARM WATCH parameter displayed	<ul style="list-style-type: none"> The monitor may not be configured to allow interaction with remote parameters. 	<ul style="list-style-type: none"> Contact your system administrator.
CANNOT deselect ALARM WATCH	<ul style="list-style-type: none"> The Ultraview Central Monitor is configured with Central Alarm Watch Manager to prevent de-selection of automatically alarm watched beds. 	<ul style="list-style-type: none"> Contact your system administrator.

Admit/Discharge Directory

Directory of Keys - Ultraview 1030/1050/1500/1600

To enter patient name, ID, or other data



To enter height, weight, BSA (and calculations with Clinical Calculations feature)

HT				66.9	
7	8	9	REMOVE KEYPAD	CLEAR	
4	5	6	RESTORE		
1	2	3	↑	ENTER	
+/-	0	.	↓		

Note: HEIGHT keypad shown as an example

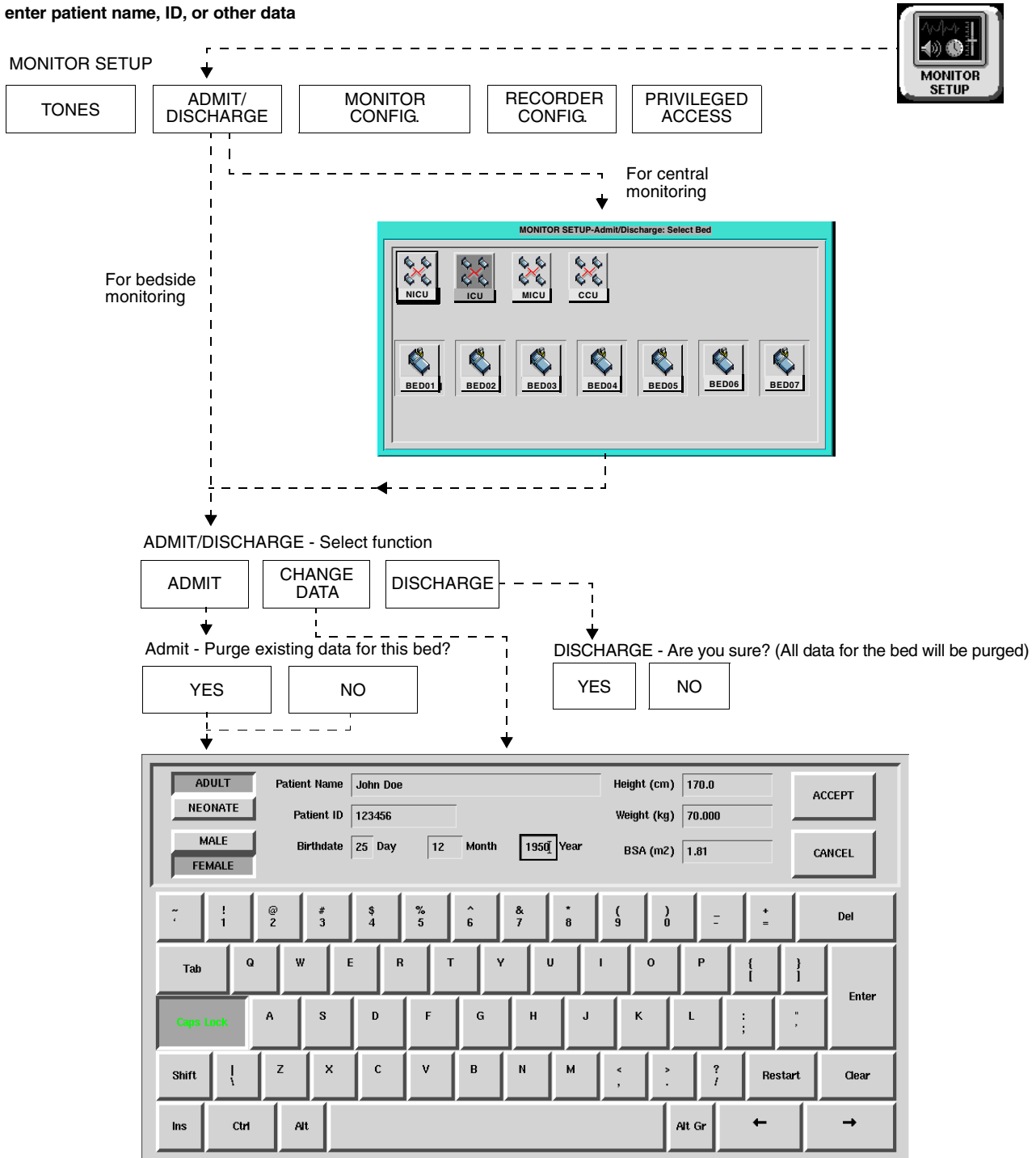


- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Admit/Discharge Directory

Directory of Keys - UCW and Ultraview 1700

To enter patient name, ID, or other data



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Admit/Discharge

Contents

Overview	3
Entering New Patient Information	4
Changing Patient Information	9
Discharging a Patient	9
Admit/Discharge Troubleshooting Guide	10

Overview

This chapter describes how to enter new patient data, change data for an existing patient, and delete patient data from a Ultraview Care Network monitor.

You can access the Admit/Discharge menu on either the central or bedside monitor. However, if you are accessing this menu at a central monitor, you must also select the patient's bed (this is not necessary at a bedside monitor).

Entering New Patient Information

To enter new patient information (Ultraview 1030/1050/1500/1600):

- 1 Touch MONITOR SETUP.
- 2 Touch ADMIT/DISCHARGE.
- 3 Touch ADMIT.
- 4 Select YES to purge the existing data.
- 5 Select ID and/or NAME.
- 6 Enter information using the on-screen keyboard.
- 7 Touch ENTER.
- 8 Touch PREVIOUS MENU (if necessary).
- 9 Select DATE OF BIRTH and enter MONTH, DAY, and YEAR.
- 10 Touch ENTER.
- 11 Touch PREVIOUS MENU.
- 12 Select HEIGHT, WEIGHT, or BSA and enter information using the on-screen keypad.
- 13 Touch ENTER.
- 14 Touch MALE/FEMALE until the correct gender is highlighted.
- 15 Touch ADULT/NEONATE until the relevant selection is highlighted.

To enter new patient information (UCW/Ultraview 1700):

- 1 Touch MONITOR SETUP.
- 2 Touch ADMIT/DISCHARGE.
- 3a Select a subnet or a bed (central only).
- 3b If you selected a subnet, then select a bed.
- 4 Touch ADMIT.
- 5 Select YES to purge the existing data.
- 6 Select a field on the on-screen keyboard.
- 7 Enter information using the on-screen keyboard.
- 8 Touch ENTER after completing each field.
- 9 Select ADULT or NEONATE.
- 10 Select MALE or FEMALE.
- 11 Touch ACCEPT to store the new patient data.

The only information required when admitting a patient to the system is the patient's name (up to 40 characters). Entering the patient's ID number (up to 15 characters) is optional.

This section discusses how to enter the following patient information, depending on which monitor you have.

- Patient Name and ID (refer to *Ultraview 1030/1050/1500/1600* and *UCW/Ultraview 1700* on page 3-5)
- Height, Weight, and BSA (body surface area) (refer to *Entering Height, Weight, and BSA* on page 3-7)
- Date of Birth (refer to *Entering Patient Date of Birth* on page 3-8)
- Patient Type and Gender (refer to *Entering Patient Type and Gender* on page 3-9)

Using the On-Screen Keyboard

A keyboard is displayed on the monitor screen as you begin the process of admitting or changing data on a patient. The on-screen keyboard functions differently depending on the monitor model you have. You can also use the external computer keyboard to enter patient data into the selected field.

Ultraview 1030/1050/1500/1600

The keyboard shown in *Figure 3-1* appears when you touch the NAME or ID key under the ADMIT and CHANGE DATA keys. Use this keyboard to enter or change the patient's name or ID only.

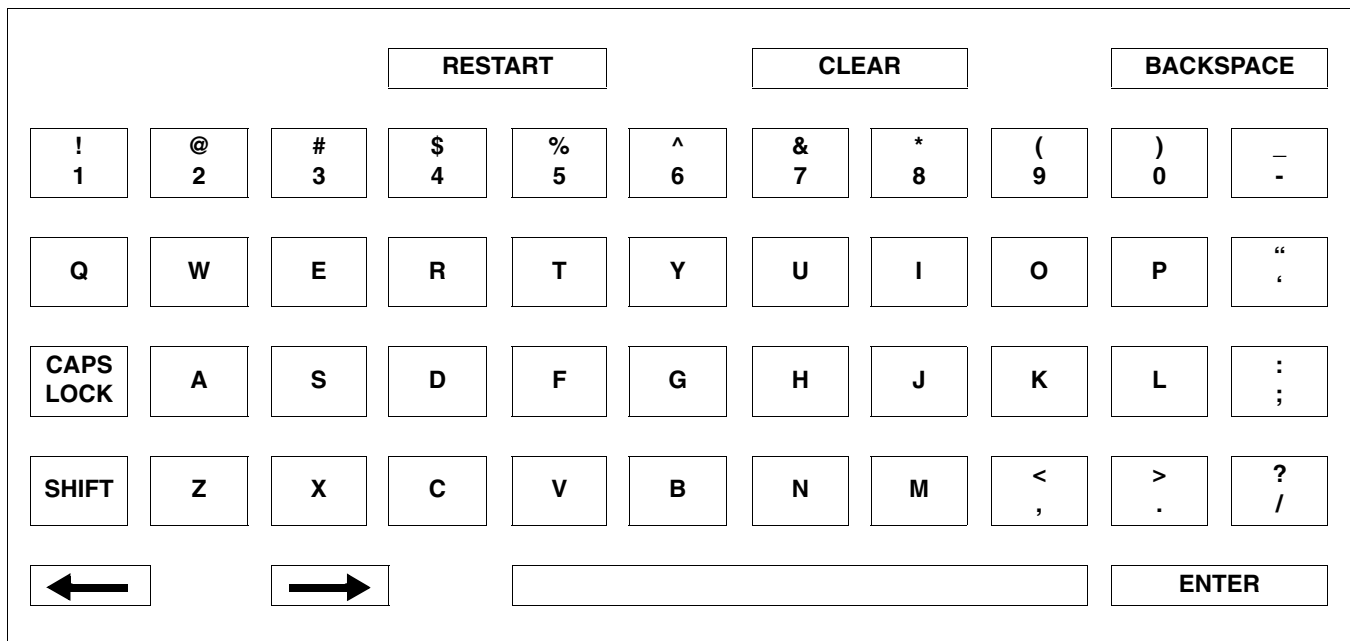


Figure 3-1: Ultraview 1030/1050/1500/1600 on-screen keyboard

UCW/Ultraview 1700

The keyboard shown in *Figure 3-2* appears when you touch the ADMIT or CHANGE DATA keys. You can use this keyboard to enter or change ALL patient information.

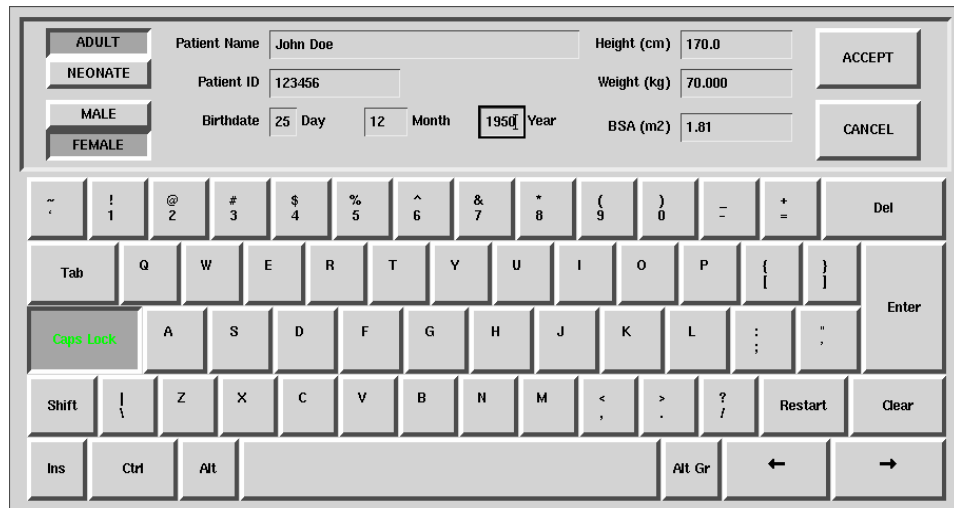


Figure 3-2: UCW/Ultraview 1700 on-screen keyboard

Character Keys — Each character key you touch displays above the keyboard on the 1030, 1050, 1500 and 1600. It displays in the selected field on the UCW and Ultraview 1700.

Function Keys —

DEL or BACKSPACE deletes the character to the LEFT of the cursor.

← moves the cursor left one position.

→ moves the cursor right one position.

RESTART redisplay the last name or value stored and deletes all earlier changes.

CLEAR deletes the currently displayed name or value.

ENTER stores the data displayed in the selected field into system memory.

TAB moves the cursor to the next field.

CAPS LOCK locks the keyboard in all caps mode.

SHIFT toggles the shift mode on and off.

INS inserts the selected data in the current space.

SPACE BAR inserts a space.

ACCEPT enters the data into the system and completes the admit.

Entering Height, Weight, and BSA

Table 1 lists the default values and valid ranges for height, weight, and BSA (body surface area). You can adjust the values up or down within the valid range. The values last set for height, weight, and BSA remain until manually changed.

Table 1: Height, Weight, BSA Default Value

Label	Name	Units	Default Value (1030, 1050, 1500, 1600 only)		Valid Range
			Adult	Neonatal	
BSA	Body Surface Area	m ²	1.81	0.11	0.03 - 3.69
HT	Height	cm in	170 66.9	35 13.8	20 - 215 7.9 - 84.6
WT	Weight	kg lb	70.000 154.324	1.500 3.307	0.2 - 250.0 0.441- 551.156

The parameter value can be displayed in either U.S or metric units (see your system administrator for details). The system automatically computes BSA from the values entered for height and weight and uses this BSA value to obtain indexed values for physiologic calculations such as Cardiac Output.

Toggle the ADULT/NEONATE key to display the respective adult and neonatal default values for height, weight, and BSA.



- On central monitors, the ADULT/NEONATE key appears dotted if the remote monitor where the admit/discharge occurs does not support the patient type selection.

Using the On-Screen Keypad (Ultraview 1030/1050/1500/1600 only)

When you select either the HEIGHT, WEIGHT, or BSA parameter key, an on-screen keypad will appear displaying the selected parameter in the upper left corner (Figure 3-3). The current parameter value is displayed in the upper right corner. You can change this parameter value up or down using the arrow keys, or you can use the keypad numbers to enter up to seven digits, including a decimal point. The system recognizes any value within the range that displays immediately below the keypad. The default values for height, weight, and BSA are displayed if other values are not available.

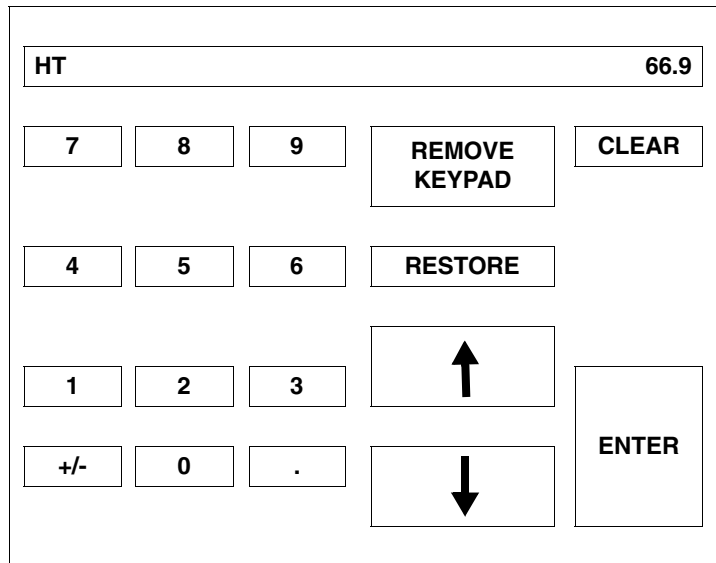


Figure 3-3: Ultraview 1030/1050/1500/1600 on-screen keypad

Numeric Keys — The 0 - 9 and decimal point keys allow you to enter numeric data.

Function Keys —

↑ ↓ increases or decreases the displayed parameter value by 1.0, 0.1, 0.01, or 0.001 depending on the resolution of the input value.

ENTER stores the value displayed in the top right corner of the keypad in system memory. The ENTER key must be touched to store the value.

CLEAR sets the value in the top right corner of the keypad to 0.

RESTORE returns the previous value or displays the stored value.

REMOVE KEYPAD clears the keypad from the screen and restores the previously displayed value.

+/- This key is disabled.

Entering Patient Date of Birth

Ultraview 1030/1050/1500/1600

To enter the patient's date of birth, touch the DATE OF BIRTH key and enter the month, day, and year. Touch ENTER to store the information in the monitor's memory.

UCW/Ultraview 1700

To enter the patient's date of birth, use the TAB key to move to the **Birthdate** field on the on-screen keyboard and enter the **Day**, **Month**, and **Year**. Touch ENTER and ACCEPT to store the information in the monitor's memory.

Entering Patient Type and Gender

To select the patient type, touch the ADULT/NEONATE key. Once the selection has been made, it is stored in the monitor's memory and either ADULT or NEONATE is highlighted. If you use one patient type exclusively, your system administrator may set the selection to that specific type.

To select the patient gender, touch the MALE/FEMALE key. Once the selection has been made, it is stored in the monitor's memory and either MALE or FEMALE is highlighted.

Changing Patient Information

To change patient information:

- 1 Touch MONITOR SETUP.
- 2 Touch ADMIT/DISCHARGE.
- 3a Select a subnet or a bed (central only).
- 3b If you selected a subnet, then select a bed.
- 4 Touch CHANGE DATA.
- 5 Make desired changes as described under *Entering New Patient Information* on page 3-4.

To alter any existing patient information, use the CHANGE DATA key. This key does not function when there is no patient name or ID number stored in the system.

Discharging a Patient

To discharge a patient:

- 1 Touch MONITOR SETUP.
- 2 Touch ADMIT/DISCHARGE.
- 3a Select a subnet or a bed (central only).
- 3b If you selected a subnet, then select a bed.
- 4 Touch DISCHARGE.
- 5 Select YES to purge the existing data.

To clear the bedside monitor of existing patient information, touch the DISCHARGE key. You can now purge the existing patient data.

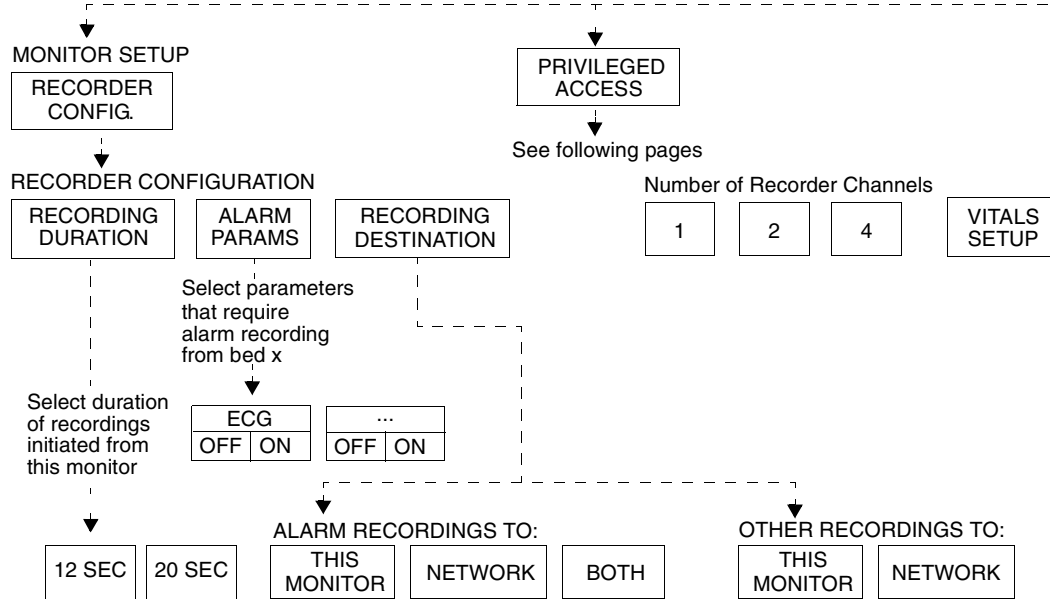
Admit/Discharge Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
Patient name incorrect as entered on keyboard menu	<ul style="list-style-type: none">■ Name exceeds 40 character maximum and system has written over some characters.■ No patient name or ID number stored in system.	<ul style="list-style-type: none">■ Re-enter name using 40 characters or less.■ Enter name or ID number.

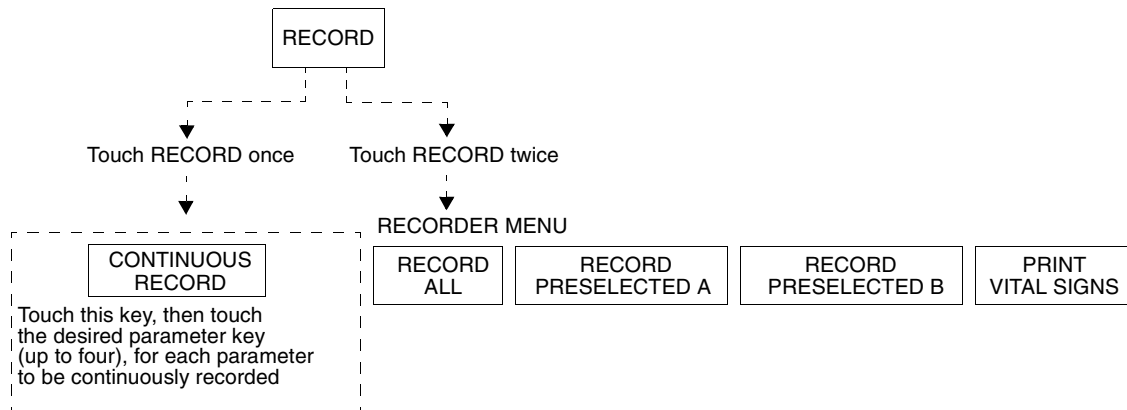
Printing Directory

Directory of Keys - Monitor Setup Level

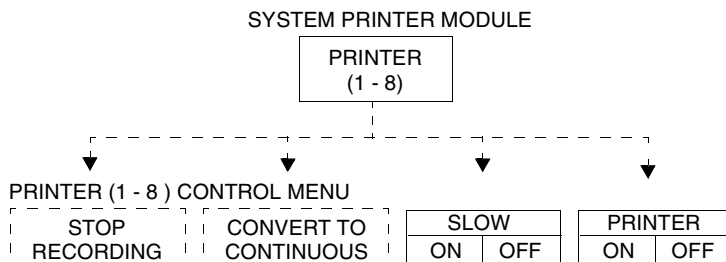
To set up the printer:



To obtain recordings from the monitor:



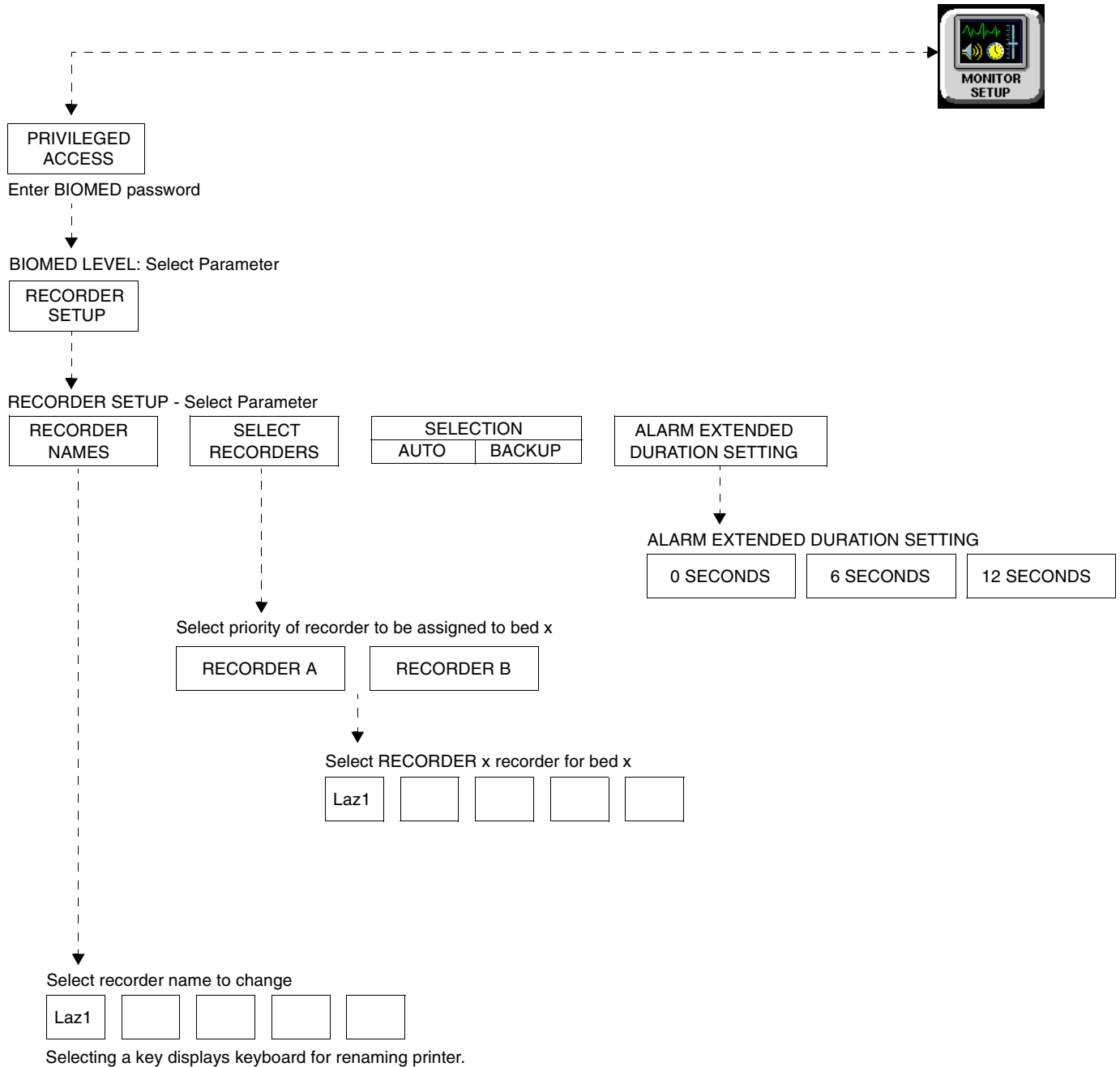
To control recordings from the monitor using the system printer module:



• Based on features purchased, more or fewer keys may appear here than on your menu screens.

Printing Directory

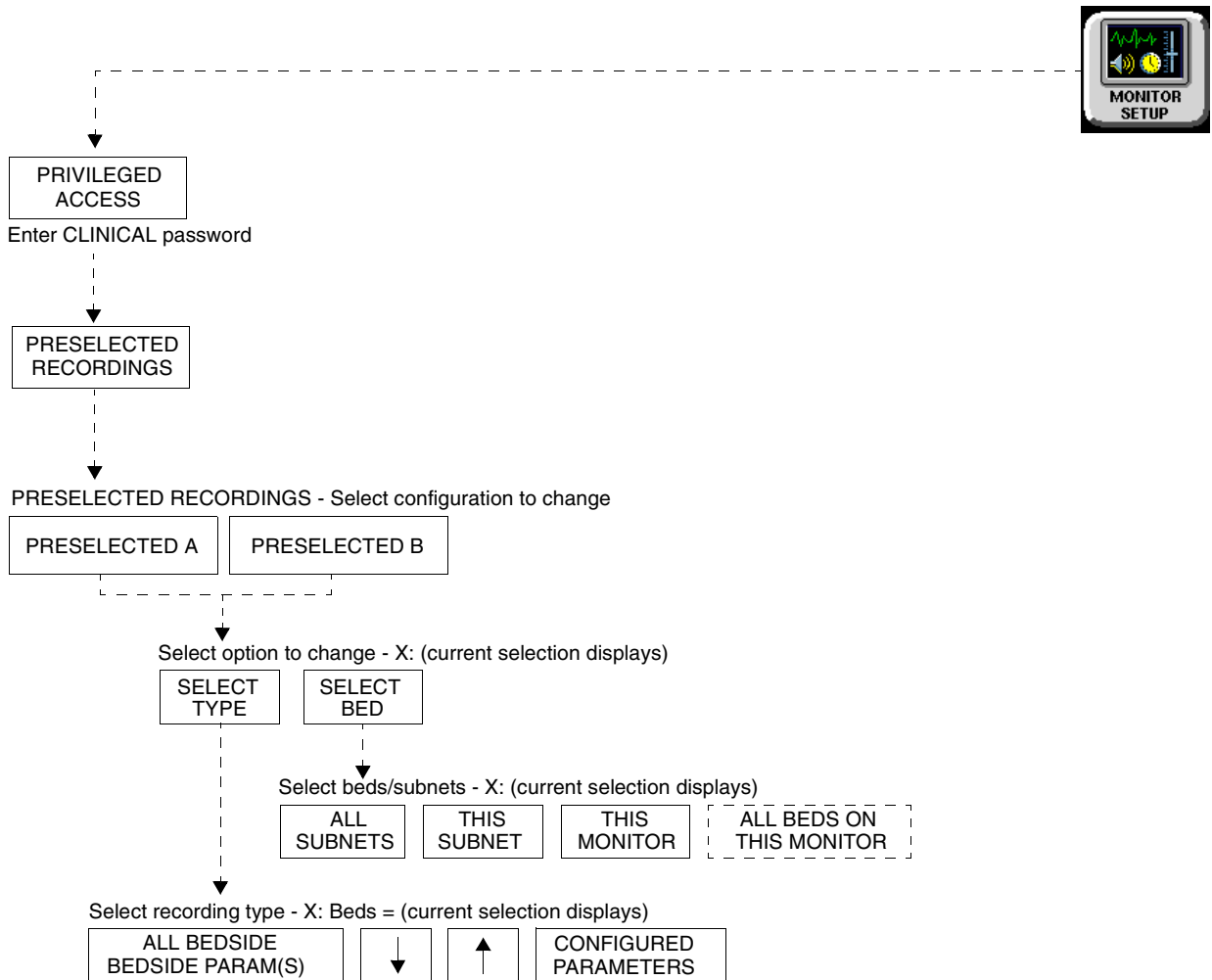
Directory of Keys - Biomed Level



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Printing Directory

Directory of Keys - Clinical Level



Refer to "To obtain recordings from the monitor" and "To control recordings from the monitor using the system printer module" on page 4-1 for more UCW and Ultraview 1700 keys.



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Contents

Overview	5
Bedside Printer Module	6
System Printer Module	6
Ultraview 1030/1050 Monitor Printers	7
PrintMaster	7
Printing Priorities	11
Selecting Print Duration	12
Printer Key Functions	13
Recording Alarms	14
Selecting Recording Destination	14
Printing via Monitors	14
Defining Preselected Recording Keys	16
Loading Paper	17
Paper Out Conditions	18
Record Vitals Report (Ultraview 1030/1050 Only)	19
Printing Troubleshooting Guide	21

Overview

This chapter documents the printing functions of the following printing components:

- 90449 bedside printer module
- 90469 (2- and 4-channel) system printer module
- Record Vitals Report
- Ultraview 1030/1050 printer
- 90838 PrintMaster™ laser printer

The chapter reviews each printer and includes information and instructions about its features.

Printers can provide strip chart recordings of the following:

- Automatic recordings of any parameter in an alarm condition (if configured in the MCM and if the Record Alarms Parameters function is enabled for that parameter).
- Parameter data such as:
 - Patient name, bed name, and time and date of recording
 - Vital signs, edgeprint annotation, and scaling information
 - Waveform data (including timing tick marks and a grid)
 - Arrhythmia/ST segments
- Non-waveform data displayed on the screen such as graphic trends, data tables, hemodynamic calculations, and cardiac output.

Bedside Printer Module

The 90449 bedside printer module is a two-channel printer that provides automatic and manual recordings of parameter data on 50mm fanfold paper.

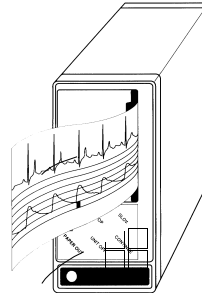


Figure 4-1: 90449 bedside printer module

The bedside printer module prints recordings of parameters in alarm conditions, requested waveforms, and non-waveform data such as:

- tabular trends
- hemodynamic calculations
- drug dose calculations
- graphic trends waveform data



- *The bedside printer is not designed for use as a system printer and will not function correctly if used in this manner.*

System Printer Module

The 90469 system printer module is a two- or four-channel printer that provides automatic and manual recordings of parameter data on 50mm or 120mm fanfold paper.

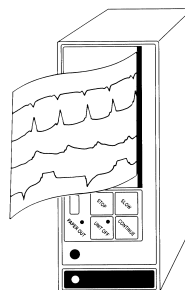


Figure 4-2: 90469 system printer module

The Ultraview Care Network system printer module prints recordings of parameters in alarm conditions, requested waveforms, and non-waveform data such as:

- tabular trends
- hemodynamic calculations
- drug dose calculations
- graphic trends waveform data

Ultraview 1030/1050 Monitor Printers

The printers in the Ultraview 1030/1050 monitors are two-channel printers that provide automatic and manual recordings of parameter data on 50mm roll paper. The printers print recordings of parameters in alarm conditions, requested waveforms, and non-waveform data.

PrintMaster

The 90838 PrintMaster is a four-channel, network printer that provides automatic and manual recordings of parameter data on 8 1/2 x 11 or A4 paper.

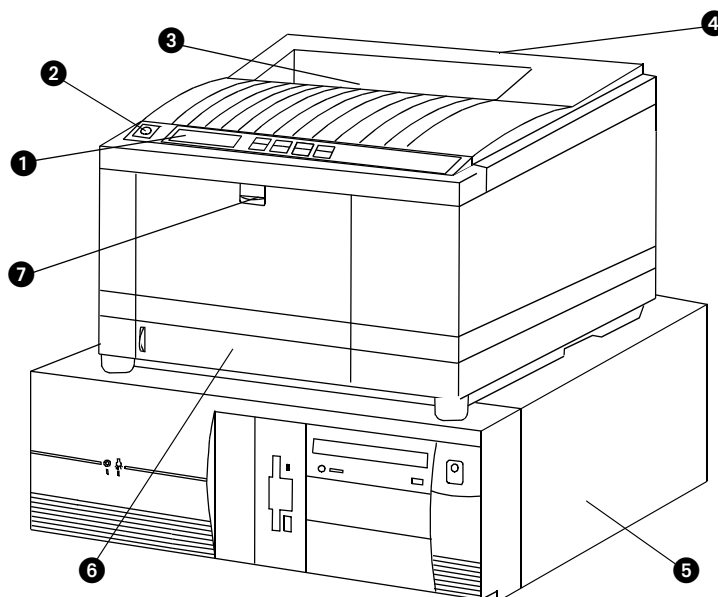


Figure 4-3: PrintMaster

- | | |
|----------------------|---------------------------|
| ❶ Display panel | ❺ Central processing unit |
| ❷ Top cover release | ❻ Paper drawer |
| ❸ Top printout tray | ❼ Front cover release |
| ❹ Rear cover release | |

The PrintMaster printer functions the same as the bedside and system printer modules in that it prints recordings of parameters in alarm conditions, requested waveforms, and non-waveform data.

Clearing Paper Jams (PrintMaster)

If a paper jam occurs, a message will indicate the location of the jam. Once the jam is cleared, the cover closed, and the printer warmed up, the printer will print all the pages affected by the jam.

One of three paper jam messages may appear on the printer display:

Table 1: PrintMaster Paper Jam Messages

PAPER INPUT JAM	<ol style="list-style-type: none">1. Pull out the paper drawer.2. Remove the sheet that did not feed.3. Inspect remaining sheets to ensure they are not wrinkled or stuck together.4. Close the paper drawer.5. Open and close the top cover to clear the paper jam message.
PAPER FEED JAM	<ol style="list-style-type: none">1. Open the top cover. CAUTION! THE FUSING UNIT IS HOT.2. Lift out the image drum cartridge.3. Carefully remove the jammed paper.4. Replace the image drum cartridge.5. Close the top cover.
PAPER EXIT JAM	<ol style="list-style-type: none">1. Open the top cover and the rear cover to release the roller pressure. CAUTION! THE FUSING UNIT IS HOT.2. Pull the paper out from the rear or inside of the printer.3. Close the top and rear covers.

Terminating a Print Job (PrintMaster)

To terminate an undesired multi-page print job that is currently printing, power the printer OFF (until the front panel lights go out) then turn it back ON. This cancels any print job in process.

Replacing the Toner Cartridge (PrintMaster)

When the TONER LOW message appears on the printer display:

1. Open the top cover.
2. Lift and pull the toner cartridge out at an angle.
3. Insert the new cartridge.
4. Close the top cover.

PrintMaster Display Messages

Table 2: Printer Display Messages

Message Text	Reason
ON-LINE	Ready to receive data.
OFF-LINE	Not ready to receive data.
DATA PRESENT	Print data is in buffer.
PRINTING	Data is being received and printed.
POWER SAVING	Power saving mode is active.
LOW TONER	Toner is running out. 100 more pages can be printed when this message is first displayed.
TONER EMPTY REPLACE TNR CART	Toner cartridge is empty. Printer will stop receiving printing until toner cartridge is replaced.
TONER SENSOR	Malfunction of toner sensor is detected.
RESET	Manual reset was initiated. All temporary fonts and macros are deleted.
PRINT FONTS	Font page is printing.
DRUM CLEANING	Drum cleaning page is printing.
PRINT DEMO PAGE	Demo page is printing.
PRINT MENU	Menu page is printing.
CHANGE DRUM	Drum near 90% of life. Change drum and reset drum counter.
FUSER LIFE	Fuser near end of life. Contact service.
COPY nnn/mmm	Indicates number of copies printed. nnn = page being printed. mmm = total copies requested.
STACKER FULL REMOVE THE PAPER	Paper exit bin is full. Printing is stopped until paper is removed.
mmmmm MANUAL PAPER REQUEST	Insert requested paper. Printing is stopped until paper is provided or RECOVER is pressed. mmmmm = requested size.
mmmmm tttttt PAPER REQUEST	Paper size mmmmm requested at tray tttttt. Printing is stopped until paper is provided or RECOVER is pressed.
PAPER OUT tttttt	Paper is out at tray tttttt. Printing is stopped until paper is provided.
ERROR MEMORY OVERFLOW	Page data exceeds available memory. Press RECOVER to continue. Adjust RASTER BUFFER, RECEIVE BUFFER, and/or FONT PROTECT in menu, and resend job.
ERROR RECEIVE BUFFER OVERFLOW	Received buffer overflow. Data was lost. Press RECOVER to continue, and resend job.

Table 2: Printer Display Messages (continued)

Message Text	Reason
ERROR PRINT OVERRUN	Data too complex for current RASTER BUFFER setting. Increase RASTER BUFFER value and resend job or add memory. Press RECOVER to continue.
ERROR HOST I/F	Host interface error. Data was lost. Press RECOVER to continue, and resend job.
CARD NOT FOUND PLEASE REINSERT	Font card removed. Reinstall card. Press RECOVER to continue, and resend job.
ERROR PAPER SIZE CHECK tttttt	Incorrect paper size detected for tray tttttt. Provide correct paper size and press RECOVER to continue.
PAPER INPUT JAM CHECK tttttt	Paper jammed while being supplied from tray tttttt. Clear jam and open/close top cover.
PAPER FEED JAM CHECK tttttt	Paper jammed during feeding from tray tttttt. Clear jam and open/close top cover.
PAPER EXIT JAM REMOVE THE PAPER	Paper jammed during exit. Clear jam and open/close top cover.
COVER OPEN	Close cover.
EEPROM RESETTING	EEPROM resetting to factory defaults; returns to ON-LINE.
ERROR CARD FORMAT CHECK	Installed font card has invalid data. Turn off printer to clear error.
ERROR CARD REMOVED ON-LINE	Font card removed while ON-LINE. Turn off printer to clear error.
ERROR CONTROLLER nn On -aaaaaaaa	Controller error, nn = error type. Power off printer to clear error. If error continues, contact your Customer Service Representative.
88888888 88888888	Displayed when power is turned on. This is done to test all LEDs and LCD segments.
INITIALIZING	Controller is being initialized at power ON.
RESET TO SAVE	Press RESET to save menu changes. Menu changes cannot be reset automatically because data is present in buffer.

The PrintMaster will beep every 15-seconds under the following conditions:

- Paper jam
- Missing toner cartridge
- Top cover or back door open
- Power to printer is OFF
- Power cord is disconnected
- Printer cable is disconnected
- Printer in Not Ready mode

Printing Priorities

Each Spacelabs Medical network-connected patient monitor is capable of sending recordings to two network printers. With two printers available to monitors on the network, printer selection rules are used to strike the best possible balance to:

- generate the most timely output of high priority recordings;
- ensure that subsequent recordings from one patient over a short time span are processed by one printer; and
- use paper as efficiently as possible.

When the printing load is heavy, these objectives may conflict. The factors that are taken into consideration when a print request occurs include:

- Are either of the two printers outputting, holding in memory queue, or loading in queue a print job from this monitor?
- Are either of the printers idle?
- Is the record request a high priority request (alarm vs. manual)?
- Are either of the printers currently printing a continuous recording?
- Are either of the printers' queues full?
- Which of the printers is the preferred size for this request (1, 2, or 4 channels)?

At the time of a printing request, the monitor from which the request is coming evaluates both of the available printers one at a time, leading to a score for each of the two printers. Each printer's evaluation passes all the way through the priority tree from the top score to the score at the bottom of the tree. The printer generating the highest score gets the job. If the evaluation produces the same score for each printer, the print job is sent to the printer designated as the primary printer for that monitor.

The printing rules mentioned work best when the two printers are sharing the printing load. The monitor automatically determines which printer is best for each type of recording. Another configuration designates one printer as the primary printer and the other as the backup printer. All recordings are sent to the primary printer unless it is unable to print for the following reasons:

- Off-line
- Out of paper
- Disconnected from network
- Powered OFF
- All print queues full
- Unable to accept recording type

If the primary printer is unable to print, the recordings are then sent to the backup printer unless it is also unable to print for the reasons listed above.

Some networks are configured so that recordings from a given monitor are directed to only one of the printers on the network. In this case only one printer will be available instead of two during possible times of simultaneous multiple bed alarms. The selection rules will not be applicable, and print performance will be affected.

The following list defines recording priorities in descending order:

- Highest
- Alarm recording or a manual recording request via a monitor
 - RECORD ALL request via a bedside monitor
 - RECORD ALL request via a central monitor
 - Non-waveform recordings
- Lowest
- All Arrhythmia/ST classes

In all network printing cases:

- High priority print jobs bump lower priority jobs. For instance, an alarm recording will bump graphic trends to a lower position in the print queue.
- A fully loaded printer will bump graphic trends out of the queue.
- A high priority request erases as many lower priority requests as needed to make room for the data it contains.



- *A status message is not displayed when a print request replacement occurs.*

Selecting Print Duration

To select print duration from the monitor:

- 1 Touch MONITOR SETUP.
- 2 Touch RECORDER CONFIG.
- 3 Touch RECORDING DURATION to change length of time for printing.

Waveform Data

In the absence of an alarm condition, the print request origin determines the length of time that waveform data (ECG, ART, RESP, etc.) is recorded.

Recordings requested via the monitor are either 12- or 20-seconds in duration. This is selectable via the RECORDING DURATION key. Recordings start with a few seconds of data received just prior to the print request, followed by real-time data.



- *The RECORDING DURATION key will not display if the recording duration has been preset by your system administrator.*

Non-Waveform Data

The length of time the printer requires to record non-waveform data, such as graphs and data tables, depends on the complexity of the data and cannot be pre-determined.

Printer Key Functions

To access printer control keys from the monitor:

- 1 Touch NORMAL SCREEN.
- 2 Touch PRINTER CONTROLS.
- 3 Select the desired key.

Ultraview 1030/1050 Monitor, Bedside, and System Printer Modules

Printer control keys for the bedside and system printer modules are located on the module front. The printers can also be controlled by keys on the monitor itself.

Table 3: Key Descriptions

Key	Function
SLOW ON/OFF	Changes the print speed of waveform recordings to 6.25mm/second. Pressing SLOW a second time returns the printer to the current system sweep speed. SLOW has no effect on the print speed of non-waveform recordings (data tables, graphics, etc.).
CONTINUE	<ul style="list-style-type: none"> • When the printer is off-line, press this key to feed roll paper at 25mm/second or to feed one sheet of perforated paper through printer module. • When the printer is on-line and currently printing a 12- or 20-second waveform recording, press CONTINUE to convert to a continuous recording. If you press CONTINUE, the 12- or 20-second recording completes, followed by a horizontal line, and then the current data. The horizontal line appears even on recordings that are not in a queue, but are the only request.
STOP RECORDING	<ul style="list-style-type: none"> • Stops any printing currently in progress and moves to the next print request in the queue. • Stops any roll paper advance currently in progress.
PRINTER ON/OFF	Takes the printer off-line without turning the power OFF. Alarms and print requests are now ignored. An LED (located either in the key or on the front panel of system printer) illuminates when this function is selected.

Recording Alarms

To select parameters for alarm recording and generate automatic recordings on a bedside recorder:

- 1 Touch MONITOR SETUP.
- 2 Touch RECORDER CONFIG.
- 3 Select RECORDING DESTINATION.
- 4 Select a destination for the alarm recording.
- 5 Touch PREVIOUS MENU.
- 6 Touch ALARM PARAMS.
- 7 Select parameter key(s) ON to initiate a recording in case of alarm. If the parameter key is OFF, no alarm recording is produced for that parameter in an alarm condition.

An alarm recording may be triggered whenever a parameter enters an alarm condition. Recordings in the process of printing cannot be interrupted or delayed by a new alarm condition.



- *Parameter alarm recordings can be set to OFF so that a printer will not respond to an alarm condition (the alarm tone and accompanying alarm message are unaffected). Refer to Automatic Recording of an Alarm on page 2-10 for more details.*

Selecting Recording Destination

The RECORDING DESTINATION menu contains keys that direct alarm recordings to a bedside recorder, a network printer, or both. All other recordings may be directed only to a bedside printer or a network printer, but not both.

Alarm recordings begin with several seconds of pre-alarm waveform data and continue for as long as the alarm condition exists (a minimum of 12-seconds).



- *12-lead ECG reports will always print to the 90838 printer, if available, regardless of the destination settings for the recording.*

Printing via Monitors

To start a manual recording via the monitor:

- 1 Touch RECORD.
- 2 Touch up to four flashing parameter keys.
- 3a Touch CANCEL RECORD SELECTION(S) to terminate.
-OR-
- 3b Touch STOP RECORDING in the PRINTER CONTROL menu to terminate.

Non-Waveform Data

Whenever you display non-waveform data on either the central or bedside monitors, a PRINT key displays. The RECORD key is not functional for printing non-waveform data. As a result, non-waveform data must be displayed before it can be recorded.

Non-waveform data usually occupies a minimum of two slots in the printer's queue due to the volume of information being sent. This means that a single non-waveform recording may take up as much room on the strip chart as two simultaneous waveform recordings.

If the data cannot fit on the strip at one time, it is separated horizontally, printing first the top half and then the bottom half of the data.

To print group recordings via the monitor:

- 1 Touch RECORD twice.
- 2a Touch RECORD ALL.
-OR-
- 2b Touch RECORD
PRESELECTED A or B.

To start a continuous recording via the monitor:

- 1 Touch RECORD.
- 2 Touch CONTINUOUS RECORD, then touch the desired parameter key (up to four, for each parameter to be continuously recorded).
- 3 Touch CANCEL RECORD SELECTION to restart the selection process.

To stop a continuous recording via the monitor:

- 1 Touch RECORD.
- 2a Touch STOP CONT. RECORD.
-OR-
- 2b Touch STOP RECORDING in PRINTER CONTROLS.

Waveform Data

Waveform data is recorded using the RECORD key on the monitor.



- Requests for recording waveform data are limited to only those waveform parameters that are currently displayed on the screen (except ECG where all leads print).
- If a parameter menu is left on the screen, the CONTINUOUS RECORD key is not displayed.

Each time you touch RECORD on the monitor, the CONTINUOUS RECORD key displays and waveform parameter keys flash for up to 4-seconds. You must make your key selection within this four-second window. This window stays open for an additional 2- to 4-seconds each time a key is selected. Once the parameter keys stop flashing, any waveforms that have been selected are automatically sent to the printer for recording.

Touch the RECORD key twice to display the Recording menu. From the Recording menu you can:

- Record all parameters currently on this screen by touching RECORD ALL.
- Initiate a preselected group of recordings by touching PRESELECTED A or PRESELECTED B.
- Select PRINT VITAL SIGNS to manually print the vital signs you have selected (refer to *Record Vitals Report (Ultraview 1030/1050 Only)* on page 4-19 for more information).

RECORD ALL and PRESELECTED A OR B recordings are 8-seconds in duration.

Group Recordings

The printers record all the requested parameters on one patient before beginning on the parameters of the next patient. Under no circumstances will the printer combine the parameters of different patients onto the same strip chart. Recordings in the process of being printed cannot be interrupted or delayed by additional print requests.

Defining Preselected Recording Keys

To define the PRESELECTED A and B parameters (UCW and Ultraview 1700):

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Clinical password.
- 4 Touch PRESELECTED RECORDINGS.
- 5 Touch key to be defined (A or B).
- 6 Touch SELECT TYPE.
- 7a Touch FIRST 2 BEDSIDE PARAM(S) and use arrow keys to cycle through parameter selections: ALL BEDSIDE PARAM(S) or FIRST n BEDSIDE PARAM(S) (where n is 1, 2, 4 or 8).
-OR-
- 7b Touch CONFIGURED PARAMETERS and toggle desired parameters ON or OFF.
- 8 Touch PREVIOUS menu twice to define the remaining PRESELECTED key.

To define the PRESELECTED A and B beds (UCW and Ultraview 1700):

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Clinical password.
- 4 Touch PRESELECTED RECORDINGS.
- 5 Touch key to be defined (A or B).
- 6 Touch SELECT BEDS.
- 7a Select ALL SUBNETS.
-OR-
- 7b Select THIS SUBNET.
-OR-
- 7c Select THIS MONITOR.
- 8 Touch PREVIOUS menu twice to define the remaining PRESELECTED key.

The Preselected Recordings function enables you to define which beds and parameters will be automatically recorded. The preselected group is established by the system administrator. For UCW and Ultraview 1700 monitors this is set up through the Clinical level of the Privileged Access menu.

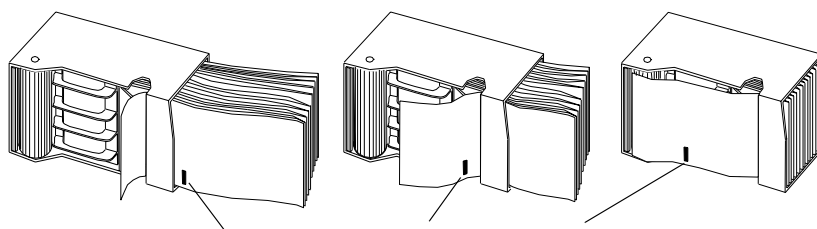
Loading Paper

To load paper in a bedside printer module (2-channel only):

- 1 Press eject button next to PAPER OUT light.
- 2 Withdraw plastic paper tray.
- 3 Discard old cardboard retainer inside tray.
- 4 Remove label from new paper but keep cardboard retainer in place around one end.
- 5 Start inserting paper into tray, beginning with cardboard retainer end.
- 6 With paper halfway into tray, lift up spring-loaded roller.
- 7 Bring out top fold of paper from under top end of cardboard retainer.
- 8 Bring top fold over top of spring-loaded roller.
- 9 Release spring-loaded roller onto remainder of paper.
- 10 Insert stack fully.
- 11 Unfold paper and position over top of black roller at end of tray.
- 12 Slide tray completely back into printer module.

Bedside Printer Module

The small black rectangular cue mark on the bedside printer paper must face out and be at the bottom of the tray when loading paper into the tray.



Note orientation of small cue mark

Figure 4-4: Bedside printer module paper tray

Each recording starts at the Z-fold perforation and blank sheets are not placed between successive print requests.

To load paper in a system printer module (2- or 4-channel):

- 1 Press eject button next to PAPER OUT light.
- 2 Withdraw plastic paper tray.
- 3 Discard old cardboard retainer inside tray (2-channel only).
- 4 Remove label from new paper but keep cardboard retainer in place around one end (2-channel only).
- 5 Discard 4-channel container.
- 6 Start inserting paper into tray, beginning with cardboard retainer end (2-channel only).
- 7 Make sure black squares are in the top left corner of the pages (4-channel).
- 8 Insert stack fully.
- 9 Unfold paper and position over top of black roller at end of tray.
- 10 Slide tray completely back into printer module.

System Printer Module

The system printer module has a slide-out plastic tray that accepts packets of Z-fold paper. The 2-channel printer uses 50mm wide by 27m long paper. The 4-channel printer uses 120mm wide by 45.7m long paper. Each sheet has a small black rectangular cue mark located along the edge used to load the paper into the tray.

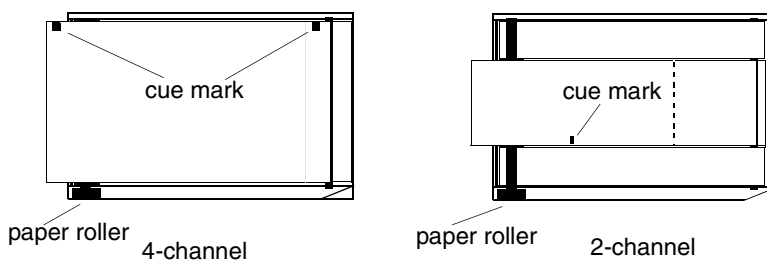


Figure 4-5: System printer module paper trays (top view)

Ultraview 1030/1050 Printers

To load paper in the Ultraview 1030/1050 printer:

- 1 Press release button on door.
- 2 Open paper tray door all the way.
- 3 Snap new roll into place.
- 4 Pull out 6 to 12 inches of paper.
- 5 Close door.

The Ultraview 1030/1050 monitor's printer uses 50mm wide by 30m long rolls of thermal paper. The printer has an automatic self-feed mechanism for threading the paper through the rollers.

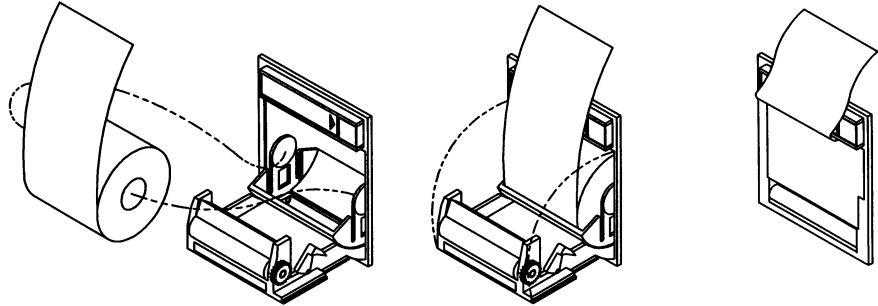


Figure 4-6: Loading printer paper

PrintMaster

The PrintMaster printer has a slide-out paper drawer that accepts up to 500 pages of letter or A4-sized copy paper. Slide the drawer out of the printer, place the paper (according to orientation) into the cassette, and place the cassette back into the printer.

Paper Out Conditions



WARNING:

- **While printers are off-line, or out of paper, they will ignore any new alarm that would normally start a recording, and no alarm or requested recordings will go into a queue.**

All printers signal a paper out condition by periodically sounding a tone. The PrintMaster will beep every 15-seconds when there is no paper in the cassette, or the cassette is not loaded. In addition, the PrintMaster and the bedside printer module flash the PAPER OUT light, while the 2-channel and 4-channel system printer modules display a LOCAL PRINTER PAPER OUT message. On the Ultraview 1030/1050 monitor's printer, the PAPER OUT tone does not sound if the local alarm tone key is set to OFF.

After reloading paper in the system printer module, the paper-feed mechanism ejects a sheet to verify proper paper feeding. For the paper-feed mechanism to work, you must leave the printer power ON while you are loading paper.



CAUTION:

- **Removing a bedside or system printer module from the monitor to load paper causes an immediate loss of pending print requests.**

Record Vitals Report (Ultraview 1030/1050 Only)

To define the details of a report:

- 1 Touch MONITOR SETUP.
- 2 Touch RECORDER CONFIG.
- 3 Touch VITALS SETUP.
- 4 Touch DATA INTERVAL and select an interval for report history.
- 5 Touch PREVIOUS MENU.
- 6 Touch START TIME and select a time period for report history.
- 7 Touch PREVIOUS MENU.
- 8 Touch SELECT PARAMETERS and select the parameters you wish to include in the report.
- 9 Touch PREVIOUS MENU.

The Record Vitals Report:

- provides manual recordings of parameter data on 50mm roll paper
- only prints to the monitor's internal recorder

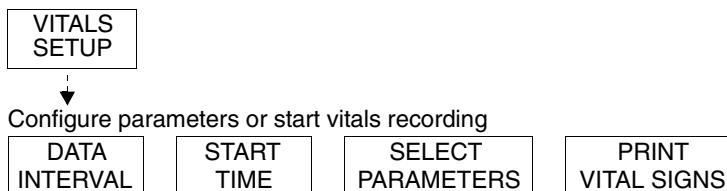


Figure 4-7: Vitals Setup menu keys

Data Interval

You may choose a time interval ranging from 1-minute to 60-minutes, specifically, 1-, 2-, 3-, 5-, 10-, 15-, 30-, and 60-minute intervals. You can also select NIBP ON/OFF and other parameter data from that reading time. If you select NIBP ON, you are not required to select an interval. NIBP readings appear in the report based on the time that you take the readings. If you do not choose an interval or NIBP ON before printing, the message **VITALS REPORT ERROR** prints.

Start Time

You may print vital sign measurements ranging from those taken in the past hour to those taken in the last 24-hours, specifically, 1-, 2-, 4-, 8-, 12-, and 24-hours.

Select Parameters

You may choose the parameters you wish to have included in the report. If you choose a vital sign for which no data is available, **???** appears on the report.

The following is an example of a vitals report. A blank space to enter notes is standard in every report.

Time	HR BPM	Resp RPM	Temp 1 C	Notes
07:50	74	18	37.8	
07:52	74	18	37.8	
07:54	54	13	37.8	
07:56	54	13	37.8	

Figure 4-8: Vitals report

To print a manual report with the Record Vitals Report option:

- 1 Touch VITALS SETUP, PRINT VITAL SIGNS.
-OR-
- 2 Touch RECORD twice and touch PRINT VITAL SIGNS.

Print Vital Signs

To print the report, touch PRINT VITAL SIGNS or touch RECORD twice and then touch PRINT VITAL SIGNS.



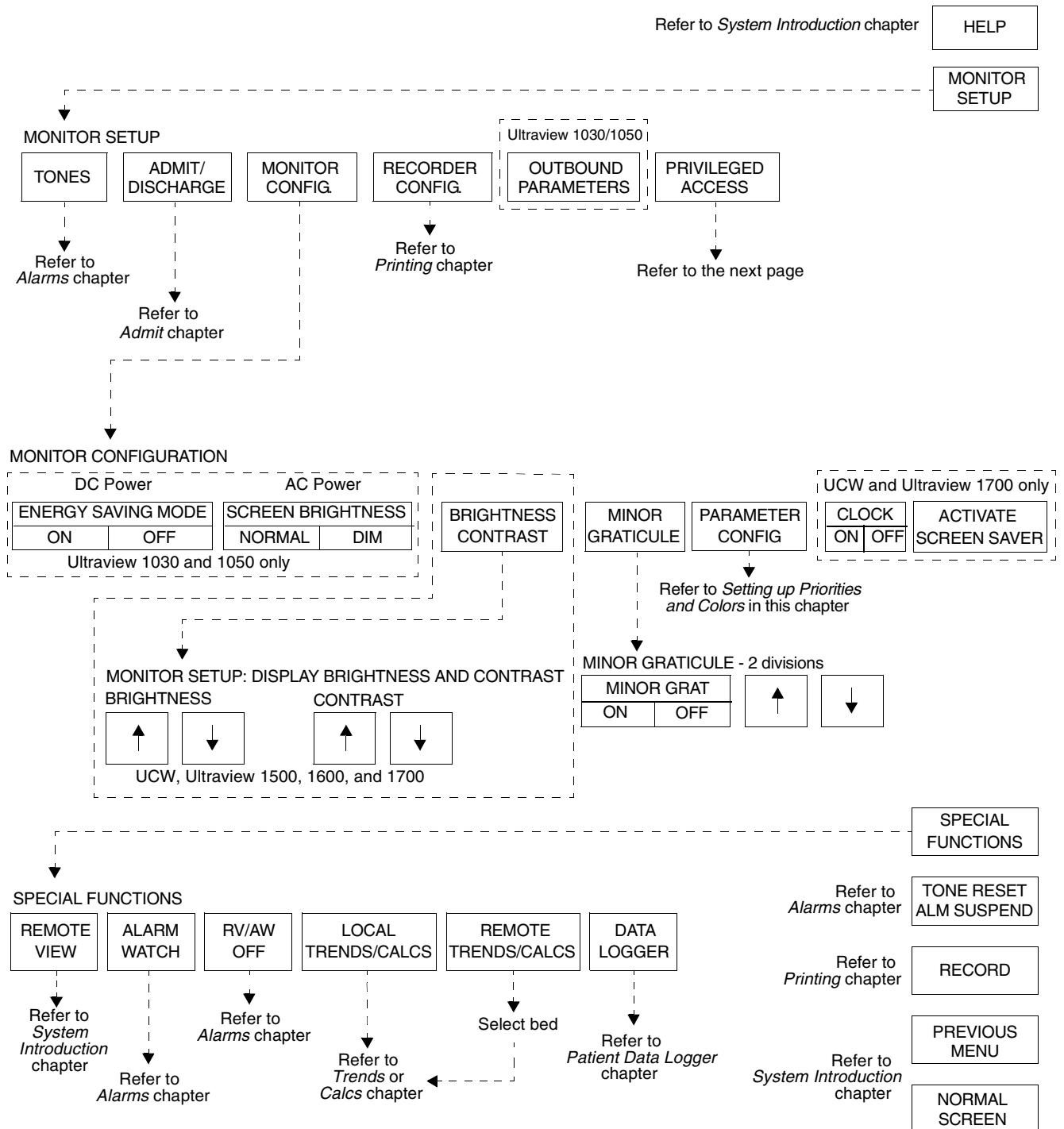
- *Be sure to choose the data interval, the start time, and the parameters you wish to include on the report before printing.*

Printing Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
Printer displays PAPER OUT message	<ul style="list-style-type: none">■ Printer is out of paper.■ Printer door is open.■ Paper was loaded improperly.	<ul style="list-style-type: none">■ Load paper (refer to <i>Loading Paper</i> on page 4-17).
Printer fails to print self-test strip	<ul style="list-style-type: none">■ Failed internal diagnostics.	<ul style="list-style-type: none">■ Notify qualified service person.
Message UNABLE TO RECORD THE REQUESTED CHANNEL is displayed	<ul style="list-style-type: none">■ Printer not active.■ Printer not selected by a system administrator.■ Printer is out of paper.	<ul style="list-style-type: none">■ Toggle PRINTER ON/OFF key.■ Check with your hospital biomed or system administrator.■ Load paper.
CONTINUOUS RECORD key not displayed	<ul style="list-style-type: none">■ Menu is at the bottom of the screen.	<ul style="list-style-type: none">■ Touch NORMAL SCREEN, then RECORD.

Bedside/Transport Monitors Directory

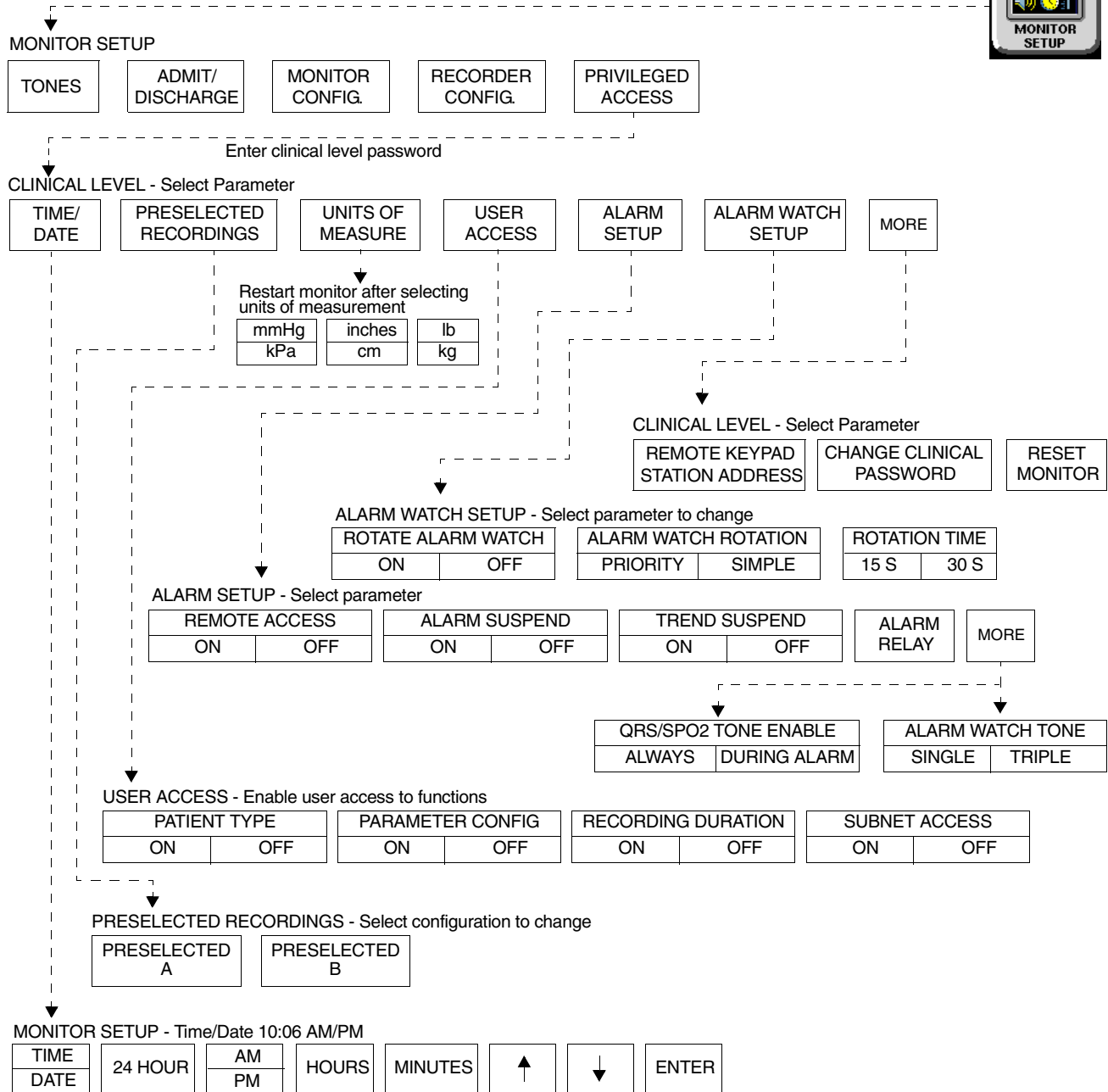
Directory of Keys



Based on features purchased, more or fewer keys may appear here than on your menu screens.

Bedside/Transport Monitors Directory

Directory of Keys - UCW and Ultraview 1700 (Privileged Access)



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Bedside/Transport Monitors

Contents

Overview	3
Display Detail	4
Identifying Special Applications	4
Bedside and Transport Monitor Features	5
Setting Up Priorities and Colors	7
Data Shuttle Option	10
Ultraview 1030/1050 Batteries	13
Wireless Network Interface	15
Outbound Parameters Menu	15
Ultraview 1030/1050 Connections	18
Ultraview 1030/1050 with Capnography (Option G or H)	21
Maternal Obstetrical Monitor - 94000	22
Bedside/Transport Monitor Troubleshooting Guide	27

Overview

This chapter describes the functions and features of bedside and transport monitors. Refer to the *Bedside/Transport Monitors Directory on page 5-1* for help in locating functions not described in this chapter.

The Ultraview Care Network family of monitors and modules have built-in error detection and recovery circuitry. This circuitry, together with special software, enables the monitor to re-initialize and continue to function if an error occurs.

When the system detects an error that cannot be corrected through other means, the bedside monitor re-initializes or resets (blanks). Normally, a reset involves very little loss of patient monitoring time (approximately 5-seconds) and, with few exceptions, all operator set inputs (alarm limits, pressure labels, transducer offsets, etc.) are retained. The entire process of restoring the bedside monitor following a reset, takes approximately 20-seconds, depending upon the number of parameters being monitored.

In some cases, stored trend data will be lost when the monitor resets. If this occurs, the lost data may indicate a hardware condition that requires corrective action. The system will then initiate the start-up diagnostics to check the monitor's operation and fully recover the data. This process takes approximately 10-seconds longer.

If a bedside monitor resets, the bedside monitor displays CHECK SETUP in the ECG zone to alert you to check all limits and values and ensure that the monitor has restored all preset values. (Refer to *Power Failure on page 1-4* for more information.) This also occurs when the monitor is turned ON or when an ECG module has been inserted. Your system administrator may disable the CHECK SETUP feature.



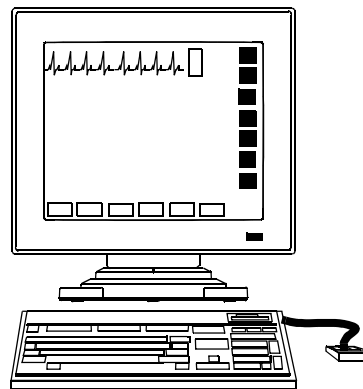
WARNING:

- ***Due to the potential for electromagnetic interference, portable communication transmitters and cellular phones should not be operated within 3.5 feet (1.07 meters) of the patient, patient leads, or associated patient monitoring equipment.***

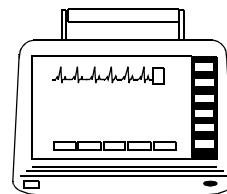
Display Detail

All monitoring data originates at the bedside. Parameter modules plug into the monitor itself or into a remote module housing to obtain patient information, including waveforms and numeric displays.

The bedside screen may (optionally) display up to eight full waveform zones. If more than eight zones are used, zones 9 through 24 appear at the bottom of the screen as numeric values. When you activate a numeric value key, that parameter is displayed in the lowest priority display zone.



UCW/Ultraview 1500/1600/1700



Ultraview 1030/1050

Figure 5-1: Bedside and transport monitors

Identifying Special Applications

If your monitor has access to Special Applications, additional keys identifying those functions appear in the Special Functions menu. Touch the SPECIAL FUNCTIONS key to access the applications.

Special applications include:

- Patient Data Logger (refer to *Patient Data Logger* on page 29-3)
- Dynamic Network Access (DNA) (refer to *DNA* on page 30-3)
(UCW and Ultraview 1700 only)

Bedside and Transport Monitor Features

To adjust screen clarity:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIG.
- 3a Touch BRIGHTNESS.
-OR-
- 3b Touch CONTRAST.
-OR-
- 3c Touch
BRIGHTNESS/CONTRAST
(for Ultraview 1500 only).
- 4 Use arrow keys to adjust.

To set the QRS tones (UCW and Ultraview 1700):

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Clinical password.
- 4 Touch ALARM SETUP.
- 5 Touch MORE.
- 6 Select QRS/SPO2 TONE
ENABLE ALWAYS or
QRS/SPO2 TONE ENABLE
DURING ALARM.

To adjust the scaled display:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIG.
- 3 Touch MINOR GRATICULE.
- 4 Select MINOR GRATICULE
ON.
- 5 Use arrow keys to adjust.

Adjusting Screen Brightness and Contrast

Using the Monitor Setup menu you may increase or decrease the monitors' screen contrast and brightness.

Ultraview 1030/1050 monitors contain a SCREEN BRIGHTNESS key for monitors operating on AC power enabling you to set the screen to NORMAL or DIM. Setting the screen to DIM also enables the power saving features such as shutting off the LEDs and disabling the mouse and keyboard. The screen will also dim approximately 30-seconds after the last time a key is touched or after the final alarm ends. Ultraview 1030/1050 monitors operating on DC (battery) power contain an ENERGY SAVING MODE ON/OFF key that enables and disables the power saving features.

Setting QRS Tones

Your monitor can be configured to sound a tone whenever an R-wave (QRS tone) or SpO₂ pulse (SpO₂ tone) is detected. The pitch of the QRS tone can be modulated with the current SpO₂ value. Refer to *Adjusting Tones on page 8-16* and *Adjusting Tone Volume on page 14-8* for more information.

Your monitor has two options for how the QRS or SpO₂ tone sounds if it has been enabled via either parameter's TONE ON/OFF key. Your monitor can be configured to always sound this tone (default setting) or to only sound this tone when an alarm is occurring.

On UCW and Ultraview 1700 monitors, this selection is available to any user with the Clinical level of "privileged access." On Ultraview 1030, 1050, 1500, and 1600 monitors, this selection is only available to your system administrator.

Using Scaled Displays

Bedside monitors display up to four scaled pressures simultaneously.

Monitors optionally display minor graticule lines that may be adjusted. Minor graticules are small dashed line segments that appear between the full scale graticule lines.

To change the network or internal system time and date (UCW and Ultraview 1700 only):

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Clinical password.
- 4 Touch TIME/DATE.
- 5a Select TIME.
-OR-
- 5b Select DATE.
- 6a Select 24-HOURS or AM/PM (12-hour).
-OR-
- 6b Select MONTH, DAY, and YEAR.
- 7 Use arrow keys to set time or date.
- 8 Touch ENTER.

Setting the Time and Date

The TIME/DATE key controls both the time and date menus. The current time or date displays above the menu.

The time displays in either 12- or 24-hour format. Network monitors display the network time; standalone monitors display the internal system time.

Touch ENTER to make the time/date change permanent in the system.



- *Setting the time on any networked monitor sets the time for all monitors on that network.*

To access the clock menu:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIGURATION.
- 3 Select CLOCK ON.
- 4 Touch the clock that appears in the lower right of the screen.
- 5 Select DIGITAL, STOPWATCH, or TIMER.

Using the System Clock

A system clock can be continually displayed in the lower right corner of the screen. The clock feature may also be used as a stopwatch or timer.



Figure 5-2: Clock display formats



- *The digital clock is available for all monitors.*
- *The stopwatch and timer are only available for the UCW and Ultraview 1700.*

To activate the screen saver:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIG.
- 3 Touch ACTIVATE SCREEN SAVER.

Activating the Screen Saver

Activating the screen saver blanks the screen (displaying only the Spacelabs Medical logo). You may also disable the screen saver by touching the screen, clicking (or dragging) the mouse, or pressing any key on the keyboard.



- *The screen will automatically be restored by an incoming alarm condition.*
- *This feature is only available for the UCW and Ultraview 1700.*

Setting Up Priorities and Colors

To change a parameter priority or color:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIG.
- 3 Touch PARAMETER CONFIG.
- 4 Select a parameter.
- 5 Select the destination priority.
- 6 Select a color.
- 7 Select the parameter key to be colored (the key and waveform will appear in the chosen color).
- 8 Touch STORE to store local color and priority settings.

Table 1 lists default priorities and colors for each screen parameter.

Table 1: Parameter Priorities and Colors

Channel Type	Name	Priority	Color
ECG1	Electrocardiogram (first lead)	1	Green
ECG2	Electrocardiogram (second lead)	2	Green
RESP	Respiration	3	Cyan
VARI	Varitrend	4	White
ART	Arterial Pressure	5	Red
UA	Umbilical Artery Pressure	6	Red
PA	Pulmonary Arterial Pressure	7	Yellow
UV	Umbilical Vein Pressure	8	Blue
CVP	Central Venous Pressure	9	Blue
RAP	Right Atrial Pressure	10	Blue
ICP	Intracranial Pressure	11	Magenta
LAP	Left Atrial Pressure	12	Red
PRS	Other Pressure (general)	13	Magenta
UNLP	Unlabeled Pressure	14	Blue
EtCO ₂	End Tidal CO ₂ (Capnography)	15	White
SpO ₂ (SaO ₂)	Pulse Oximetry (O ₂ Saturation)	16	Green
NIBP	Noninvasive Blood Pressure	17	Red
SvO ₂	Venous O ₂ Saturation	18	Magenta
TCP	Partial Pressure of Transcutaneous O ₂	19	White
EEG	Electroencephalogram	20	Blue
GAS	Gas Analyzer Flexport [®] Interface	21	White
CO	Cardiac Output	22	Magenta
TEMP	Temperature	23	White
INCUB WARMR	Incubator/Warmer	24	White
PO + ET	SpO ₂ and EtCO ₂ Flexport Interface	25	White
IV	Infusion Flexport Interface	26	White
VENT	Ventilator Flexport Interface	27	White
OTHER		28	White

Ultraview Care Network

On the UCW and Ultraview 1700 Parameter Configuration screen, you can touch ALL to display all color configurations (Figure 5-3) or touch LOCAL to display the local color configurations (Figure 5-4).

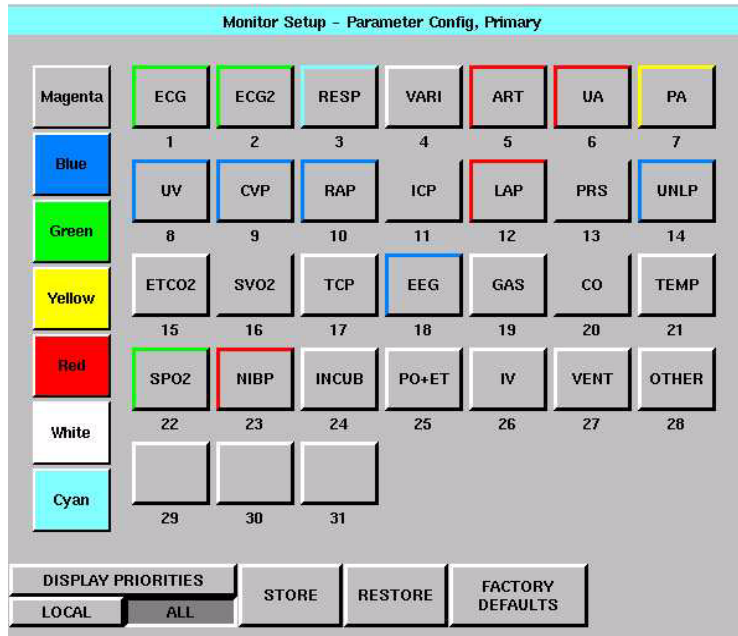


Figure 5-3: UCW and Ultraview 1700 parameter configuration (ALL selected)

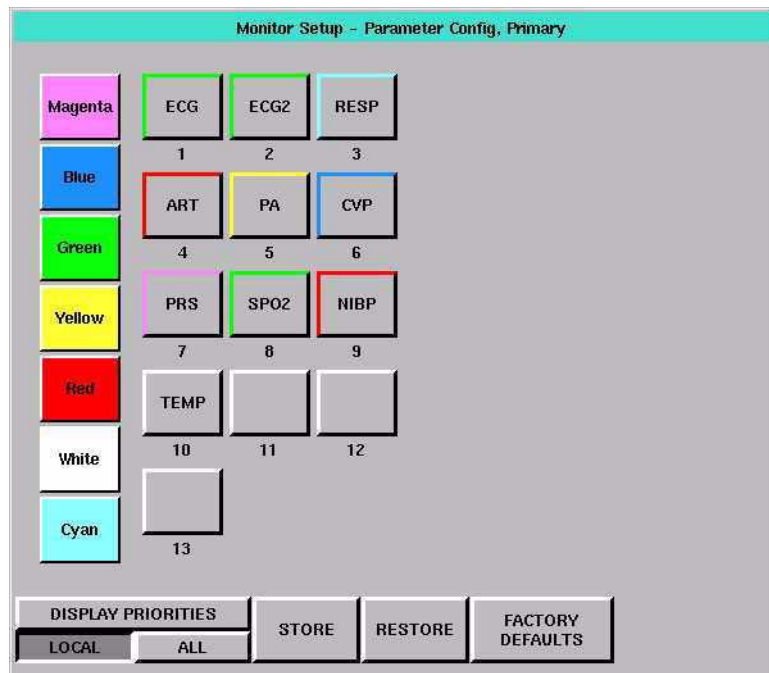


Figure 5-4: UCW and Ultraview 1700 parameter configuration (LOCAL selected)

Bedside/Transport Monitors

				Not available on Ultraview 1030 monitors					
ART	CO	CVP	ECG1	WHITE	1 ECG1	2 ECG2	3 RESP	4 VARI	
ECG2	EEG	ETCO2	GAS	RED	5 ART	6 UA	7 PA	8 UV	
ICP	INCUB WARMR	IV	LAP	GREEN	9 CVP	10 RAP	11 ICP	12 LAP	
NIBP	OTHER	PA	PO+ET	BLUE	13 PRS	14 UNLP	15 ETCO2	16 SPO2	
PRS	RAP	RESP	SPO2	YELLOW	17 NIBP	18 SVO2	19 TCP	20 EEG	
SVO2	TCP	TEMP	UA	CYAN	21 GAS	22 CO	23 TEMP	24 INCUB	
UNLP	UV	VARI	VENT	MAGENTA	25 PO+ET	26 IV	27 VENT	28 OTHER	
INS BLANK	DEL BLANK					29	30	31	32
					STORE	RESTORE	FACTORY DEFAULTS		

Figure 5-5: Ultraview 1050, 1500, 1600 parameter configuration



- Your monitor or workstation may not be configured to allow changes to parameter priorities or colors. Contact your system administrator for details.

The Parameter Configuration screen enables you to change the monitor's default priorities and colors.

Each parameter is displayed in order, and is based upon its assigned priority. The highest priority appears at the top of the screen.

Blank parameter keys enable you to insert a space above, between, or below other parameters. Blanks of any priority can be inserted into a template by selecting the blank and putting it into the desired location. This causes a blank zone to be inserted into the corresponding display area and pushes down all active parameters with a lower priority.

For the UCW and Ultraview 1700, the DISPLAY PRIORITIES key displays a list of the currently active parameters, or all possible parameters, ordered by priority. Touch LOCAL to display only this bed's currently active parameters.

STORE — causes the currently displayed parameter priorities and colors to be stored in memory.

RESTORE — causes the last stored local priority and color settings to be restored from memory.

FACTORY DEFAULTS — causes the factory default priority and color settings to be restored.

Data Shuttle Option

The Data Shuttle option enables you to transfer patient admit data (e.g., age, gender, name, and BSA) and up to 24-hours of trend and episodic data from one monitor to another using a 90496 Ultraview Command Module.

You can transfer data acquired through any Ultraview Care Network module or Flexport interface. Before you shuttle data from one monitor to another, you must first transfer the data from the source monitor into a 90496 module. When you remove the module from the source monitor and insert it into the receiving monitor, data can be transferred to the receiving monitor.



- *The time and date set on both the sending and receiving monitors must be identical for the data transfer to be successful.*

To transfer data:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Select TRANSFER DATA.
- 4 Remove module after DATA TRANSFER COMPLETED is displayed.

Transferring Data to the Module

If your monitor and module support the Data Shuttle option, the monitor displays a TRANSFER DATA key in your ECG Setup menu. When you wish to transfer data (for example when transporting a monitored patient from one unit to another), touch the TRANSFER DATA key to initiate data transfer into the module. The monitor will then display the message TRANSFERRING PATIENT DATA INTO MODULE.



- *The Data Shuttle option is only available in bedside or transport monitors. Central monitors do not display keys and messages related to data transfer.*
- *If you insert a module that supports the Data Shuttle option into a monitor that does not have the option, the monitor will not display data transfer messages and keys.*

Once the data is completely transferred, the monitor sounds a tone and displays the message DATA TRANSFER COMPLETED below the UPDATE TRANSFER and CANCEL TRANSFER keys. The module is now ready to be removed from that monitor.

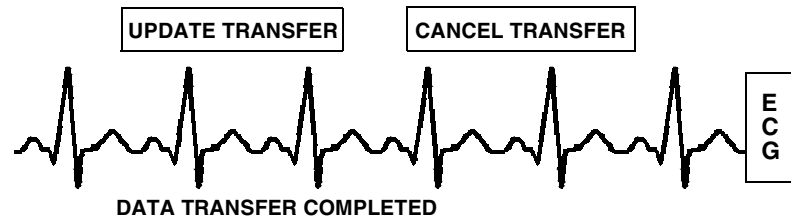


Figure 5-6: Data Transfer Completed display

If you do not transfer the module to the receiving monitor immediately, the source monitor will be storing new data, but the module's transfer data is not automatically updated.

After 2-minutes, a tone will sound once each minute to remind you to update the module with the newly acquired data and the monitor will display the message DATA TRANSFER COMPLETED.

The message DATA IS XX MINUTES OLD displays the amount of time that has elapsed since you last transferred the data. The monitor updates this message each minute.

To update transfer data, touch
UPDATE TRANSFER.

Updating the Data Transfer

If time has elapsed between data transfer into the module and module removal, you may wish to update the transferred data before you remove the module. To update this data, touch UPDATE TRANSFER.

While the data is being updated, the monitor re-displays the message TRANSFERRING PATIENT DATA INTO MODULE.



- *Parameter information acquired between the time you transfer data and the time you remove the module is lost. The monitor indicates this lost information as a gap in the trends of the parameters involved when you retrieve the data.*
- *To provide seamless trend information, remove the module and insert it into the receiving monitor within 30- to 45-seconds after you transfer the data. If there is a delay in completing the data shuttle, update the transfer data just before you remove the module.*
- *If the module has been out of the monitor for 10 or more minutes, all data will be lost.*

To cancel data transfer, touch
CANCEL TRANSFER.

Canceling the Data Transfer Before Module Removal

Touch the CANCEL TRANSFER key to clear all data transfer messages and keys from the ECG display zone and purge previously transferred data from the module. The monitor will then reactivate the TRANSFER DATA key in the ECG Setup menu.

To receive transferred data:

- 1 Touch RETRIEVE DATA.
- 2 Touch YES.

Retrieving Transfer Data

When you insert the module into the receiving monitor, the monitor displays the RETRIEVE DATA and CANCEL TRANSFER keys and sounds a low priority alarm tone every 5-seconds until you either cancel the data transfer or retrieve the data. The monitor also displays the patient name associated with the data to be transferred and, if applicable, the patient name associated with the data that currently resides in the monitor.

When you touch the RETRIEVE DATA key, the monitor displays YES and NO keys along with the following message:

YES purges the monitor's data and retrieves data from the module.

NO cancels this action.

Touch NO to return to the previous screen. Touch YES to transfer the data from the module into the receiving monitor and purge any data previously stored in that monitor.

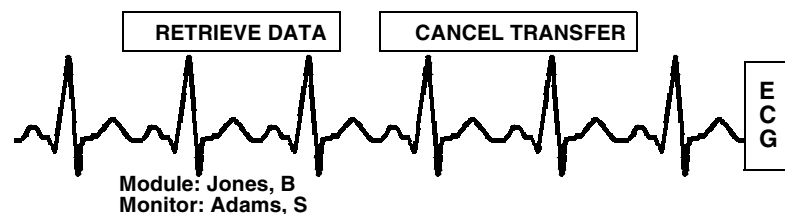


Figure 5-7: Retrieving Transfer Data display

Once you initiate data retrieval, the monitor removes all data transfer-related keys from the ECG display zone and displays the message TRANSFERRING PATIENT DATA INTO MONITOR. When the data retrieval into the monitor is complete, the monitor displays the message DATA TRANSFER COMPLETED. for one minute.

When you insert a module loaded with transfer data, you cannot purge a prior patient's data (while data is being transferred) using the monitor's Admit or Discharge menus. If you attempt to purge patient data in this manner, the monitor will display the following message:

Purge is not allowed during transport.

To cancel data transfer:

- 1 Insert module into receiving monitor.
- 2 Touch CANCEL TRANSFER.
- 3 Touch YES.

Canceling the Data Transfer After Module Insertion

To cancel a data transfer, touch the CANCEL TRANSFER key. The monitor displays YES and NO keys along with the following message:

YES purges data previously transferred into the module.

NO cancels this action.

Touch YES to confirm the cancellation of the data transfer and reactivate the TRANSFER DATA key in the ECG Setup menu. Touch NO to return to the previous screen.

Ultraview 1030/1050 Batteries

Each transport monitor is shipped with one 12 V battery. Monitors will accept two.

Batteries may be changed during battery or AC operation without losing data, provided that one charged battery remains connected at all times during the exchange.

A green LED in the lower-right corner of the front panel will flash when the batteries are charging and will be continually illuminated once the batteries are fully charged.

Sealed Lead Acid (SLA)

Sealed Lead Acid batteries only need to be charged for about 4-hours prior to use. When storing, be sure to maintain their charge or to “top charge” them every three months. These batteries are compatible with all 1030/1050 monitors.

Nickel Metal Hydride (NiMH)

Prior to use, Nickel Metal Hydride batteries should be run through three charge/discharge cycles in the monitor. This will ensure that during the first transport maximum run time will be possible. No other maintenance is required for this battery type.

NiMH batteries may only be used in the Ultraview 1030/1050, with serial numbers starting at 369-1xxxxx or 367-1xxxxx.

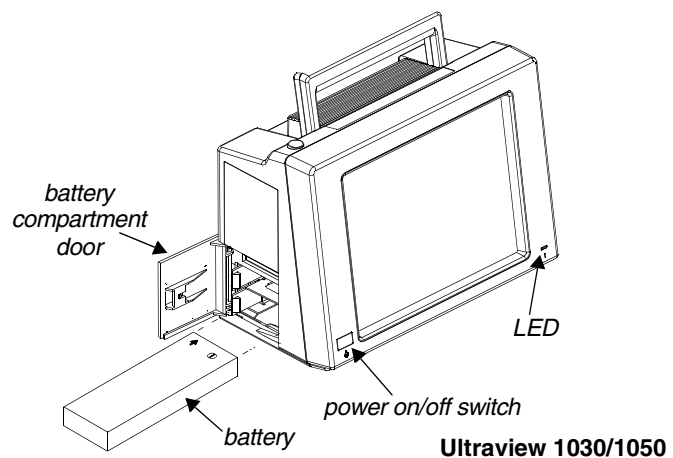


Figure 5-8: Ultraview 1030/1050 monitor battery installation

Battery Status Messages

The Ultraview 1030/1050 provides you with several battery condition status messages.

Battery Charged — A Solid Green LED

A solid green LED indicates the battery, or batteries, installed into the monitor are fully charged and are ready to be used.

It functions with the monitor powered ON and with the monitor powered OFF.



- *If a battery is not installed, a solid green LED will also display.*

Battery Charging — A Flashing Green LED

A flashing green LED indicates the battery, or batteries, installed in the monitor are not fully charged and are not ready to be used. The flashing is different than the battery fault detection flash.

The flashing LED turns on and off in a constant pattern, with no delays. It functions with the monitor powered ON and with the monitor powered OFF.

Battery Fault Detected — An Intermittent Flashing Green LED

An intermittent flashing green LED indicates that either battery A or battery B is faulty. Faulty batteries are determined to be batteries which do not hold a charge or batteries which attempt to charge too long. The flashing is different than the battery charging flash.

The intermittent signal will display a solid green LED for one second and then display a flashing LED for one second in a repeating pattern. An error log message is also added to the CMOS error log for review by your system administrator.

To determine whether one battery, or both, is faulty, power the monitor ON using the front panel switch and observe the display message. The message will display along the bottom of the monitor indicating whether one, or both, of the batteries are faulty. Replace the faulty battery with a fully charged battery.

Battery Gauge

The battery gauge is always present in the lower-right corner of the display when the monitor is powered ON and not plugged into AC power. This gauge indicates the approximate battery capacity. For example, the gauge will display:

- a fully charged battery
- 3/4 battery charge remaining
- 1/2 battery charge remaining
- 1/4 battery charge remaining
- minimum battery charge remaining



- *When the battery power reaches 1/2 battery charge remaining, recordings that drain large amounts of power can cause the monitor to power OFF without warning.*

Recordings are automatically inhibited when the battery power reaches 1/2 battery charge remaining.



- *When the battery power becomes critically low (approximately 1/4 battery charge remaining), the monitor may power OFF at any time, depending on monitor loading.*

The entire battery gauge flashes to emphasize this danger warning.

Wireless Network Interface

The Wireless Network Interface (WNI) provides Ultraview 1030/1050 monitors equipped with the wireless option to communicate with the Spacelabs Medical Ethernet network. This enables the wireless bedside monitor to communicate with a central station and other networked devices.

The WNI provides wireless transmission of up to five waveforms along with associated numerics, alarms, trends, arrhythmia, ST, and Flexport Interface systems data.

Alarm Watch and Remote Trends are not restricted. Bed-to-bed communications enable a bedside to use the Remote View or Alarm Watch features to view data from other beds on the wireless or hardwired network.

Outbound Parameters Menu

To select parameters to be monitored:

- 1 Touch MONITOR SETUP.
- 2 Touch OUTBOUND PARAMETERS.
- 3 Select the parameters you wish to display (up to five).

To change parameters:

- 1 Touch MONITOR SETUP.
- 2 Touch OUTBOUND PARAMETERS.
- 3 Deselect the parameter key that you wish to stop displaying.
- 4 Select the parameter you wish to display.

To view the Outbound Parameters menu, touch the OUTBOUND PARAMETERS key in the Monitor Setup menu.

When a parameter key is ON, the parameter is available for selection in another monitor's Remote View menu and Select Outbound Parameters menu. If two parameters have identical labels, both parameters will display. The maximum number of parameters that can be set depends upon the monitor's specific configuration for wireless networking. When the maximum number of parameters is reached, the remaining parameters that were not selected become unavailable. The monitor's default outbound parameter selection is ECG1 when turned ON.

All parameters, including the parameters that are set to OFF in this menu, are displayed by other monitors that are set to ALARM WATCH this monitor. If an outbound parameter is set to OFF, all existing remote views for that parameter will be dropped.



- *Setting OTHER to ON selects any unlisted channel types such as VARI, CO, and unlabeled pressures.*

Wireless Ethernet Connection

Ultraview 1030/1050 Monitors (Option Z)

In wireless mode, the monitor maintains network communication with a central station through the Wireless Network Interface (WNI) that is connected to the standard Spacelabs Medical hardwired Ethernet network. Wireless communication is automatically disabled when the monitor is directly hardwired to the network using its network port, and enabled when the hardwired port is disconnected.

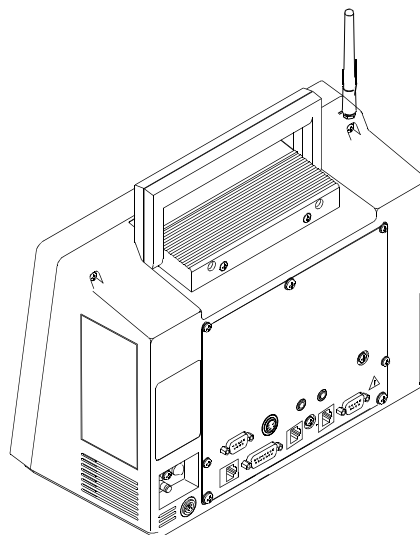


Figure 5-9: Rear panel Ultraview 1030/1050

Optional Model 90310 Wireless Network Interface

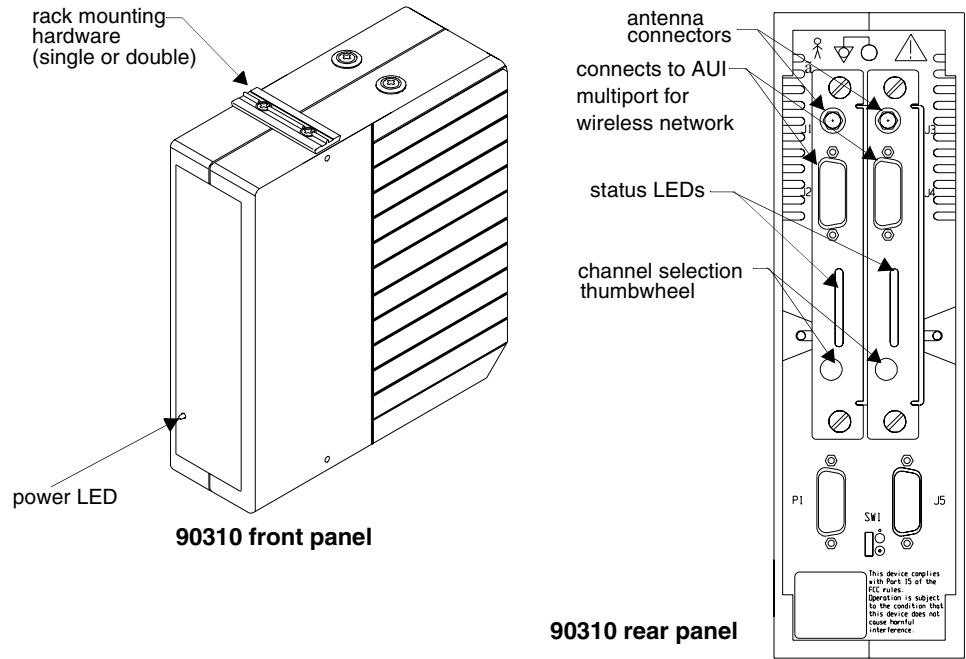


Figure 5-10: 90310 Wireless Network Interface

Ultraview 1030/1050 Connections

To connect to an external power supply:

- 1 Attach the DC outlet cable to J1.
- 2 Connect the power cord of the external power supply to an AC outlet.

External Power Supply Connection

The connection for the external power supply is shown in *Figure 5-11*. The green LED on the front panel will display ON whenever the unit is powered by an external power supply.

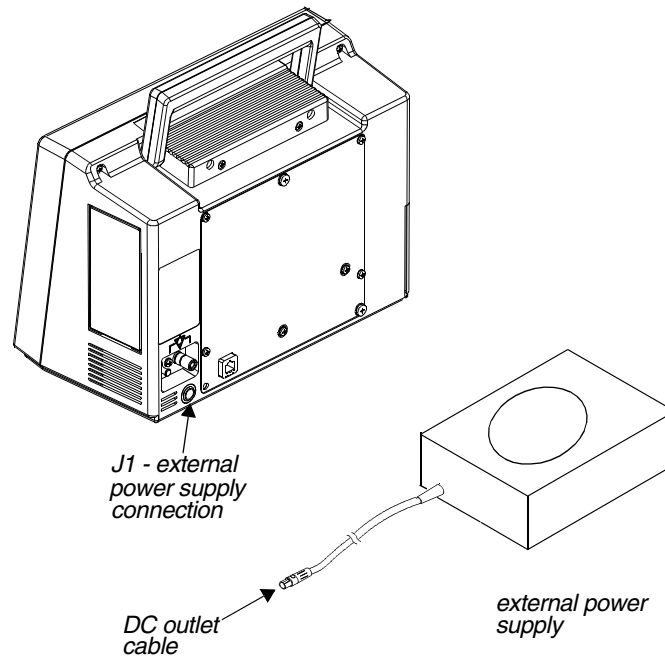


Figure 5-11: Ultraview 1030/1050 external power supply connection

Bedside/Transport Monitors

The Ultraview 1030/1050 also provides an external Flexport System Interface connection (Figure 5-12).

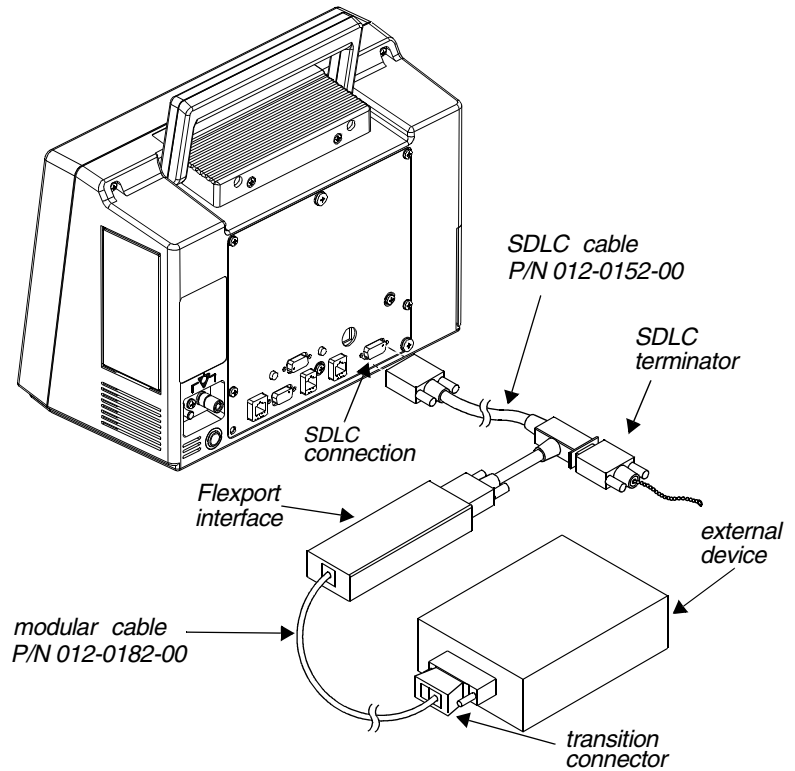


Figure 5-12: Ultraview 1030/1050 external Flexport connection - interface connector option F or G

Ultraview Care Network

To connect to the 10BaseT port for network communication:

- 1 Plug either end of cable assembly 175-0951-XX into the modular jack connection on the back of the monitor.

Network communication is done through the 10BaseT cable assembly only.

- 2 Plug the other end of the cable into the wall in a wall plate with an eight pin modular jack connector.

Ethernet Connection - Options F or G for Ultraview 1030/1050

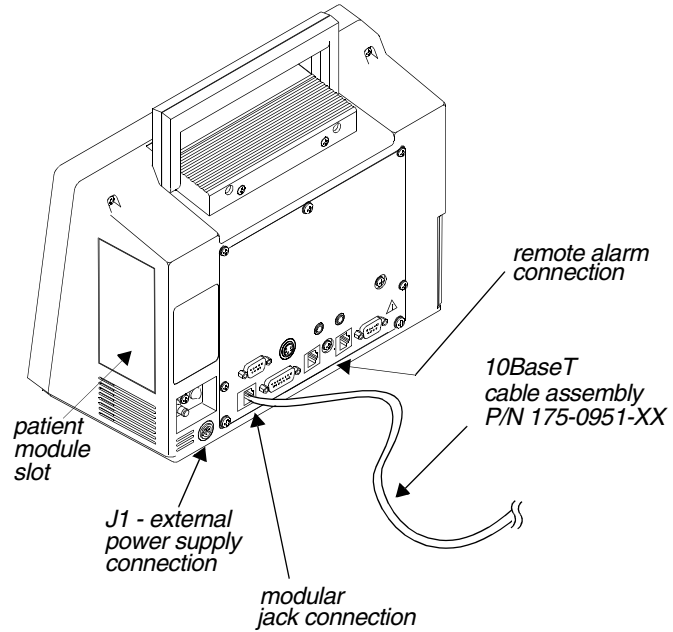


Figure 5-13: Ultraview 1030/1050 10BaseT network connection

Ultraview 1030/1050 with Capnography (Option G or H)

To start capnography monitoring:

- 1 Plug the mainstream EtCO₂ sensor cable into the EtCO₂ receptacle on the capnography panel.
- 2 Perform sensor calibration, if necessary.
- 3 Prepare the patient according to hospital procedures.
- 4 Select the appropriate airway adapter (neonate or adult).
- 5 Verify that the windows are clean and dry.
- 6 Place the sensor head over the airway adapter and perform an adapter calibration, if necessary.
- 7 Remove the airway adapter from the sensor head.
- 8 Insert the airway adapter into the ventilator circuit and Ballard style tracheal suction system (if present) as shown.
- 9 Attach the sensor head to the airway adapter.
- 10 Make the other connections as shown.
- 11 Ensure that the sensor head is always positioned above the ventilator circuit so that moisture will not enter the adapter.

Option G adds mainstream EtCO₂ monitoring to the Ultraview 1030/1050.

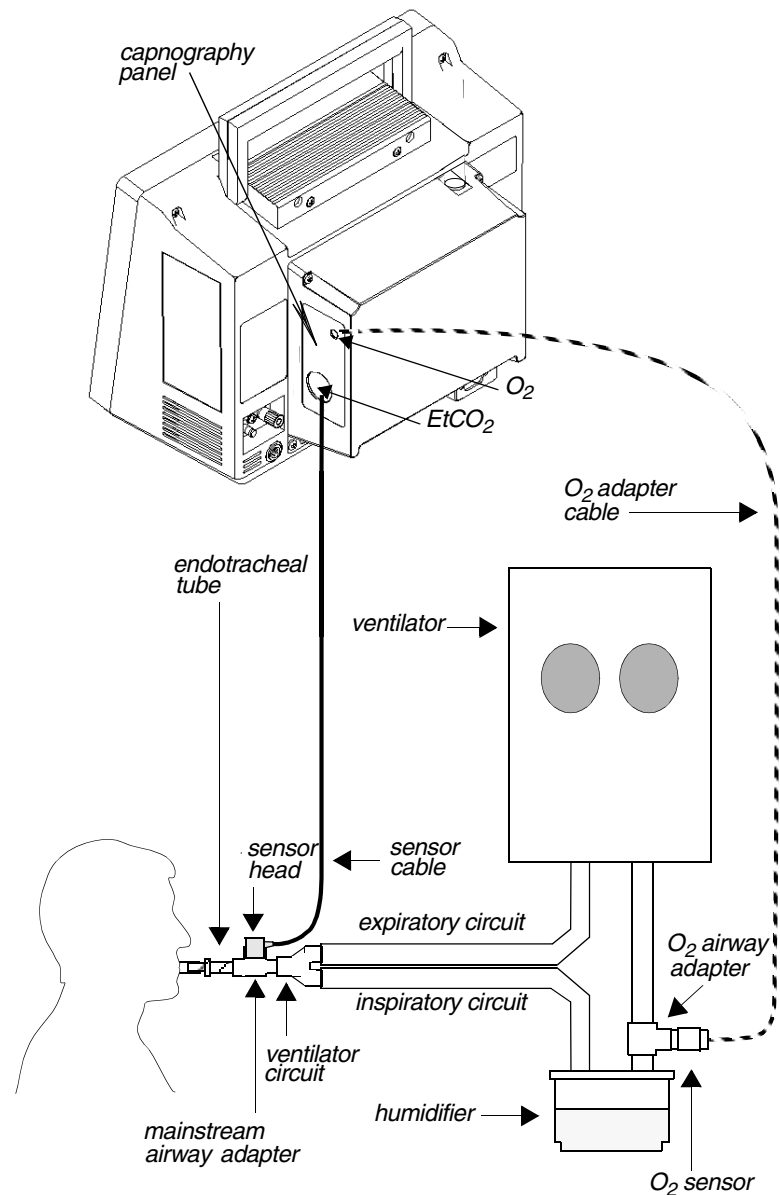


Figure 5-14: Ultraview 1030/1050 rear panel with option G or H

Maternal Obstetrical Monitor - 94000

The Maternal Obstetrical Monitor (MOM) is a fetal monitor which, when used with an Ultraview Command Module or other Ultraview modules, provides the optional ability to monitor maternal ECG, NIBP, temperature, and SpO₂. The multiple trace screen enables simultaneous display of real-time fetal and maternal ECG and maternal SpO₂. Both internal and external fetal monitoring capabilities are provided.

The monitor provides networking capabilities to Spacelabs Medical monitors through an Ethernet network, BirthNet[®], and other manufacturers' fetal data management systems.

Data for the fetal heart rate and uterine activity can be captured using telemetry or Mermaid wireless technology options.



WARNING:

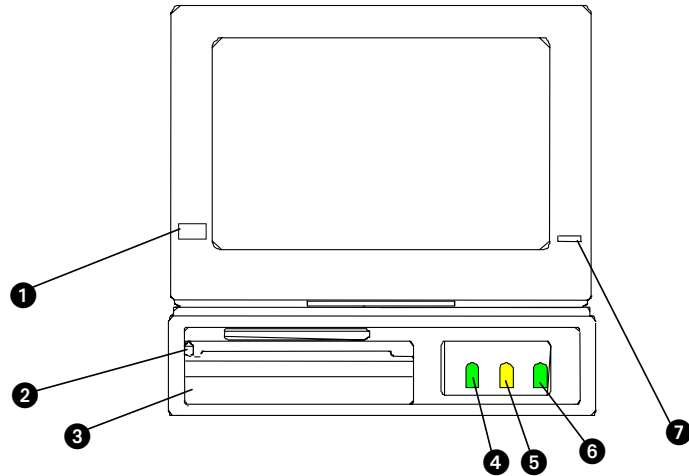
- ***Shock hazards may exist if this instrument is not properly grounded. Protection against electrical shock is provided by grounding the chassis with a three-wire cable and plug. The grounding wire must not be removed or defeated. Grounding reliability can only be assured if connected to a receptacle marked Hospital Only or Hospital Grade.***
- ***To reduce the risk of electric shock, do not remove the protective covers. Only qualified Spacelabs Medical personnel should service the instrument.***
- ***There is a risk of explosion if the instrument is operated in the presence of flammable anesthetics.***
- ***Always inspect the transducer face, housing, cable, and power cord before using the instrument. If the transducer is cracked or chipped, or if the power cord is frayed, broken, or otherwise damaged, call a qualified technician. Do not use the transducer or the monitor on a patient.***
- ***Always disconnect the instrument from the power supply prior to cleaning the monitor.***
- ***The total system chassis risk current should not exceed 300 μ A @ 120V, 500 μ A @ 240V.***
- ***Do not operate this instrument if it is wet or if condensation is present.***
- ***During recharging, the wireless transducers may become hot or warm to the touch. Allow the wireless transducers to cool prior to using them on a patient.***
- ***An intentional reset will occur if the processors lose communication with each other. Under these circumstances, the main processor will self-reset and the communication will be re-established after the startup sequence. A solid triangle is printed on the 60-bpm line of the FHR scale to differentiate this type of reset from others. A small gap in the heart rate tracing will result.***



CAUTION:

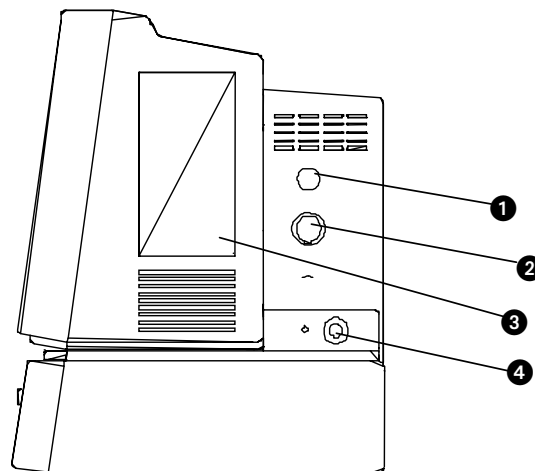
- Excessive bending or twisting of a transducer cable may cause failure or intermittent operation of the transducer.
- Do not sterilize a transducer using gas, heat, or liquid methods. Do not autoclave a transducer. These sterilization methods may permanently damage the transducer.
- This instrument is not intended for use with defibrillators.
- Disposal of these devices and all accessories must be in accordance with local and federal laws.
- Due to the potential for electromagnetic interference, electronic devices (for example, portable communication transmitters, cellular telephones, personal computers, electronic toys, and other medical devices) should not be operated within 3.5 feet (1.07 meters) of the patient, patient leads, or associated patient monitoring equipment until evaluated by the Biomedical Engineering staff.
- If the integrity of the external protective earth conductor is in doubt, the equipment must be operated from its internal power source.
- The fetal module is an IEC 601-1 Class I device with type B, BF, and CF patient connectors. Type B equipment provides a particular degree of protection against electric shock, particularly regarding allowable leakage current (not to exceed 0.1 mA) and reliability of the protective earth connection (if present). Type BF equipment meets the criteria above for B with an F-type applied part. An F-type applied part is isolated from all other parts of the equipment to such a degree that the patient leakage current allowable in single fault condition is not exceeded with a voltage equal to 1.1 times the highest rated mains voltage applied between the applied part and earth. Type CF equipment provides a degree of protection higher than that for type BF against electroshock, particularly regarding allowable leakage currents (not to exceed 0.01 mA), and having an F-type applied part.
- Water ingress for the fetal module is IPX0; water ingress for the Mermaid transducers is IPX7 per IEC 529.
- The MOM unit is not approved for transport applications.

Front Panel



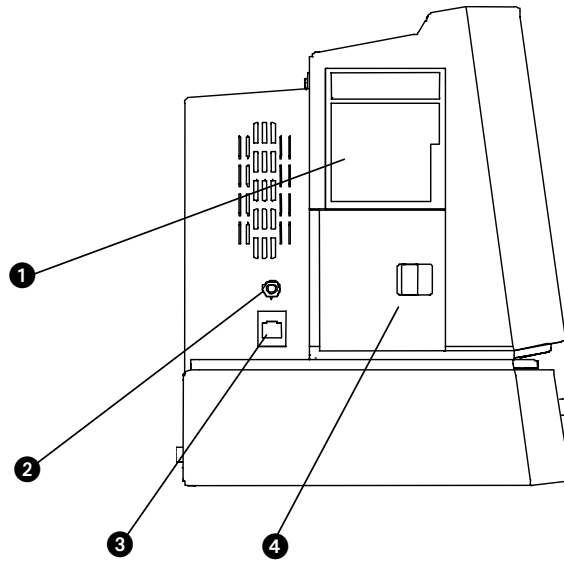
- ❶ Power ON/OFF
- ❷ Recorder drawer release button
- ❸ Fetal chart recorder
- ❹ FHR 1 connector (either ultrasound or ECG)
- ❺ UA connector
- ❻ FHR 2 connector (ultrasound only)
- ❼ Battery charging light

Right Side Panel



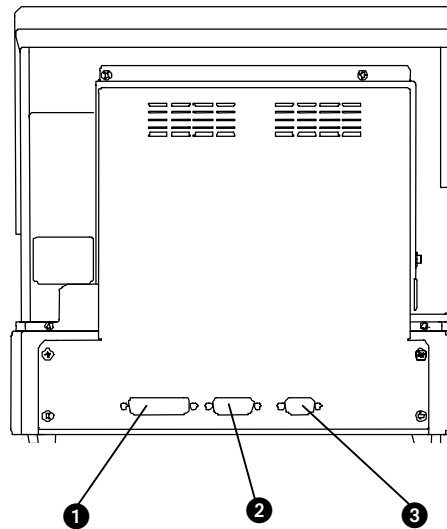
- ❶ Telemetry antenna connector (optional)
- ❷ Mermaid wireless connector (optional)
- ❸ Ultraview Module (optional)
- ❹ J1 - External power supply connector

Left Side Panel



- ❶ Maternal chart recorder (optional)
- ❷ Event marker connector
- ❸ Ethernet connector (Ultraview Care Network)
- ❹ Battery compartment door

Rear Panel



- ❶ J4 - Other I/O
- ❷ J3 - RS485 port - BirthNet
- ❸ J2 - External device port - RS232



WARNING:

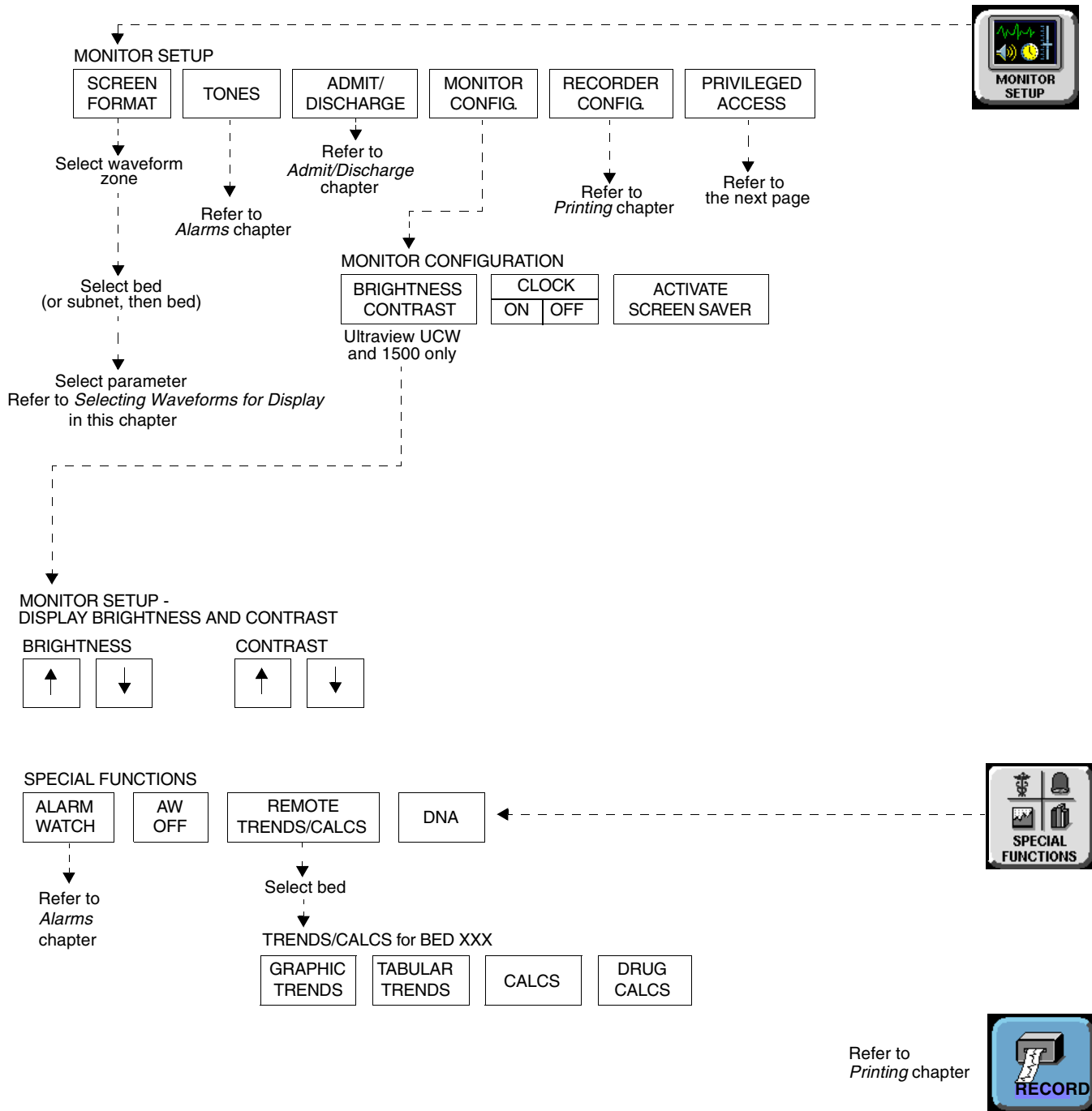
- *The use of accessory equipment that does not comply with the monitor's safety requirements may lead to a reduced level of safety. Consideration should be given to the use of the accessory in the vicinity of a patient. The safety certification of the accessory must be performed in accordance with the appropriate IEC 601-1 and/or IEC 601-1-1 harmonized national standard.*
- *EMC compliance may be compromised by the connection of accessory and/or peripheral equipment. Compliance of accessory and/or peripheral equipment must be considered to ensure continued EMC compliance.*

Bedside/Transport Monitor Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
Cannot change parameter priority or colors	■ Monitor may not be set up to allow the user to change priority or colors.	■ Contact your system administrator.
Changed parameter priority or colors are lost	■ The STORE key was not touched after the selection was made.	■ Touch the STORE key to make changes permanent.
Transport monitor has no DC power	■ The monitor was not plugged into an AC outlet while not in use.	■ Plug the monitor into an AC outlet to recharge batteries to 80% power (refer to <i>Battery Gauge</i> on page 5-14).

Central Monitors Directory

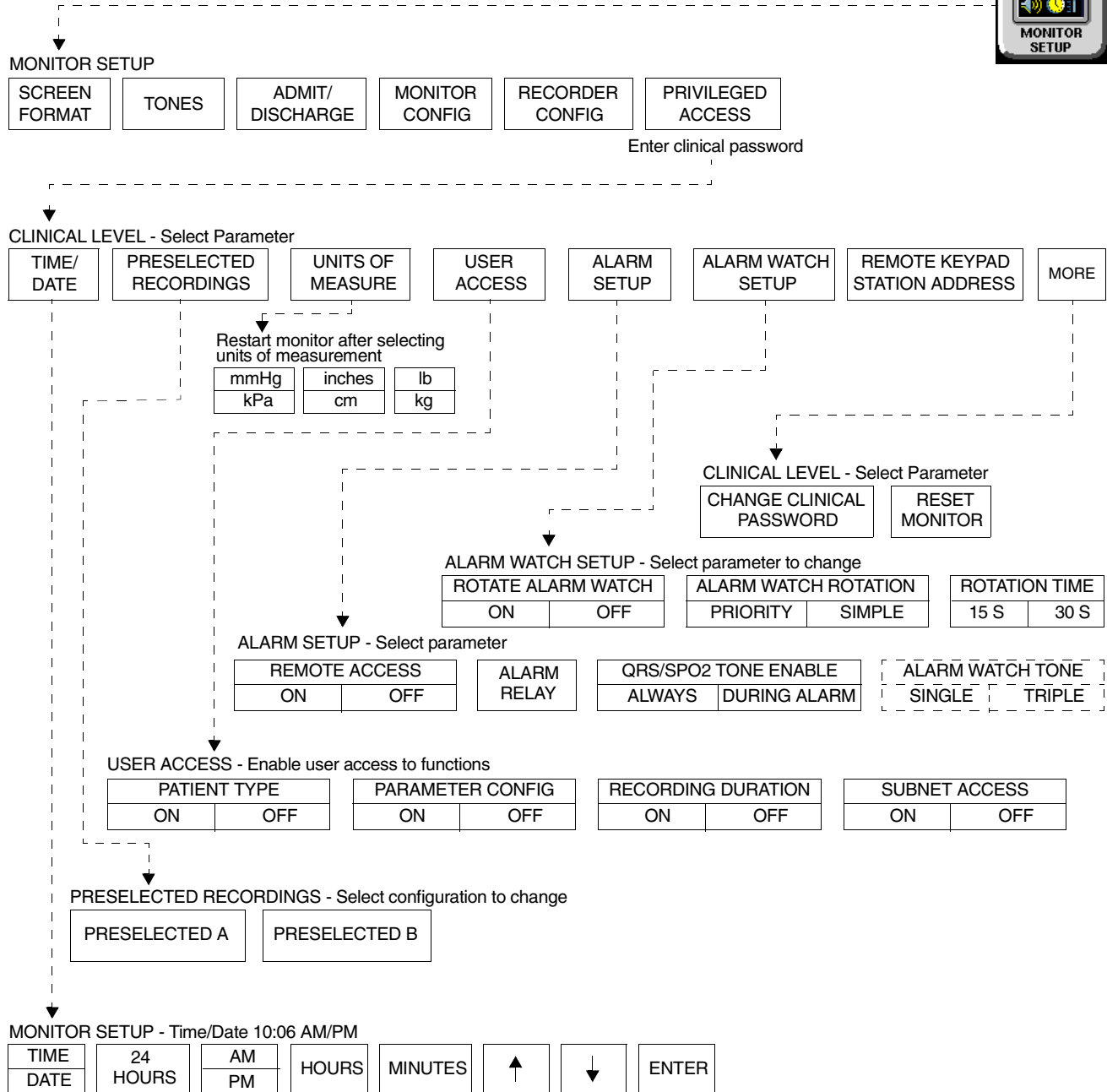
Directory of Keys - UCW and Ultraview 1700



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Central Monitors Directory

Directory of Keys - Privileged Access



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Central Monitors

Contents

Overview	3
Display Detail	4
6-Trace Option	4
Central Monitor Features	5
System Clock	6
Screen Saver	7
Data Communications Watch	7
Central Monitors Troubleshooting Guide	9

Overview

The central monitor provides full monitoring control of remote parameters including display and alarms, with both visual and audible annunciation. All waveform and current numeric data, arrhythmia, ST segment, and trends are available with central monitoring.

The Ultraview Care Network family of monitors and modules have built-in error detection and recovery circuitry. This circuitry, together with special software, allows the central to re-initialize and continue to function if an error occurs.

When the system detects an error that cannot be corrected through other means, the central monitor re-initializes or resets (blanks). Normally, a reset involves very little loss of patient monitoring time (approximately 5-seconds) and, with few exceptions, all operator set inputs (for example, alarm limits, pressure labels, transducer offsets, etc.) are retained. The entire process of restoring the central display following a reset, takes approximately 20-seconds, depending upon the number of parameters being monitored.

In some cases, stored trend data will be lost when the monitor resets. Typically, this is indicative of a hardware condition that requires corrective action. In this case, the system initiates the start-up diagnostics to check the monitor's operation so that full recovery takes approximately 10-seconds longer.

If a bedside monitor has reset, the central and bedside monitors display CHECK SETUP in the ECG zone to alert you to check all limits and values and ensure that the monitors have restored all preset values. Refer to *Power Failure* on page 1-4 for more information. This also occurs when the monitors are turned ON or when an ECG module has been inserted. However, your system administrator may disable this CHECK SETUP feature.



CAUTION:

- Due to the potential for electromagnetic interference, electronic devices (for example, portable communication transmitters, cellular telephones, personal computers, electronic toys, and other medical devices) should not be operated within 3.5 feet (1.07 meters) of the patient, patient leads, or associated monitoring equipment until evaluated by the Biomedical Engineering staff.

Display Detail

UCW and Ultraview 1700 central monitor screens can display up to 8 full waveform zones. The split screen option allows for a maximum of 12 or 16 zones to be displayed.

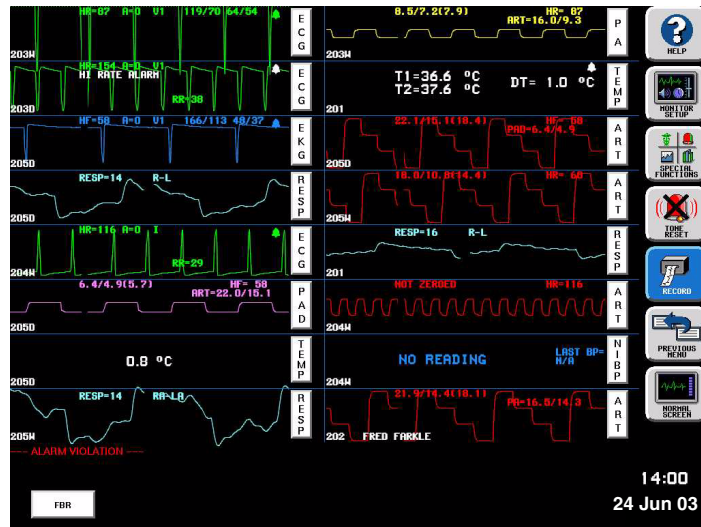


Figure 6-1: Split screen display

6-Trace Option

The 6-trace mode feature includes automatic screen formatting that increases the font and zone size for alphanumeric text.

The larger font and zone size always appears on central monitors configured for 4-, 5-, 6-, and 12-trace operation because no more than 6 full zones can have parameters assigned.

Central Monitor Features

Selecting Parameters for Display

To select remote parameters for display:

- 1 Touch MONITOR SETUP.
- 2 Touch SCREEN FORMAT.
- 3 Select a bed (or a subnet, then a bed).
- 4 Select the parameter(s) to be displayed.
- 5 Select a zone.

Use the SCREEN FORMAT key in the Monitor Setup menu to assign remote parameters to specific display zones and to choose the color of those zones. Names of the subnet and bedside keys are assigned by your system administrator.

One to 8 waveform zones may be displayed across the entire screen. Split screen central monitors may display 16 waveform zones, with 1 at the top, left zone on the display, and zone 9 appearing in the 1st zone upper right.

To assign color to a zone:

- 1 Touch MONITOR SETUP.
- 2 Touch SCREEN FORMAT.
- 3 Touch the desired color.
- 4 Touch the zone to be colored.

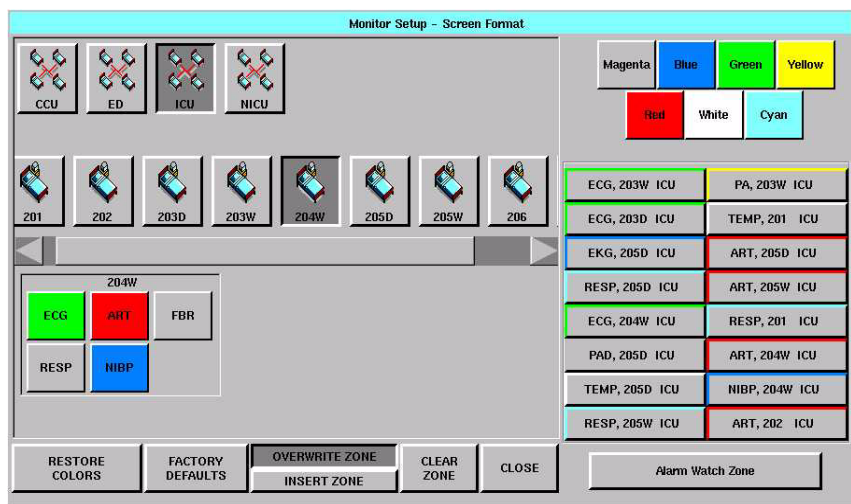


Figure 6-2: Central display - Screen Format menu

RESTORE COLORS — restores the last stored color settings from memory.

FACTORY DEFAULTS — restores the zone colors to the factory color setting of white.

OVERWRITE ZONE — replaces a zone that has already been assigned a parameter. Select the new parameter and then touch OVERWRITE ZONE to drop the previously assigned parameter channel and replace it with the new parameter.

INSERT ZONE — moves the assigned zone and all other zones immediately adjacent to the assigned zone down one zone, and the new zone is inserted above them. If this causes an assigned zone to disappear from the screen, a warning box will appear prompting you to complete or cancel the insert.

CLEAR ZONE — clears the zone assignment and returns the zone to an unassigned state. Touch CLEAR ZONE, then touch the zone from which you wish to remove an assignment.

To change the network or internal system time and date:

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Clinical password.
- 4 Touch TIME/DATE.
- 5a Select TIME.
-OR-
- 5b Select DATE.
- 6a Select 24-HOURS or AM/PM (12-hour).
-OR-
- 6b Select MONTH, DAY, and YEAR.
- 7 Use arrow keys to set time or date.
- 8 Touch ENTER.

Setting the Time and Date

The TIME/DATE key controls both the time and date menus. The current time or date is displayed above the menu.

Time is displayed in either 12- or 24-hour format. Network monitors display the network time and stand-alone monitors display the internal system time.

The system will not make any time/date change permanent until you touch ENTER.



- *Setting the time on any networked monitor sets time for all monitors on that network.*

System Clock

To enable/disable the clock:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIGURATION.
- 3a Select CLOCK ON to enable the clock.
-OR-
- 3b Select CLOCK OFF to disable the clock.

A system clock can be continually displayed in the lower right corner of the screen. The clock feature can also be used as a stopwatch or timer.



Figure 6-3: Clock display formats

To access the clock menu:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIGURATION.
- 3 Select CLOCK ON.
- 4 Touch the clock that appears in the lower right of the screen.
- 5 Select DIGITAL, STOPWATCH, or TIMER.



- *The digital clock is available for all monitors.*
- *The stopwatch and timer are only available for the UCW and Ultraview 1700.*

Screen Saver

To activate the screen saver:

- 1 Touch MONITOR SETUP.
- 2 Touch MONITOR CONFIGURATION.
- 3 Touch ACTIVATE SCREEN SAVER.

Activating the screen saver blanks the screen (displaying only the Spacelabs Medical logo). You may also disable the screen saver by touching the screen, clicking (or dragging) the mouse, or pressing any key on the keyboard.



- The screen will automatically be restored by an incoming alarm condition.

Data Communications Watch

To enable Data Communications Watch (must have system administrator menu access):

- 1 Touch MONITOR SETUP.
- 2 Touch PRIVILEGED ACCESS.
- 3 Enter Biomed password.
- 4 Touch MORE.
- 5 Touch DATA COMM WATCH.
- 6 Select COMM WATCH ON.
- 7 Select ALARM ON to enable DCW alarms.
- 8 Select ADMIT REQUIRED ON to enable DCW for admitted patients only.

The Data Communications Watch (DCW) feature displays a Data Communications Interrupted (DCI) message on the central when the central's communication link to a bedside/remote monitor is interrupted.

A bedside monitor may drop from the central display because of a power interruption at the bedside, Ethernet failure, or other circumstance. As soon as a communication loss is detected by the central monitor, a DCI notification will be displayed on the screen in place of each channel that lost communication, and an alarm tone will sound if enabled (refer to *Enabling Alarms (Optional)* on page 6-8).

Keys will be displayed in the waveform zone of the interrupted channel to permit disabling of the alarm tone associated with the interruption, and to remove the zone from the display.

The DCI notification shows the bed name, patient name and the parameter key label of the lost channel, as shown in *Figure 6-4*.

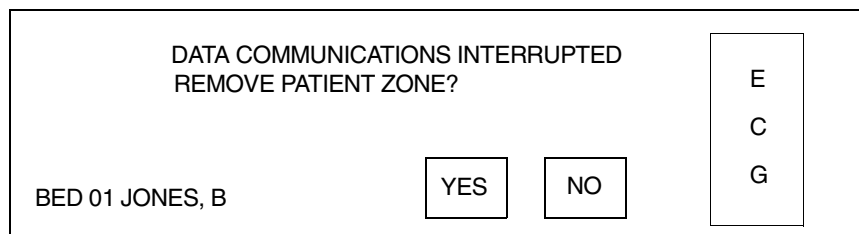


Figure 6-4: DCI notification display



- The Data Communications Watch feature is enabled only through the system administrator menu.

The parameter key (ECG in the above example) will also flash (if DCW alarms are enabled) when the DCI notification is displayed on the screen. Touch this key to display a status message at the bottom of the screen noting the time and date that communication with the lost channel was interrupted.

Press YES to remove all DCI notifications associated with the same bedside from the central display. Unless the zone is re-assigned by the user, the central will continue to attempt communication with the remote monitor. Once communication is restored, the patient data is displayed in the zones again.

Press NO to silence the alarms (if enabled), but to continue display of the DCI notification. All alarms for that bedside monitor are silenced simultaneously. The NO key becomes dithered (inactive) after it is pressed.

Enabling Alarms (Optional)

When activated, this option causes an alarm to sound and the parameter key to flash when the DCI notification is displayed. This option must be enabled through the Biomed menu.

A flashing parameter key and low level alarm tone, signifying an alarm condition, will occur as soon as the central detects a communication loss. Alarm conditions will continue until either YES or NO is pressed on the DCI notification, a new parameter is assigned to the zone, or communication is restored.

Enabling Detection for Admitted Patients (Optional)

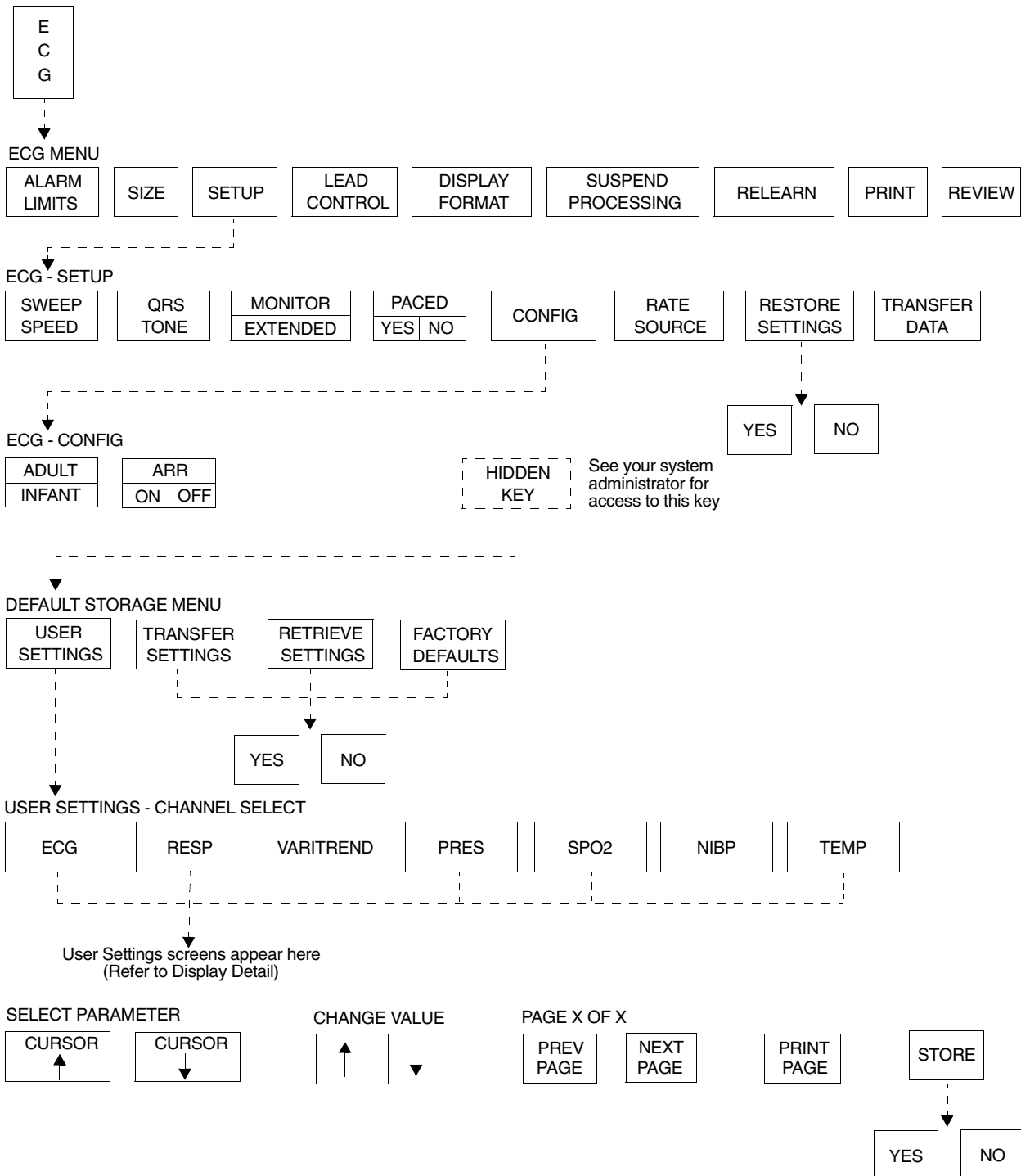
If ADMIT REQUIRED is ON, communication will be watched for only those remote monitors having admitted patients. If ADMIT REQUIRED is OFF, communications will be watched for all patients on the central monitor.

Central Monitors Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
Cannot assign color to a zone	<ul style="list-style-type: none">■ Monitor may not be set up to allow you to assign colors.	<ul style="list-style-type: none">■ Contact your system administrator.
Cannot assign a parameter to a zone	<ul style="list-style-type: none">■ Zone may not have been cleared of previous assigned waveforms.	<ul style="list-style-type: none">■ Select CLEAR ZONE, then touch the zone in which to display the new parameter. Repeat the initial SCREEN FORMAT steps.
Cannot access the clock menu	<ul style="list-style-type: none">■ Clock may have been left in STOPWATCH or TIMER mode.	<ul style="list-style-type: none">■ Touch the clock/timer display, then touch PREVIOUS MENU to restore the clock.
CANNOT deselect ALARM WATCH	<ul style="list-style-type: none">■ The Ultraview Central Monitor is configured with Central Alarm Watch Manager to prevent de-selection of automatically alarm watched beds.	<ul style="list-style-type: none">■ Contact your system administrator.

Module Configuration Manager Directory

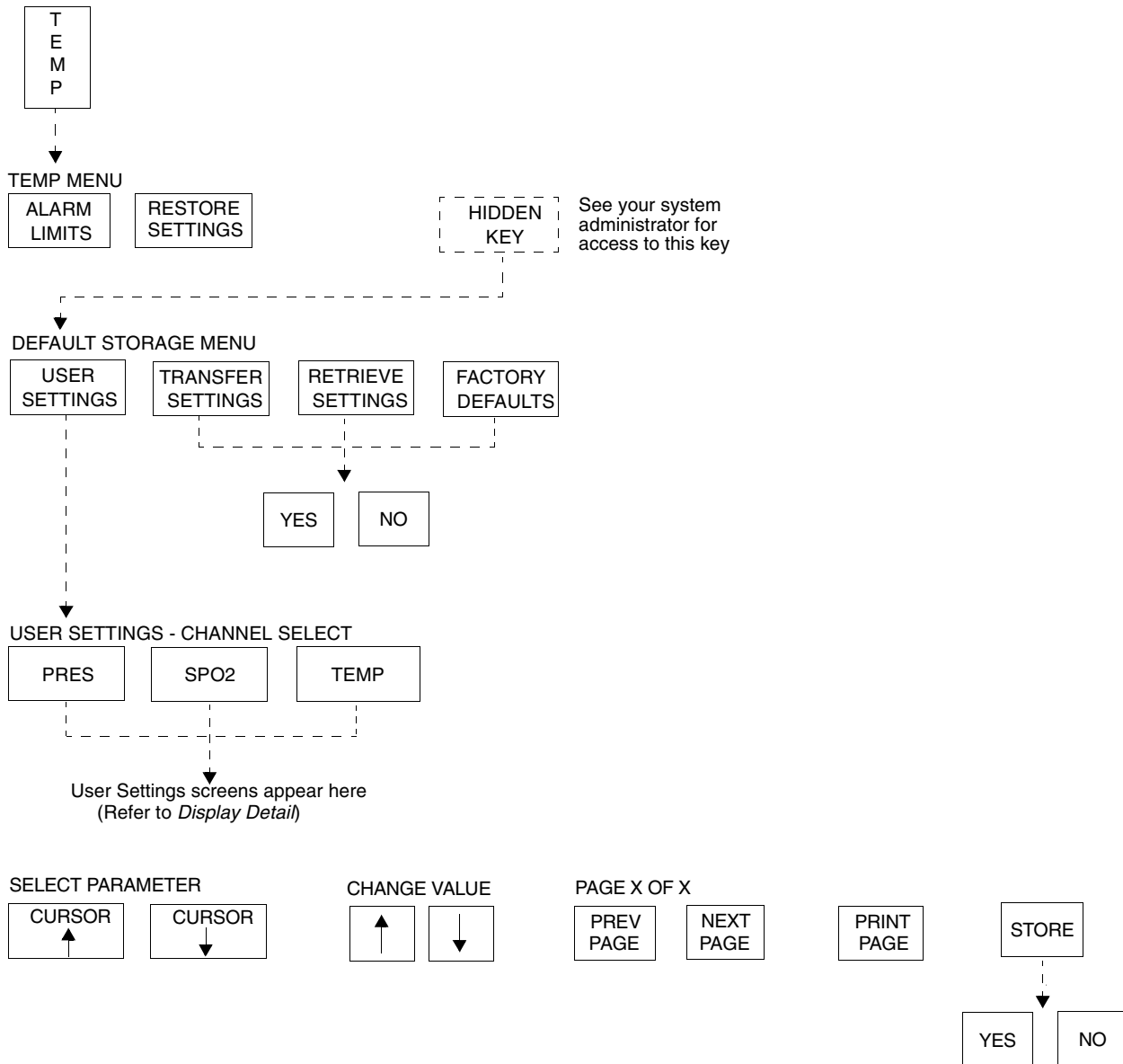
Directory of Keys - For Configurations With ECG



• Based on features purchased, more or fewer keys may appear here than on your menu screens.

Module Configuration Manager Directory

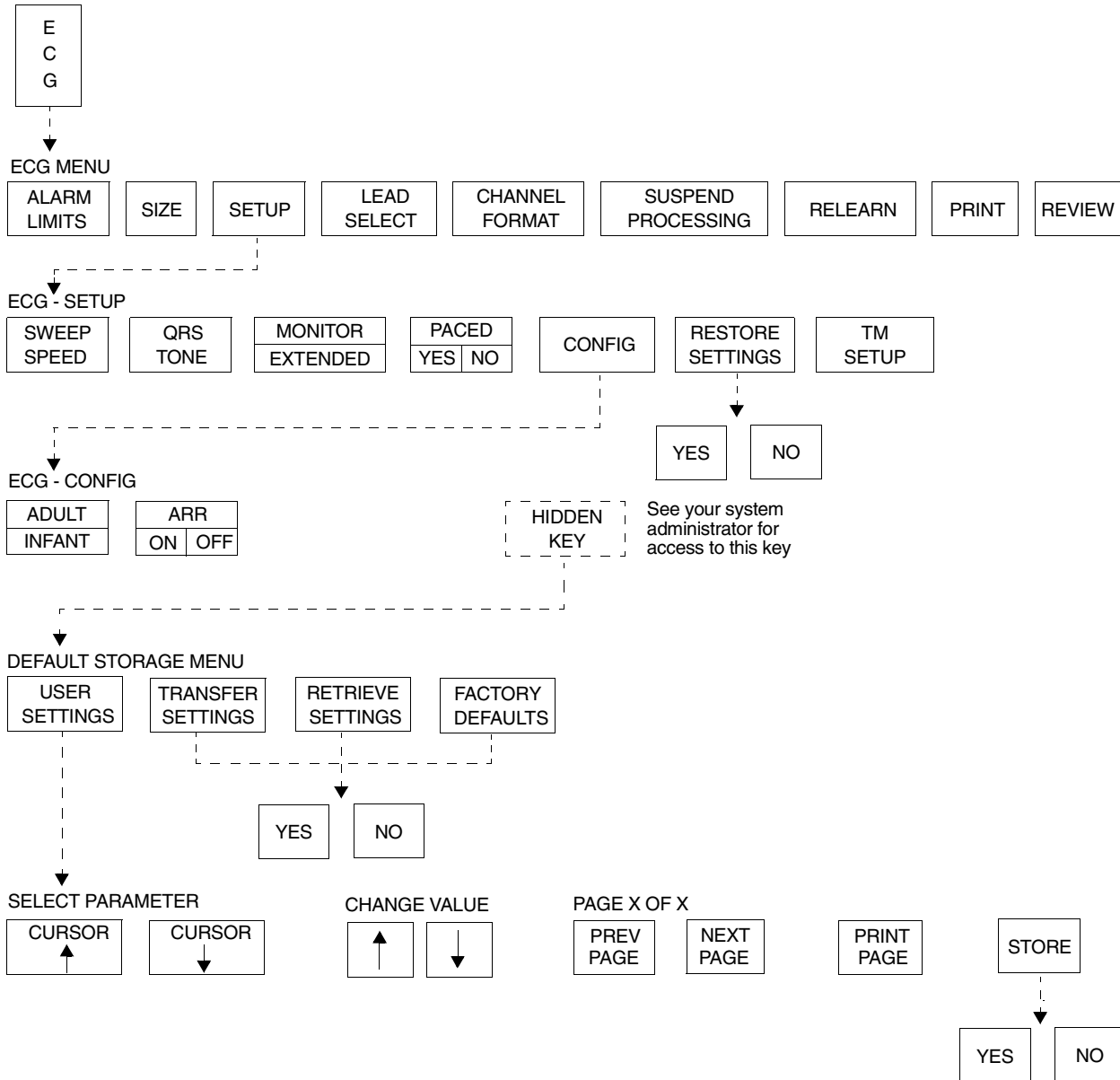
Directory of Keys - For Configurations Without ECG



- Based on features purchased, more or fewer keys may appear here than on your menu screens.

Module Configuration Manager Directory

Directory of Keys - For Telemetry Configurations



• Based on features purchased, more or fewer keys may appear here than on your menu screens.

Module Configuration Manager

Contents

Overview	5
Display Detail	6
Setting User-Defined Default Values	7
Storing Changed Settings	7
Selecting Alarm Attributes	7
Parameter Configurations	8
Transferring User-Defined Settings	33
Retrieving User-Defined Settings	33
Restoring Factory Settings	34
Restoring User-Defined Settings	34

Overview

The Module Configuration Manager feature provides the capability to define and store all user-configurable options within your module. Once a module has been configured, these settings will control its operation whenever the module is powered ON.

To ensure standardization of multiple modules, settings may be transferred from one configured module to another. Settings are first transferred from a configured module to the monitor (using the TRANSFER SETTINGS key), then retrieved from the monitor into other modules (using the RETRIEVE SETTINGS key).

The Restore Settings feature changes all the module's parameter user-configurable options to the defaults previously stored as user settings.



- *User-configurable parameters are available based on the options in your module. For example, if your module does not have the Arrhythmia Processing feature (Multiview™ I), parameters related to arrhythmia detection and alarms will not be available.*
- *User-defined settings which have been transferred to the monitor's memory are available for retrieval into other modules until (1) the monitor is powered OFF or (2) a patient is admitted or discharged with a purge of data.*

Depending on the parameter configuration of the module, the Module Configuration Manager feature is accessible through either the ECG or TEMP parameter key. For module configurations without ECG, use the TEMP key. For module configurations with ECG, use the ECG key. (Refer to *Module Configuration Manager* on page 15-23 for more information.)



- *The TEMP key will only be displayed if a temperature probe is connected to the module.*

Display Detail

The User Settings screens list all user-configurable options for ECG, respiration, Varitrend 3, temperature, invasive pressure, non-invasive blood pressure, and SpO₂. From these screens you can change and store the options in your module.

Figure 7-1 illustrates the ECG User Settings screen which is used to change and store ECG rate alarm limits. In this example, LEARNED has been chosen as the adult rate alarms type.

The parameter configuration tables in this chapter list all available options, the available user settings, and the factory defaults for each parameter.

PARAMETER DESCRIPTION	VALUE	PARAMETER DESCRIPTION	VALUE
ECG RATE ALARMS (ADULT)		ECG RATE ALARMS (INFANT)	
• TYPE	LEARNED	• TYPE	LEARNED
• HIGH RATE	180	• HIGH RATE	220
• LOW RATE	40	• LOW RATE	100
• HIGH RATE OFFSET	50	• HIGH RATE OFFSET	50
• LOW RATE OFFSET	50	• LOW RATE OFFSET	50
		• DELAY	3
Set ECG alarm type to LEARNED or FIXED limits			

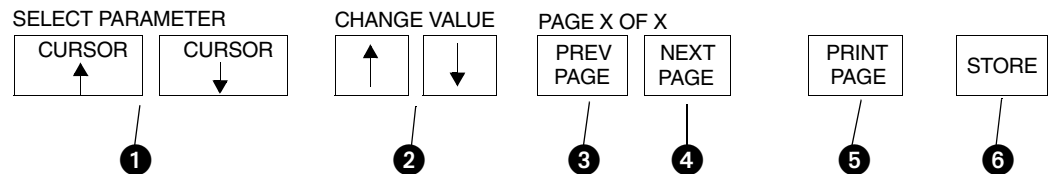


Figure 7-1: ECG user settings

- 1 CURSOR ↑ AND CURSOR ↓ keys scroll through the two columns of parameters on the screen.
- 2 ↑ and ↓ keys scroll the list of valid settings for the highlighted parameter.
- 3 PREV PAGE key returns to the previous screen.
- 4 NEXT PAGE key advances to the next screen.
- 5 PRINT PAGE key prints the current screen.
- 6 STORE key stores the currently selected settings as defaults.

Setting User-Defined Default Values

Use the User Settings screens to change and store settings. If the setting for the selected parameter cannot be changed, the message THIS SETTING CANNOT BE CHANGED will be displayed.

The ability to access the Module Configuration Manager screens can either be visible to all users or remain hidden. The factory default setting is Invisible. Adjust the SYSTEM SETUP key to the Visible setting in the ECG configuration table to enable user access to this function.

Storing Changed Settings

Touch the STORE key after entering configuration changes for any parameter in the module. This action stores only the currently selected settings for all parameters in that module.

The Patient Admit/Discharge function (available in the ECG configuration screen) allows you to SAVE the changes in the alarm limit settings as the default settings for future patients, or RESTORE the original default settings upon discharge of that patient or admission of a new patient.

The Save setting is commonly used in environments where multiple patients are monitored for short periods of time, for example, the operating room. Selecting SAVE allows you to save specific settings from patient to patient until the module is removed or the monitor is powered OFF.

The Restore setting is more commonly used in environments where it is desirable to initialize alarm limit settings for each patient, for example, the critical care unit or the intensive care unit. Selecting RESTORE returns the module to the default settings upon patient admission or discharge.

Your selection on the ECG Configuration screen applies to all parameters.

Selecting Alarm Attributes

Alarms can be independently configured for all parameters including: tone types (high, medium, low, or none), whether a specific alarm condition triggers an automatic recording, or alarms are watched under the Alarm Watch feature.

In the Monitor Setup menu, individual parameters may be selected for automatic alarm recording. If alarm recording is enabled for a particular parameter, for example ECG, you can further specify which alarms will generate a recording.

You can also specify which alarms will be watched using the Alarm Watch feature. For example, if you have selected a patient for Alarm Watch, but you do not want to be alerted to LEAD OFF conditions remotely, select Alarm Watch OFF for that condition in the corresponding Alarm Attributes screens. Refer to the Alarm Attributes tables in this chapter for available user-defined settings and factory defaults for the individual parameters.

Parameter Configurations

To review or change settings:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6a Select ECG.
-OR-
- 6b Select RESP.
-OR-
- 6c Select VARITREND.
-OR-
- 6d Select PRESSURE.
-OR-
- 6e Select SPO2.
-OR-
- 6f Select NIBP.
-OR-
- 6g Select TEMP.
- 7 Use CURSOR \uparrow and CURSOR \downarrow to scroll through the parameter description list.
- 8 Use \uparrow and \downarrow to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.
- 11 Touch YES when the STORE ALL CHANNEL DEFAULTS message is displayed

ECG

Heart rate alarms can be set to fixed values or based upon the patient's learned heart rate. The learned heart rate is known as a result of ECG monitoring. If the learned option is selected, you must specify high and low offset values. The high and low rate alarm limits specify boundaries of the maximum available settings.

To automatically set heart rate alarms to:

- 40 beats above and 40 beats below the patient's learned heart rate.
- not to exceed a high rate of 200 and a low rate of 30.

Adjust the default settings as follows:

	Type	Learned
	HIGH RATE	200
	LOW RATE	30
	HIGH RATE OFFSET	40
	LOW RATE OFFSET	40

When selecting the fixed option, you only need to adjust the high and low rate settings.

Heart rate alarms can be set independently for the adult mode and the infant mode.

In the infant mode, you can select a delay between the time of initiation of monitoring and alarm activation (0- to 3-minutes). This provides a period of time for the patient to calm down after electrode application.

ST alarms can be set to identify regional and global changes. Specific leads can be selectively included or excluded to provide more specific information.

The Check Setup feature provides a visual and audible prompt for you to assess the patient setup before initiating monitoring or following a monitor reset or ECG module change. You can disable this feature by setting it to OFF.

If you do not want to suspend ECG processing or disable ECG alarms, set the CONTROL setting to OFF.



- For telemetry, some settings may or may not be available depending on whether the module is used in a central or bedside monitor.
- For Ultraview Digital Telemetry (multiparameter), default settings for SpO₂ and NIBP may be found as part of the ECG channel. Telemetry ECG parameter configuration and alarm attributes are found in separate tables in this chapter following the tables for the hardwired (non-telemetry) products. Refer to Table 1 and Table 2 for non-telemetry products. Refer to Table 3 and Table 4 for telemetry products.

Table 1: ECG Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
ECG Rate Alarms (Adult)			
Rate Alarm Type	Learned or fixed limits	Learned	
High Rate Alarm Limit	5 to 300 BPM	180 BPM	
Low Rate Alarm Limit	0 to 200 BPM	40 BPM	
High Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Low Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
ECG Rate Alarms (Infant)			
Rate Alarm Type	Learned or fixed limits	Fixed	
High Rate Alarm Limit	5 to 300 BPM	220 BPM	
Low Rate Alarm Limit	0 to 200 BPM	100 BPM	
High Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Low Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Infant Alarm Delay (for ECG and Resp alarms)	0- to 3-minutes	3-minutes	
ECG Mode	Adult/Infant	Adult	
Sweep Speed	50, 25, or 12.5 mm/sec.	25 mm/sec.	
Respiration	On/Off	On	
Varitrend	On/Off	Off	
QRS Tone (local only)	On/Off	Off	
QRS Volume (local only)	1 (soft) to 8 (loud)	4	
SpO ₂ Pitch Modulation of QRS Tone	On/Off	Off	
Display Resolution	Monitor/Extended	Monitor	

Table 1: ECG Parameter Configuration (continued)

Parameter	Available User Settings	Factory Defaults	User Settings
Arrhythmia Processing	On/Off	On	
Abnormals in a Row	2 to 10 or Off	5	
Abnormals/Minute	1 to 99 or Off	Off	
Review	On/Off	On	
1st Lead Selection	Limb, V, or augmented lead	V2	
1st Lead Waveform Size	2.00 mV/cm - 0.10 mV/cm	0.50 mV/cm	
2nd Lead Selection	Limb, V, or augmented lead	II	
2nd Lead Waveform Size	2.00 mV/cm - 0.10 mV/cm	0.50 mV/cm	
ST Alarm (single lead)	0.00 mm (Off) to 9.00 mm	1.0 mm	
ST Alarm (multi-lead)	0.00 mm (Off) to 8.75 mm	0.50 mm	
ST Alarm (I)	On/Off	On	
ST Alarm (II)	On/Off	On	
ST Alarm (III)	On/Off	On	
ST Alarm (AVR)	On/Off	On	
ST Alarm (AVL)	On/Off	On	
ST Alarm (AVF)	On/Off	On	
ST Alarm (V1)	On/Off	On	
ST Alarm (V2)	On/Off	On	
ST Alarm (V3)	On/Off	On	
ST Alarm (V4)	On/Off	On	
ST Alarm (V5)	On/Off	On	
ST Alarm (V6)	On/Off	On	
Automatic Lead Switch	On/Off	On	
Single Lead Alarm	On/Off	Off	
Primary Rate Source	ECG/ART/SPO2/UA	ECG	
Alternate Rate Source (ECG)	On/Off	On	
Alternate Rate Source (ART)	On/Off	On	
Alternate Rate Source (SPO2)	On/Off	On	
Alternate Rate Source (UA)	On/Off	On	
Enhanced Vital Signs	On/Off	Off	
Display Format	Full view, Split view, 2-lead, 1-lead, or Cascade	1-lead	
Save ST Time Interval	Off, 5-, 10-, 15-, 30-, or 60-minutes	15-minutes	

Module Configuration Manager

Table 1: ECG Parameter Configuration (continued)

Parameter	Available User Settings	Factory Defaults	User Settings
ST Trend Scale	-5 to 0 mm 0 to 5 mm -2 to 0 mm 0 to 2 mm -1 to 1 mm -2 to 2 mm -5 to 5 mm -10 to 10 mm	+/- 2.0 mm	
ST Trend Timebase	1.5-, 3-, 6-, 12-, or 24-hours	6-hours	
Real-Time ST Trend	On/Off	Off	
Real-Time Trend Timebase	15- or 30-minutes	30-minutes	
Auto Report	Off; 30-minutes; 1-, 2-, 4-, 8-, 24-hours	Off	
Auto Print	On/Off	Off	
Report Format	Standard -1, Cabrera-1, Standard-3, Cabrera-3	Standard-1	
Send ECG Report	Auto/Manual	Auto	
Check Setup	On/Off	On	
Line Frequency	50 Hz, 60 Hz	60 Hz	
Control	On/Off	On	
Default Storage Key	Visible/Invisible	Invisible	
Patient Admit/Discharge	Save/Restore	Restore	
Select HLO Parameters	ECG1/P1, ECG1/RESP, ECG1/ECG2, P1/P2	ECG1/P1	

Table 2: ECG Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
Asystole	H	H	H	Y	Y	Y	Y	Y	Y
VFIB	H	H	H	Y	Y	Y	Y	Y	Y
High Rate	H,M,L,N	H		Y,N	Y		Y,N	Y	
Low Rate	H,M,L,N	H		Y,N	Y		Y,N	Y	
Run	H,M,L,N	H		Y,N	Y		Y,N	Y	
Couplet	H,M,L,N	M		Y,N	Y		Y,N	Y	
Tach	H,M,L,N	M		Y,N	Y		Y,N	Y	
ABN/MIN	H,M,L,N	M		Y,N	Y		Y,N	Y	
ST Single-lead	H,M,L,N	M		Y,N	Y		Y,N	Y	
ST Multi-lead	H,M,L,N	M		Y,N	Y		Y,N	Y	
Classes Full	H,M,L,N	L		N	N	N	Y,N	N	
CH 1 & 2 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
CH 1 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
CH 2 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
Low Voltage	H,M,L,N	M		N	N	N	Y,N	Y	
Noisy Signal	H,M,L,N	L		N	N	N	Y,N	N	
HR Unavailable	H,M,L,N	M		N	N	N	Y,N	Y	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Alarm attributes for asystole and ventricular fibrillation cannot be changed.
 - If ECG alarms are enabled, episodes of asystole and ventricular fibrillation will always trigger a high alarm tone.
 - If ECG alarm recording is enabled, asystole and ventricular fibrillation will always trigger a recording.
 - If Alarm Watch is enabled for a patient, asystole and ventricular fibrillation will always trigger an alarm notification.
- Setting tone type to NONE automatically sets alarm recording and alarm watch to NO for that alarm. Changing tone type from NONE to any other setting returns alarm recording and alarm watch to factory defaults.
- Setting tone type to NONE for high rate, low rate, ABN/MIN, or run causes the affected alarm limit to be displayed in reverse video in the ECG display zone.

Table 3: ECG Parameter Configuration (Telemetry Only)

Parameter	Available User Settings	Factory Defaults	User Settings
ECG Rate Alarms (Adult)	On	On	On
Rate Alarm Type	Learned/Fixed	Learned	
High Rate Alarm Limit	5 to 300 BPM	180 BPM	
Low Rate Alarm Limit	0 to 200 BPM	40 BPM	
High Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Low Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
ECG Rate Alarms (Infant)	On	On	On
Rate Alarm Type	Learned/Fixed	Learned	
High Rate Alarm Limit	5 to 300 BPM	220 BPM	
Low Rate Alarm Limit	0 to 200 BPM	100 BPM	
High Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Low Rate Offset (only applies to learned limits)	5 to 80 BPM	50 BPM	
Infant Alarm Delay (for ECG and Resp alarms)	0- to 3-minutes	3-minutes	
2nd Lead Display	On/Off	Off	
ECG Mode	Adult/Infant	Adult	
Sweep Speed	50, 25, or 12.5 mm/sec.	25 mm/sec.	
Enhanced Vital Signs	On/Off	Off	
ST Trend Timebase	1.5-, 3-, 6-, 12-, or 24-hours	6-hours	

Table 3: ECG Parameter Configuration (Telemetry Only) (continued)

Parameter	Available User Settings	Factory Defaults	User Settings
QRS Tone (local only)	On/Off	Off	
QRS Volume (local only)	1 (soft) to 8 (loud)	4	
SpO ₂ Pitch Modulation of QRS Tone	On/Off	Off	
Display Resolution	Monitor/Extended	Monitor	
Arrhythmia Processing	On/Off	On	
Abnormals in a Row	2 to 10 or Off	5	
Abnormals/Minute	1 to 99 or Off	Off	
Review	On/Off	On	
1st Lead Selection	Limb, V, augmented or MCL lead	VI	
1st Lead Waveform Size	2.00 mV/cm - 0.10 mV/cm	0.5 mV/cm	
2nd Lead Selection	Limb, V, augmented or MCL lead	II	
2nd Lead Waveform Size	2.00 mV/cm - 0.10 mV/cm	0.5 mV/cm	
ST Level Alarm (channel 1)	On/Off	Off	
ST Level Alarm Type	Learned/Fixed	Learned	
High Level Alarm Limit (only applies to fixed limits)	-8.75 mm to 9.00 mm	1.00 mm	
Low Level Alarm Limit (only applies to fixed limits)	-9.00 mm to 8.75 mm	- 1.00 mm	
High Level Offset (only applies to learned limits)	0.25 mm to 9.00 mm	1.00 mm	
Low Level Offset (only applies to learned limits)	0.25 mm to 9.00 mm	1.00 mm	
ST Change Alarm (channel 1)	On/Off	Off	
Max-Min. Change Within 5-Minutes (delta)	0.25 mm to 9.00 mm	1.00 mm	
ST Level Alarm (channel 2)	On/Off	Off	
ST Level Alarm Type	Learned/Fixed	Learned	
High Level Alarm Limit (only applies to fixed limits)	-8.75 mm to 9.00 mm	1.00 mm	
Low Level Alarm Limit (only applies to fixed limits)	-9.00 mm to 8.75 mm	- 1.00 mm	
High Level Offset (only applies to learned limits)	0.25 mm to 9.00 mm	1.00 mm	
Low Level Offset (only applies to learned limits)	0.25 mm to 9.00 mm	1.00 mm	
ST Change Alarm (channel 2)	On/Off	Off	
Max-Min. Change Within 5-Minutes (delta)	0.25 mm to 9.00 mm	1.00 mm	
Check Setup Key	On/Off	On	
Line Frequency	50 Hz, 60 Hz	60 Hz	

Module Configuration Manager

Table 3: ECG Parameter Configuration (Telemetry Only) (continued)

Parameter	Available User Settings	Factory Defaults	User Settings
Control (controls ALARM ON/OFF and SUSPEND PROCESSING keys)	On/Off	On	
Automatic Lead Switch	On/Off	On	
Single Lead Alarm	On/Off	Off	
Default Storage Key	Visible/Invisible	Invisible	
Low Battery Alarm	On/Off	On	
Patient Record	On/Off	Off	
Telemetry Bed Assignment	Temporary/Permanent	Temporary	
Patient Admit/Discharge	Save/Restore	Restore	
Frequency Band	North America UHF, North America VHF, European Telecom, United Kingdom, Australia, Spain, Sweden, Finland, New Zealand, Norway, Singapore, South Africa	North America UHF	
Primary Heart Rate Source	ECG/ART/SPO2/UA	ECG	
Alternate Rate Source (ECG)	On/Off	On	
Alternate Rate Source (ART)	On/Off	On	
Alternate Rate Source (SPO2)	On/Off	On	
Alternate Rate Source (UA)	On/Off	On	
Multiparameter Telemetry	On/Off	On	
Telemetry SpO2 Alarms (only if multiparameter is On)	On	On	On
SpO2 High Limit (only if multiparameter is On)	51% - 100%	100%	
SpO2 Low Limit (only if multiparameter is On)	50% - 99%	85%	
SpO2 Limit Alarm Delay (only if multiparameter is On)	0- to 30-seconds	15-seconds	
SpO2 Message Alarm Delay (only if multiparameter is On)	0- to 60-seconds	20-seconds	
Telemetry NIBP Alarms (only if multiparameter is On)	On	On	On
NIBP Systolic High Limit (only if multiparameter is On)	35 to 260 mmHg	150 mmHg	
NIBP Systolic Low Limit (only if multiparameter is On)	30 to 255 mmHg	100 mmHg	
NIBP Diastolic High Limit (only if multiparameter is On)	35 to 260 mmHg	100 mmHg	

Table 3: ECG Parameter Configuration (Telemetry Only) (continued)

Parameter	Available User Settings	Factory Defaults	User Settings
NIBP Diastolic Low Limit (only if multiparameter is On)	30 to 255 mmHg	60 mmHg	
NIBP Mean High Limit (only if multiparameter is On)	35 to 260 mmHg	110 mmHg	
NIBP Mean Low Limit (only if multiparameter is On)	30 to 255 mmHg	90 mmHg	



- Multiparameter telemetry displays ECG, SpO₂, and NIBP data all in the ECG channel. Alarm messages are displayed in order of priority.

Table 4: ECG Alarm Attributes (Telemetry Only)

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
Asystole	H	H	H	Y	Y	Y	Y	Y	Y
VFIB	H	H	H	Y	Y	Y	Y	Y	Y
High Rate	H,M,L,N	H		Y,N	Y		Y,N	Y	
Low Rate	H,M,L,N	H		Y,N	Y		Y,N	Y	
Run	H,M,L,N	H		Y,N	Y		Y,N	Y	
Couplet	H,M,L,N	M		Y,N	Y		Y,N	Y	
Tach	H,M,L,N	M		Y,N	Y		Y,N	Y	
ABN/MIN	H,M,L,N	M		Y,N	Y		Y,N	Y	
ST High/Low	H,M,L,N	M		Y,N	Y		Y,N	Y	
ST Change	H,M,L,N	M		Y,N	Y		Y,N	Y	
Classes Full	H,M,L,N	L		N	N	N	Y,N	N	
CH 1 & 2 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
CH 1 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
CH 2 Lead Off	H,M,L,N	M		N	N	N	Y,N	Y	
Low Voltage	H,M,L,N	M		N	N	N	Y,N	Y	

Module Configuration Manager

Table 4: ECG Alarm Attributes (Telemetry Only) (continued)

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
Noisy Signal	H,M,L,N	L		N	N	N	Y,N	N	
Squelch	H,M,L,N	L		N	N	N	Y,N	N	
Signal Interference	H,M,L,N	L		N	N	N	Y,N	N	
Low Battery	H,M,L,N	L		N	N	N	Y,N	N	
SpO2 Monitor Fail	H,M,L,N	L		N	N		N	N	
SpO2 High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
SpO2 Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	
SpO2 Faulty Sensor	H,M,L,N	L		N	N		N	N	
SpO2 Sensor Disconnected	H,M,L,N	L		N	N		N	N	
SpO2 Ambient Light Intf.	H,M,L,N	L		N	N		N	N	
SpO2 Sensor Off Patient	H,M,L,N	L		N	N		N	N	
SpO2 Insufficient Signal	H,M,L,N	L		N	N		N	N	
SpO2 Noisy Signal	H,M,L,N	L		N	N		N	N	
NIBP Cable Disconnected	H,M,L,N	L		N	N		N	N	
NIBP Unavailable (xx)	H,M,L,N	L		N	N		N	N	
NIBP Reading Failure (xx)	H,M,L,N	L		N	N		N	N	
NIBP Air Leak	H,M,L,N	L		N	N		N	N	
NIBP Loose or No Cuff	H,M,L,N	L		N	N		N	N	
NIBP Patient Cancelled	H,M,L,N	L		N	N		N	N	
NIBP Low Battery	H,M,L,N	L		N	N		N	N	
NIBP Low Battery Backup	H,M,L,N	L		N	N		N	N	
NIBP Kinked Hose	H,M,L,N	L		N	N		N	N	
NIBP Event Code (xx)	H,M,L,N	L		N	N		N	N	
NIBP Sys High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
NIBP Sys Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	
NIBP Dia High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
NIBP Dia High Limit	H,M,L,N	L		Y,N	N		Y,N	N	

Table 4: ECG Alarm Attributes (Telemetry Only) (continued)

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
NIBP Mean High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
NIBP Mean Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Messages and alarms beginning with “SPO2” or “NIBP” apply only when the Ultraview Multiparameter Digital Telemetry transmitter is used and multiparameter operation is enabled by the MCM Multiparameter Telemetry ON setting. Refer to Multiparameter Telemetry Overview on page 17-5 for more information.
- Alarm attributes for asystole and ventricular fibrillation cannot be changed.
 - If ECG alarms are enabled, episodes of asystole and ventricular fibrillation will always trigger a high alarm tone.
 - If ECG alarm recording is enabled, asystole and ventricular fibrillation will always trigger a recording.
 - If Alarm Watch is enabled for a patient, asystole and ventricular fibrillation will always trigger an alarm notification.
- Setting tone type to NONE automatically sets alarm recording and alarm watch to NO for that alarm. Changing tone type from NONE to any other setting returns alarm recording and alarm watch to factory defaults.
- Setting tone type to NONE for high rate, low rate, ABN/MIN, or run causes the affected alarm limit to be displayed in reverse video in the ECG display zone.

Respiration

To review or change Respiration settings:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key three times.
- 5 Touch USER SETTINGS.
- 6 Select RESP.
- 7 Use CURSOR \uparrow and CURSOR \downarrow to scroll through the parameter description list.
- 8 Use \uparrow and \downarrow to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.
- 11 Touch YES when the STORE ALL CHANNEL DEFAULTS message is displayed.

Respiration alarms can be set independently for the adult and infant mode. In the adult mode, respiratory rate alarms can be set as determined following initiation of respiratory monitoring. If you select the learned option, the high rate alarm limit is set at 1.5 times the learned rate. The low rate alarm limit is set to 0. The high limit is never automatically set above 150 breaths per minute (BPM) or lower than 30 BPM in the learned model.



- *Respiratory rate and apnea alarms cannot be disabled in the infant mode.*

Table 5: Respiration Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
Rate Alarms (Adult)	On/Off	Off	
High Rate Alarm Type	Learned/Fixed	Learned	
High Rate Alarm Limit (only applies to fixed limits)	1 to 200 breaths/min.	50 breaths/min.	
Low Rate Alarm Limit (only applies to fixed limits)	0 to 195 breaths/min.	0	
Apnea Alarm	On/Off	Off	
Apnea Duration	5- to 40-seconds	20-sec.	
Breathing Pattern	Shallow/Normal	Normal	
Rate Alarms (Infant)	On	On	On
High Rate Alarm Type	Learned/Fixed	Fixed	
High Rate Alarm Limit	1 to 200 breaths/min.	100 breaths/min.	
Low Rate Alarm Limit	0 to 195 breaths/min.	10 breaths/min.	
Apnea Alarm	On	On	On
Apnea Duration	5- to 40-seconds	20-sec.	
Breathing Pattern	Shallow/Normal	Shallow	
Waveform Display	On/Off	On	
Waveform Size	2.00 - 0.10 ohms/cm	1.00 ohms/cm	
CVA Filter	On/Off	On	
Lead Selection	RA-LA, RL-LA, RA-LL, RL-LL	RA-LA	
Sweep Speed	25, 12.5, 6.25 or 1.56 mm/sec.	12.5 mm/sec.	
Breath Tone (local only)	On/Off	Off	
Breath Tone Volume (local only)	1 (soft) to 8 (loud)	3	

Table 6: Respiration Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
Apnea	H	H	H	Y	Y	Y	Y	Y	Y
High Rate	H,M,L,N	M		Y,N	Y		Y,N	Y	
Low Rate	H,M,L,N	M		Y,N	Y		Y,N	Y	
Loss of Signal	H,M,L,N	M		N	N	N	Y,N	Y	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Alarms attributes for apnea cannot be changed.
 - If RESP alarms are enabled, episodes of apnea will always trigger a high alarm tone.
 - If RESP alarm recording is enabled, apnea will always trigger a recording.
 - If Alarm Watch is enabled for a patient, apnea will always trigger an alarm notification.
- Setting tone type to NONE automatically sets alarm recording and alarm watch to NO for that alarm. Changing tone type from NONE to any other setting returns alarm recording and alarm watch to factory defaults.
- Setting tone type to NONE for high rate or low rate alarms causes the affected alarm limit to be displayed in reverse video in the RESP display zone.

Varitrend® 3

To review or change Varitrend 3 settings:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6 Select VARITREND.
- 7 Use CURSOR↑ and CURSOR↓ to scroll through the parameter description list.
- 8 Use ↑ and ↓ to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.
- 11 Touch YES when the STORE ALL CHANNEL DEFAULTS message is displayed.

Default settings and individual parameter scales for the Varitrend timebase and display are adjustable. Definitions for up to five events can be pre-selected to describe concurrent changes in heart rate, respiration rate, or saturation level that may be of specific clinical interest.

Table 7: Varitrend 3 Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
Trend Timebase	1.5 min. or 3.0 min.	1.5 min.	
Resp Display	Rate or waveform	Waveform	
Resp Waveform Size	+/- 0.3 ohms +/- 0.5 ohms +/- 1.0 ohms +/- 2.0 ohms +/- 6.0 ohms	+/- 2.0 ohms	
Resp Rate Scale	AUTOSCALE 0 to 50 0 to 100 0 to 150 0 to 200	AUTOSCALE	
Heart Rate Scale	AUTOSCALE 0 to 100 0 to 150 50 to 150 0 to 200 100 to 200 0 to 250 100 to 250 0 to 300 100 to 300	AUTOSCALE	
SpO ₂ Scale	AUTOSCALE 0 to 100 25 to 100 50 to 100 75 to 100	AUTOSCALE	
Auto Alarm Recording	On/Off	Off	
Bradycardia Limit (event 1)	0 to 150 BPM or Off	Off	
Tachycardia Limit (event 1)	100 to 300 BPM or Off	Off	
Apnea Limit (event 1)	10- to 40-seconds or Off	Off	
SpO ₂ Limit (event 1)	25 to 95% or Off	Off	
Bradycardia Limit (event 2)	0 to 150 BPM or Off	Off	
Tachycardia Limit (event 2)	100 to 300 BPM or Off	Off	
Apnea Limit (event 2)	10- to 40-seconds or Off	Off	

Table 7: Varitrend 3 Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
SpO ₂ Limit (event 2)	25 to 95% or Off	Off	
Bradycardia Limit (event 3)	0 to 150 BPM or Off	Off	
Tachycardia Limit (event 3)	100 to 300 BPM or Off	Off	
Apnea Limit (event 3)	10- to 40-seconds or Off	Off	
SpO ₂ Limit (event 3)	25 to 95% or Off	Off	
Bradycardia Limit (event 4)	0 to 150 BPM or Off	Off	
Tachycardia Limit (event 4)	100 to 300 BPM or Off	Off	
Apnea Limit (event 4)	10- to 40-seconds or Off	Off	
SpO ₂ Limit (event 4)	25 to 95% or Off	Off	
Bradycardia Limit (event 5)	0 to 150 BPM or Off	Off	
Tachycardia Limit (event 5)	100 to 300 BPM or Off	Off	
Apnea Limit (event 5)	10- to 40-seconds or Off	Off	
SpO ₂ Limit (event 5)	25 to 95% or Off	Off	

Non-Invasive Blood Pressure

To review or change NIBP settings:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6 Select NIBP.
- 7 Use CURSOR \uparrow and CURSOR \downarrow to scroll through the parameter description list.
- 8 Use \uparrow and \downarrow to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.
- 11 Touch YES when the STORE ALL CHANNEL DEFAULTS message is displayed.

Non-invasive blood pressure (NIBP) alarms can be set independently for the adult and infant modes. Default settings for systolic, diastolic and mean alarm limits are fully adjustable within the specified ranges.

To have measurements automatically initiated at regular intervals, you can select from the list of AUTO INTERVALS. After connecting a cuff to the patient, set AUTO to ON in the NIBP menu and NIBP measurements will be automatic.

Table 8: NIBP Parameter Configurations

Parameter	Available User Settings	Factory Defaults	User Settings
Systolic Alarm (Adult)	On/Off	Off	
High Alarm Limit	45 to 260 mmHg	150 mmHg	
Low Alarm Limit	40 to 255 mmHg	100 mmHg	
Diastolic Alarm (Adult)	On/Off	Off	
High Alarm Limit	45 to 260 mmHg	100 mmHg	
Low Alarm Limit	40 to 255 mmHg	60 mmHg	
Mean Alarm (Adult)	On/Off	Off	
High Alarm Limit	45 to 260 mmHg	110 mmHg	
Low Alarm Limit	40 to 255 mmHg	90 mmHg	
Systolic Alarm (Infant)	On/Off	Off	
High Alarm Limit	15 to 150 mmHg	85 mmHg	
Low Alarm Limit	10 to 145 mmHg	55 mmHg	
Diastolic Alarm (Infant)	On/Off	Off	
High Alarm Limit	15 to 150 mmHg	75 mmHg	
Low Alarm Limit	10 to 145 mmHg	45 mmHg	
Mean Alarm (Infant)	On/Off	Off	
High Alarm Limit	15 to 150 mmHg	80 mmHg	
Low Alarm Limit	10 to 145 mmHg	50 mmHg	
NIBP Mode	Adult/Neonate	Adult	
Display Pulse Rate	Yes/No	Yes	
Auto Interval	1- to 10-minutes by 1 15- to 55-minutes by 5 1-, 2-, 4-, or 8-hours	15-minutes	

Table 9: NIBP Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
Systolic	H,M,L,N	M		Y,N	N		Y,N	N	
Diastolic	H,M,L,N	M		Y,N	N		Y,N	N	
Mean	H,M,L,N	M		Y,N	N		Y,N	N	
No Reading	H,M,L,N	N		Y,N	N		Y,N	N	
System Fault	H,M,L,N	L		Y,N	N		Y,N	N	
Remove Cuff	H,M,L,N	H		Y,N	N		Y,N	Y	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No

To review or change Temperature settings:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6 Select TEMP.
- 7 Use CURSOR \uparrow and CURSOR \downarrow to scroll through the parameter description list.
- 8 Use \uparrow and \downarrow to change the settings.
- 9 Touch STORE to save the new settings.
- 10 Touch YES when the STORE ALL CHANNEL DEFAULTS message is displayed.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 10 above.

Temperature

Default settings for high and low temperature alarm limits are adjustable, as well as the settings for the delta temperature.

Table 10: Temperature Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
Temperature 1 Alarms	On/Off	Off	
High Alarm Limit	0.1° - 50.0°C	37.5°C	
Low Alarm Limit	0.0° - 49.9°C	36.5°C	
Temperature 2 Alarms	On/Off	Off	
High Alarm Limit	0.1° - 50.0°C	37.5°C	
Low Alarm Limit	0.0° - 49.9°C	36.5°C	
Delta Alarms	On/Off	Off	
High Alarm Limit	0.1° - 50.0°C	2.0°C	
Low Alarm Limit	0.0° - 49.9°C	0.0°C	
Default Storage Key	Visible/Invisible	Invisible	
Patient Admit/Discharge	Save/Restore	Restore	

Table 11: Temperature Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
T1 High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
T1 Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	
T2 High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
T2 Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	
DT High Limit	H,M,L,N	L		Y,N	N		Y,N	N	
DT Low Limit	H,M,L,N	L		Y,N	N		Y,N	N	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Setting the tone type to NONE automatically sets the alarm recording and alarm watch to NO for that alarm. Changing the tone type from NONE to any other setting returns the alarm recording and alarm watch to the factory defaults.

To review or change Invasive Pressure settings:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6 Select PRESSURE.
- 7 Use CURSOR↑ and CURSOR↓ to scroll through the parameter description list.
- 8 Use ↑ and ↓ to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.
- 11 Touch YES when the STORE ALL CHANNEL DEFAULTS is displayed.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 10 above.

Invasive Pressure

Invasive pressure parameters can be independently configured for each of two or four pressure channels. The alarm type must be set to Fixed for the user-defined alarm limit settings to be functional for high and low pressure alarm limits. If the alarm type is set to the Learned mode, high and low alarm limits are set according to the patient's learned pressure.

The factory default label is:

- ART for the first pressure channel label
- PA for the second pressure channel
- PRS for the third channel
- CVP for the fourth channel

The associated alarm limit defaults correspond to typical pressure values for the respective catheter site.

Table 12: Pressure Parameter Configuration Table (Channel 1)

Parameter	Available User Settings	Factory Defaults	User Settings
Label (P1)	ICP, LAP, RAP, CVP, PA, ART, UA, UV, PRS	ART	
Scales	On/Off	Off	
Top of Scale	10 to 500 mmHg or Auto	200 mmHg	
Filter Frequency	3, 8, 12, 15, 18, 21, 25, 30, 35, 40 Hz	12 Hz	
Sweep Speed	50, 25, 12.5, 6.25 mm/sec., or same as ECG	same as ECG	
Artifact Rejection	On/Off	Off	
Numeric Size	Sys/Dia Large Mean Large All Large	Sys/Dia Large	
Alarm Type	Learned/Fixed	Learned	
Systolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	180 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	100 mmHg	
Diastolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	120 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	60 mmHg	
Mean Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	130 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	80 mmHg	
CPP Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	

Module Configuration Manager

Table 13: Pressure Parameter Configuration Table (Channel 2)

Parameter	Available User Settings	Factory Defaults	User Settings
Label (P2)	ICP, LAP, RAP, CVP, PA, ART, UA, UV, or PRS	PA	
Scales	On/Off/Auto	Off	
Top of Scale	10 to 500 mmHg	50 mmHg	
Filter Frequency	3, 8, 12, 15, 18, 21, 25, 30, 35, 40 Hz	12 Hz	
Sweep Speed	50, 25, 12.5, 6.25 mm/sec., or same as ECG	Same as ECG	
Artifact Rejection	On/Off	On	
Numeric Size	Systolic/Diastolic Large Mean Large All Large	Systolic/Diastolic Large	
Alarm Type	Learned/Fixed	Learned	
Systolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	10 mmHg	
Diastolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	20 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	
Mean Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	20 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	5 mmHg	
CPP Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	

Table 14: Invasive Pressure Parameter Configuration (Channel 3)

Parameter	Available User Settings	Factory Defaults	User Settings
Label (P3)	ICP, LAP, RAP, CVP, PA, ART, UA, UV, or PRS	PRS	
Scales	On/Off/Auto	Off	
Top of Scale	10 to 500 mmHg	200 mmHg	
Filter Frequency	3, 8, 12, 15, 18, 21, 25, 30, 35, 40 Hz	12 Hz	
Sweep Speed	50, 25, 12.5, 6.25 mm/sec., or same as ECG	Same as ECG	
Artifact Rejection	On/Off	Off	
Numeric Size	Systolic/Diastolic Large Mean Large All Large	Systolic/Diastolic Large	
Alarm Type	Learned/Fixed	Learned	
Systolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	180 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	100 mmHg	
Diastolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	120 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	60 mmHg	
Mean Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	130 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	80 mmHg	
CPP Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	

Module Configuration Manager

Table 15: Pressure Parameter Configuration Table (Channel 4)

Parameter	Available User Settings	Factory Defaults	User Settings
Label (P4)	ICP, LAP, RAP, CVP, PA, ART, UA, UV, or PRS	CVP	
Scales	On/Off/Auto	Off	
Top of Scale	10 to 500 mmHg	50 mmHg	
Filter Frequency	3, 8, 12, 15, 18, 21, 25, 30, 35, 40 Hz	12 Hz	
Sweep Speed	50, 25, 12.5, 6.25 mm/sec, or same as ECG	Same as ECG	
Artifact Rejection	On/Off	Off	
Numeric Size	Systolic/Diastolic Large Mean Large All Large	Systolic/Diastolic Large	
Alarm Type	Learned/Fixed	Learned	
Systolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	10 mmHg	
Diastolic Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	20 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	
Mean Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	20 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	5 mmHg	
CPP Alarm	On/Off	Off	
High Alarm Limit	-45 to 300 mmHg or Off	50 mmHg	
Low Alarm Limit	-50 to 295 mmHg or Off	0 mmHg	

Table 16: Invasive Pressure Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
CH1 Systolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH1 Diastolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH1 Mean	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH1 CCP	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH2 Systolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH2 Diastolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH2 Mean	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH2 CCP	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH3 Systolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH3 Diastolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH3 Mean	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH3 CCP	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH4 Systolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH4 Diastolic	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH4 Mean	H,M,L,N	H		Y,N	Y		Y,N	Y	
CH4 CCP	H,M,L,N	H		Y,N	Y		Y,N	Y	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Setting the tone type to NONE automatically sets the alarm recording and alarm watch to NO for that alarm. Changing the tone type from NONE to any other setting returns the alarm recording and alarm watch to the factory defaults.

To review or change SpO₂ settings:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch USER SETTINGS.
- 6 Select SPO2.
- 7 Use CURSOR↑ and CURSOR↓ to scroll through the parameter description list.
- 8 Use ↑ and ↓ to change the settings.
- 9 Touch NEXT PAGE to continue to next screen of parameters.
- 10 Touch STORE to save the new settings.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 10 above.

SpO₂

Default settings can be adjusted for high and low SpO₂ alarm limits and settings for alarm priority.

Table 17: SpO₂ Parameter Configuration

Parameter	Available User Settings	Factory Defaults	User Settings
SpO ₂ Alarms	On	On	
High Alarm limit	51 to 100%	100%	
Low Alarm limit	50 to 99%	85%	
Limit Alarm Delay	0- to 30-seconds	15-sec.	
Message Alarm Delay	0- to 60-seconds	20-sec.	
Data Averaging Time	4-, 8-, or 16-seconds	8-sec.	
Pulse Tone (local only)	On/Off	Off	
Pulse Tone Volume (local only)	1 (soft) to 8 (loud)	4	
Pulse Rate Display	On/Off	On	
Motion Detection	On/Off	On	

Table 18: SpO₂ Alarm Attributes

Alarm Type	Tone Type			Alarm Recording			Alarm Watch		
	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings	Available User Settings	Factory Defaults	User Settings
High Limit	H,M,L,N	H		Y,N	Y		Y,N	Y	
Low Limit	H,M,L,N	H		Y,N	Y		Y,N	Y	
Adapter Disconnected	H,M,L,N	L		N	N	N	Y,N	N	
Sensor Disconnected	H,M,L,N	L		N	N	N	Y,N	N	
Sensor Off Patient	H,M,L,N	L		N	N	N	Y,N	N	
Insufficient Signal	H,M,L,N	L		N	N	N	Y,N	N	
Light Interference	H,M,L,N	L		N	N	N	Y,N	N	
Noisy Signal	H,M,L,N	L		N	N	N	Y,N	N	
Low Signal Strength	H,M,L,N	N		N	N	N	Y,N	N	

H = High; M = Medium; L = Low; N = None; Y = Yes; N = No



- Setting tone type to NONE automatically sets alarm recording and alarm watch to NO for that alarm. Changing tone type from NONE to any other setting returns alarm recording and alarm watch to factory defaults.
- Ultraview Digital Telemetry SpO₂ default settings are described in Setting Up SpO₂ Monitoring on page 14-4.

Transferring User-Defined Settings

To transfer user-defined settings from the module into the monitor:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch TRANSFER SETTINGS.
- 6 Select YES.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 6 above.

Once you have configured the settings on your module you may transfer these settings to the monitor for subsequent retrieval into other modules. (Refer to *Retrieving User-Defined Settings* on page 7-33.)

When the transfer of settings into the monitor is complete, the transfer successful message will be displayed.



- *User-defined default settings that have been transferred to the monitor's memory are available for retrieval into other modules until (1) the monitor is powered OFF or (2) a patient is admitted to or discharged from that monitor with a Purge Data/Yes.*

Retrieving User-Defined Settings

To retrieve user-defined settings from the monitor into another module:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch RETRIEVE SETTINGS.
- 6 Select YES.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 6 above.

To standardize the user-configurable options for similar modules, you can configure a single module and transfer its settings to the monitor for subsequent retrieval into other modules.

First, transfer the settings from the configured module into the monitor. Insert a second module or remote module housing into the monitor and retrieve the settings.

When the retrieval of data into the module is complete, a RETRIEVAL SUCCESSFUL message will be displayed. If settings have not been previously transferred into the monitor, a RETRIEVAL FAILED message will be displayed.



- *User-defined default settings that have been transferred to the monitor's memory are available for retrieval into other modules until (1) a monitor is powered OFF or (2) a patient is admitted to or discharged from that monitor with a Purge Data/Yes.*
- *Once retrieved, alarm ON/OFF status and alarm limits for all parameters will be reset according to the newly retrieved settings.*

Restoring Factory Settings

To restore factory settings:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Touch the hidden key 3 times.
- 5 Touch FACTORY DEFAULTS.
- 6 Select YES.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 4 through 6 above.

The Factory Default feature changes the user-configurable settings for *all* parameters in the module to the factory default settings.



- *Alarm ON/OFF status and alarm limits for all parameters are reset to the factory default settings.*

Restoring User-Defined Settings

To restore user-defined settings:

Module Configurations with ECG

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch RESTORE SETTINGS.
- 4 Select YES.

Module Configurations without ECG

- 1 Touch TEMP.
- 2 Refer to steps 3 and 4 above.

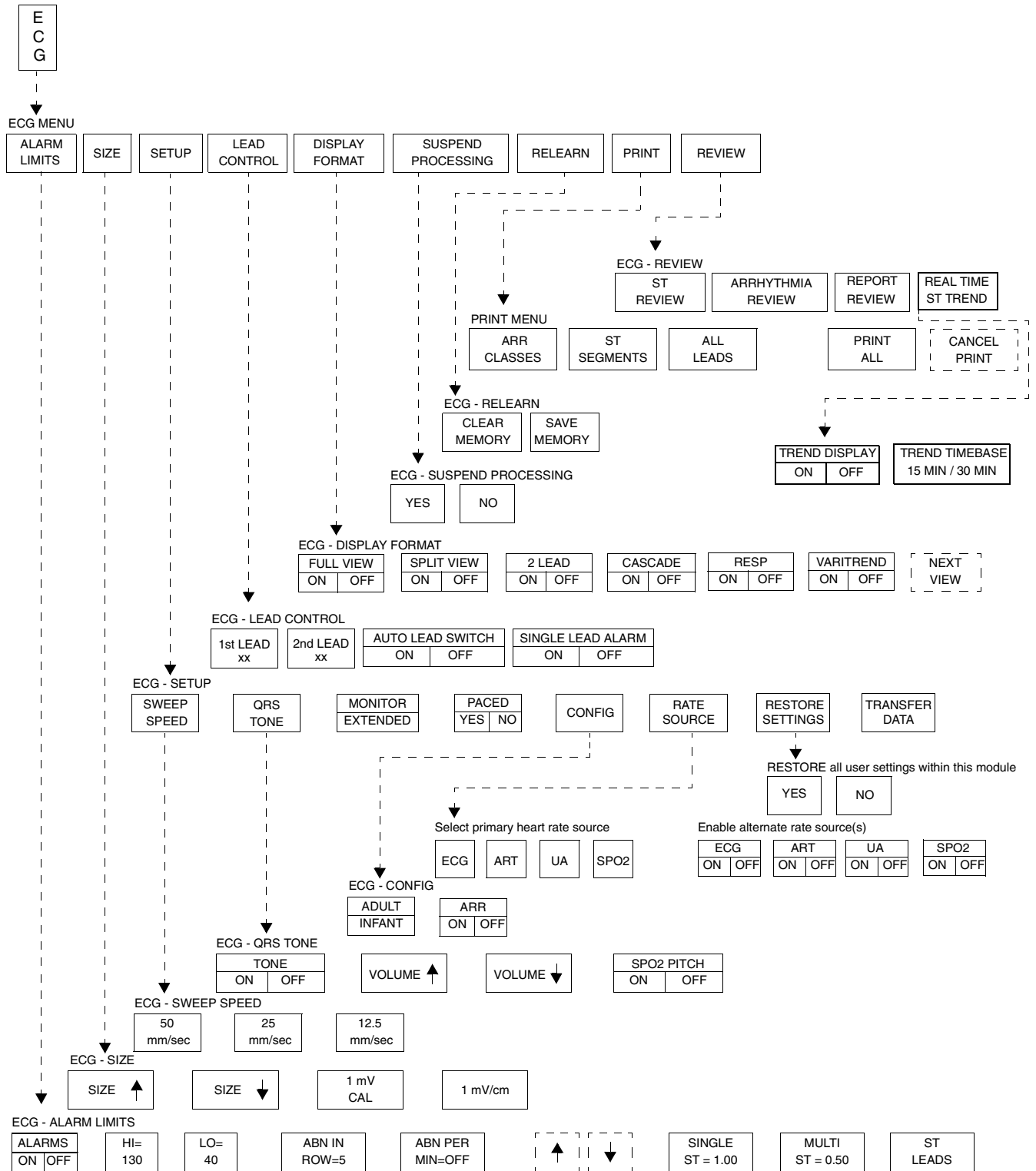
The Restore Settings feature changes the user-configurable settings for *all* parameters in the module to the defaults previously stored as user settings.



- *Once restored, alarm ON/OFF status and alarm limits for all parameters in the module are reset to the previously stored user settings.*

ECG Directory

Directory of Keys



• Based on features purchased, more or fewer keys may appear here than on your menu screens.

Contents

Overview	3
ECG Setup	4
Display Detail	9
Selecting Adult or Neonate Mode	11
Monitoring Paced Patients	11
Setting and Adjusting Alarms	13
Selecting ECG Leads	14
Displaying Additional Waveforms	15
Checking the ECG Amplitude	15
Adjusting Waveform Size	15
Adjusting Sweep Speed	16
Adjusting Tones	16
Changing the Display Resolution	17
Selecting Primary and Alternate Heart Rate Source	17
Suspending/Resuming ECG Processing	18
Printing ECG Recordings	18
Restoring Default Settings	19
Power Failure	19
ECG Problem Solving	19
ECG Troubleshooting Guide	21

Overview

When used in conjunction with a Spacelabs Medical Ultraview Care Network monitor, the ECG function provides a means for continuous monitoring of electrocardiographic signals. It can detect abnormal cardiac rhythms, including life-threatening arrhythmias such as asystole, ventricular fibrillation, and ventricular tachycardia.

The basic ECG software provides alarms for high and low heart rates, ventricular fibrillation, and asystole.

The Multiview I option provides enhanced arrhythmia detection and alarm capability. Multiview 1 detects ventricular tachycardia, couplets, and single abnormal beats in addition to the detection and alarm capabilities of the basic ECG software.

The Multiview II option expands arrhythmia detection to include pauses and tachycardias of a supraventricular origin. This option also offers storage capabilities so that trends of arrhythmia episodes, as well as dominant, ventricular-paced and AV-paced rhythms, can be reviewed, edited, and printed. Refer to *Arrhythmia* on page 9-3 for detailed information about the Multiview options.

The diagnostic ECG feature, which meets all of the requirements and standards for electrocardiographic devices, provides the capability to obtain a diagnostic 12-lead report as a function of the monitoring system. The 12-lead report is a set of diagnostic-quality electrocardiographic waveforms that accurately represent both the detailed cardiac cycle and the cardiac rhythm.

The ECG function:

- detects and displays a waveform representing each cardiac cycle
- determines lead configuration options
- displays heart rate (heart rate is computed from an average of eight beats with a provision for immediately updating the heart rate should the rate slow suddenly)
- detects pacemaker pulses
- initiates ECG-related alarms when limits are violated
- acquires, displays, and prints diagnostic-quality 12-lead reports

ECG traces for multiple leads can be displayed, however, ECG monitoring is always performed on two leads. Lead faults are identified by a message on the screen. If automatic lead switching is enabled, the system automatically switches to another appropriate lead to continue monitoring in the event of a lead fault.



WARNING:

- ***Following a lead switch and until the patient's rate and morphology are learned, some ECG alarms are not active. Alarms for ventricular fibrillation and asystole continue to be active. However, ECG alarms for high rate, low rate, run, couplet, abnormal per minute, and tachycardia are not.***



- *Monitor input circuits are protected for electrosurgical equipment and defibrillator use.*
- *Cardiac pacemakers or other electrical stimulators do not affect and are not affected by operation of this unit.*
- *You can define your own default settings for such characteristics as alarm limits and display configuration. Refer to Module Configuration Manager on page 7-5 for further information.*

ECG Setup

The ECG waveform area displays the CHECK SETUP key and sounds an alarm when the monitor is powered ON, following a monitor reset, and after an ECG module is inserted. Touch the ECG key to dismiss the CHECK SETUP key and silence the alarm. Verify that the system configuration (for example, alarm limits, lead selection, etc.) is appropriate before you begin, or resume, monitoring.



- *When the Check Setup feature is disabled, the CHECK SETUP key will not display and its associated alarm tone will not sound. Contact your system administrator to enable this feature.*



WARNING:

- ***Signals resulting from devices such as Automatic Implantable Cardiac Defibrillators (AICD) may momentarily blank the ECG trace rather than display an out-of-range signal. In such cases, it may not be apparent that the AICD has fired and the condition of the patient should be checked. In all instances of AICD firing, the monitor will redisplay the ECG waveform within 5-seconds.***

Accessories



WARNING:

- **Use only monitoring cables and safety lead wires to protect against accidental connection to electrical power cords or outlets. Failure to do so may result in adverse health consequences or death.**

Use silver/silver-chloride electrodes or their equivalent, and always connect all electrodes required for a particular lead. Missing electrodes may result in the loss of ECG tracing.



- *Use only Spacelabs Medical recommended electrodes. Some electrodes may polarize, creating large offset potentials which can compromise recovery time after application of defibrillator pulses. Squeeze bulb electrodes, commonly used for diagnostic ECG recording, may be particularly vulnerable to this effect.*



CAUTION:

- **Visually inspect each lead wire for obvious damage and replace them as needed.**
- **When placing a telemetry transmitter on the patient, make sure the front of the transmitter is always facing away from the patient.**
- **Use only patient cables and lead wires specified by Spacelabs Medical. Other cables and lead wires may degrade performance and may damage the monitor during defibrillation or high frequency electrosurgery. Non-Spacelabs Medical cables and lead wires may also change the required input impedance and DC offset voltage, affecting monitor performance.**
- **Do not use stainless steel electrodes.**
- **Place the electrodes as far away from the electrosurgery site as possible because considerable high frequency current may flow into the electrodes. This can cause patient burns, especially if a defect is present in the neutral cable of the electrosurgical unit. Placing electrodes too close to the electrosurgery site can also cause a noisy ECG trace.**
- **Do not allow conductive parts of electrode leads or connectors, including the neutral electrode, to contact other conductive parts, including the ground.**
- **Poor cable dress or improper electrode preparation may cause line isolation monitor transients to resemble actual cardiac waveforms and thus inhibit heart rate alarms. Refer to *Patient Preparation and Electrode Application* on page 8-6 for details on proper electrode preparation and application.**

To prepare the patient:

- 1 Wash area with soap and water.
- 2 If necessary, shave the area where you plan to position the electrodes.
- 3 Clean the skin with alcohol.
- 4 Dry the skin thoroughly.
- 5 Abrade the skin.

To apply ECG electrodes:

- 1 Attach electrode to lead wire.
- 2 Apply electrode to patient skin.

Patient Preparation and Electrode Application

To set up for ECG monitoring, first attach lead wires to the patient cable or telemetry transmitter. Match the color-coding on the patient cable or telemetry transmitter to the lead wire color.

Next, attach each electrode to its lead wire before applying the electrodes to the patient. *Figure 8-1* displays the correct procedure for applying electrodes to a patient. Be sure to press firmly around the entire edge of the adhesive surface. Do not apply pressure over the gel column itself as this may trap air or displace the conductive gel, which may degrade the signal significantly. Gel displacement arising from attaching the electrode to the lead wire after applying the electrode to the patient may also degrade the signal.

Electrodes should be placed over flat, non-muscular areas of the body to minimize muscle artifact (refer to *Figure 8-2* and *Figure 8-3*). This is particularly important for telemetry patients who are commonly ambulatory. If necessary, after the electrodes and lead wires have been attached, tape a stress loop (a loop of lead wire close to the electrode that minimizes stress or pulling on the electrode itself). Stress-looping significantly improves ECG signal quality, particularly for ambulatory patients.

ECG monitoring begins when the module detects a signal via connection of an ECG patient cable to the module or by installation of a battery in a telemetry transmitter.

ECG monitoring requires the following minimum conditions:

- ECG electrodes must be properly attached the patient and lead wires must be properly attached to the patient cable or telemetry transmitter.
- The patient cable must be connected to the module or telemetry transmitter.
- The module must be connected to a monitor that is powered ON.

Telemetry ECG monitoring requires the following additional minimum conditions:

- The telemetry transmitter must have a functional battery.
- The telemetry receiver module must be tuned to the telemetry transmitter's frequency (channel number).
- The telemetry receiver module must be connected to a Spacelabs Medical diversity antenna.
- Refer to *Assigning a Telemetry Channel* on page 17-14 for more information.

1. Attach electrode to lead wire.
2. Apply electrode to skin.

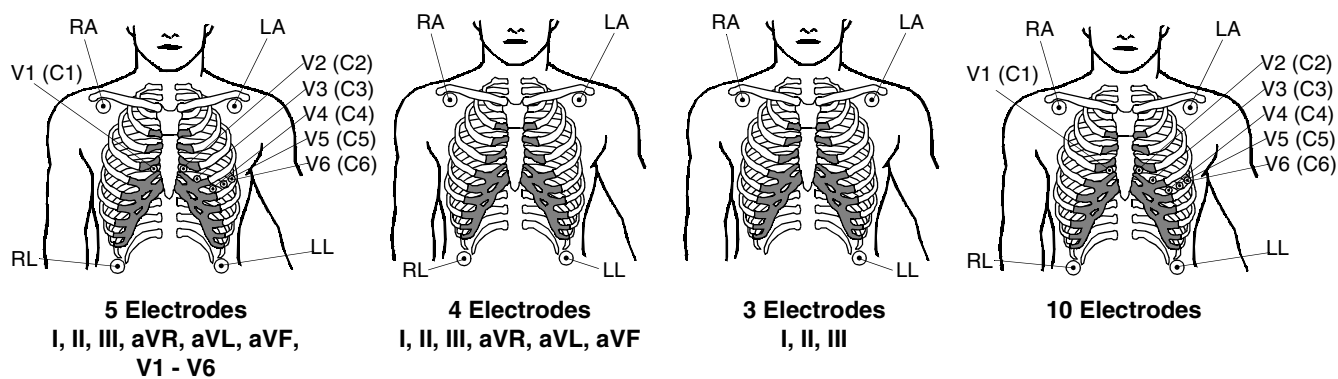


Figure 8-1: Electrode application

Table 1 lists electrode color and identifier codes.

Table 1: Electrode Color and Identifier Codes

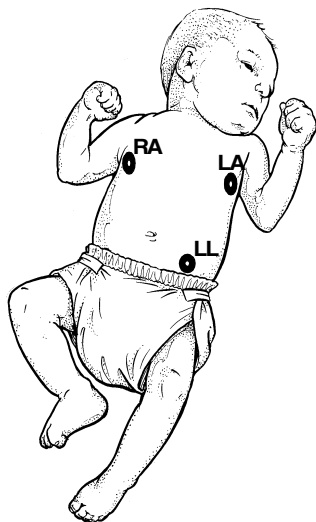
AHA Electrode Identifier	AHA Color Code	Electrode Placement	IEC Electrode Identifier	IEC Color Code
RA	White	Right Arm	R	Red
LA	Black	Left Arm	L	Yellow
LL	Red	Left Leg	F	Green
RL	Green	Right Leg	N	Black
V1	Brown/Red	4th Intercostal - Right Sternum	C1	White/Red
V2	Brown/Yellow	4th Intercostal - Left Sternum	C2	White/Yellow
V3	Brown/Green	Midway Between V2 and V4	C3	White/Green
V4	Brown/Blue	5th Intercostal - Left Midclavicular	C4	White/Brown
V5	Brown/Orange	Left Anterior Axillary Line at V4	C5	White/Black
V6	Brown/Violet	Left Midaxillary Line at V4	C6	White/Violet
C	Brown	Chest	C	White



Chest electrodes must be appropriately relocated on patient's chest to view alternate precordial leads.

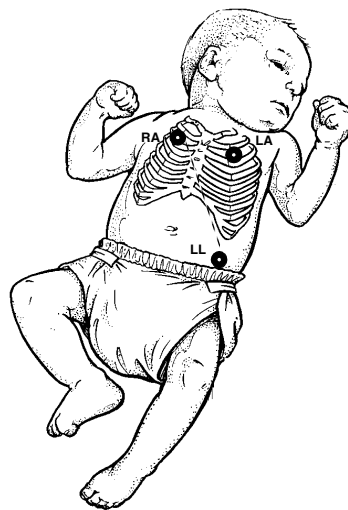
Chest electrodes must be appropriately placed on the patient's chest to view precordial leads.

Figure 8-2: Adult electrode placement



Maximum Impedance Change:

Position RA and LA electrodes at the nipple level, midaxillary line. Position LL below the diaphragm, preferably below the umbilicus.



Alternate Method:

Position RA and LA electrodes at the 2nd intercostal space, midclavicular line. Position LL below the diaphragm, preferably below the umbilicus.

Figure 8-3: Neonate electrode placement

Display Detail



- For telemetry display information refer to Display Detail on page 17-12.

Your ECG display may differ from the one shown here depending on: 1) the type of monitor you are using, 2) the options in your module, 3) which functions you have enabled, and 4) which patient type you have selected.

The illustrations below show the displays with arrhythmia and ST analysis ON.

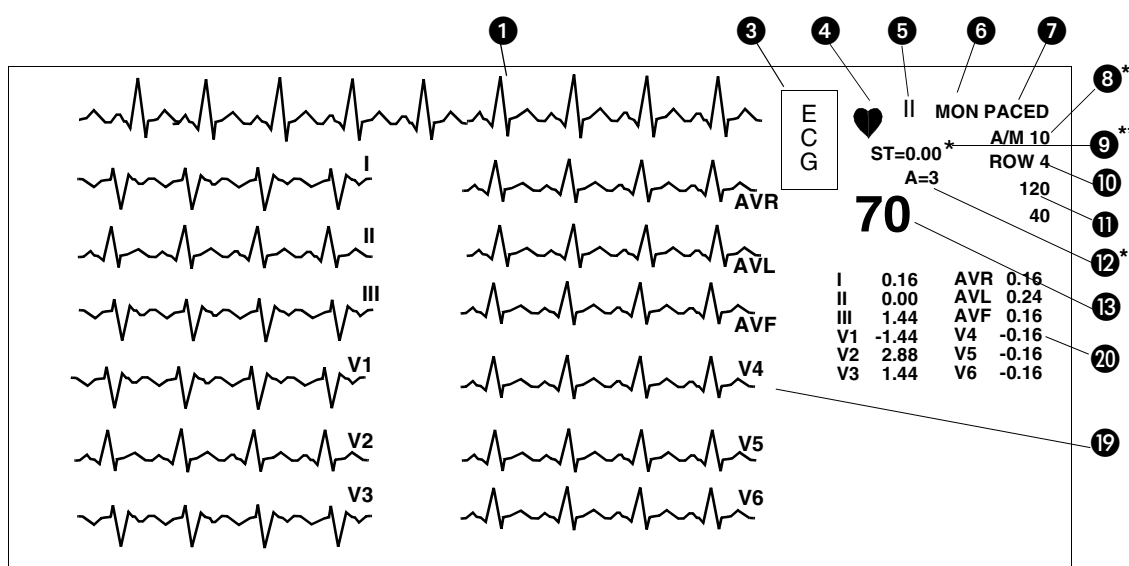


Figure 8-4: Bedside monitor display (full view)

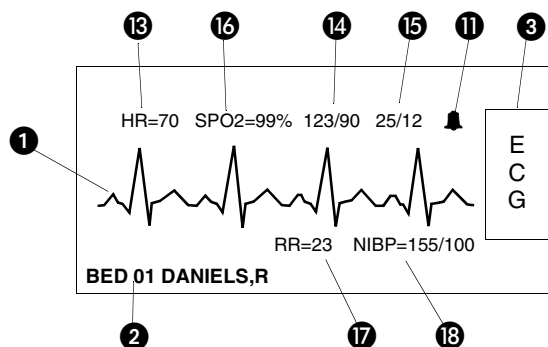


Figure 8-5: Central monitor display (split screen)

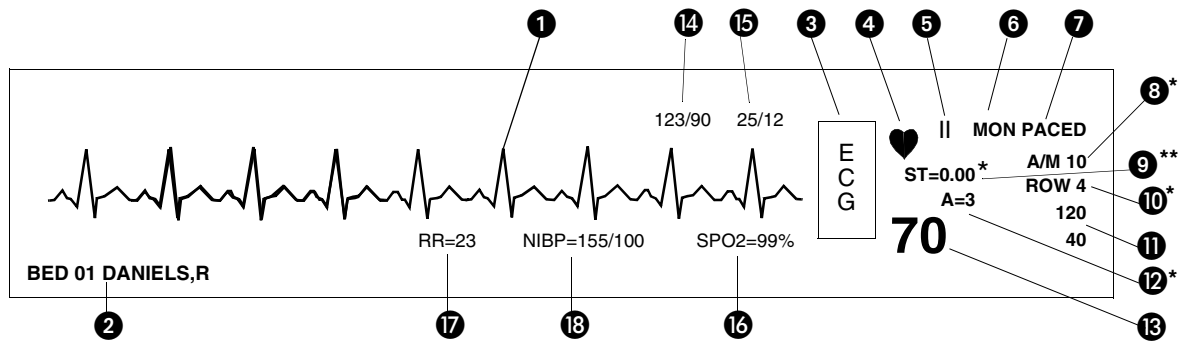


Figure 8-6: Central monitor display

- 1 ECG trace for first lead
- 2 Bed name
- 3 ECG key for first lead
- 4 QRS indicator (flashes once per detected beat)
- 5 ECG lead designator
- 6 Display resolution (monitor or extended)
- 7 Paced operation indication (pacemaker detection is enabled)
- 8 Abnormals per minute alarm limit *
- 9 ST segment level for first lead**
(the asterisk indicates ST alarms are enabled)
- 10 Abnormals in a row alarm limit *
- 11 ECG rate alarm limits. Split-screen central monitors display a bell symbol when alarms are enabled; bedside monitors display the rate alarm limits (120/40)
- 12 Abnormals per minute counter *
- 13 Current heart rate
- 14 Arterial pressure
- 15 Pulmonary artery pressure
- 16 SpO₂ level
- 17 Respiration rate
- 18 Non-invasive blood pressure (systolic/diastolic)
- 19 ECG Full View display
- 20 ST Segment levels for Full View Display

* Only appears with the Multiview I or II option in the adult mode with Arrhythmia detection enabled.

** Only appears in adult mode with the ST segment analysis option.



- If the enhanced vital sign display feature is enabled, you can view SpO₂, respiration rate, and non-invasive pressure in the ECG zone on central or remote bedside monitors. However, no alarms are active.

Selecting Adult or Neonate Mode

To specify the patient type:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch CONFIG.
- 4 Select ADULT or INFANT.

The ECG function provides both adult and neonate operational modes. When you select adult or infant, ECG alarm limits are adjusted based on your selection.



WARNING:

- **When the system is in the neonate mode, ECG and respiration alarm activation can be delayed from 0- to 3-minutes. The factory default setting for alarm delay is 3-minutes. Closely observe the patient during this period.**

Monitoring Paced Patients

To monitor paced patients:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Select PACED YES.

When you monitor pacemaker patients, use the Paced feature to automatically enhance pacemaker spikes for display and eliminate them from the heart rate counter.

To prevent pacemaker pulses from being counted as actual beats, specialized circuitry removes the pacemaker pulses from the ECG signal and replaces them with pacemaker flags.

If the interval between the pacemaker pulse and the QRS complex is greater than 150 milliseconds, the beat is considered to have originated in the atria, and is not classified as a paced beat.



- *The optimal leads for monitoring paced patients may vary. To select an optimal trace, sequence through the available leads. If pacemaker spikes are not detected or if the heart rate is incorrectly counted, select another lead or change electrode position.*
- *In telemetry monitoring, pacemaker spikes are detected on lead II.*

**WARNING:**

- **ECG detection circuitry may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon ECG rate alarms. Keep pacemaker patients under close surveillance.**
- **During electrosurgical activity, the system may not accurately detect paced beats due to the electrical interference.**
- **The system may insert pacemaker flags into the ECG signal in response to signals that are not pacemaker pulses. Therefore, if you use a Spacelabs Medical monitor to observe pacemaker performance, you must take into account all possible sources of pacemaker flags.**
- **Use the pacemaker manufacturer's performance analyzer as the primary means of evaluating pacemaker operation.**
- **Operation of some pacemaker programs may suppress the ECG waveform, preventing QRS detection and rate counting. This may result in an erroneous asystole alarm.**
- **Signals resulting from devices such as Automatic Implantable Cardiac Defibrillators (AICD) may momentarily blank the ECG trace rather than display an out-of-range signal. In such cases, it may not be apparent that the AICD has signaled and the condition of the patient should be checked. In all instances of AICD signaling, the bedside or central will redisplay the ECG waveform within 5-seconds.**

To check capture threshold:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Select PACED NO.
- 4 Select EXTENDED.
- 5 Touch SWEEP SPEED.
- 6 Select 50 mm/sec.
- 7 Perform capture threshold verification procedure according to your protocol.
- 8 Touch ECG.
- 9 Touch SETUP.
- 10 Select PACED YES.
- 11 Select MONITOR.
- 12 Touch SWEEP SPEED.
- 13 Select desired speed.

When using temporary transvenous pacemakers, you may want to check the pacemaker capture threshold on a regular basis (refer to your hospital protocol for frequency and procedure). Since the pacemaker flag substituted by the monitor does not represent the true amplitude of the detected pacemaker pulse, you will need to temporarily deactivate the Ultraview Care Network pacemaker software to check the capture threshold. In addition, placing the display in the extended mode and changing the sweep speed to 50 mm/sec will enhance the resolution and improve visualization of the pacemaker pulse amplitude. Remember to return to the monitor mode, reactivate pacemaker detection, and reset desired sweep speed after checking the capture threshold.

Permanent transvenous pacemakers employing a bipolar lead system are capable of obtaining capture of the cardiac muscle at a much lower current than those with unipolar lead systems. For optimal paced rhythm detection, the pacemaker pulse and QRS complex must be of sufficient voltage. To determine if the monitor is correctly detecting the pacemaker pulses, verify that the Paced mode is activated. Each paced beat should have a pacemaker flag superimposed on the ECG trace at the appropriate point prior to the QRS complex. If flags are not consistently observed, sequence through the available leads for a better lead, or reposition electrodes, to optimize pacemaker detection. Check the amplitude of the QRS complex by inserting a 1 mV calibration pulse in the ECG trace as described in *Checking the ECG Amplitude* on page 8-15.

Setting and Adjusting Alarms

To set or adjust rate alarms:

- 1 Touch ECG.
- 2 Touch ALARM LIMITS.
- 3 Touch ALARMS ON.
- 4 Touch HI = or LO = key.
- 5 Use arrow keys to adjust.

ECG alarms default to the ON position when the module is inserted into a monitor that is powered ON. Events that can cause an ECG alarm include:

- High or low rate
- Ventricular fibrillation (VFIB)
- Asystole



WARNING:

- *If ECG monitoring is interrupted and subsequently resumed during an asystole event, 5- to 6-seconds will elapse prior to the monitor sounding and displaying the Asystole alarm.*
- *If ECG monitoring is initiated during an asystole event, 10- to 11-seconds will elapse prior to the monitor sounding and displaying an Asystole alarm.*

Additional conditions which can cause an alarm with the Multiview I or II options include:

- Abnormals in a row (couplets or runs)
- Abnormals per minute
- Tachycardia (of supraventricular origin)



- *If the alarm limit for high rate, low rate, abnormals per minute (A/M) or abnormals in a row (ROW) is displayed in reverse video, this is an indication that alarm tone, alarm recording, and alarm watch have been disabled for the indicated alarm.*

Refer to *Arrhythmia* on page 9-3 for details concerning arrhythmia alarms or to *ST Analysis* on page 10-3 for details concerning ST alarms.

Initial Alarm Limits for Heart Rate

At the completion of a learn sequence (refer to *Learning the Dominant Waveform* on page 9-4), the rate alarm limits are initialized using fixed or learned criteria.

When you change the adult/neonate configuration, the system changes the alarm limits accordingly. You can adjust these limits up or down as needed.

Alarms

Table 2 displays the conditions for which an alarm may be initiated.

Table 2: ECG Alarms

Alarm	Cause Of Alarm	Display Indication
VFIB	Ventricular fibrillation detected	VFIB
Asystole	>5-seconds with no QRS detected	Heart rate 0; flashing low rate limit; ASYSTOLE
High Heart Rate	High limit violated	Flashing high limit and HI RATE ALARM
Low Heart Rate	Low limit violated	Flashing low limit and LO RATE ALARM
Chan 1 & 2 - Leads Off	One or more of the electrodes for <i>both</i> ECG leads are off or loose	No ECG trace and CHAN 1 & 2 LEADS OFF
Chan 1 - Lead Off	One or more of the electrodes for the <i>first</i> ECG lead are off or loose	No ECG trace and CHAN 1 - LEADS OFF
Chan 2 - Lead Off	One or more of the electrodes for the <i>second</i> ECG lead are off or loose	No ECG trace and CHAN 2 - LEADS OFF
Rate Source Unavailable	Heart rate is not available from either the primary or any alternate heart rate source	HR UNAVAILABLE
Noisy Signal	Excessive noise, artifact or baseline shift	NOISY SIGNAL
Low ECG Voltage	QRS amplitude is between 0.16 and 0.20 mV (adult only)	ECG VOLTAGE TOO LOW

Selecting ECG Leads

To change the lead selection:

- 1 Touch ECG.
- 2 Touch LEAD CONTROL.
- 3 Touch 1ST LEAD or 2ND LEAD.
- 4 Select lead.

When you select a precordial lead, a help message appears that describes the proper location for the chest electrode. For example, if you select V1, the message (C) 4TH INTERCOSTAL SPACE, RIGHT STERNAL BORDER is displayed.

No message appears when you choose to display a limb or augmented lead (for example, I, II, III, AVR, AVL, or AVF).



- *Changing your selection for the first lead may change the selection for the second lead.*

When you change lead selections, the new waveform is displayed and the learn sequence is automatically initiated. If you change lead selections while processing is suspended, the module initiates the learn sequence when you resume processing.

**WARNING:**

- *Following a lead switch and until the patient's rate and morphology are learned, some ECG alarms are not active. Alarms for ventricular fibrillation and asystole continue to be active; however, some ECG alarms (high rate, low rate, run, couplet, abnormal per minute, and tachycardia) are not.*

To display six traces (requires a 12-lead cable):

- 1 Touch ECG.
- 2 Touch DISPLAY FORMAT.
- 3 Select SPLIT VIEW ON.

To display twelve traces (requires a 12-lead cable):

- 1 Touch ECG.
- 2 Touch DISPLAY FORMAT.
- 3 Select FULL VIEW ON.

To check the ECG amplitude:

- 1 Touch ECG.
- 2 Touch SIZE.
- 3 Touch 1 mV CAL.

To adjust waveform size:

- 1 Touch ECG.
- 2 Touch SIZE.
- 3a Touch the arrow keys to adjust.
-OR-
- 3b Touch the 1mV/cm key to standardize.

Displaying Additional Waveforms

Multiple ECG traces can be displayed by selecting either FULL VIEW, SPLIT VIEW, 2ND LEAD or CASCADE.

A second waveform zone can be used to display either a second ECG lead or a cascaded trace from the first ECG zone. However, you cannot display both a second ECG trace and a cascaded ECG trace at the same time.

Data in a cascaded ECG trace wraps from the first waveform zone into the second to display 12-seconds of data for the selected lead. While the cascaded trace is displayed, the text in the parameter key for the second zone displays STOP. Touching the STOP key freezes the trace for viewing. While the display is frozen, the text in the key displays START. Touching the key again unfreezes the trace.

Checking the ECG Amplitude

Touching the 1 mV CAL key inserts a 1 mV amplitude calibration pulse into all ECG tracings. Use this calibration pulse as a reference to determine whether the amplitude of the ECG waveform exceeds the minimum voltage threshold.

For ECG detection, the QRS amplitude must be at least 0.2 - 0.5 mV in an adult and 0.15 - 0.5 mV in a neonate.

Adjusting Waveform Size

You can increase or decrease the display size of the ECG waveform. This changes the displayed size only and does not affect the signal gain.

When you touch the 1 mV/cm key, you set the ECG waveform size to 1 millivolt per centimeter. This standardizes the waveform to aid in accurately viewing QRS complexes for ST segment deviation. The factory default setting for ECG waveform size is 0.5 mV/cm.



- *When displaying multiple ECG leads in the split-view or full-view format, the waveform size of all leads is adjusted simultaneously.*

Adjusting Sweep Speed

To adjust the sweep speed:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch SWEEP SPEED.
- 4 Select the desired sweep speed.

The sweep speed determines the speed at which the ECG traces move across the screen. When multiple ECG traces are displayed, changes to SWEEP SPEED affect all waveform traces. Available sweep speeds are 12.5, 25, or 50 mm/second. The factory default setting is 25 mm/second.



- *Changing the ECG sweep speed may also change the speed of the invasive pressure waveforms. Refer to Pressure on page 18-3 for more details.*

Adjusting Tones

To set the QRS tone:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch QRS TONE.
- 4 Select TONE ON.
- 5 Use arrow keys to adjust volume.

The QRS tone is the sound the monitor generates with each detected R wave. When you enable the QRS tone, you can adjust the volume and select whether to modulate the tone with the current SpO₂ value. The factory default setting for QRS tone is OFF.

The factory default setting for SpO₂ pitch is OFF. In this setting, the monitor uses the default pitch for the QRS tone. When you enable the SpO₂ pitch tone, the monitor modulates the pitch of the QRS tone higher or lower depending on the current SpO₂ value. When you disable the QRS tone, the system automatically turns SpO₂ pitch modulation OFF.

Changing the Display Resolution

To change the display resolution:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Select MONITOR or EXTENDED.

The MONITOR/EXTENDED key determines the display resolution of the ECG traces.

- The Monitor mode displays a reduced frequency range, but filters out more noise for better viewing.
- The Extended mode displays a broader frequency range, and also more noise.



- *Changing the display resolution does not change the waveform bandwidth used to analyze the ECG signals for arrhythmia and ST segment level.*

Table 3: Display Resolution

Key	Telemetry	Non-telemetry
MONITOR	0.5 — 30 Hz	0.5 — 40 Hz
EXTENDED	0.05 — 30 Hz	0.05 — 150 Hz

The factory default setting for display resolution is monitor mode.

Selecting Primary and Alternate Heart Rate Source

To select a primary heart rate source:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch RATE SOURCE.
- 4 Select the desired primary rate source (ECG, ART, UA, or SPO2).

You may select a primary rate source as well as enable alternate rate sources. Rate sources include ECG, ART (arterial pressure), UA (umbilical artery) and SpO₂. If you enable one or more alternate sources, a heart rate will be displayed, if available, from either the primary or an alternate source. If you do not enable any alternate sources, a heart rate will only be displayed if the primary rate source is available.

If a heart rate is not available from any source, the message HR UNAVAILABLE is displayed in the ECG waveform zone, and ??? replace the rate numbers.

To enable alternate rate sources:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch RATE SOURCE.
- 4 Set the desired alternate source(s) to ON (ECG, ART, UA, and/or SPO2).



- *If ART is to be used as an alternate heart rate source, Spacelabs Medical recommends setting up each monitor with only one arterial pressure channel.*
- *Use of SpO₂ as the primary heart rate source is not recommended by Spacelabs Medical.*



CAUTION:

- **Cardiovascular Artifact (CVA) detection is disabled for the respiration channel when using an alternate heart rate source.**

Suspending/Resuming ECG Processing

To suspend ECG processing:

- 1 Touch ECG.
- 2 Touch SUSPEND PROCESSING.
- 3 Touch YES.

To resume ECG processing:

- 1 Touch ECG.
- 2 Touch RESUME PROCESSING.
- 3 Touch YES.

When you touch YES in the Suspend Processing menu, ECG and respiration waveforms continue to be displayed, but no processing occurs. If you touch NO, the display returns to the ECG menu without affecting ECG and respiration processing.

When you suspend ECG processing:

- the message ECG PROCESSING SUSPENDED appears in the ECG waveform zone. In modules with the respiration option RESP PROCESSING SUSPENDED appears in the respiration waveform zone.
- question marks replace the heart rate immediately and replace the ST segment value after 30-seconds. If an alternate heart rate source is available, the new heart rate is displayed. Question marks (???) will continue to display for the ST segment value.
- the message ECG ALM OFF replaces the alarm limits (if no alternate rate source is available).
- the keys in the ECG Alarm Limits menu display dotted outlines to indicate they are disabled (if no alternate rate source is available).
- the key SUSPEND PROCESSING changes to RESUME PROCESSING.

Printing ECG Recordings

To print recordings of all leads:

- 1 Touch ECG.
- 2 Touch PRINT.
- 3 Touch ALL LEADS.

All printouts of ECG data are annotated with the following:

- Bed identification
- Time and date of the printout
- Lead designator

To print a 12-lead report:

- 1 Touch ECG.
- 2 Touch REVIEW.
- 3 Touch REPORT REVIEW.
- 4 Touch STAT REPORT.
- 5 Touch PRINT.

Depending on the printer model and software version, the ALL LEADS recording can be printed on a single page or as consecutive two- or four-channel recordings. For these recording formats, 6.25-seconds of waveform data will be printed for all available leads.

If you are using a 90838 PrintMaster and if all the leads are connected, touching the STAT REPORT key will provide a 12-lead report. For this recording format, 2.5-seconds of waveform data will be printed for each lead plus 10-seconds of waveform data for a rhythm lead.

To print a 12-lead report at pre-selected intervals:

- 1 Touch ECG.
- 2 Touch REVIEW.
- 3 Touch REPORT REVIEW.
- 4 Select AUTO REPORT of 30-minutes, 1-hour, 2-hours, 4-hours, 8-hours, or 24-hours.
- 5 Touch AUTO PRINT ON.

A 12-lead report can be scheduled to print at regular time intervals using the AUTO REPORT and AUTO PRINT features. Available intervals are 30-minutes, 1-hour, 2-hours, 4-hours, 8-hours, and 24-hours.



- *A printer (with 1.10.04 version software or greater) is required for the STAT REPORT feature.*
- *A 12-lead report cannot be printed using the 90449 printer module.*

Restoring Default Settings

To restore default settings:

- 1 Touch ECG.
- 2 Touch SETUP.
- 3 Touch RESTORE SETTINGS.
- 4 Select YES.

Using the Module Configuration Manager feature, you can restore all default settings. User-configurable settings are described in *Setting User-Defined Default Values* on page 7-7.

After the default settings are restored, the system initiates a learn sequence. Following the learn sequence, rate and ST alarm limits are reset.



- *RESTORE SETTINGS* changes the user-configurable settings for all parameters in the module.

Power Failure

In the case of a power failure, the remote module housing (90499) provides +5V of power to maintain data integrity. If the power is interrupted to the remote module housing but not to the monitor, the following will occur:

- all parameters will display ??? in the numeric zone
- ECG will display **Channel 1 & 2 Leads Off**
- Respiration will display **Loss of Signal**
- Cardiac output will display **Catheter Fault** and **Probe Fail**
- SpO₂ will display **Adapter Disconnected**

ECG Problem Solving

In general, if ECG signal quality is poor (as evidenced by wandering baseline, excessive noise, or muscle or respiration artifact), try the following solutions:

- Ensure that the patient's skin was properly prepared.
- Ensure that all electrodes are firmly attached and in good condition.
- Ensure that the electrodes are positioned on a flat, non-muscular area.
- Ensure that lead wires are properly fastened and in good condition.

If this fails to resolve the problem, select a different lead.

By following the instructions provided in this chapter and discussed during inservice education, you can avoid most common monitoring problems. If a problem occurs, consult the *ECG Troubleshooting Guide* on page 8-21. The following additional information should help you resolve a few of the more complex problems.

Lead Fault Indication

If a lead fault occurs, the message CHECK XX is displayed in the ECG waveform zone, where XX identifies the failed or missing electrode. If automatic lead switching is enabled, the module selects another lead automatically so that monitoring is uninterrupted. If automatic lead switching is disabled, a LEAD OFF message is displayed.

Noise Detection

Upon detection of noise, a NOISY SIGNAL message is displayed in the ECG waveform zone. If both the 1st and 2nd leads are noisy, the module suspends processing temporarily. If the noise persists for 10-seconds, the system sounds a tone. When the noise disappears, the message and tone cease.



- *If monitoring is interrupted due to overload or saturation of the input amplifiers, including overload caused by a defibrillator discharge, the ECG trace is displayed as an out-of-range signal accompanied by a NOISY SIGNAL or an HR UNAVAILABLE message, or both. If the overload or saturation condition persists, the ECG trace is displayed as a flat line signal accompanied by an ASYSTOLE message.*
- *If the displayed waveform does not appear noisy, but the NOISY SIGNAL message persists, check all leads for noise before calling a qualified service person.*

False Alarms

Careful attention to skin preparation and electrode application, especially during setup, will reduce false alarms. Should false alarms occur, check for the following:

- There may be excessive noise on the signal (the most common cause of false alarms). Electrodes misplaced over muscles or a poor lead connection can cause significant noise when the patient moves.
- Heart rate limits may be set too close to patient's heart rate. Check to see if this is the case and adjust the limits as necessary.
- The ECG amplitude may have dropped below the R-wave detector threshold level causing false low rate alarms. Reposition the electrodes to obtain a QRS amplitude of at least 0.20 mV (adult) and 0.15 mV (neonate).
- QRS frequency components and shape may be unsatisfactory for accurate beat detection and classification. Make necessary changes in electrodes, electrode sites or lead selection to restore a good signal.
- In some cases, VFIB may resemble previously classified abnormal beats which may cause VFIB to be detected as a RUN. If this occurs, use the waveform display as the primary indication of condition.
- The module may not recognize some beats as morphologically different from the learned dominant beat. You may be able to improve performance by changing electrode positions or switching to a lead setting that provides better differentiation between the dominant and abnormal beats.

ECG Troubleshooting Guide

Clinical Situation	Possible Cause	Solution
AC noise	<ul style="list-style-type: none"> ■ Display resolution set to extended mode (0.05 to 150 Hz). ■ Electrodes dry. ■ Patient cable entwined with other electrical devices. 	<ul style="list-style-type: none"> ■ Select monitor mode (0.5 - 40 Hz). ■ Repeat skin preparation and apply new moist electrodes. ■ Separate patient cable from all other cables.
Baseline wanders	<ul style="list-style-type: none"> ■ Patient moving excessively. ■ Respiration artifact. ■ Electrodes dry. 	<ul style="list-style-type: none"> ■ Use stress loops to secure lead wires and cable to the patient. ■ Select another lead or reposition the electrodes. ■ Repeat skin preparation and apply new moist electrodes.
Low amplitude ECG	<ul style="list-style-type: none"> ■ Skin improperly prepared. ■ Lead selected not showing QRS complex with greatest amplitude. ■ Electrodes could be positioned too near bone or muscle mass. 	<ul style="list-style-type: none"> ■ Abrade skin and reapply electrodes. ■ Check 12-lead ECG to determine better monitoring lead and reposition electrodes. ■ Select another lead or reposition electrodes.
Module won't learn	<ul style="list-style-type: none"> ■ ECG signal too noisy for initialization. ■ ECG voltage below threshold. ECG VOLTAGE TOO LOW message may be displayed. 	<ul style="list-style-type: none"> ■ Improve signal quality by repeating skin preparation and/or repositioning electrodes. ■ Perform the following steps as needed. <ol style="list-style-type: none"> 1. Check cables, lead wires and electrodes, then relearn patient rhythm. 2. Change lead or reposition electrodes.
No ECG trace	<ul style="list-style-type: none"> ■ Improper attachment of ECG connector cable to the module/or leads off. ■ LEDs flashing on front panel of module. ■ Module is not seated into the monitor or remote housing. 	<ul style="list-style-type: none"> ■ Remove, then re-plug the connector into the module or reconnect the leads. ■ Call a qualified service person. ■ Remove, then reinsert the module or exchange the module.
Excessive alarms	<ul style="list-style-type: none"> ■ Electrodes dry. ■ Alarm limits set too close to patient's normal heart rate. ■ Excessive interference: patient cable or wires routed too close to other electrical devices. ■ Excessive patient movement or muscle tremor. 	<ul style="list-style-type: none"> ■ Repeat skin preparation and apply new moist electrodes. ■ Readjust alarm limit. ■ Reroute cables and leads. ■ Reposition electrodes and use stress loops to secure lead wires and cable to the patient.

