

HTS820TC TRENSCenter Central Station Cardiac Monitor ICU/PCU Operator/Technical Manual

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PREFACE

This manual describes the operation and use of the *TrensCenter* Telemetry System. It is intended for use by clinicians trained in the use of clinical monitoring systems familiar with the associated terms and procedures. The system is intended to be used in any area of the hospital where cardiac monitoring is required. The system is intended to be used in accordance with accepted hospital and clinical protocols and the instructions contained in this manual. Use of the system with other than supplied accessories or parts may result in inaccurate patient information or damage to the monitor.

The manual contains detailed descriptions of all controls and indicators. Each control of the system is depicted in this manual by the use of hand symbols:



When a specific control function is described, a hand symbol will point to the location of that control key or button. When multiple control functions are described on a single display, the hand symbols will be numbered in the order that they are referenced in the text. Example: ① - ⑥.

Those controls appearing on a keyboard or keypad are referred to as keys. Additionally, Button Controls are as shown below:

VIEW STORED EVENTS		MANUAL STORE EVENT		SETUP PATIENT		VIEW WAVES	RECORD
08/10/01	10:00:00	SILENCE	VOLUME UP	VOLUME DOWN	STORE ALL	STATUS	RECORD

NOTE statements are for general information applicable to the current subject and appear in ***bold italic*** type style. Note statements appear as shown below:

NOTES

Note Information.

CAUTION statements in the manual identify conditions or operations that could result in damage to the system or other property. Caution statements appear in UPPERCASE as shown below:

CAUTION

CAUTION INFORMATION.

WARNING statements in the manual identify conditions or operations that could result in personal injury. Warning statements appear in **UPPERCASE BOLD** type style as shown below:

WARNING!

WARNING INFORMATION.

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SAFETY SUMMARY

- 1) **DO NOT** autoclave the patient transmitters.
- 2) Frequent electrical and visual checks should be made on electrode wires. Broken or frayed electrode wires or loose fittings may cause interference or loss of signal. Particular attention should be paid to the point where the electrode wire enters the snap fittings since flexure will eventually cause breakage of strands at this point.
- 3) **DO NOT** operate this product in the presence of flammable anesthetics. Explosion may result.
- 4) If the system is connected to accessory equipment, proper grounding must be maintained.
- 5) To insure patient safety, use only software, accessories and parts recommended by the manufacturer.
- 6) A product that has been dropped or severely abused should be checked by qualified service personnel to verify proper operation.
- 7) Component replacement or adjustment must be made only by qualified service personnel.
- 8) Patient transmitters have limited range. Ensure that patients remain within the area covered by the antenna system.
- 9) The system is intended as a complement to, not a substitute for, patient observation by trained health care personnel. Do not rely entirely on the alarm, arrhythmia or paging structure of the system.
- 10) **WARNING: PACEMAKER PATIENTS.** Heart Rate Counts on patients with pacemakers may be erratic. Follow the instructions contained in the *Paced Patients* section of this manual. Keep pacemaker patients under close observation.
- 11) Do not place any item on top of the receiver enclosure that would obstruct airflow since heat may build up and cause damage to receivers.
- 12) Do not allow objects to rest on keyboard since erroneous data may be entered into patient chart and certain keys may cause adverse operations.
- 13) The fans on the processor chip and the power supply require periodic cleaning (based on hospital environ). Use forced air not vacuum.
- 14) If the system has been shipped or moved, remove the cover and check all to make sure they are seated properly.
- 15) Do not connect or disconnect any peripheral devices while power is applied to the CPU. Damage may occur. This includes mouse and keyboard.
- 16) Do not attempt to run other programs on this system. Other programs may interfere with the TrensCenter program.
- 17) If circuit boards need to be removed leave the power cord plugged in to prevent static damage.
- 18) Do not over amplify antenna system.

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SECTION 1 - OPERATION

Arrhythmia Monitoring

Monitoring systems are aids to the nursing staff and are not intended to replace the vigilance of the staff to react to a displayed waveform on the monitor and take the appropriate action for the patient's well being even though the monitor has not alarmed. Qualified and trained monitoring technicians working in concert with arrhythmia detection systems produce the best results in detecting and alerting the nursing staff to patients' problems.

No arrhythmia detection algorithm is currently available from any supplier that can guarantee 100% accuracy. There is no method in use to simulate the infinite number of variations in patient waveforms. No arrhythmia system can, without some human intervention both at the monitor and the patient, detect and identify every type of morphology change that may occur in the total patient population.

The arrhythmia algorithm contained in the central station has been in use since the 1960's in many clinical environments. The algorithm has been tested against the AHA, MIT, and Beth Israel databases and was found to be well over 90% accurate. This is well within the government standards.

The algorithm looks at five parameters of each and every ECG complex to decide if it is substantially different from the previously learned complexes from the subject patient. A decision is then made as to whether the ECG complex is normal or abnormal. If the ECG complex is determined to be abnormal, it is totaled in the abnormal counter. Should the number of abnormal exceed the operator set limit, an abnormal alarm will be generated and a sample of the abnormal will be stored for later recall. The total number of abnormal can be viewed and recorded on the *report screen*. (See the report generation section of this manual).

ST segment monitoring is accomplished by establishing a zero reference on the P-R interval during the *learn* process. A measurement is then taken 90ms from the peak of the "R" wave. Should the ST level exceed the operator set limit for a period of 15 seconds, an alarm notification will be presented on the display and a sample of the ECG will be stored. Since patient artifact is present in telemetry, no quantitative measurements are presented. If ST changes are present, revert to a proven method of ST detection such as a 12 lead EKG machine.

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Attaching the Transmitter to the Patient

The TM8 transmitter utilizes 5 electrodes to provide Lead II and a Modified Chest Lead (MCL) for review at the central station. For optimum monitoring the electrodes should be placed in the following locations:

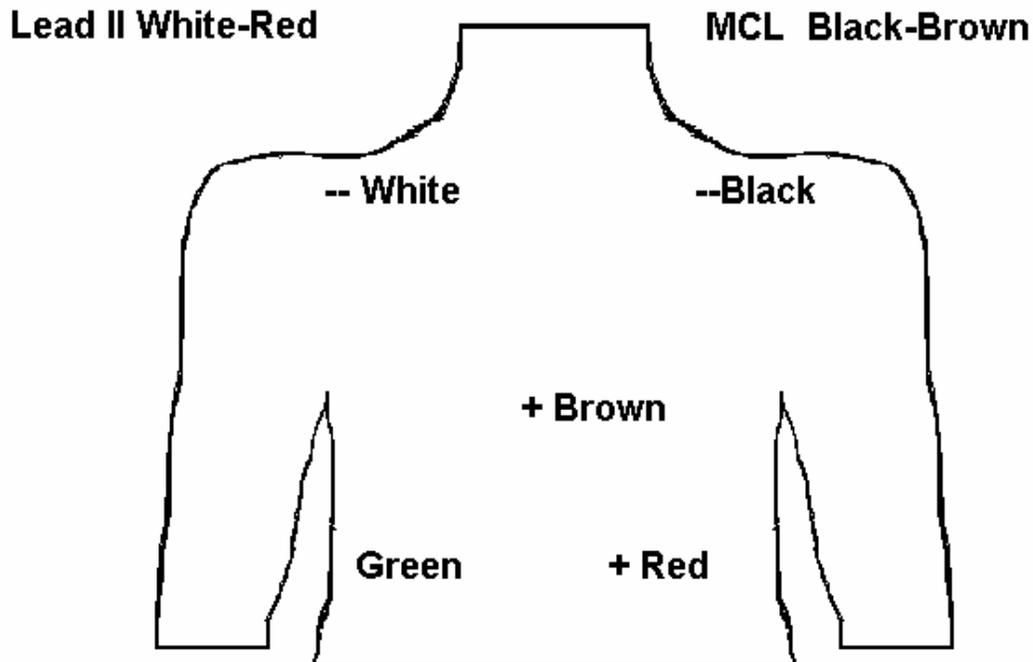
WHITE Lead II negative electrode, **RIGHT CLAVICLE OR RIGHT STERNAL BORDER.**

RED Lead II positive electrode, **LOWER LEFT RIB CAGE.**

BLACK MCL negative electrode, **LEFT CLAVICLE OR LEFT STERNAL BORDER.**

BROWN MCL positive electrode, **PLACE ON ANY OF 6 V-LEAD POSITIONS.**

GREEN Reference electrode, **LOWER RIGHT RIB CAGE.**



The patient lead wires have a small ring on the bottom of the cable that plugs into the transmitter. When installing lead wires, press down until the cables snap into the transmitter.

If only one lead of ECG is required remove the brown and black lead wires from the transmitter. Refer to the section on **MULTI-VIEW WAVEFORMS** to disable lead fault on second channel.

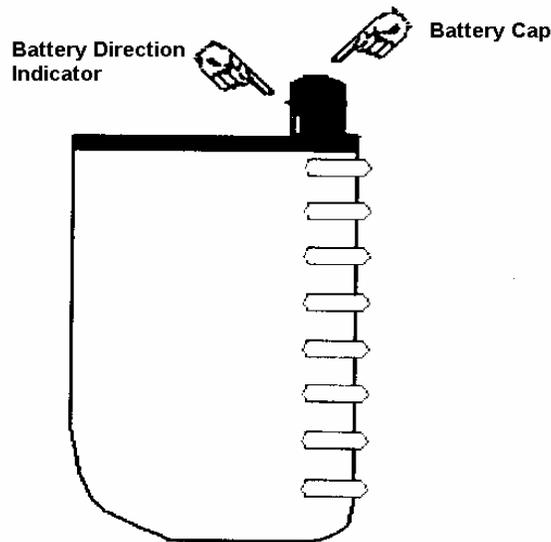
WARNING!

ONLY USE THE SAFETY LEAD WIRES SUPPLIED WITH THE TRANSMITTER.

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Attaching the Transmitter to the Patient (Cont.)

Gently abrade the electrode sites with an alcohol prep pad until slight redness is observed. Dry the site before applying the electrodes. Attach the electrodes to the lead wires. Insert the batteries in the transmitter as follows:



Hold the transmitter in one hand. Using the other hand thumb and index finger, grasp the battery cap and turn counter clockwise until the cap can be removed. Insert both batteries with the positive ends up. See the battery direction indicator on the battery cap. Repeat the above instructions for the battery cap but rotate the cap clockwise.

CAUTION

MAKE SURE THE BATTERIES ARE INSTALLED CORRECTLY. IF THE BATTERIES ARE INSTALLED INCORRECTLY, THE TRANSMITTER WILL NOT FUNCTION.

MAKE SURE THAT THE BATTERY CAP IS TIGHT. IF THE CAP IS NOT TIGHTENED PROPERLY, THE TRANSMITTER MAY BE INTERMITTENT AND THE WATER PROOFING SEAL MAY LEAK CAUSING DAMAGE TO THE TRANSMITTER

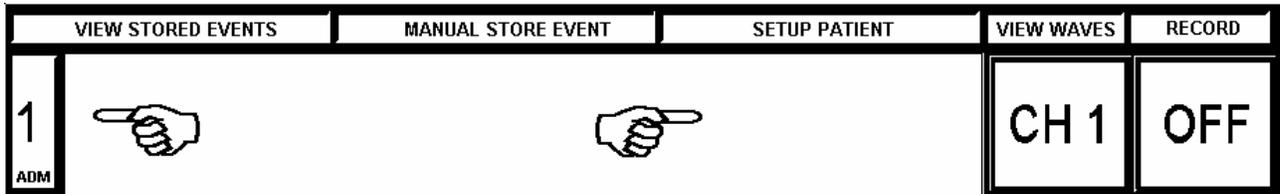
Attach the electrodes to the patient on the prepared sites. Apply pressure to the outer edges of the electrode, not the center. Applying pressure to the center may cause the electrode conductive jelly to ooze out resulting in a loose electrode.

If it is desirable to start the recorder from the transmitter, press and hold the *remote record* control for approximately 2 seconds. This will generate a 20 second strip at the central station. See the *Remote Record* section of this manual.

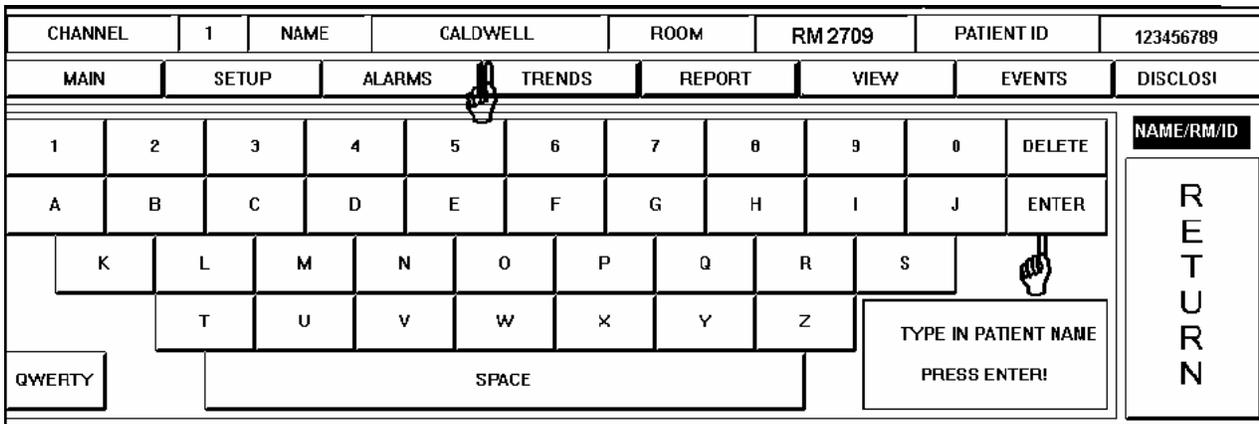
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Admit a New Patient

At the MAIN Screen, touch the area under the SETUP Column or the Channel Number of the channel desired as shown above.



The following screen will be displayed.



A keyboard is displayed beneath the patient waveforms. The above example shows the keyboard in ALPHA mode. If a typewriter keyboard is desired, touch the QWERTY key. The keyboard changes to a typewriter keyboard and the key toggles to ALPHA. The input focus is now at the NAME Window. Type in the patient name by touching the letters on the keyboard. Observe the name displayed in the NAME Window. In this example, the name CALDWELL has been entered. When correct, touch the ENTER Key.

After entering the patient name, you are now prompted to enter the patient room number. The input focus has tabbed to the ROOM Window. Type in the room number by touching the numbers on the keyboard. Observe the numbers in the ROOM Window. In this example, RM2709 has been entered. When the room number is correct, touch the ENTER Key.

After entering the patient room number, you are now prompted to enter the patient ID number. The input focus has tabbed to the PATIENT ID Window. Type in the ID number by touching the numbers on the keyboard. Observe the numbers in the PATIENT ID Window.

In this example, a patient ID number of 123456789 has been entered. When the patient ID number is correct, touch the SETUP key.

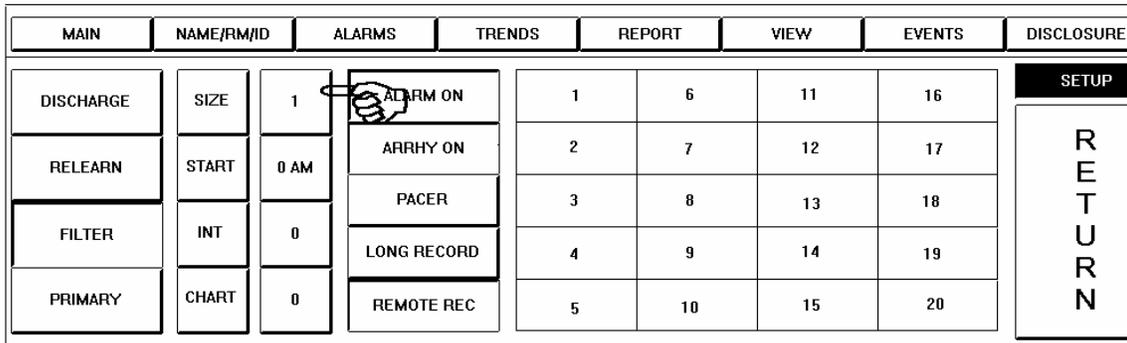
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ECG Size Adjustment

At the MAIN Screen, touch the area under the SETUP Column of the patient channel number desired.



The following screen will be displayed.



Note the SIZE Label. The ECG display size is adjusted by touching the numeric SIZE Key immediately to the right of the SIZE Label. The normal size setting is 1 as shown above. The ECG may be displayed at half normal size, normal size, twice normal size and four times normal size. In this example, touching the Size Key four times would cycle the ECG display size through 2, 4, ½, and back to 1.

Low QRS Alert

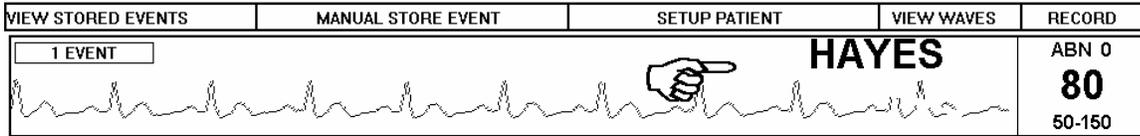


If the size of the QRS is too small for the system to count, a LOW QRS message will be displayed. The electrodes must be repositioned to acquire a larger QRS. Normal monitoring should be accomplished through the use of Lead II (white electrode on right clavicle or mid sternum, red electrode on lower left rib cage). If the QRS is too small in Lead II, try a MCL lead (White electrode on left clavicle, red electrode in the V1 position (right of sternum, 4th or 5th intercostal space). If neither of these lead placements work, check the patient's 12 Lead Electrocardiogram to check which side of the heart is putting out the most voltage. Apply the electrodes there to simulate Lead I, II or III.

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Change Waveform Color

At the MAIN Screen, touch the area under the SETUP Column of the patient channel number desired.



The following screen will be displayed.

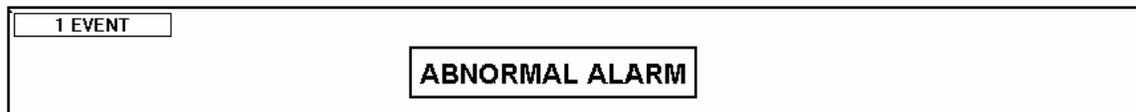
MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20
							SETUP
							RETURN

The panel beneath the patient waveforms contains a color selection keypad. In this example, the display color for patient HAYES is Color Number 1 and the Color Number 1 Key is depressed. Changing the display color to Color Number 17 is accomplished by touching the Color Number 17 Key on the keypad. The patient Label (Channel Number), waveform, ID Number, Name and Room Number are now displayed in Color Number 17. Touch RETURN or right click to go to the MAIN screen. The patient's display color has been updated.

Alarm Indications



Rate Alarm messages indicate the heart rate has exceeded the high or low limits.

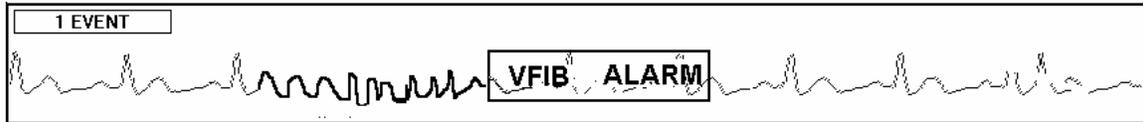


Abnormal Alarm messages indicate the abnormalities per minute have exceeded the high alarm limit.

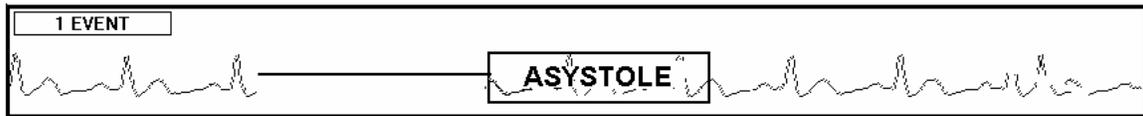
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VTACH Alarm messages indicate that there has been an episode of consecutive abnormal.

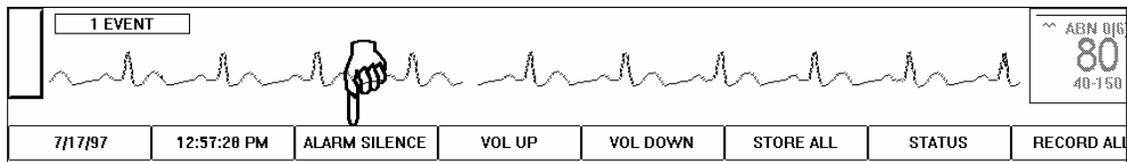


VFIB Alarm messages indicate the system has detected an episode of **VFIB**.



Asystole Alarm messages indicate that the system has detected an episode of Asystole.

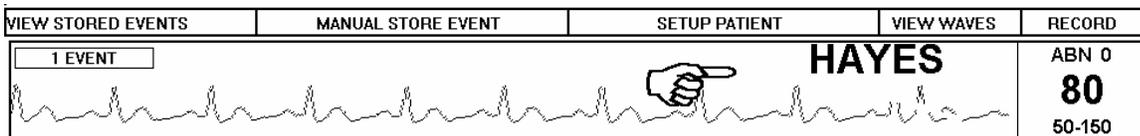
Silencing Alarms



The **SILENCE** Button is used to temporarily silence the alarm tone. This button is a touch and release control. Touch once to silence alarms. This silences any alarms that are currently active. Any new alarm that occurs after the **SILENCE** Button has been touched will reactivate the audible alarms. The **SILENCE** function will time out after two minutes and resume the alarm in progress if the alarm still exists.

Changing Alarm Limits

At the **MAIN** Screen, touch the area under the **SETUP** Column of the patient channel number desired.



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The SETUP Screen is displayed.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	6	11	16	RETURN
RELEARN	START	0 AM	ARRHY ON	7	12	17	
FILTER	INT	0	PACER	8	13	18	
PRIMARY	CHART	0	LONG RECORD	9	14	19	
			REMOTE REC	10	15	20	

Touch the ALARM OFF Key. The key displays as recessed and the label changes to ALARM ON.
 Touch the ARRHY OFF Key. The key displays as recessed and the label changes to ARRHY ON.

Touch the ALARMS Button to go to the ALARMS Screen.

CHANNEL	8	NAME	H. H	TARGET LOW	60	TARGET HIGH	130						
MAIN	SETUP	NAME/LO/HI	TRENDS	RHB LOG	VIEW	EVENTS	DISCLOSURE						
SETTINGS	LOW	HIGH	SETTINGS	LOW	HIGH	SETTINGS	LOW	HIGH	PG: 1	1	2	3	RETURN
HEART RATE	40	150	TEMP	95	104	P2 SYST	20	60	↑	4	5	6	
SYST	100	160	TEMP2	80	80	P2 DIAST	10	30		7	8	9	
DIAST	50	70	P1 SYST	100	160	P2 MEAN	5	40	↓	DELETE	0	ENTER	
MEAN	50	110	P1 DIAST	60	100	ETCO2	0	0					
RESP	3	50	P1 MEAN	50	110	SPO2	82						

CHANGING ALARM LIMITS: Alarm Limits are set by touching the keys directly below the LOW and HIGH column heading labels. Note that the key will be displayed as recessed as soon as you touch it, indicating that it is active. To *increase* the limit, touch the UP ARROW Key. To *decrease* the limit, touch the DOWN ARROW Key. Limit settings may also be made by touching the numbers on the numeric keypad. Touch ENTER to confirm the process. Upon touching ENTER, note that the key is no longer recessed.

Note that the button located immediately above the [UP] arrow indicates [PG:1]. Depending on how many events were configured on the [ALARMS] configuration page in the configuration menu, some of the alarm information might be found on the next page. Simply touch the [PG(x)] button, and if another page has been required, it will switch to that page.

Arrhythmia Adjustments

ABN is the number of abnormal beats (PVC'S) per minute.
 VTACH is the number of PVC's in a row to be declared VTACH.
 ST is the amount of elevation or depression in millimeters from baseline.

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Alarm Settings - Active/Inactive

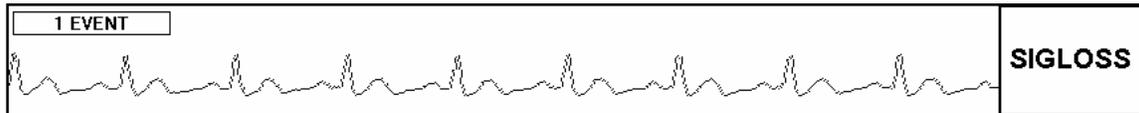
- Note:** 1) The HEART RATE, ABN and VTACH alarm buttons respond only to the ALARM ON/OFF and ARRHY ON/OFF buttons respectively, located on the patient setup page.
2) The three blood pressure buttons assigned to each of the three blood pressure types are ganged such that touching one will cause the other two to follow suit.

The various alarms will default to the condition initially set on the [Alarm] page of the TrensCenter Configuration menu. Once changed on the patient setup page, the setting(s) will remain in effect until the current patient has been discharged. Upon admission of a new patient, the alarm settings will again default to the original settings.

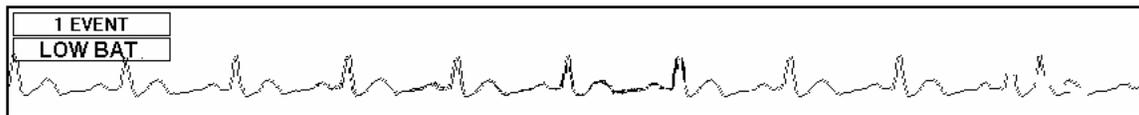
Operator Alerts



LEAD FAULT messages indicate an electrode is detached or is not making good contact. Lead Fault II indicates red, white or green electrode. Lead Fault MCL indicates brown or black electrode.



SIGNAL LOSS messages indicate the central station is not receiving from the patient transmitter or there is too much noise on the trace for the system to analyze. Check to make sure the patient is within the designated monitoring area, the batteries are good, or there is AC interference on the baseline.



LOW BAT messages indicate the batteries have approximately one hour before they reach a level where the transmitter will no longer function. Replace the batteries as soon as possible when the message appears.

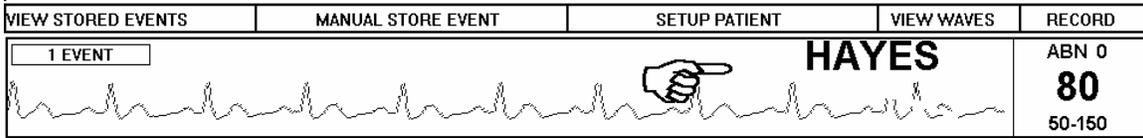
7/17/97	12:51:28 PM	ALARM SILENCE	VOL UP	VOL DOWN	STORE	CHECK RECORDER	RECORD
---------	-------------	---------------	--------	----------	-------	----------------	--------

Problems with the recorder or printer are reported by the label of the control immediately to the left of the ALL RECORD button. The default label for this button is STATUS. If there is a problem with the recorder, the label changes to CHECK RECORDER as above. Check the recorder to insure that it is not out of paper or that the paper is jammed. See LOADING PAPER AND RECORDINGS section of this manual.

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Relearn ECG

At the MAIN Screen, touch the area under the SETUP Column of the patient channel number desired.



MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE	
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16	SETUP R E T U R N
RELEARN	START	0 AM	ARRHY ON	2	7	12	17	
FILTER	INT	0	PACER	3	8	13	18	
PRIMARY	CHART	0	LONG RECORD	4	9	14	19	
			REMOTE REC	5	10	15	20	

If the system is counting a normal complex as an *abnormal*, such as, Bundle Branch Block, Aberrancy or Paced Patients, touch the RELEARN key. The system will look at the next 60 complexes to establish a new normal complex for that patient.

Filter-Monitor

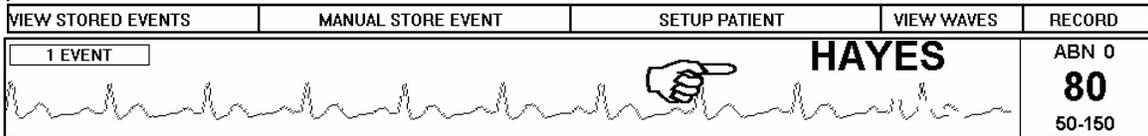
MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE	
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16	SETUP R E T U R N
RELEARN	START	0 AM	ARRHY ON	2	7	12	17	
MONITOR	INT	0	PACER	3	8	13	18	
PRIMARY	CHART	0	LONG RECORD	4	9	14	19	
			REMOTE REC	5	10	15	20	

The SETUP Screen is displayed. The FILTER selection is used to present a clean waveform by removing the artifact from the baseline of the ECG. Note the key labeled MONITOR. This is a two-state selection key to toggle between FILTER Mode and MONITOR Mode. In the above example, FILTER Mode is available for selection and MONITOR Mode is the active state. FILTER Mode is the default. Note that the key is recessed. Touch the MONITOR Key to go the next display. MONITOR Mode removes the artifact filter and allows more signal to be displayed. This might be used when a pacemaker spike is present and a larger spike is required for display.

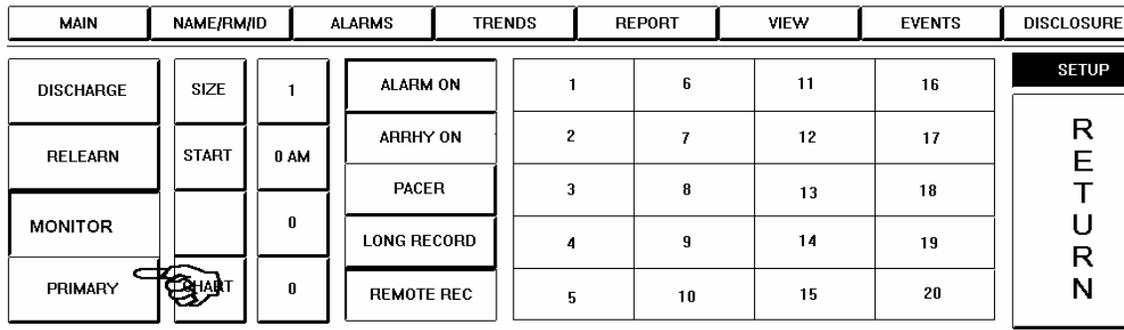
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Backup Transmitter

At the MAIN Screen, touch the area under the SETUP Column of the patient channel number desired.

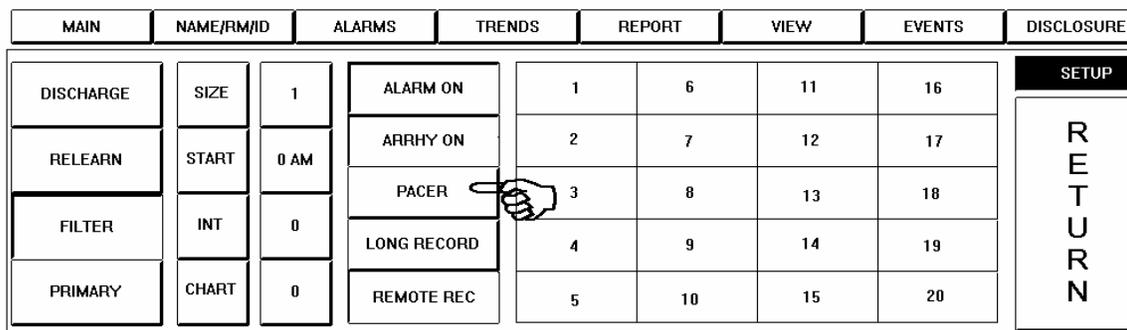


The SETUP screen will be displayed.



The control for the receiver should show PRIMARY, If it is necessary to use the Auxiliary (Back-up) Transmitter, touch the PRIMARY key. The key label changes to AUXILIARY. The system is now set up to use the Back-up Transmitter for that channel.

Pacemaker Patients



If a patient is admitted with a pacemaker, touch the PACER Key. The key becomes recessed. This will insure a more reliable heart rate count. Touch the FILTER button to the left of the screen. The button will change to MONITOR. This should enhance the pacer spike on the display.

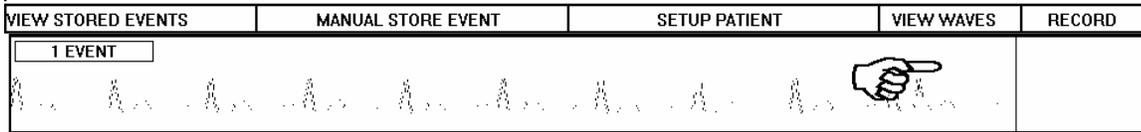
NOTE

Do not monitor a non-pacer patient in the pacer mode. This could result in inaccurate heart rate count.

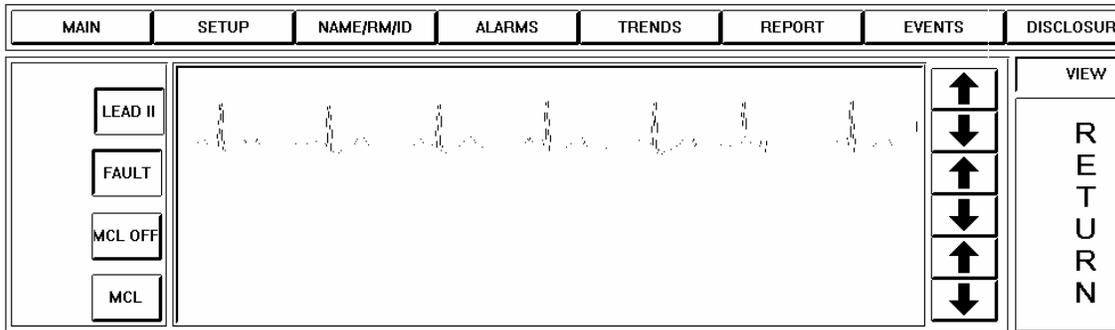
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View Second Lead

Touch the area under the VIEW WAVES Column of the patient channel desired as shown above.



The multi-view screen will be displayed.



The button labeled MCL OFF indicates that the secondary lead (MCL) is not activated. To turn on MCL, touch the MCL OFF button. The button turns blue and MCL lead is displayed if the electrodes are attached. This function is controlled through the initial setup of the system.

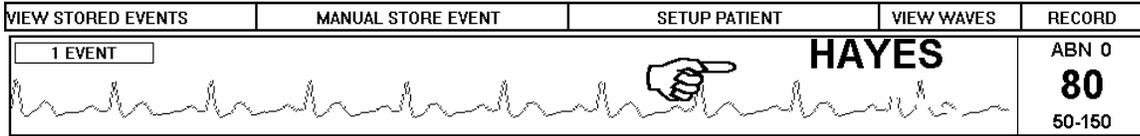
The FAULT button determines whether a lead fault condition is reported on the main screen. With the FAULT on (button in blue) a lead fault message will appear on the main screen. With the button in white a lead fault will not be reported. If an electrode becomes detached and the lead fault is on, the lead fault message will indicate whether it is LEAD II or MCL lead. If the system designates LEAD FAULT II, check the WHITE and RED electrode. If the system designates LEAD FAULT MCL, check the BROWN and BLACK electrodes. If both waveforms are good, check the GREEN electrode. If the lead fault occurs on the Primary Lead, the system will switch automatically to the secondary lead. When the lead fault is corrected, the system will automatically switch back to the Selected Lead.

The bottom buttons are for selecting which lead is to be displayed on the main screen. In this situation LEAD II will be displayed. Touch MCL to make it the displayed lead.

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Discharging a Patient

At the MAIN Screen, touch the area under the SETUP Column of desired channel number.



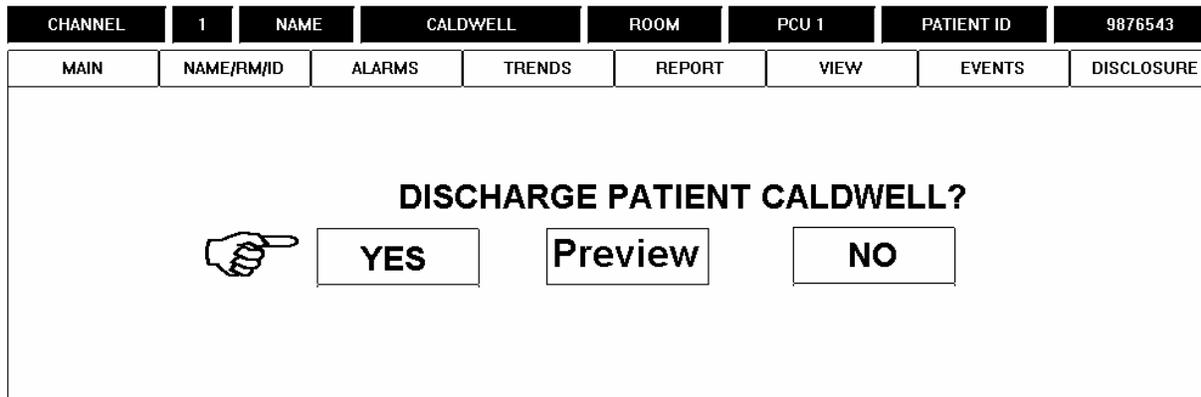
The SETUP Screen is displayed.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	1	ALARM ON	1	6	11	16	RETURN
RELEARN	0 AM	ARRHY ON	2	7	12	17	
FILTER	0	PACER	3	8	13	18	
PRIMARY	0	LONG RECORD	4	9	14	19	
		REMOTE REC	5	10	15	20	

NOTES

Discharging a patient erases all data for that patient.

Touch the DISCHARGE Key as shown above to go to the next screen.



You are prompted to confirm that you want to discharge the patient. If the patient is, in fact, to be discharged, touch the YES Key. If the DISCHARGE Key was touched in error, touching the NO Key will return you to the SETUP display.

Touch the PREVIEW key to view the final discharge report.

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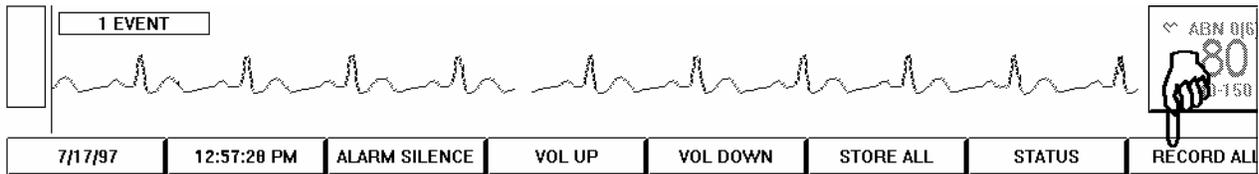
SECTION 2 – RECORD/STORE/DISCLOSURE

Recording-Manual

To manually record a strip, left click on the patient's Heart Rate display. Right click for a continuous recording.

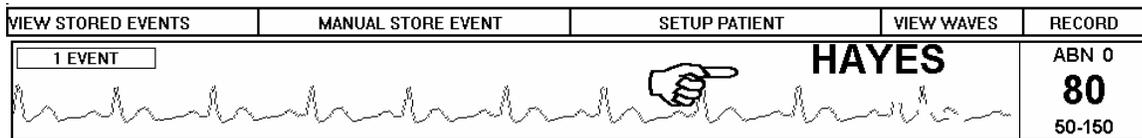
Record All

To record a strip on all patients admitted click on the ALL RECORD.



Remote Record

At the MAIN Screen, touch the area under the SETUP Column of desired channel number.



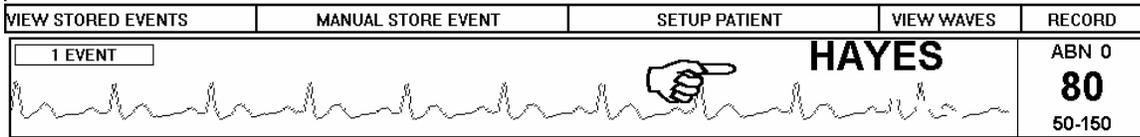
MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20

SETUP
R E T U R N

The Remote Record Control may be turned on or off for each individual patient. Note the REMOTE REC Key above. The default is Remote Record Disabled and the REMOTE REC Key is not recessed. Touch the REMOTE REC Key to activate remote recording. The key is now recessed. To deactivate, touch the REMOTE REC Key. The key returns to non-recessed position. This prevents remote activation of the recorder. Press and hold the remote record key on the transmitter to generate ECG strip.

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Recording Automatically



At the MAIN Screen, touch the area under the SETUP Column of desired channel number.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20
							SETUP
							R E T U R N

Automatic recordings are available for all patients at the end of the shift or at any preset interval. To set the time of the first recording, touch the setting key to the right of the START Label. This setting key is a touch and release control to adjust the starting time. To set the hourly interval between recordings, touch the key to the right of the INT Label. With settings of START 7 AM and INT 8, recordings would be generated at 7 AM, 3PM and 11PM.

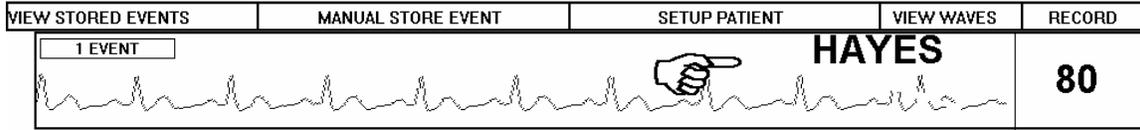
MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20
							SETUP
							R E T U R N

Note the key immediately to the right of the CHART Label. This key is a touch and release control used to set the charting interval. The numeric value displayed on this control is the current number of minutes between automatic charting of patient vitals. This control changes the charting interval from minimum to maximum and back to minimum. The *TrensCenter* will automatically store all the patient vitals and trace data.

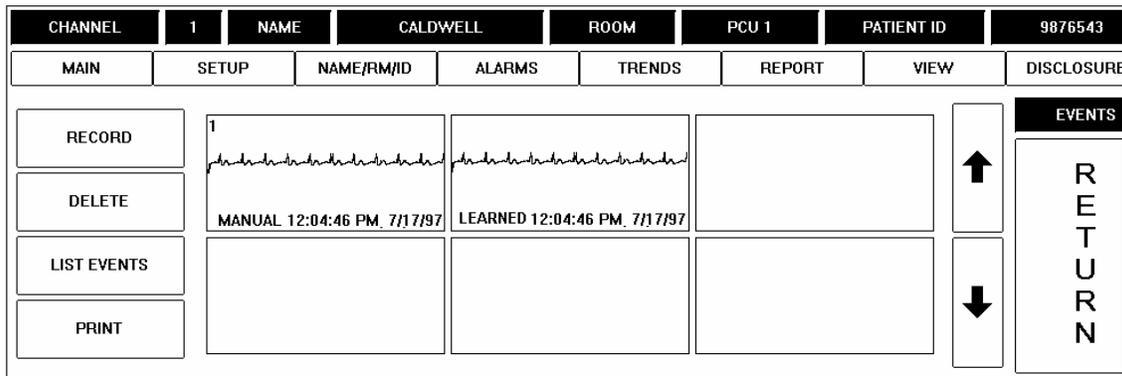
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Store Event--Manual

To store a strip for later recording, touch the waveform directly under the MANUAL STORE EVENT window.



To freeze the waveform and store it for further examination, touch the area under the STORE Column at the MAIN Screen of the patient channel desired.

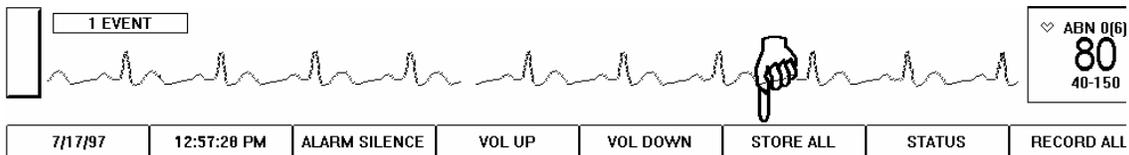


The manually stored waveform is displayed on the EVENTS Screen.

Touch the waveform and DELETE if the waveform is not important.

Touch the waveform and RECORD to make a permanent copy of the waveform.

Store All



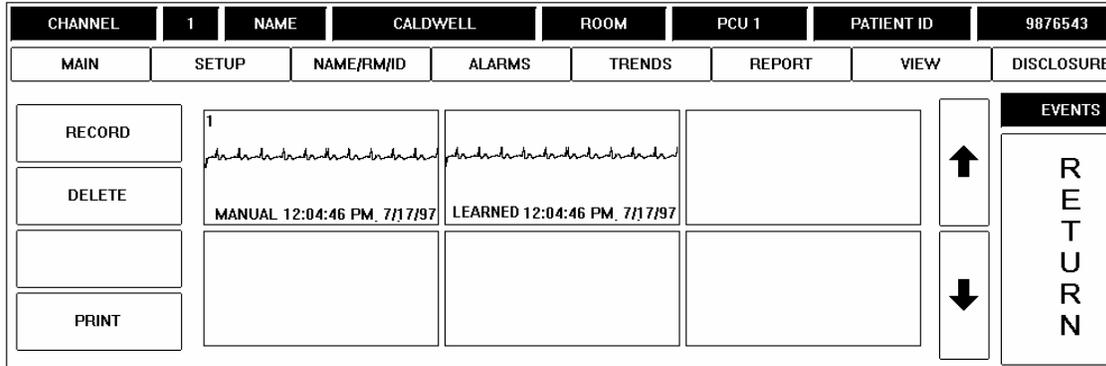
Events may be stored for all active channels. At the MAIN Screen, note the STORE ALL Button. The STORE ALL Button is a touch and release control. Touch the STORE ALL Button to store manual events for all patients. Touching this control is functionally the same as touching the STORE Column area for each patient.

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View Events

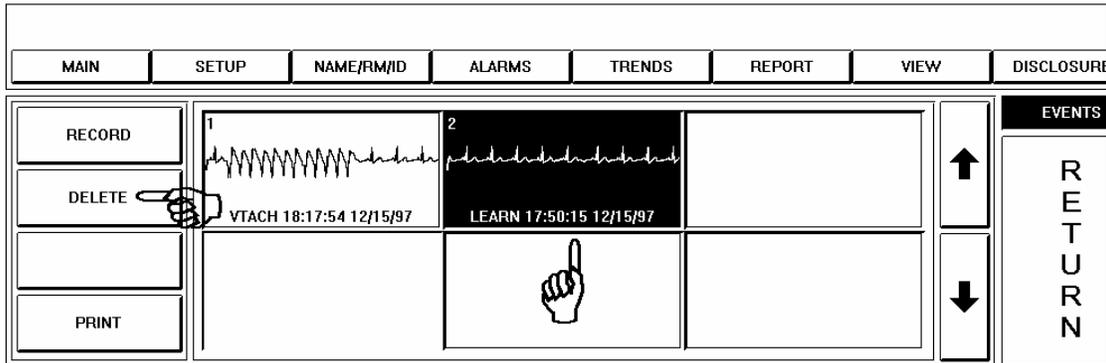


Touch the patient waveform under the VIEW STORED EVENTS Column of the patient channel desired.



The EVENTS Screen is displayed. Both manually stored and learned events are displayed as above. If alarmed events have occurred, they are displayed as well.

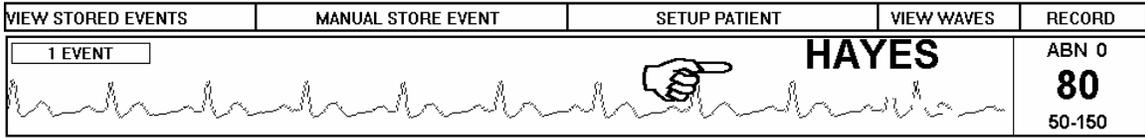
Delete Events



The EVENTS Screen is displayed. To delete a stored event, touch the event waveform to be deleted, the selected waveform is highlighted in reverse video as above^①. Next touch the DELETE Key^②. The DELETE Key deletes all highlighted (touched) waveforms.

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Full Disclosure

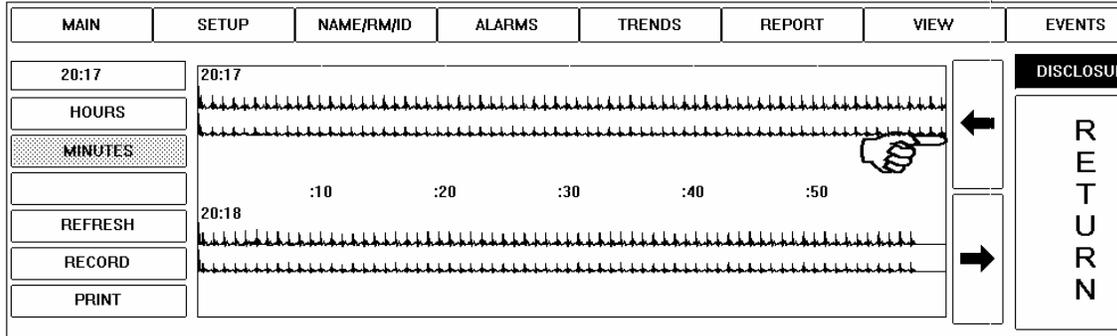


At the MAIN Screen, touch the area under the SETUP Column of desired channel number.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20

SETUP
RETURN

Touch the DISCLOSURE Button to go to the next display.

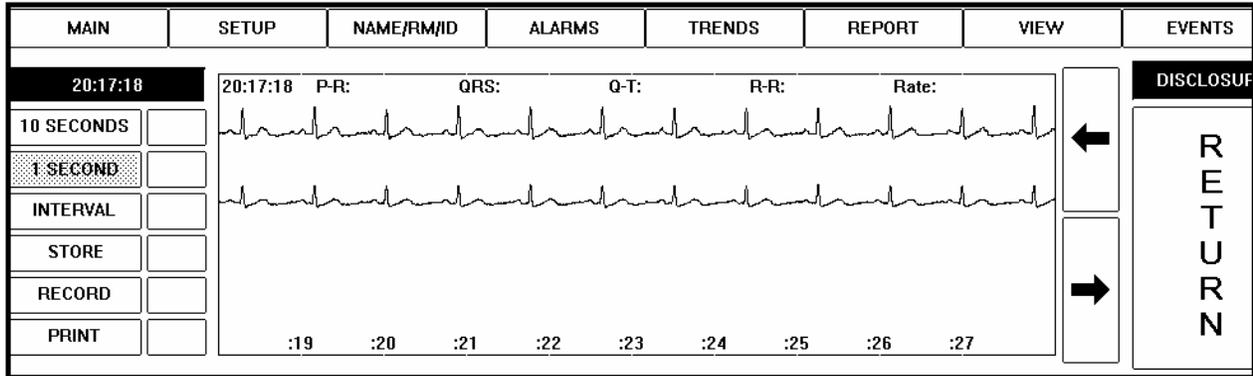


The DISCLOSURE Screen is displayed. In this example, the MINUTES Key has been selected and is displayed as recessed. To view a minute-by-minute "snapshot" of the Chart for the selected patient, use the ARROW Keys with the MINUTE Key selected, as in this example. To go backward from the displayed time, touch the *Left* ARROW Key. To go forward, touch the *Right* ARROW Key. The MINUTE Key allows you to move forward and backward by minute. The HOURS key allows you to move forward and backward by hour.

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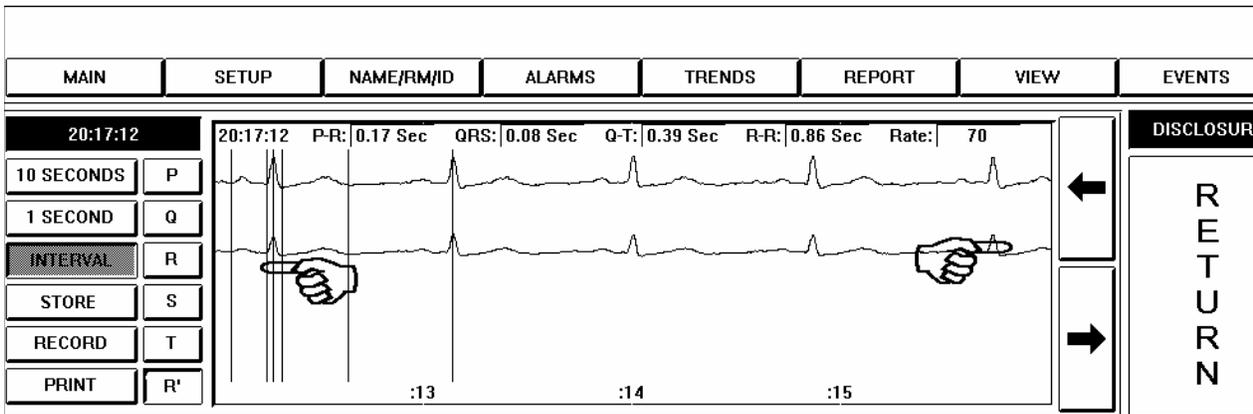
Full Disclosure

Touch on the waveform to expand the waveform to real time.



The above example displays the expanded waveform in the 1 second zoomed view. To return to the two-minute view, touch the waveform again. Touch the arrows to move forward or backward in time. The 1-second button will allow scrolling of the waveform. The 10-second button will move the waveform in 10-second increments. Press the STORE button to store strip.

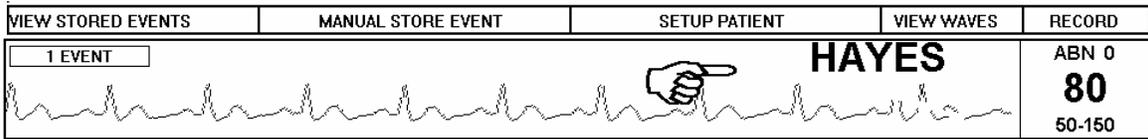
Interval Calculations



To measure the intervals of the ECG touch the **INTERVAL** button. Touch the **P** button to set the onset of the P wave. Use the left and right arrow keys to adjust the position of the red cursor. Continue touching the Q, R, S, T, and R' keys to adjust the cursor. The interval values will be displayed above the waveform.

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Print Report



At the MAIN Screen, touch the area under the SETUP Column of the patient channel number desired.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	11		RETURN
RELEARN	START	0 AM	ARRHY ON	2	7	17	
FILTER	INT	0	PACER	3	8	18	
PRIMARY	CHART	0	LONG RECORD		9	14	
			REMOTE REC	5		15	

The SETUP Screen is displayed. Touch the REPORT Button to go to the next display.

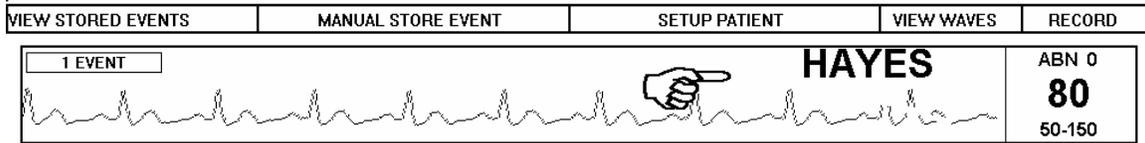
MAIN	SETUP	NAME/RM/ID	ALARMS	TRENDS	VIEW	EVENTS	DISCLOSURE					
PRINT	HR	RESP	SYST	DIAS	SPO2	TEMP	ABN	VTACH	VFIB	ASYST	REASON	RETURN
	02:59p	70	20	0	0	73.7	0	0	0	0	MANUAL	
	02:13p	68	20	0	0	73.4	0	0	0	0	IBP2	
	02:13p	62	20	0	0	73.4	0	0	0	0	ETCO2	
	02:13p	62	20	0	0	73.4	0	0	0	0	LEARN	

The Reports Screen is displayed. In this example, various events have been recorded. The Top and Bottom ARROW Keys are for moving to the beginning or end of the report. The values recorded in the first five columns can be edited before printing.

To print the report, touch the [PRINT] button..

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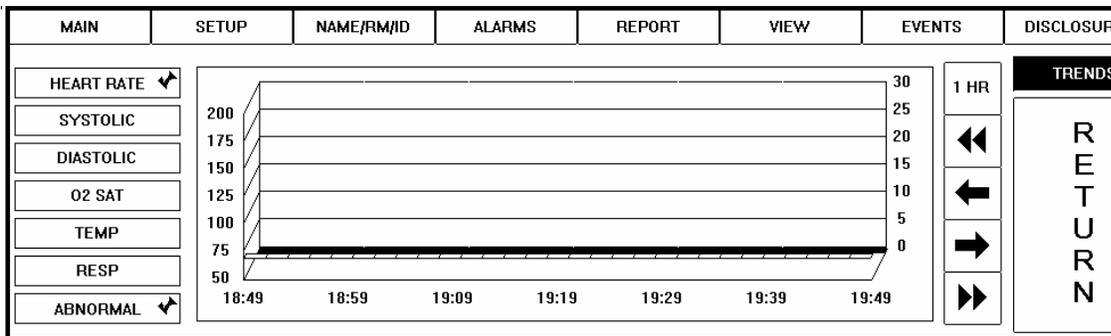
Print Trends



At the MAIN Screen, touch the area under the SETUP Column of desired channel number.

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20
							RETURN

Note the TRENDS Button. Touch the TRENDS Button to go to the next display.



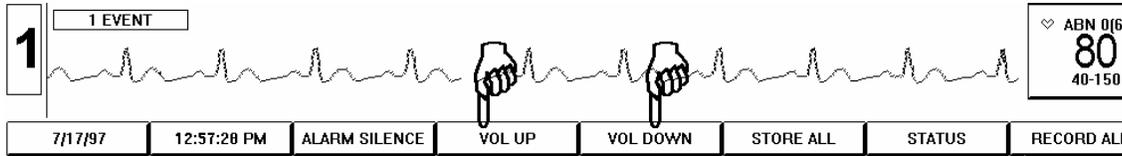
The TRENDS Screen is displayed. Trends can be displayed for all patient vitals. Touch the desired vitals key. It will display as recessed and a red check mark will display. In the above example, the HEART RATE Key and the ABNORMAL Key have been selected to display the heart rate and diastolic trends. These keys display as recessed and are marked with a red check mark. The Double Triangle ARROW Keys are for moving forward and back by one-hour intervals. The Left and Right ARROW Keys are for moving forward and back by one minute intervals. The 50-200 scale on the left is the scale for heart rate, systolic and diastolic blood pressure, O2 saturation and body temperature. The 0-30 scale on the right is the scale for respiration rate and abnormal count. The trends information in this example is displayed in 3D mode.

Touch the 1 Hour key to change to 12 or 24-hour interval.

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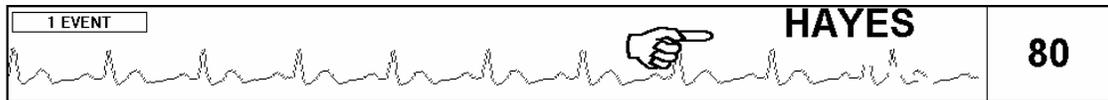
SECTION 3 - ADDITIONAL CONTROLS

Alarm Volume Control



The alarm volume can be increased or decreased at the MAIN Screen by touching the VOL UP or VOL DOWN Buttons. The volume controls are touch and release controls. Touch the button once and release, touch again to continue adjusting the volume. The volume controls are available at all screens in the same screen position as shown above. When the minimum and maximum levels are reached the controls will turn light blue.

VIEW STORED EVENTS	MANUAL STORE EVENT	SETUP PATIENT	VIEW WAVES	RECORD
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At the MAIN Screen, touch the area under the SETUP Column of desired channel number.

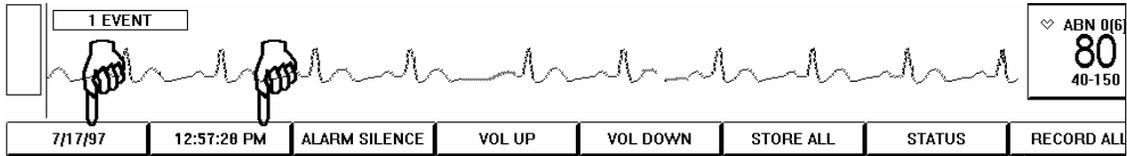
Long and Short Record

MAIN	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS	DISCLOSURE
DISCHARGE	SIZE	1	ALARM ON	1	6	11	16
RELEARN	START	0 AM	ARRHY ON	2	7	12	17
FILTER	INT	0	PACER	3	8	13	18
PRIMARY	CHART	0	LONG RECORD	4	9	14	19
			REMOTE REC	5	10	15	20
							S E T U P R E T U R N

There are two recording activation modes, long and short. The default is LONG RECORD and the LONG RECORD Key is not recessed. To select SHORT RECORD mode, touch the LONG RECORD Key. The key label changes to SHORT RECORD and the key displays as recessed. In the LONG RECORD mode, the recorder will only record arrhythmia alarm events which have a duration longer than 6 seconds. In the SHORT RECORD mode, the recorder is activated by any arrhythmia alarm event including ABNORMAL alarms. The LONG RECORD mode is used to prevent running of paper for repeat alarms.

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Date and Time Settings



At the MAIN Screen, note the two buttons at the lower left corner. The leftmost button is the DATE Button. Immediately to the right of the DATE Button is the TIME Button. To change the date setting, touch the DATE Button. The DATE/TIME Screen will be displayed.

Setting the Date

MAIN	SETUP	NAME/RM/ID	ALARMS	TRENDS	REPORT	VIEW	EVENTS
NEW DATE				YEAR	MONTH	DAY	DATE/TIME
11/25/1997				↑	↑	↑	RETURN
				↓	↓	↓	
NEW TIME			HOUR	MINUTE	AM/PM		
8:13 AM			↑	↑			
			↓	↓			
			SET				
				DELETE	0	ENTER	

Touch the NEW DATE Key. Use the UP and DOWN ARROW Keys for YEAR, MONTH and DAY to increase or decrease the displayed date on the NEW DATE Key. When the displayed date on the NEW DATE Key is correct touch the SET Key to complete the date setting. The NEW DATE key is no longer recessed and the DATE Key in the lower left corner of the screen displays the revised date.

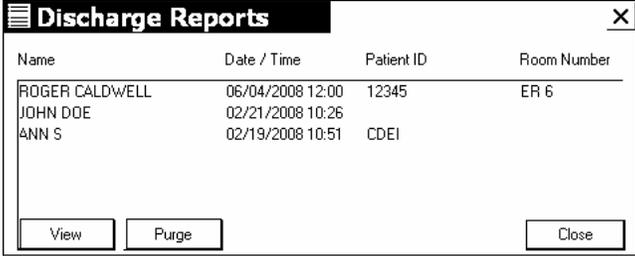
Setting the Time

Touch the NEW TIME Key. Use the UP and DOWN ARROW Keys for HOUR and MINUTE to increase or decrease the displayed time on the NEW TIME Key. When the displayed time on the NEW TIME Key is correct, touch the SET Key to complete the time setting. The NEW TIME key is no longer recessed and the DATE Key in the lower left corner of the screen displays the revised date.

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Discharge Report

Click on STATUS, click on SETTINGS, click on DISCHARGE REPORTS to view previous reports. The following screen will appear.



Name	Date / Time	Patient ID	Room Number
ROGER CALDWELL	06/04/2008 12:00	12345	ER 6
JOHN DOE	02/21/2008 10:26		
ANN S	02/19/2008 10:51	CDEI	

View Purge Close

To view a discharge report, touch the patient name desired, touch VIEW. The report will be displayed. To remove a report, touch the desired patient name and touch PURGE. A prompt will appear on screen asking "Are you sure you want to delete this PDF.file. Touch YES.

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SECTION 5 - CONFIGURATION

Access Configuration Screens

To enter the configuration screens, discharge all patients. Touch **STATUS** key at bottom of the screen. Touch **SERVICE**. Touch 329 on the keypad. Touch **CONFIGURATION**.

Alarm Configuration

The screenshot shows the Configuration screen with the following sections:

- Alarm Settings:**
 - Alarms Enabled
 - Short Record Enabled
 - Remote Record
 - Low Battery Checking
- Alarm Event Offset (Seconds):**
 - Asystole: 6
 - VFib: 4
 - VTACH: 6
 - Rate: 4
 - Abnormal: 4
- Default Alarm Settings:**

Type	Low	High	Enable
HEART RATE	40	180	<input checked="" type="checkbox"/>
NIBP SYST	90	200	<input checked="" type="checkbox"/>
NIBP DIAST	40	105	<input checked="" type="checkbox"/>
NIBP MEAN	50	110	<input type="checkbox"/>
IBP1 SYST	90	200	<input checked="" type="checkbox"/>
IBP1 DIAST	40	105	<input checked="" type="checkbox"/>
IBP1 MEAN	50	110	<input checked="" type="checkbox"/>
IBP2 SYST	5	40	<input checked="" type="checkbox"/>
IBP2 DIAST	5	40	<input checked="" type="checkbox"/>
IBP2 MEAN	5	40	<input type="checkbox"/>
RESP	5	35	<input type="checkbox"/>
TEMP	95	104	<input checked="" type="checkbox"/>
TEMP2	95	104	<input checked="" type="checkbox"/>
SPO2	82	100	<input checked="" type="checkbox"/>
- Alarm Display Order (On Alarm Screen):**
 - HEART RATE
 - NIBP SYST
 - NIBP DIAST
 - NIBP MEAN
 - RESP
 - TEMP
- Alarm Suspend:**
 - Admit 10 seconds.
 - Disable Lead Fault
 - Signal Loss 10 seconds.
 - Lead Fault [] seconds.
- Store Learn Event
- Alarm Strip Length: 20
- Use Printer For Alarm Recordings

Alarm Settings

Alarms Enabled: Alarms on or off when new patient is admitted.

Short Record Enabled: If short record is on all alarms will record. If short record is off only episodes greater than 6 seconds will be recorded but the events will be stored.

Remote Record: Remote activation of the recorder from the transmitter.

Low Battery Checking: Turns the low battery checking on or off.

Alarm Event Offset (Seconds)

Note: Factory adjustment only

Default Alarm Settings

Default settings for all alarm limits. Enable turns the alarms on when patient is admitted.

Alarm Display Order (On Patient Alarm Setup Screen)

Allows user to add/delete and in specified order, only the alarm functions required relative to the patient connected device.

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Alarm Suspend

[On admit suspend alarms for ___ seconds] turns off the alarms for the specified number of seconds. This prevents false alarms during hook up.

[On Signal Loss suspend alarms for ___ seconds] turns off the alarms following a signal loss and lead fault for specified number of seconds to prevent false alarms.

[On Lead Fault suspend alarms for ___ seconds] turns off the alarms following a lead fault for specified number of seconds to prevent false alarms.

[Disable Lead Fault] causes indefinite suspension and will be indicated on the left side of the main screen as [FAULT OFF] unless overwritten by the [ALARMS OFF] indication, which includes disabling lead fault.

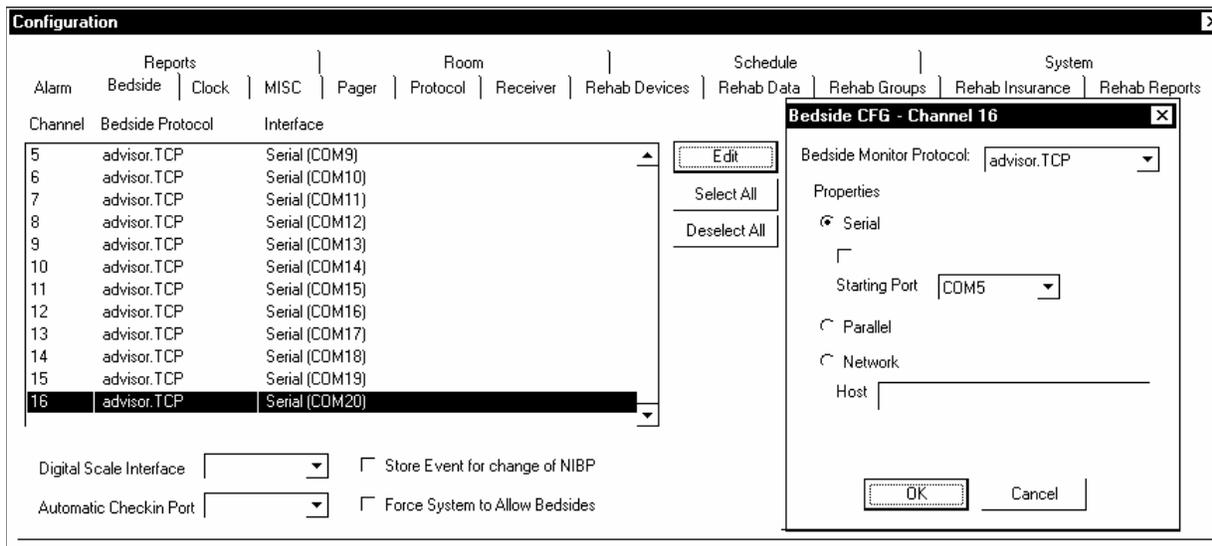
[Store Learn Event] turns on or off the storage of a learned event.

[Alarm Strip Length] specifies amount of ECG Strip printed on an alarm.

[Use printer for alarm recordings] utilizes a laser printer for alarm recordings. This could be used for a system without a strip chart recorder.

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Bedside Configuration



The bedside configuration screen is used to inform the system what type of bedside, if any, is to be used and on what channel.

Click on the channel number desired. Click on **EDIT**. Click on the Bedside Monitor Protocol arrow. A list of compatible bedside monitors will be displayed. Move the cursor to the type bedside desired and click on that model bedside.

There are three types of interfaces available:

Serial, which is the RS232 interface, used by most bedsidings. For Serial RS232 ASCII communications, click on SERIAL, click on the **COM** port arrow and select the appropriate communications port. The systems are set at the factory for **COM** ports. Click on **OK**.

Parallel is not used at this time.

Network interfaces: See Network Section.

Serial Interface Ports for the Digital Scales and the Check-In Box are entered in the appropriate boxes. These are factory settings for the TrensStation only.

Click on Store Event for Change in NIBP if the user wishes to store the vital sign numbers when a Non-Invasive pressure is taken.

Force System To Allow Bedside is only used when a client is used in the ICU mode where digitals are displayed at the remote.

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Clock Configuration

Alarm	Arrhy	Bedside	Clock	MISC	Printer	Protocol	Receiver	Reports	Room	Schedule	Service	System	Transmitter
Date/Time Display													
Date Format													
<input checked="" type="radio"/> MM/DD/YY <input type="radio"/> MM DD, YYYY													
<input type="radio"/> MM/DD/YYYY <input type="radio"/> DDD, MMM DD, YYYY													
<input type="radio"/> MMM DD YY <input type="radio"/> DD MMM, YYYY													
Time Format													
<input type="radio"/> HH:MM (24 Hour) <input type="radio"/> HH:MM a (12 Hour)													
<input type="radio"/> HH:MM AM (12 Hour) <input type="radio"/> HH:MM:SS (24 Hour)													
<input type="radio"/> HH:MM am (12 Hour) <input checked="" type="radio"/> HH:MM:SS AM (12 Hr)													
<input type="radio"/> HH:MM A (12 Hour) <input type="radio"/> HH:MM:SS am (12 Hr)													

The clock configuration screen is used to select the proper display for the date and time.

Determine which format the customer desires and click on that display format.

Language Configuration

The TrensCenter Language Configuration screen will be displayed.

Configuration															
Rehab Reports				Reports				Room			Schedule			System	
Alarm	Bedside	Clock	Language	MISC	Pager	Protocol	Receiver	Rehab Devices	Rehab Data	Rehab Groups	Rehab Insurance				
Annotation Text															
Filter On:	<input type="text" value="FIL"/>	Alarms On:	<input type="text"/>	Auto:	<input type="text" value="AUTO"/>										
Filter Off:	<input type="text" value="MON"/>	Alarms Off:	<input type="text" value="x"/>	All Record:	<input type="text" value="ALL REC"/>										
Pri Freq:	<input type="text" value="PRI"/>	Arrhy On:	<input type="text"/>	25 MM:	<input type="text" value="25MM/S"/>										
Aux Freq:	<input type="text" value="AUX"/>	Arrhy Off:	<input type="text" value="#"/>	50 MM:	<input type="text" value="50MM/S"/>										
Hardwire:	<input type="text" value="HW"/>	Lead 1	<input type="text" value="II"/>	Pacer On Ind:	<input type="text" value="P"/>										
Non Mon:	<input type="text" value="NM"/>	Lead 2	<input type="text" value="MCL"/>	Pacer Off Ind:	<input type="text"/>										
Pacer On:	<input type="text" value="PHR"/>	Lead 3	<input type="text"/>												
Pacer Off:	<input type="text"/>	Manual:	<input type="text" value="MANUAL"/>												
Learn:	<input type="text" value="LEARN"/>	Remote:	<input type="text" value="REMOTE"/>												

Place the cursor in the lead 1= window and click. Delete whatever is there and type whatever you want lead 1 to be.

Repeat the above procedure for all of the changes to be made.

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Miscellaneous

Alarm	Arthy	Bedside	Clock	MISC	Printer	Protocol	Receiver	Reports	Room	Schedule	Service	System	Transmitter
<input checked="" type="checkbox"/> Use 3-D Trends													
<input checked="" type="checkbox"/> Auto View Manual Freeze													

The miscellaneous screen is used to set the trends to 3 dimensional or 2dimensional. In the 2D node the trend are presented in a standard flat line display where as 3D presents the graphical data in the EXCEL format. This is for display only and does not affect the print out.

The Auto View Manual Freeze tells the system whether or not you want the screen to show the frozen waveform at the bottom of the screen.

If the box is not checked an event will be stored but the screen will not flip.

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Receiver Configuration

The Configuration window displays a table of channels and frequency bands. The table has columns for Channel, Type, Primary Frequency, and Auxiliary Frequency. The Frequency Band section on the right lists VHF 174-216 and B 608-614 (180-186).

Channel	Type	Primary Frequency	Auxiliary Frequency
1	Telemetry	176.00	
2	Telemetry	176.00	
3	Telemetry	176.00	
4	Telemetry	176.00	
5	Telemetry	176.00	
6	Telemetry	176.00	
7	Telemetry	176.00	
8	Telemetry	P-180.20	A-182.80
9	Telemetry	P-180.20	A-182.80
10	Telemetry	P-180.20	A-182.80
11	Telemetry	P-180.20	A-182.80
12	Telemetry	P-180.20	A-182.80
13	Telemetry	000.00	000.00

Frequency Band options:

- VHF 174-216
- A 608-614 (174-180)
- B 608-614 (180-186)
- C 608-614 (186-192)
- D 608-614 (192-198)

Allow Use Of Auxiliary Frequencies

TM8A (VHF) Click the VHF 174-216 Frequency Band. Click in the frequency windows for each channel. Back space out the existing frequencies and type in the new frequencies. The channel frequencies are the last three digits of the transmitter serial number, put a one in front of the three digits and a 0 after the three digits. For example TM8767 would be 767 plus a 1 = 1767 plus a 0 after = 176.70. This is the number to enter in the channel window.

TM8B (WMTS) Click the **B 608-614** Frequency Band. Click in the frequency windows for each channel. Back space out the existing frequencies and type in the new frequencies. The channel frequencies are the last five digits of the transmitter serial number. Click on **EDIT**.

The Channel Receiver Properties dialog box shows options for channel operation. The 'TELEMETRY' option is selected, and the 'Frequencies' section has input fields for 'Pri' (176.00) and 'Aux'.

Select the mode of operation from the selections below for this channel.

Channel Properties

- TELEMETRY - Use Receivers for analog and digital information input.
 - Frequencies
 - Pri:
 - Aux:
- HARDWARE - Use direct RS-232 or Network for all information input.
- BOTH - All information can come from either type.

OK Cancel

Telemetry: if the system is only to be use with telemetry transmitters either dual lead or multi-parameter.

Hardware: if the system is only going to be used with bedside monitors hardwired back to central.

Both: if the channels will be switched from telemetry and hardware.

Allow use of Auxiliary Frequencies: If the system is supplied with an auxiliary transmitters select the Allow use of the auxiliary frequencies. This will enable the Primary/Auxiliary switch on the system SETUP screen.

NOTE: It is important to set the hardware/telemetry/both parameters properly to match system capabilities so accidental activation will be prevented.

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Reports Configuration

The reports screen is used to tell the system what type reports are desired and on which device to print the reports.

Move the cursor to the LOGO window and type the path and file name of logo.

The facility name is used as the header for all reports printed on a laser printer. Move the mouse cursor to the box and click. Type in the information.

Report Printer. Click on the arrow to the left of the box and select the proper printer.

MANUAL RECORD.

If a laser printer is used click the box labeled SEND TO PRINTER. This tells the system to send the manual record information to the printer and not the chart recorder.

Pre, Post and Parallel annotation is not implemented at this time. In the future this will allow the customer to customize how the data is printed on the recorder.

Strip length tells the system how long to print on a manual record. The time interval is 5 seconds to infinity. If set to infinite the recorder must be stopped manually.

Record all length tells the system how long to print if record all is activated.

Live Delay sets the amount of delay to the chart recorder. The interval is 0 to 20 seconds. **NOTE: If the recorder is set for a timed strip, make sure the delay is set less than the record time or the event will never print. It would be necessary to use the full disclosure file to find the event.**

EVENT RECORD Same as manual record.

Record Interval allows the user to print the events at timed interval. If the interval is set to 4 all stored events will print every 4 hours.

TREND REPORT, FULL DISCLOSURE AND CHART REPORT.

Same as event record.

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Paperless Report Settings

Select "Paperless Report Settings". The output path defaults to "C:\Trens32\Reports". Enter an alternate path if desired.

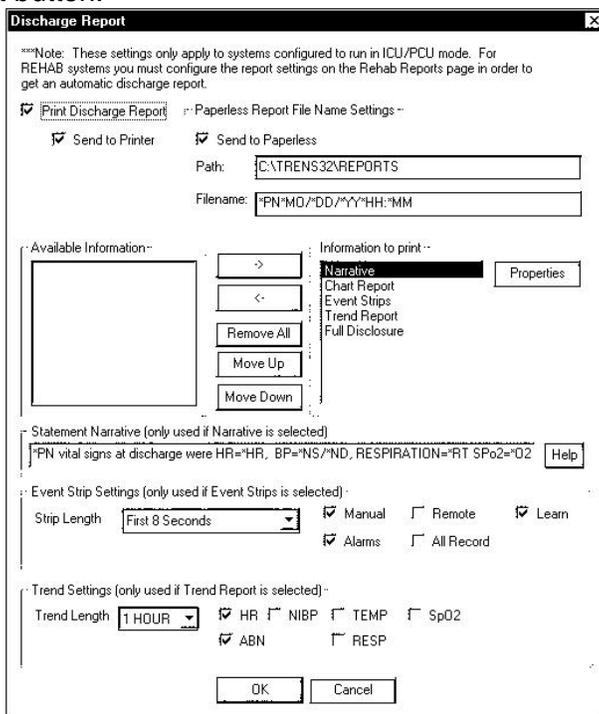
Report Type	Paperless	Normal
Manual Record	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Event Record	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Trend Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Full Disclosure	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Chart Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Attendance	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Patient List	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Comments	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Patient Notes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Patient Summary	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schedule	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sess Trends	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sess Detail	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sess Summary	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sess Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>

For each required report select "normal" for printer output, "paperless" for PDF output. Note: Both may be selected for any listed output.

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Discharge Report Configuration

Click on Discharge Report button.



The ICU/PCU Discharge report configuration permits configuration of the final report when a channel is discharged. The Print Discharge Report function tells the system to automatically print the report on discharge. Send to Printer tells the system to print a hard copy of the report.

Send to Paperless tells the system to generate a PDF document. The Path tells the system where to save the report. File name tells the system what to label the report. In this case, the report will be labeled Patient Name, Patient ID, month/day/yr, hour:minutes.

To configure the report contents; click on the desired function in the Available Information window. Click on the right arrow to move the function to the right window, Information to Print. Continue moving information to print window and use the Move Up and Move Down buttons to arrange the report.

The Narrative Statement configuration will generate a statement in paragraph form. All information that is printed on the ECG strips is available. Use all capital letters for data fields and precede the data with an asterisk.

- | | | | |
|-------------------|--------------------|--------------------|--------------------|
| *HR=Heart Rate | *NS=NIBP Systolic | *ND=NIBP Diastolic | *O2=SpO2 |
| *TM=Temperature | *RE=Respiration | *EC=End Tidal Co2 | *FI=FIo2 |
| *S1=IBP1 Systolic | *D1=IBP! Diastolic | *S2=IBP2 Systolic | *D2=IBP2 Diastolic |

In this example the last group of vital signs will be printed.

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Discharge Report Configuration (Cont.)

The Event Strip Settings configures what the ECG strips will look like. The Strip Length options are first 8 seconds, last 8 seconds or the entire strip. This is useful when the system is set to print 40 seconds of an alarm event in real time, but only the first 8 seconds are desired for the final report.

The type of events to store options are: Manual, Learn, Alarm, All Record and Remote Record.

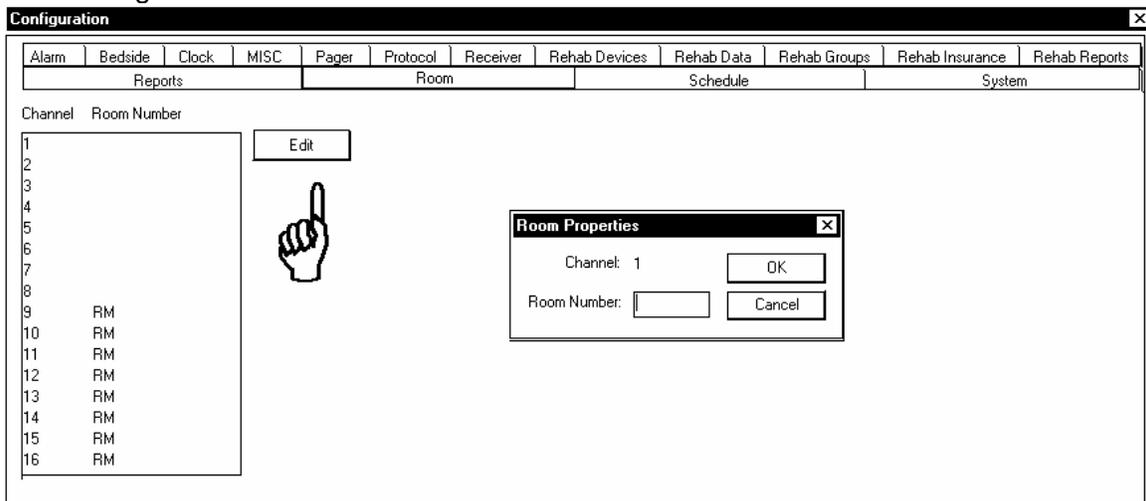
The Trend settings select the Trend Time, The options are 1, 12, 24 Hours.

The vitals to trend options are Heart Rate, Abnormals, Blood Pressure, SpO2, Respiration and Temperature.

The Properties and the Help functions are not implemented at this time.

Room Configuration

The room configuration screen is used to set the default room numbers.



ROOM NUMBERS

This sets the default room numbers when patients are admitted to the system. Click in the appropriate channel number box click on **EDIT** and type in the desired room number. Click on OK and repeat for all channels.

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Schedule Configuration

The schedule configuration screen is used to schedule procedures that occur on a routine basis. This is used to print end of shift reports for example.

To enter a scheduled procedure click on **New Procedure**.

Scheduled Automatic Procedures

Time Of Procedure	Description
-------------------	-------------

Available Activities

- Record All
- Store All
- Print Events
- Print Trends
- Print Full Disclosure
- Print Chart Reports

Scheduled Activities

Procedure Properties

Description: END OF SHIFT

Shift (Use Only For End Of Shift Procedures):

When To Invoke Procedure

Days of Month

- 1ST
- 2ND
- 3RD
- 4TH
- 5TH
- 6TH

Days of Week

- Sunday
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday

Time

Every [] hour(s) beginning at:

Specific Time: 06:50

Hour: Earlier Later

Minute: Earlier Later

Every Day! Never! Note: You can use the "Every Day" and "Never" buttons to set or clear all days quickly.

OK Cancel

Type in the name of the procedure

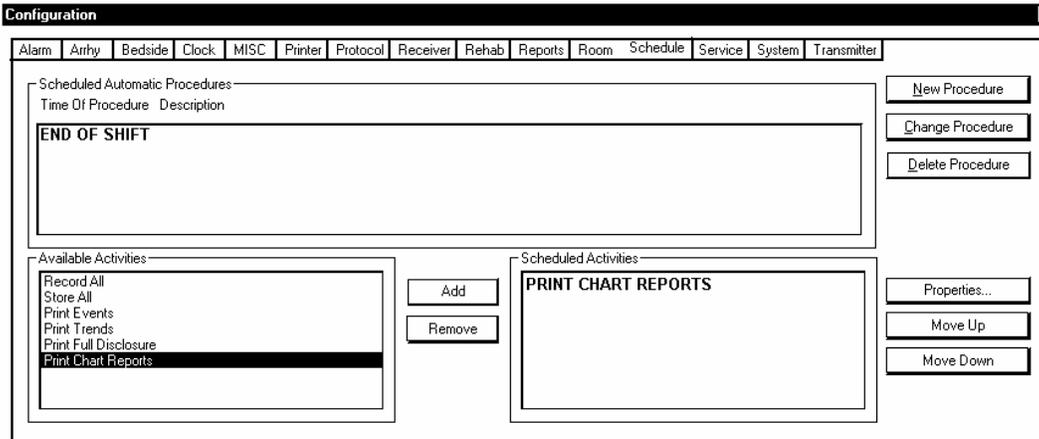
If the procedure is performed every day, click on every day. If the procedure is only performed on certain days click on the individual days. This might be used if the hospital has 8-hour shifts during the week and 12 hour shifts on weekends.

Click on the Specific Time and use the **Later Hour** control to select the time to start the first procedure. In the example given the end of shift report will print at 10 minutes before shift change to give the printer time to print everything. When all information is entered click on **OK**. This would be used for end of shift or where a specific time is used.

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Schedule Configuration (Cont.)

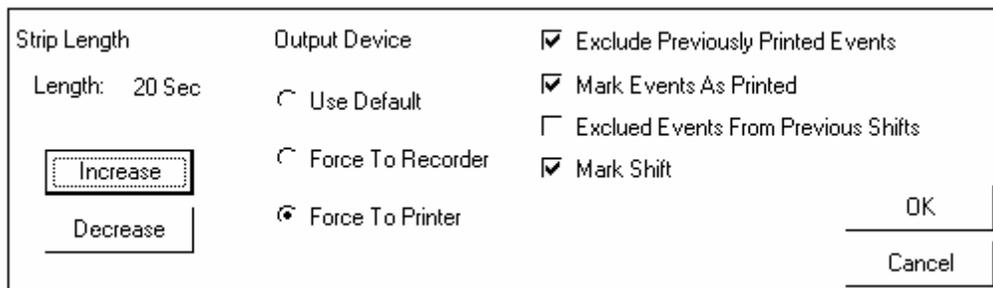
For procedures that are performed at certain intervals, i.e. recordings click on the **EVERY** circle and click on the arrow tab. Select the desired interval. The system defaults to 00:00 as the beginning hour. To change this click on the **LATER** button to select the start time desired. Always put the earliest time desired in Beginning at box. Nothing will print before the time entered.



Click on the procedure that is desired i.e. End of Shift Use the cursor to select from the available activities. When the activity is selected click on **ADD**. The activity is now placed in the scheduled activities field. Select all of the activities desired. The new procedure is now active.

Click on the procedure in Scheduled Activities box then click on properties.

This Screen is used to set up the properties of each type of event. Strip length, print destination and excluding from later reports can be selected.

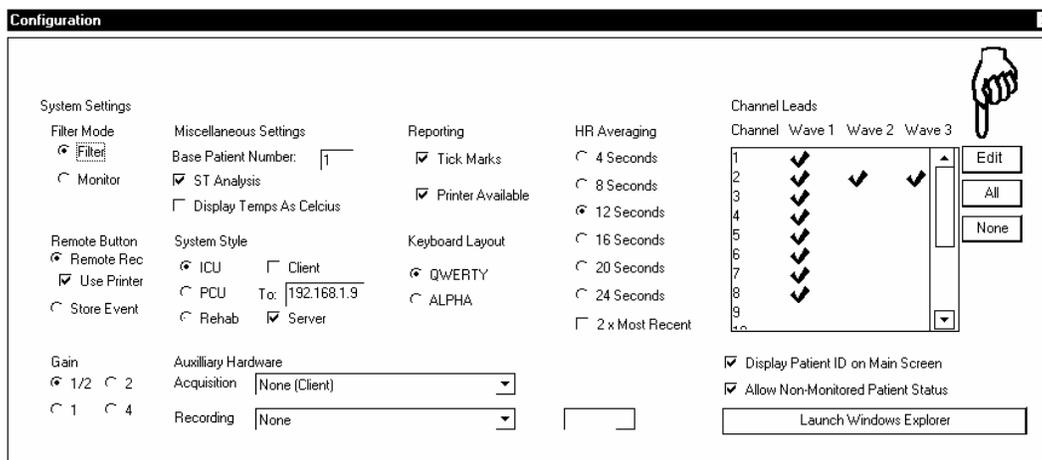


Use the change procedure button to make changes to the protocol. Use the delete procedure button to remove the entire procedure. A typical schedule would be end of shift reports and a full disclosure procedure to print the full disclosure reports on an hourly basis.

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System Configuration

The system configuration screen sets up the type of system; the number of leads viewed and miscellaneous system functions.



SYSTEM SETTINGS

Filter/Monitor sets the default setting when a new patient is admitted to the system. Filter is the normal default and reduces most artifacts from the waveform.

GAIN sets the default size of the waveform.

MISCELLANEOUS SETTINGS

Base patient number sets the number to be used for channel 1. All channels following will be in sequential order. This is used where multiple systems are installed.

ST ANALYSIS can be defaulted on or off. On when ticked.

DISPLAY TEMPS AS CELCIUS

Some bedside monitors only transmit temperature in Celsius. If the Nurses want to see Fahrenheit values do not click this box.

SYSTEM STYLE sets the type of system layout,

ICU will process ECG information and display the digital values from a bedside or the TeleTrens. It also displays the alarm limit settings on the alarm screen.

PCU WILL only process ECG and not display other vital signs.

REHAB sets up the system for rehab applications with data base information.

The system style also sets up the central station to be used as a client or host in a network application by clicking the appropriate box and entering the TCP/IP address. If the system is a standalone unit leave all entries blank. **See networking section of manual.**

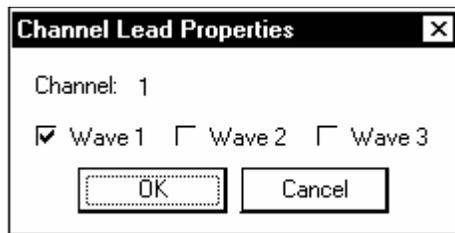
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KEYBOARD LAYOUT sets the default from an alphabetical or computer keyboard.

ALLOW CHART EDITING enables the editing function for PATIENT REPORT in ICU/PCU modes only. The equivalent document in REHAB is the PATIENT RHB LOG, which by default is editable.

HEART RATE AVERAGING sets up the system heart rate counting. In PCU/ICU set the system up for 4 or 8 seconds. This will give faster response to sudden changes in Heart Rate.

CHANNEL LEADS - Click on a channel number. Click on **EDIT**.



This tells the system which waveforms to process. Click the appropriate waves for the device. The TM8 transmitter is only Wave1 and Wave2. The TeleTrens also has a respiration waveform. Most bedsides will have three waveforms.

STRIP CHART SETTINGS

Tick Marks places the marks on the recorder paper every 3 seconds.

Printer Available sets the system up to use the laser printer.

Auxiliary Hardwire is set for the central to be used as a client in a network environment. Click on none for E101's and the system will obtain the ECG information from the network.

Display Patient ID on main screens can be on or off for patient confidentiality.

Allow non-monitored patient status is for phase III rehab patients who do not get monitored for ECG while exercising.

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Settings

Click on STATUS. Click on SETTINGS.

<i>TRENSCenter Settings</i>	
25 MM	TOUCH OFF
PRINTER ON	DISCHARGE RPTS
FAX OFF	VPOS 1
TREND 2D	VPOS CH ALL

The 25 MM button changes the recorder (NOT THE PRINTER) speed from 25 to 50 mm.

The PRINTER button turns the laser printer on or off.

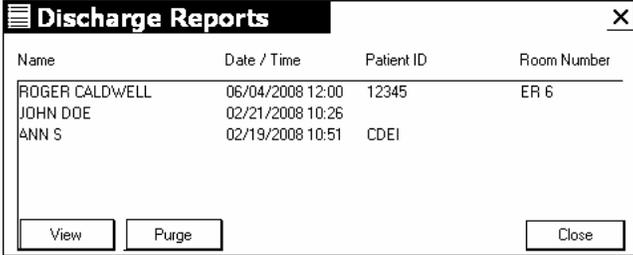
The FAX button turns the FAX option on or off. If the FAX button is ON all print requests will be FAXED.

The TRENDS 3D selects either 3d or 2d trends.

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Discharge Reports

Click on DISCHARGE RPTS. The following screen will appear.



Name	Date / Time	Patient ID	Room Number
ROGER CALDWELL	06/04/2008 12:00	12345	ER 6
JOHN DOE	02/21/2008 10:26		
ANN S	02/19/2008 10:51	CDEI	

View Purge Close

To view a discharge report, touch the patient name desired, touch VIEW. The report will be displayed. To remove a report, touch the desired patient name and touch PURGE. A prompt will appear on screen asking "Are you sure you want to delete this PDF.file. Touch YES.

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Changing Lead Labels

When using bedside monitors with the TrensCenter it will be necessary to change the lead annotation on the recorded strips.

TeleTrens should be Lead1=Lead II Lead2=MCL Lead3=Resp

IVY should be Lead1=ECG, Lead2=Resp and Lead3=SpO2

Advisor should be Lead1=ECG. Lead 2 and 3 will be whatever waveform is displayed on the 2nd and 3rd channel of the monitor.

IVY should be Lead1=***, Lead2=Resp and Lead3=SpO2 Lead1 will be determined by the bedside monitor. Whichever lead is selected on the bedside will be shown at central.

NOTE: If an IVY is used for demo and then disconnected you will probably get an X for lead designation

Click on STATUS-SERVICE-329-CONFIGURATION-LANGUAGE

The TrensCenter Language Configuration screen will be displayed.

The screenshot shows a window titled "Configuration" with a close button in the top right corner. The window is divided into several sections by tabs: "Rehab Reports", "Reports", "Room", "Schedule", and "System". Under "Rehab Reports", there are sub-tabs for "Alarm", "Bedside", "Clock", and "Language". The "Language" sub-tab is active, showing the following settings:

Annotation Text	Filter On: <input type="text" value="FIL"/>	Alarms On: <input type="text"/>	Auto: <input type="text" value="AUTO"/>
Filter Off: <input type="text" value="MON"/>	Alarms Off: <input type="text" value="~"/>	All Record: <input type="text" value="ALL REC"/>	
Pri Freq: <input type="text" value="PRI"/>	Arrhy On: <input type="text"/>	25 MM: <input type="text" value="25MM/S"/>	
Aux Freq: <input type="text" value="AUX"/>	Arrhy Off: <input type="text" value="#"/>	50 MM: <input type="text" value="50MM/S"/>	
Hardwire: <input type="text" value="HW"/>	Lead 1: <input type="text" value="II"/>	Pacer On Ind: <input type="text" value="P"/>	
Non Mon: <input type="text" value="NM"/>	Lead 2: <input type="text" value="MCL"/>	Pacer Off Ind: <input type="text"/>	
Pacer On: <input type="text" value="PHR"/>	Lead 3: <input type="text"/>		
Pacer Off: <input type="text"/>	Manual: <input type="text" value="MANUAL"/>		
Learn: <input type="text" value="LEARN"/>	Remote: <input type="text" value="REMOTE"/>		

Place the cursor in the lead 1= window and click. Delete whatever is there and type whatever you want lead 1 to be.

Repeat the above procedure for all of the changes to be made.

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Changing Number of Hours for Disclosure

The full disclosure hours are set at the factory for 24 hours. This can be changed to any time frame based on the size of the hard drive in the system.

To change, exit the TrensCenter. Click on RUN. Type TC.INI and hit ENTER.

Hit F3. In the Find What window, type SAMPRATE. Click on Find Next. The SAMPRATE line should be blue. Click on Cancel on the search box.

The display should be.

SAMPRATE=18

There are 1440 minutes in a day—This takes~500-600M of disk space

Disclosure File Minutes=1440

Use the arrows or mouse to position the cursor in front of the 1440 and hit delete our times. This will remove the 1440. Type in the new minutes. 2880 =48 hours. 4320 =72 Hours.

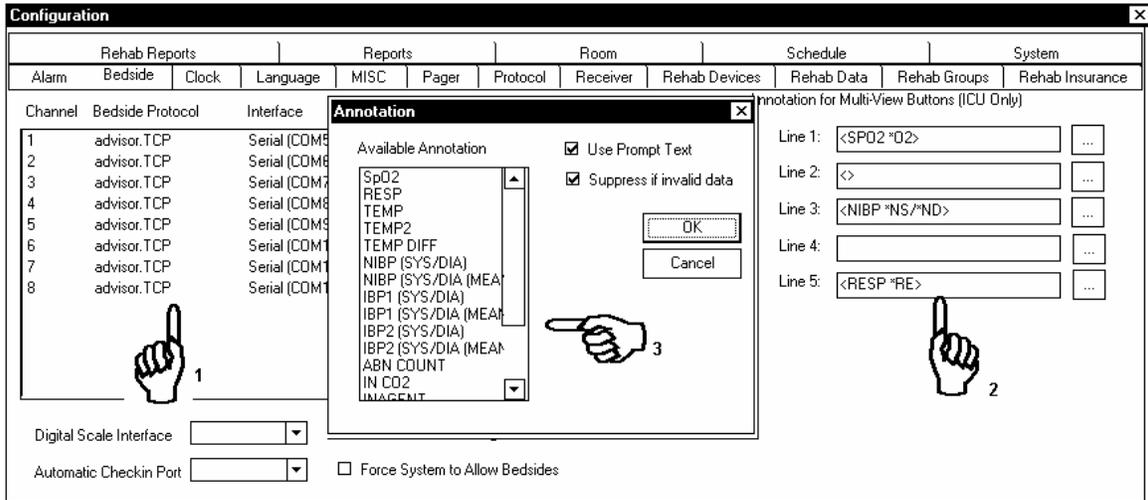
NOTE: Do not exceed the capacity of the hard drive since the system will shut down.

Save the TC.INI and restart TrensCenter.

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ARRANGING DISPLAY OF VITAL SIGNS ICU

To change the order of display or to remove some of the vital signs, i.e. BP! And BP2, do the following: click on STATUS-SERVICE-329-CONFIGURATION-BEDSIDE.



Click on the Channel number to be changed. Click on the browse button next to the Line number to be changed. Select the parameter to be displayed and click on OK.

To change the size of these characters run TC.INI, add the lines, Multi Button Font Height=20 and Multi Button Font Width=9. This will provide large digital displays for the O2 and BP and RESP.

NOTE: It will be necessary to shorten the labels to provide enough room to display the digitals, i.e. BP, O2, RSP.

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SERVICE SCREEN

				1	2	3	GENERAL
CH1 180.50	CH5 180.50	TOUCH CAL	CONFIGURATION	4	5	6	SETTINGS
CH2 180.50	CH6 180.50	Freq. 1-8	STATUS LOG	7	8	9	SOUND
CH3 180.50	CH7 180.50	PRIMARY	REC QUEUE	DELETE		ENTER	HARDWARE
CH4 180.50	CH8 180.50	AUXILIARY	PRT QUEUE				SERVICE
		CALIBRATE					

The service screen is used for service functions.

Touch 329 on the keypad to activate the other functions. To access the configuration screen all patients must be discharged.

FREQUENCIES

To change primary frequencies, select the frequency 1-8 or 9-16. Touch PRIMARY then touch the channel to change. Use the keypad to enter new frequency. Touch ENTER to change to the new frequency,

To change auxiliary frequencies touch AUXILIARY then touch the channel to change. Follow above instructions for primary.

TOUCH CAL is not implemented at this time. See section on touch screen calibration for information.

REC queue shows the number of records waiting to be recorded.

Printer queue shows the number of records waiting to be printed.

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Transmitter Frequency Programming

1. Turn on system, allow it to boot and load the TrensCenter program.
2. From the main screen, touch the **Status** button in the lower right corner of the screen. On the next Screen, touch the **Service** button.
3. On the on-screen numerical keypad, touch **3 2 9**. This will enable the options at the left side of the Screen, turning the letters/numbers within the various keys black.
4. Touch the **CH** button of the desired channel. You will see it “depress”. Enter in the new frequency via the numerical keypad on the right side of the screen. Touch the **Enter** key when finished. This will complete the frequency change for channel 1. Repeat for any other channel desired.
5. **TM8A (VHF)** The frequency for a particular transmitter can be found in its serial number by referring to the last three numbers. A **1** must be placed in front of the three digits, and a **0** following them. Example: if the last three numbers of the serial number is **845**, then the frequency of that transmitter is **184.50**. Note: when entering the freq via the numerical keypad, the decimal point will be automatically inserted by the software. The entries on the keypad would be **1 8 4 5 0** in order to complete the programming.
6. **TM8B (WMTS)** The frequency for a particular transmitter can be found in its serial number by referring to the last five numbers. Example: if the last five numbers of the serial number is **60845**, then the frequency of that transmitter is **608.45**. Note: when entering the freq via the numerical keypad, the decimal point will be automatically inserted by the software.

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Post Installation System Checkout

1. Turn on system.
2. Install all patient lead wires into the transmitters observing proper color placement.
3. Install two "AAA" batteries in all transmitters observing proper polarity + end up.
4. Verify proper frequencies are installed by checking frequency on back of transmitter against the frequency on service screen. Adjust if necessary.
5. Admit all patients to the system.
6. Connect Channel 1 transmitter to a simulator or person. Observe the ECG tracing on TrensCenter screen. If simulated, the trace should be approximately 1 CM high and free of all artifact. If on person, trace should be free of artifact.
7. Remove Red or White electrode from transmitter. Lead Fault message should appear. Replace lead.
8. Unscrew cap from transmitter. Signal Loss message should appear. Tighten cap.
9. Walk around area of antenna coverage. Observe full disclosure to assure no drop out of ECG trace.
10. Touch Print for that channel. ECG strip should print.
11. Repeat step 6 through 10 for remaining transmitters.

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TrensCenter Secure Log In

Click on Start button. Click on RUN. Type in C:\trens32\tcsecure.exe. The following page will be displayed.

The screenshot shows a dialog box titled "TRENSCenter Security Login". It contains the text "Please Login with Administrator Credentials". Below this, there are two input fields: "Administrator Name:" with the text "admin" entered, and "Administrator Password:" with "*****" entered. At the bottom of the dialog are two buttons: "OK" and "Cancel".

The default password for TCSECURE is "admin" and "password". The administrator should change these even if they don't intend to use security, otherwise a malicious user could get in with the default values and lock access to their system.

Once you are logged in check the box to indicate whether security is used or not. If security is not used click on Close.

The screenshot shows a dialog box titled "TRENSCenter Security Configuration". It has a checked checkbox "Use Security On This System" and a "Close" button. Below the checkbox is a "Change Administrator Password" button and a "PIN Idle Timeout:" field with the value "300" and the unit "seconds". A table lists users with columns for "Name", "PIN", and "Security Level". One user is listed: "Roger Caldwell" with PIN "3287" and Security Level "999". To the right of the table are buttons for "Add", "Change", and "Delete".

Users	PIN	Security Level
Roger Caldwell	3287	999

If security is used, one user must be set up. Click on **Add**.

The screenshot shows a dialog box titled "User Information". It contains three input fields: "Name:", "PIN:", and "Access:". At the bottom are two buttons: "OK" and "Cancel".

Each PIN must be unique and ZERO is not a valid PIN. Recommend all PINS be between 0001 and 9999. The supervisor should set up a PIN number with an Access number of at least 99. If the user's security level is greater than 99 the user can see the PIN numbers when accessing the status log. Currently that is the only use of the security level. Repeat procedure for all users.

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TM8 (A)(B)(C) DUAL LEAD TRANSMITTER



Tested to Comply with FCC Standards

TM8A FCC ID: OF8-TM8A
TM8B FCC ID: OF8-TM8B
TM8C FCC ID: OF8-TM8B

LIFE SENSING INSTRUMENT COMPANY, Inc.

329 WEST LINCOLN STREET

TULLAHOMA, TENNESSEE 37388

(931- 455-9016)

declares that the device manufactured as TeleMaster, model no. TM8A does conform to the regulations as outlined in Title 47 of the US code of federal regulations, Part 15 covering Class B personal computers and peripherals, and model no. TM8B does conform to the regulations as outlined in Title 47 of the US code of federal regulations, Part 95, subpart H covering Wireless Medical Telemetry Service (WMTS).

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Parts 15 and 95 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna of the interfered device. Increase the separation

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between the equipment and interfered device.

- Connect the equipment to a different outlet on a circuit other than the one the interfered device is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT - Operation of a TM8B requires prior coordination with the ASHE frequency coordination designator. For further guidance visit the ASHE website at:
www.wmtssearch.com

CAUTION: Changes or modifications not expressly approved by the manufacturer can void the user's authority to operate the equipment. It is the responsibility of the equipment user to maintain compliance with the FCC rules. To ensure compliance, use only those cables and/or accessories prescribed by the manufacturer.

IMPORTANT: To comply with the FCC RF exposure requirements, users should avoid grasping the transmitter for any extended period of time while the device is in operation.

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Limited Warranty

Life Sensing Instrument Company (LSI) manufactures medical telemetry monitoring systems from parts that are new or equivalent to new in accordance with industry-standard practices. LSI warrants that the parts used in the manufacture of their products will be free from defects in material and workmanship. The warranty begins on the date of invoice.

Customer/End User must return completed Warranty Card included, to LSI to activate warranty.

This warranty does not cover damage to parts due to external causes, including accident, abuse, misuse, problems with electrical power, usage not in accordance with product instructions, and problems caused by use of parts and components not authorized by LSI.

LSI will replace or repair parts qualifying under this warranty with new or reconditioned parts. The decision to repair or replace parts will be at the discretion of LSI. The decision to use new or reconditioned parts will be at the discretion of LSI.

Parts returned to LSI must be authorized by Return Material Authorization (RMA) process. LSI will issue the RMA number to be attached to the returned part or parts. LSI owns all parts that are replaced or repaired under this warranty.

The use or installation of unauthorized system components or software will result in voiding this warranty.

Parts provided on an exchange basis will be shipped using UPS ground or equivalent method. Any expedited shipping charges will be charged to the end-user.

HTS820TC TRENSCenter Central Station Cardiac Monitor ICU/PCU Operator/Technical Manual

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Specifications

SIZE:

Display 7" Deep x 17" High x 20" Wide 12 lb.
Enclosure Telemetry 12" Deep x 7" High x 13.25 Wide 15.5 lb
CPU 19" Deep x 17" High x 8" Wide 32 lb.

Hardwire Specifications:

Pentium 1.8 GHz or faster	Wide Screen LCD Monitor
256 Megabytes Internal RAM Memory	2 Each 30-Gigabyte Hard Drive or Larger
AGP VGA Graphics Card	CD-R DRIVE
Lexar USB Backup Drive	10/100 Network Controller
1 COM Port	1 Parallel Port for Laser Printer
4 USB Ports	

WAVEFORM Display:

22 Inch Color High Resolution Monitor	16 Independent Traces 8 Seconds Full Screen
3.5 Seconds Half Screen Interactive Mode	

Alphanumeric Display:

Name, ID#, Channel#, Date and Time	Heart Rate, Timers, Device
HR Alarm Limits and Target Limits	All Status Information
All Alarm Information	

Heart Rate:

Large 1 -Inch Digital Display	0-250 BP +/- 1% Accuracy
HR Updated 4 Seconds	Alarm Limits 0-250 BPM

Gain:

Settings of 5mm/mv, 10mm/mv, 20mm/mv, 40mm/mv

Arrhythmia:

Automatic Learn Cycle	Alarms ABN. VTACH, VFIB, ST and ASYSTOLE
1Hour Graphical Trends of HR and Abn	Storage of All Events for Recall
2-Hour Full Disclosure	

Recordings:

Annotation of all information	Adjustable Delay of 0 to 40 Seconds
Automatic Each Device	Trend Recording
Full disclosure print out	Rehab Log

Alerts:

End of Device Time	High Target limit Exceeded
Lead Fault, Low Battery, Loss of Signal	

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Document History

Version	Issue Date	Changes	Owner's Signature
4.000A	05-16-05	Version change consistent with software	<i>Eugene W Money</i>
4.000B	02-22-06	Version change consistent with software	<i>Eugene W Money</i>
4.000C	07/13/06	Version change consistent with software	<i>Eugene W Money</i>
5.000A	11/1/2007	Version change consistent with software	<i>Eugene W Money</i>
5.000B	10/7/2008	Version change consistent with software	<i>Eugene W Money</i>
5.000C	05/10/09	Version change consistent with software	<i>Eugene W Money</i>
5.000D	01/20/10	Version change consistent with software See p. 11,12,28,41	<i>Eugene W Money</i>