

***Patient Monitoring System  
DynaScope DS – 3300***

***CENTRAL MONITOR***

***Operator's Manual***



**FUKUDA DENSHI CO., LTD.**

4L2198A 9110®



# SAFETY



*This symbol on the unit indicates that some hazard might be present. Relevant information is supplied in this operation manual.*

## **Design and construction**

The Dynascope DS – 3300 system are designed to be classified as IEC 601-1 class I type CF.

## **Preventive maintenance**

The purpose of preventive maintenance is to eliminate future problems and keep instrument a condition providing completely safe, satisfactory recordings. Preventive maintenance should be carried out once a year as prescribed in the Service Manual for the Dynascope DS – 3300 system.

Before using the instrument, always ensure that the unit shows no signs of damage.

Immediate maintenance has to be carried out :

- If the instrument was subject to extreme mechanical stress, e.g. after a heavy fall.
- If the instrument was subject to spill of liquids.
- If the function of the instrument seems to be disturbed.
- If parts of the enclosure of the instrument are cracked, removed or lost.
- If any connector or cord shows signs of deterioration.

## **Leakage current**

All ECG wires, electrodes, transducers, and connectors (plus their amplifiers) connected to the patient are galvanically isolated from the rest of the instruments and from ground.

This isolation, which has been incorporated to ensure the patient's safety, is bypassed if the electrodes on the patient cable come into contact with any metal object or other electrically conductive object (such as your bare hands).

A shock hazard then arises, regardless of whether the objects are ground or not.

## **Non-explosion-proof**

The Dynascope 3300 system are not designed for operation in areas in which there is a risk of explosion.

## **Cleaning and disinfection**

### **Electrodes and electrode cables**

For disinfection, the electrodes and electrode cables should be rubbed with a swab or cloth moistened with a formaldehyde solution, such as Cidex 5% or Formalin 1.5%.

Under no circumstances may the electrode cables be immersed in any cleaning fluid.

Nor may they be subjected to hot sterilization with water, steam or air or to ether sterilization.

### **Monitor**

The instrument cabinet may be cleaned and disinfected in the following manner:

**Cleaning** : Rub the unit with a cleaning cloth moistened with water to which an ordinary household cleaning agent can be added if necessary. But never use ether or benzene.

**Disinfection** : Thoroughly spray the cabinet with Formalin 1.5 % or a similar product.

## **Defibrillation protection**

The unit can remain connected to a patient during defibrillation. The patient cable and input circuits are designed so the unit is not damaged even if defibrillator electrodes come into contact with the ECG electrodes during defibrillation.

**Note** : This defibrillation protection is effective only if the correct patient cable supplied with the instrument is used.

## **High-frequency surgery**

The Dynascope 3300 system may be used during surgical operation, provided that cautionary instructions in the operator's manual for the electrosurgical knife are strictly observed, especially attention being paid to the placement of the counter-electrode plate.

If not observed, the high-frequency energy of electrosurgical knife may cause a skin burn at the site of an ECG electrode or damage the instrument.

# **Notes to Users**

***This operator's manual gives a description of the fully — provided system. Therefore, select and read the items related to your system composition.***

***Also, before operating the system, read this operation manual carefully for correct operation.***

## ***Paper handling precautions***

Since the instrument uses a highly-sensitive paper, take the following precautions.

- Do not expose to direct or leave it in a high-temperature room.
- Do not keep it under a fluorescent lamp for a long period of time.
- Do not use PVC film for filling.
- If a recorded paper is stored for a long period of time while touching another record, waveforms may be copied on each other.

## ***Repairs and subsequent modifications***

As a manufacturer of electromedical instruments, we, FUKUDA DENSHI can only assume responsibility for the safety features of the instrument in those cases in which maintenance, repairs and modifications have been carried out by us or agencies expressly authorized by us and in which components affecting the safety of the instrument have been replaced by original spare parts in the event of failure.

Furthermore, when such work is carried out we advise you to get a certificate from the persons carrying out the work indicating the type and extent of the work, including details about any changes in the rated data or operating range.

The certificate should specify the data when the work was carried out and the name of the firm and include a signature.

**CAUTION – FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR  
ON THE ORDER OF A PHYSICIAN**

# **PREFACE**

This operator's manual is for the DS — 3300 when used as a Central monitoring station.  
The manual consists of three sections:

## **1. Basic Operation**

Introduction of the fundamental displays.

Measurement methods for the fundamental parameters in the basic display mode.

## **2. Applied Operations**

General description and features.

Name of each part and it's function.

Preparation.

Screen display and operation.

Specifications.

## **3. Installation**

Connection and installation of related instruments.

Materials required for connection and installation.

Pin assignment for external connectors.

The Basic Operation section of this manual is prepared using heavy duty pages so they can be removed and used as a daily reference during operation of the Central Monitor.

The Applied Operation section of this manual provides more detailed information for the DS — 3300 Central Monitor such as the set — up and preparation for operation.

Read this section thoroughly so you are familiar with the detailed operation and functions of the monitor controls.

The Installation section of this manual provides details for the installation of the DS — 3300 Central Monitor, the connections to the communications network and the connections for external recording devices.

# Basic Operation

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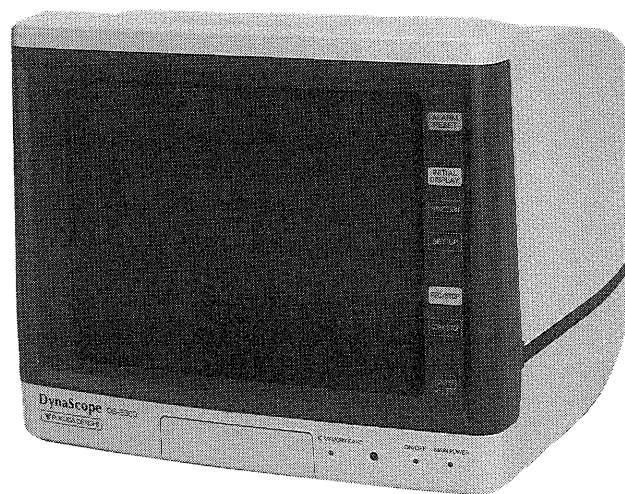


# 1. GENERAL DESCRIPTION

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The Dynascope DS – 3300 CMW is a Central Station Monitor with the capability to monitor up to twelve patients when connected to the DS – 3300 Bedside Monitor on the Local Area Network.

Individual display mode selections enable you to control and monitor the display in the same manner as the DS – 3300 Bedside Monitor. The large 12 inch display incorporates a touch screen for simplistic operation. By utilizing a Local Area Network(LAN), a maximum of 24 bedside monitors can be connected to this Central Monitor in a system configuration.



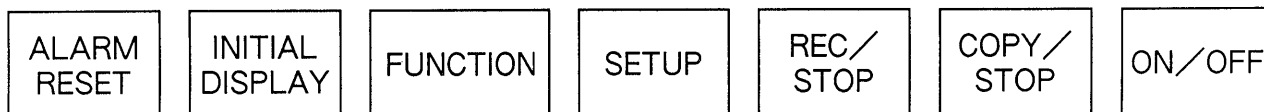
## 2. EASY OPERATION !

---

A touch screen display is employed in the DS—3300 to allow for extremely easy operation.

The number of fixed switches are limited to seven, located at the right of the display. The touch keys are used to reduce the number of mechanical switches and are labeled to clearly indicate their function.

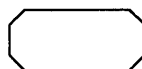
The seven fixed switches are:



These seven switches are typically sufficient for daily operation !

Pushing the INITIAL DISPLAY switch always returns the display to the initial display.

The touch keys shown on the display appear like this:

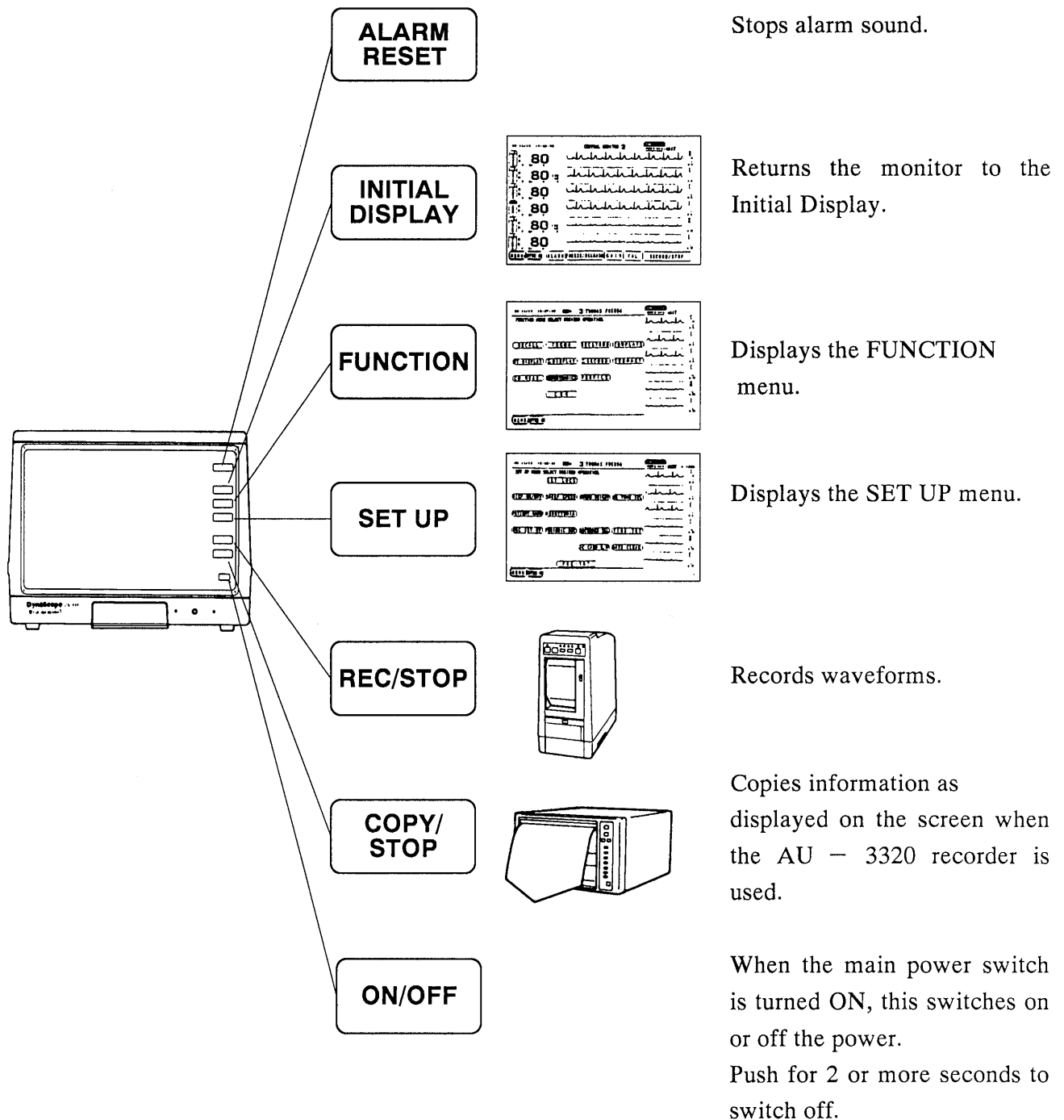


The individual touch keys are only displayed when they are needed.

When a key is pushed, a sound is generated to indicate acceptance of the operation.

### 3. BASIC OPERATION

The basic operation of the DS — 3300 patient monitor is realized with the seven dedicated switches on the right of the display and the touch keys shown on the display itself. The diagram below shows the operation of the seven fixed switches:



● The main power switch is located on the rear panel of the DS — 3300.

## 4. DISPLAYS

There are three main screen displays for the DS – 3300.

1. **INITIAL DISPLAY :** This is for daily patient monitoring. The fundamental functions for monitoring are all contained in the INITIAL DISPLAY.
2. **FUNCTION DISPLAY :** Other FUNCTIONS of the monitor, such as trend, recall, hemodynamic calculations etc. are controlled here.
3. **SET UP DISPLAY :** Display ON/OFF, clock setting and other functions are controlled through this switch.

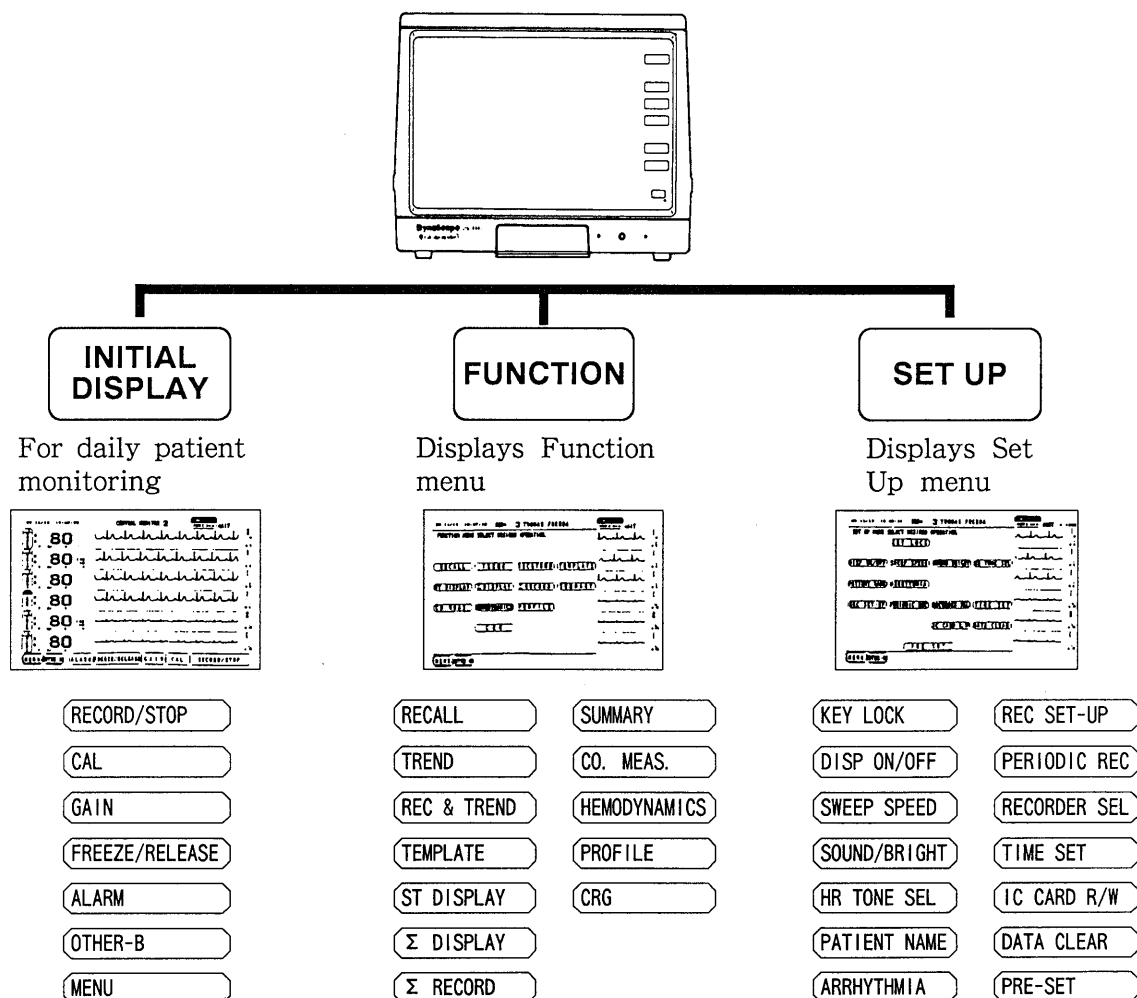
Operation of these three switches produces useful menus on the display. The desired function is then selected via the touch keys.

All touch keys are displayed with an eight sided border and look like this:



When a key is pressed, a tone is heard to confirm operation.

The menu selections for the three switches described above are outlined below,

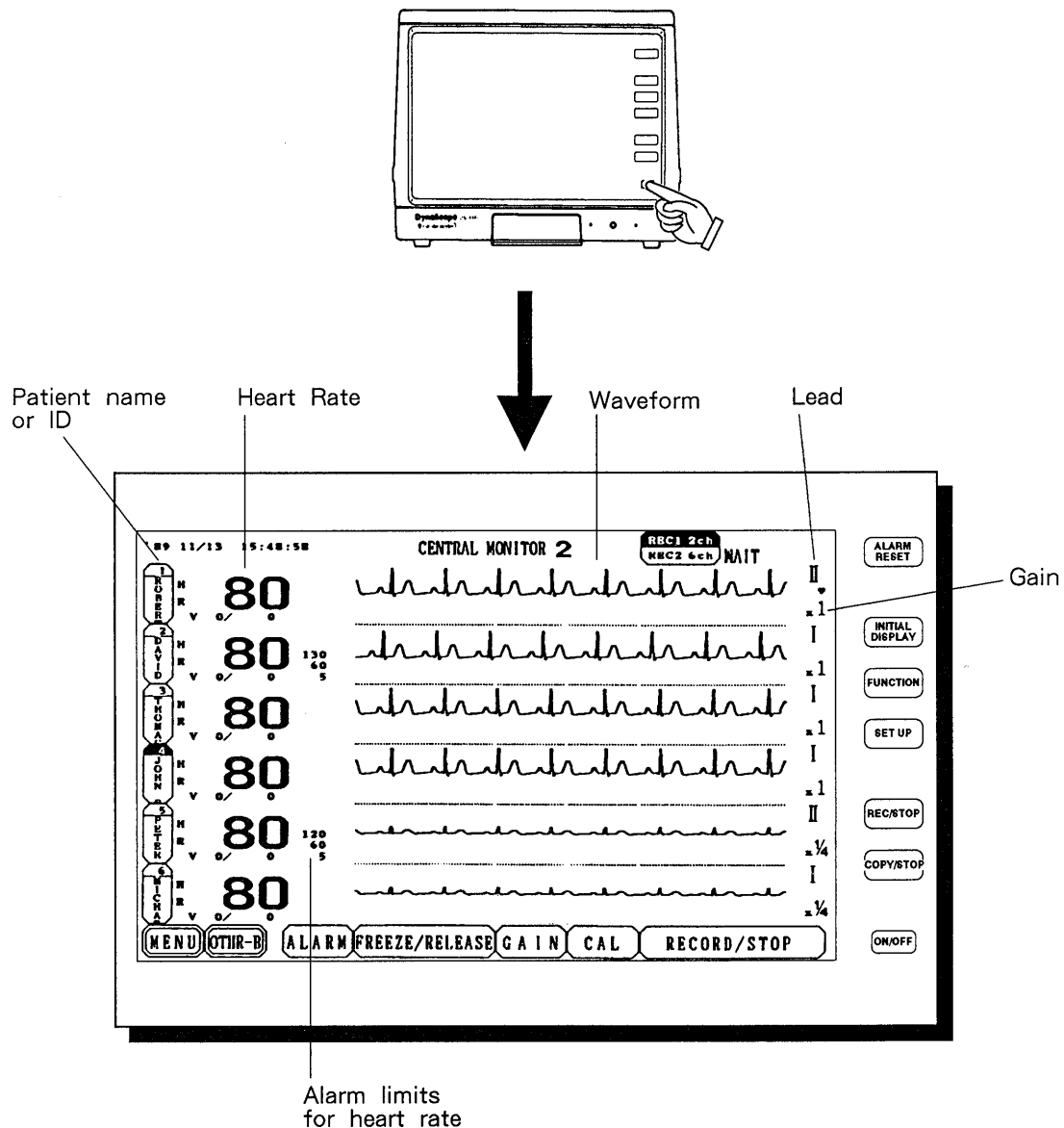


# OPERATION AT INITIAL DISPLAY

## POWER ON

A few seconds after turning the power on, the display will appear as shown below. This is the INITIAL DISPLAY for 6 patients. The screen is divided into 6 channels, one for each patient's ECG.

The patient name or ID is located at the far left of each channel. Moving across each channel from left to right you will see the Heart Rate, the alarm limits for heart rate, the ECG waveform and the gain and lead selection.

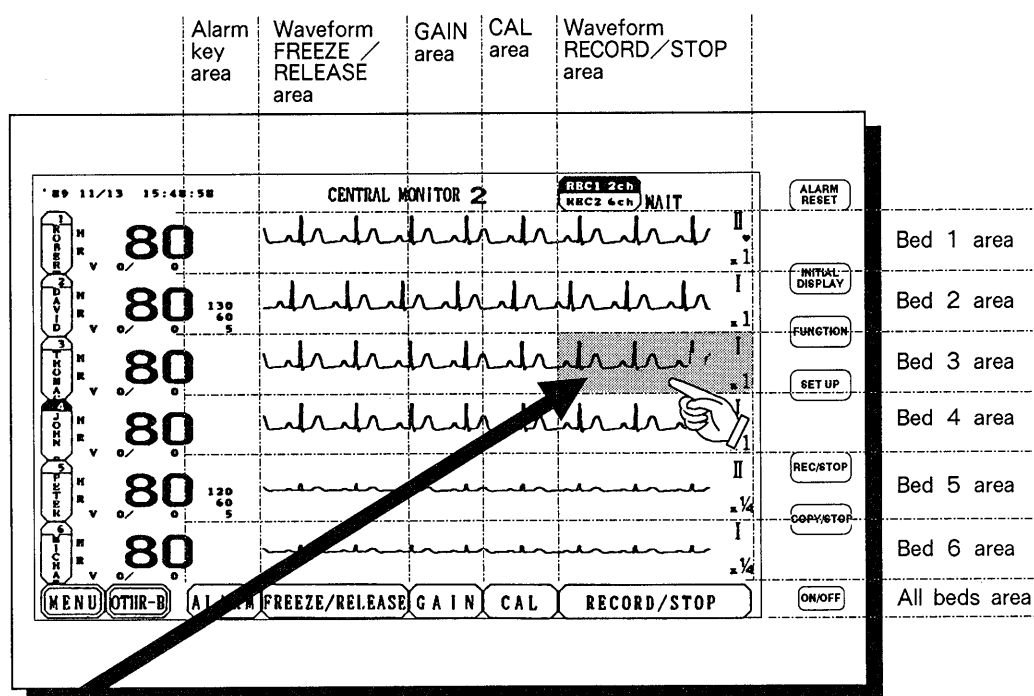


## OPERATION OF EACH KEY AREA

Operation is very simple due to the incorporation of touch screen technology. As shown in the figure below, each channel is divided into five columns. These correspond to the five keys at the bottom of the screen. These functions, ALARM, waveform FREEZE/RELEASE, GAIN, CAL and waveform RECORD/STOP are all allocated on the display.

You can activate any of these functions for individual patients by simply touching the area for the desired function in the individual channel.

### OPERATION OF EACH KEY AREA



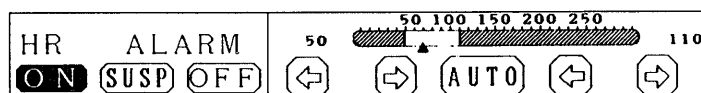
Example : Push here to activate recorder for bed 3.

## FUNCTION OF EACH KEY

Since the entire display can be thought of as a switch, the basic operation can be accessed quickly and easily. In a conventional system, it is often necessary to first select a bed number and then activate a function, this two step method is not necessary.

### Operation of each of the Key areas

1. **RECORD/STOP** : Waveform of the bed selected will be recorded. Push the key again to stop recording.
2. **CAL** : Waveform of the bed selected will have a 1 millivolt calibration pulse.
3. **GAIN** : Amplitude of the waveform will be changed in the sequence of 1/4, 1/2, 1, 2, and 4.
4. **FREEZE/RELEASE** : Waveform of the bed selected will be frozen. Push again to release.
5. **ALARM** : Alarm set up display for the bed selected will be displayed and alarm limits for that bed can be changed. You can selecte ALARM ON/OFF, SUSPend alarm limits. When the AUTO key is pushed, the alarm limits will be automatically set for 20 BPM below and 40 BPM above the current heart rate.



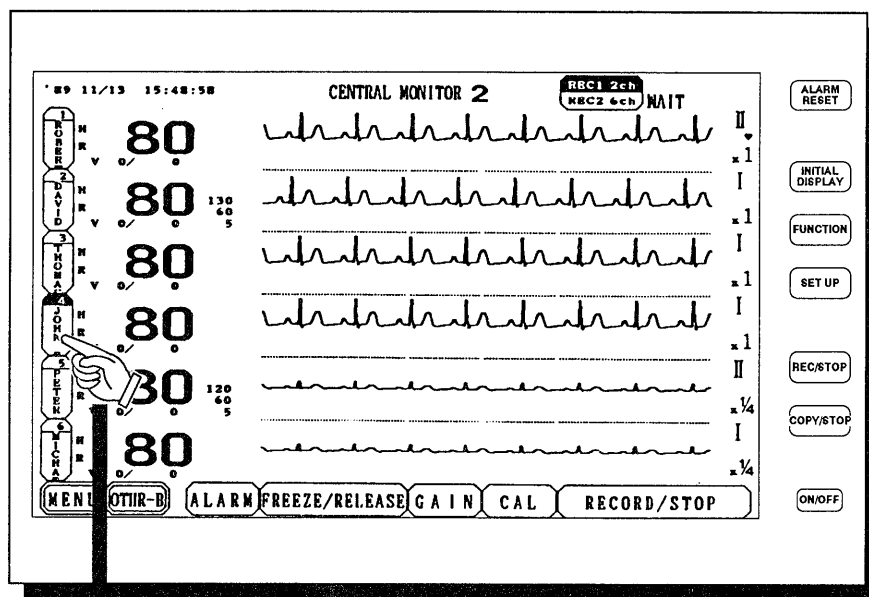
**Note :** The keys at the bottom of the screen have the same functions. When one of these is selected, all patients will be affected except for the **RECORD/STOP** key. This will record the waveform of the patient selected by touching that patients name on the left of the display.

## INDIVIDUAL DISPLAY MODE

If it is desired to “zoom” on any patient and view all of the monitored parameters from the bedside monitor, you simply push the BED SELECT key at the far left of the screen.

When this is done, the display will change to display the same information as it is on the bedside monitor. Push the INITIAL DISPLAY switch on the right of the front panel to return to the all bed display.

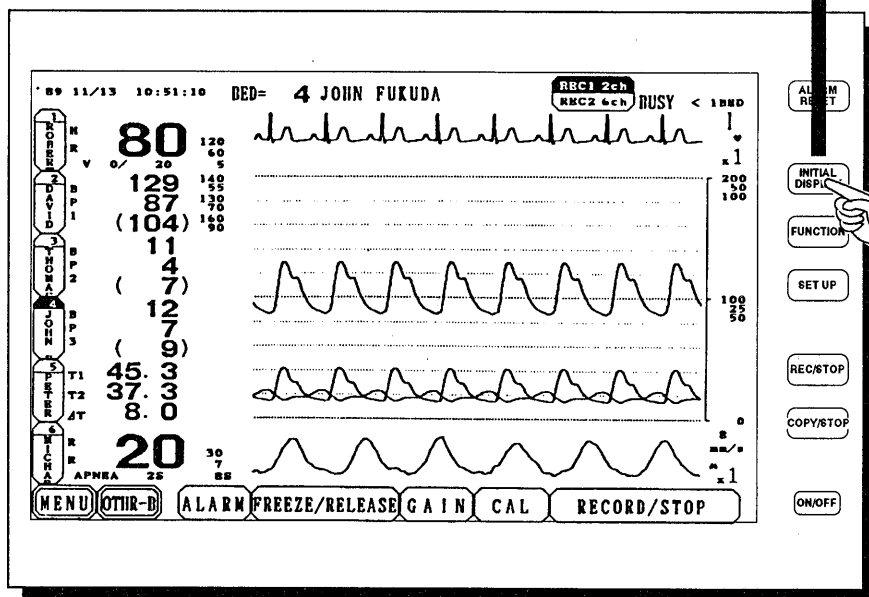
### Central monitor display mode



Push the **BED SELECT** key

Push the **INITIAL DISPLAY** switch

### Bed side monitor display mode





## 5. Specifications

### Measurement parameter

DS – 3300 Central monitor	
Display	12 inches, Amber
No. of waveform	Max. 12(STD 6)
Waveform display	6 sec/waveform
Time	25mm/sec. standard

AU – 3310 2 channel recorder	
Recording method	Thermal dot array
Paper width	63mm
No. of channel	2

AU – 3320 6 channel recorder	
Recording method	Thermal dot array
Paper width	217mm
No. of channel	6

### ECG

With Bipolar lead, one lead is selected.

H.R. measurements range : 12 – 300 beats/min.

H.R. alarm limit : 20 – 300 beats/min.

Types of arrhythmias : Arrest, VF, VT, SHORT RUN, BIGEM, TRIGEM, FREQNT VPC, MULTI – VPC

### Respiration

Measurement range : 4 – 150 breaths/min

Alarm limit : 5 – 150 breaths/min

Apnea time detection : 1 – 40 sec

### Blood Pressure

Measurement range : – 50 – 300 mmHg

Alarm limit : 0 – 300 mmHg

### Body temperature

Measurement range : – 10 – 50 °C

Alarm limit : 20 – 45 °C

### Cardiac output

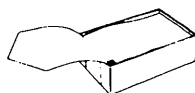
Measurement range : 0.2 – 15 /min.

Blood temperature : 25 – 45 °C

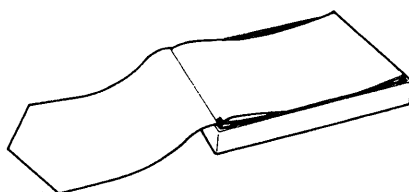
Injectate temperature : 0 – 30 °C

In line sensor : can be used

### Consumables



1. To record 63mm wide paper for the AU – 3310  
OP – 219TE(Z – fold)



2. 217 mm wide paper for the AU – 3320  
OP – 031TE(Z – fold)



# Applied Operations

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# 1. GENERAL DESCRIPTION

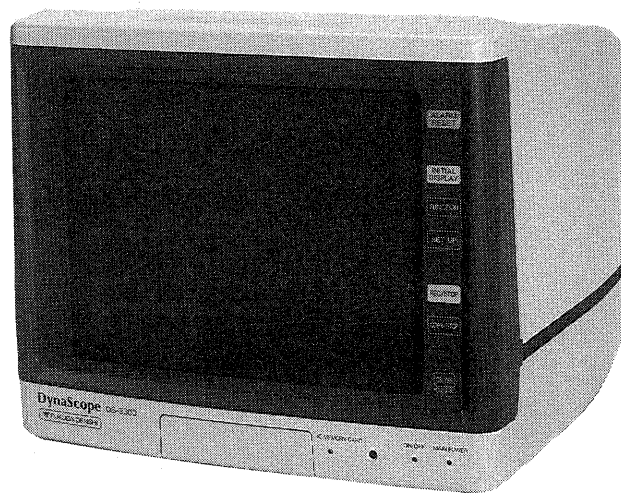
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The DS – 3300 Central Station incorporates touch screen technology and Local Area Network (LAN) communications with the DS – 3300 bedside monitors.

Because of the touch screen, operation has been greatly simplified. LAN communications allows for up to 24 bedside monitors and 6 central stations to be connected to the network.

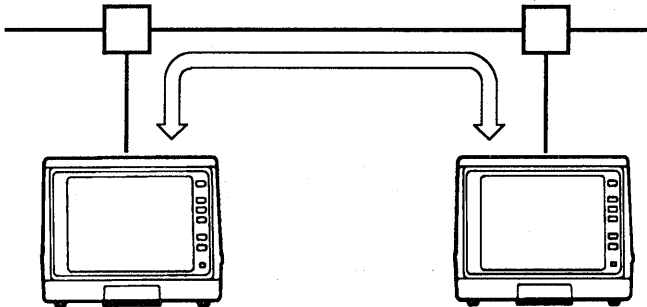
A dual channel thermal array recorder (AU – 3310) or a six channel thermal array recorder (AU – 3320) or both can be connected to the monitor for documentation purposes.

The six channel AU – 3320 can record continuous waveform or print hard copy of the entire screen display. Both recorders can be accessed from either the bedside monitor or from the Central Station monitor.



## 2. FEATURES

### ● Highly systemized with Local Area Network

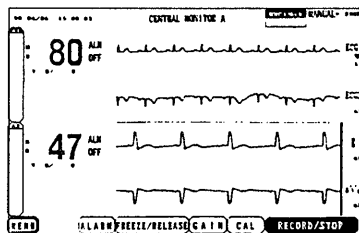


Communication capability through the powerful Local Area Network (LAN) allows up to 24 bedside monitor to be connected to the central station monitor.

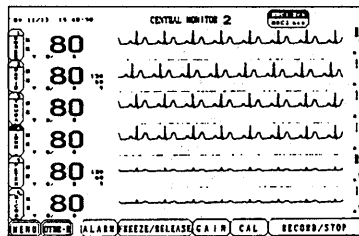
The central monitor can review any data stored in any bedside monitor. Up to 6 central monitors can be connected to the LAN.

### ● Free selection of patients for display

2 Patients

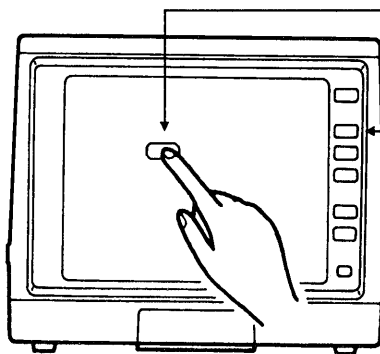


6 Patients



The central monitor can be configured for 1, 2, 4, 6, 8 or 12 patients for display.

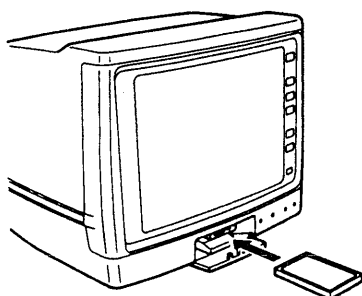
### ● Simplified operation with touch screen



All other function keys are displayed on the screen only when needed.

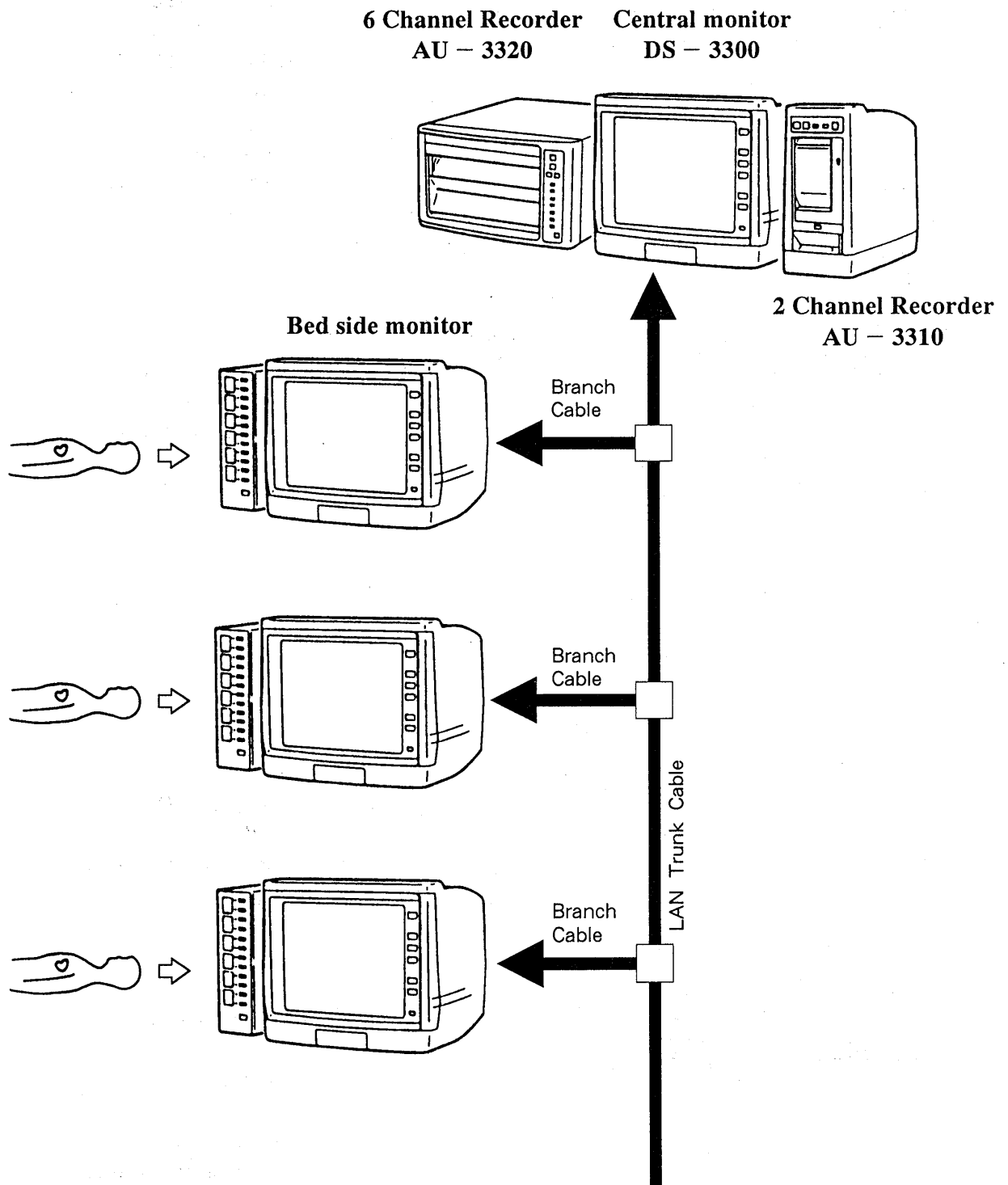
Touch screen technology allows for only 7 fixed function switches.

### ● Memory expansion with the IC memory card.



By using the optional IC memory card, the storage capacity of the DS - 3300 central monitor can be expanded for waveform storage, monitor set-up data and patient identification data.

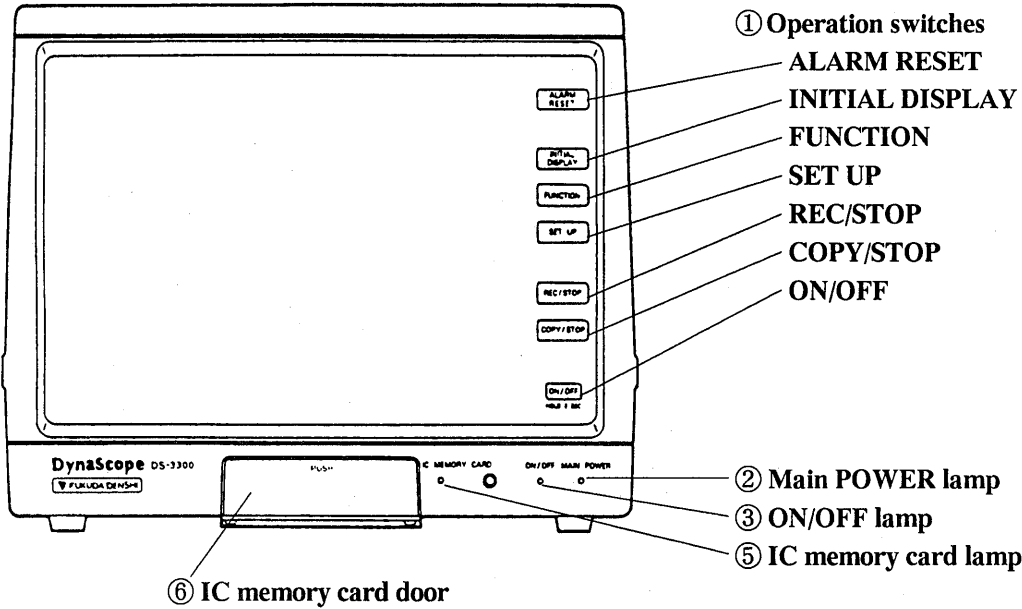
### 3. BASIC CONFIGURATION



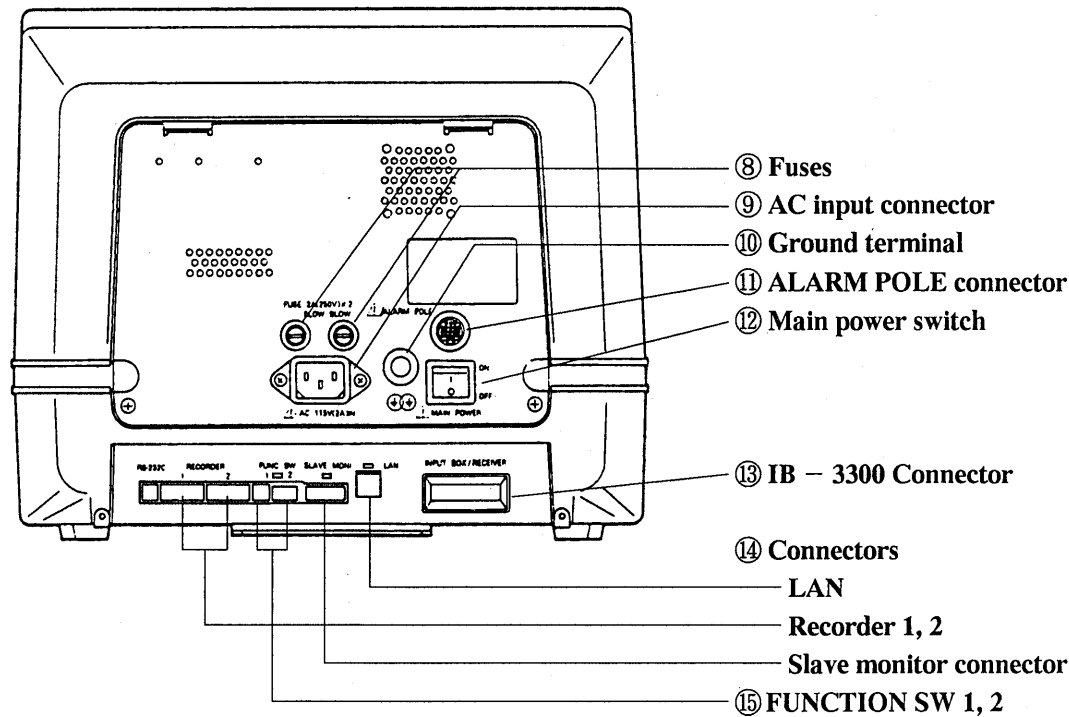
# 4. CONTROLS AND FUNCTIONS

DS — 3300  
Patient Monitor

Front View



Rear View





### **Front View**

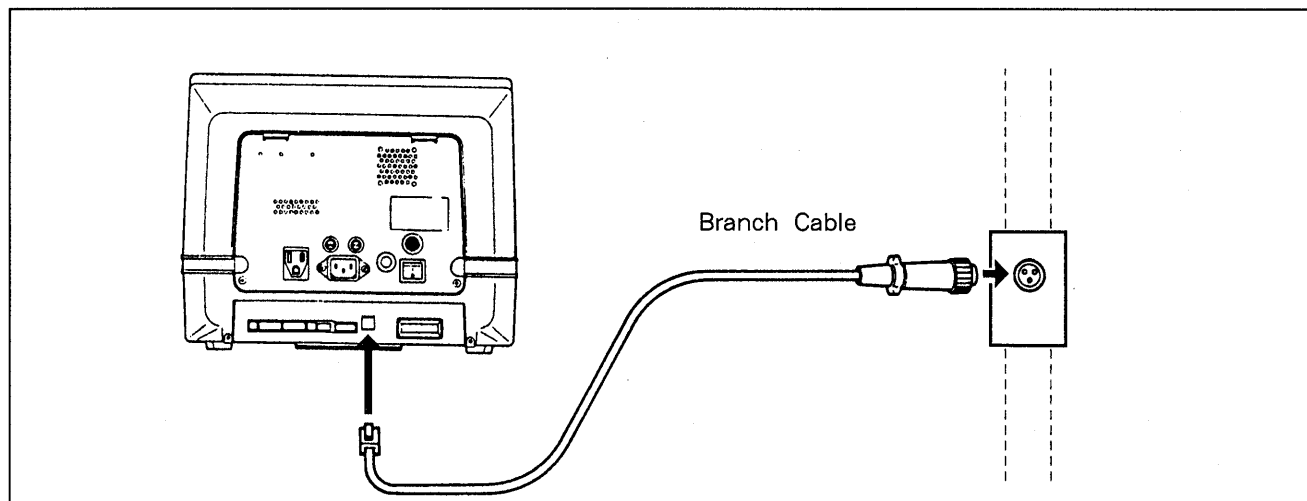
- ① **Operation switches**
  - ALARM RESET** : Resets alarm sound.
  - INITIAL DISPLAY** : Returns monitor to initial display.
  - FUNCTION** : Displays the FUNCTION menu.
  - SET UP** : Displays the SET UP menu.
  - REC/STOP** : Initiates and stops recording.
  - COPY/STOP** : Initiates hard copy printing on the AU — 3320.
  - ON/OFF** : Provides power to the unit.
- ② **Main POWER lamp** : Lights when the main power switch on the rear panel is turned ON.
- ③ **ON/OFF lamp** : Lights when the ON/OFF switch on the front panel is turned on.
- ⑤ **IC memory card lamp** : Lights when the card is inserted and the door is closed.
- ⑥ **IC memory card door** : IC memory card is inserted here.

### **Rear View**

- ⑧ **Fuses** :
- ⑨ **AC input connector** : Mains power input, AC50/60Hz.
- ⑩ **Ground terminal** :
- ⑪ **ALARM POLE connector** : For the AP — 300 ALARM POLE.
- ⑫ **Main power switch** : Turns power ON or OFF.
- ⑬ **IB — 3300 Connector** : For the module input box (not applicable to for Central Monitor).
- ⑭ **Connectors**
  - LAN** : Connection of the branch cable to the LAN.
  - Recorder 1, 2** : Connectors for the AU — 3310 or AU — 3320
  - Slave monitor connector** : Connectors for the slave monitor.
- ⑮ **FUNCTION switch 1, 2** : Set up the function of DS — 3300. See “ Installation ”.

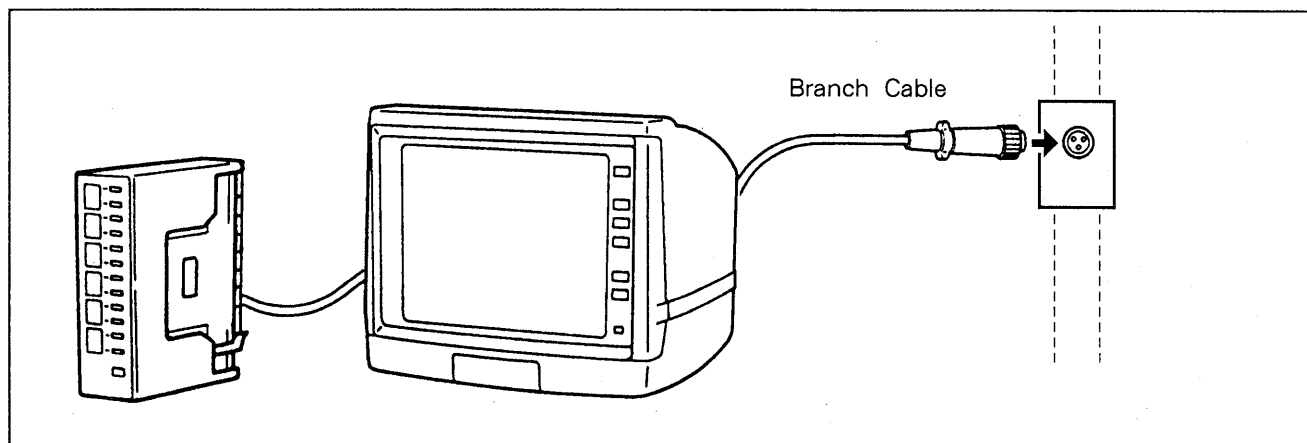
## 5. PREPARATION

### 1. LAN connection for DS – 3300 Central Monitor



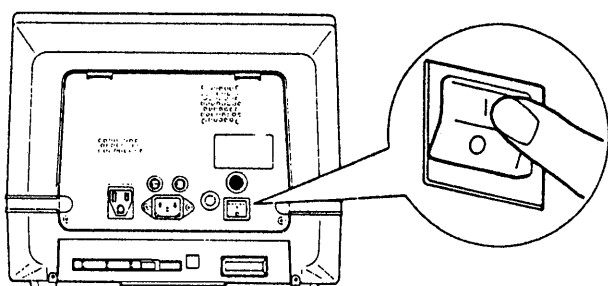
### 2. Confirmation of Bedside Monitor

Make sure that the bedside monitors are connected to the LAN.

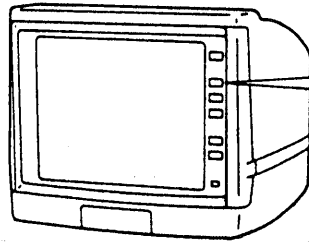


### 3. Input of Bedside ID number and patient name:

#### ① Power Switch is ON !



## ② INITIAL DISPLAY

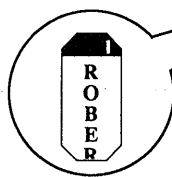


INITIAL  
DISPLAY

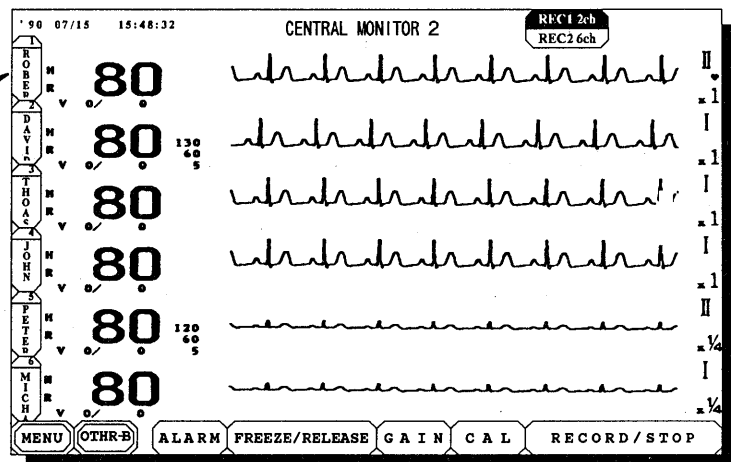


At power turn on rear panel main switch, the INITIAL DISPLAY will automatically be on the screen. At any time, pushing the **INITIAL DISPLAY** switch on the front panel will bring the INITIAL DISPLAY on the screen.

## ③ Bed ID number and Patient Name



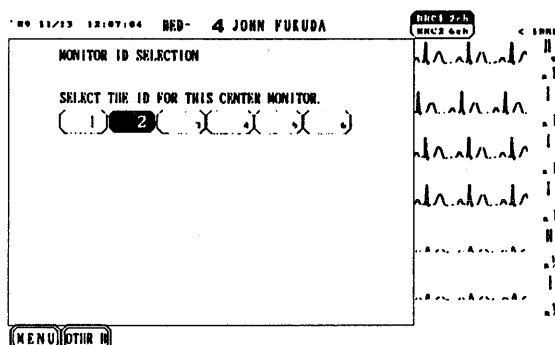
Verify the bed ID number and patient name are on the left of the screen on INITIAL DISPLAY.



When the bed ID number and patient name are not yet registered:

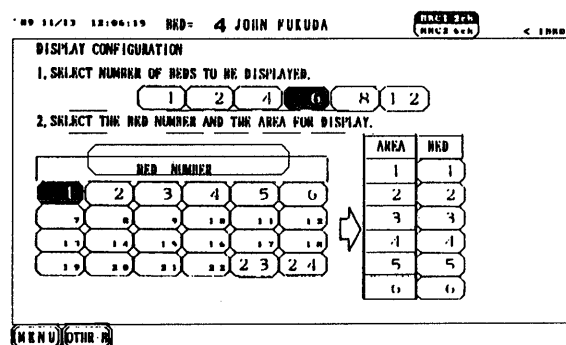
### 1. Central Monitor ID number

Push the **SET UP**, **PRE - SET** and **MONITOR ID** keys in sequence. The display will be shown below. The ID number for this Central Monitor can be selected. One of Central Monitors have to be set to ID 1.



### 2. Bedside Monitor ID number

Push the **SET UP**, **PRE - SET** and **DIPS CONFIG** keys in sequence. The display will be as shown below. The number of beds to be displayed on this monitor can be selected as well as the channel AREA for their display.



## 6. EASY OPERATION !

---

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The number of fixed switches are limited to seven, located at the right of the display. The touch keys are used to reduce the number of mechanical switches and are labeled to clearly indicate their function.

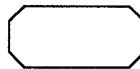
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The touch keys shown on the display appear like this:

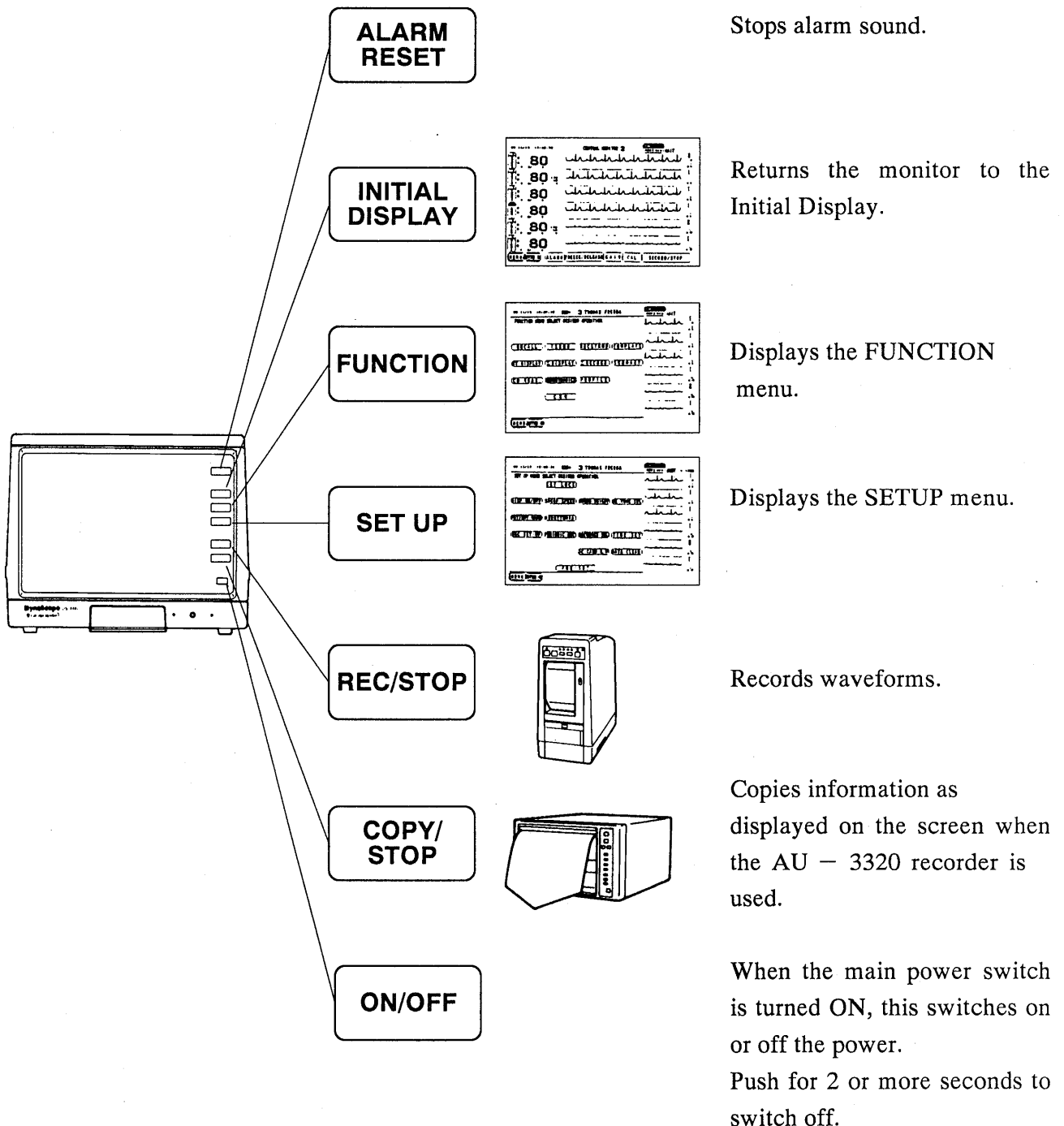


The individual touch keys are only displayed when they are needed.

When a key is pushed, a sound is generated to indicate acceptance of the operation.

## 7. DISPLAY SCREENS AND OPERATIONS

The basic operation of the DS — 3300 patient monitor is realized with the seven dedicated switches on the right of the display and the touch keys shown on the display itself. The diagram below shows the operation of the seven fixed switches:




● The main power switch is located on the rear panel of the DS — 3300.

## 8. DISPLAYS

There are three main screen displays for the DS – 3300.

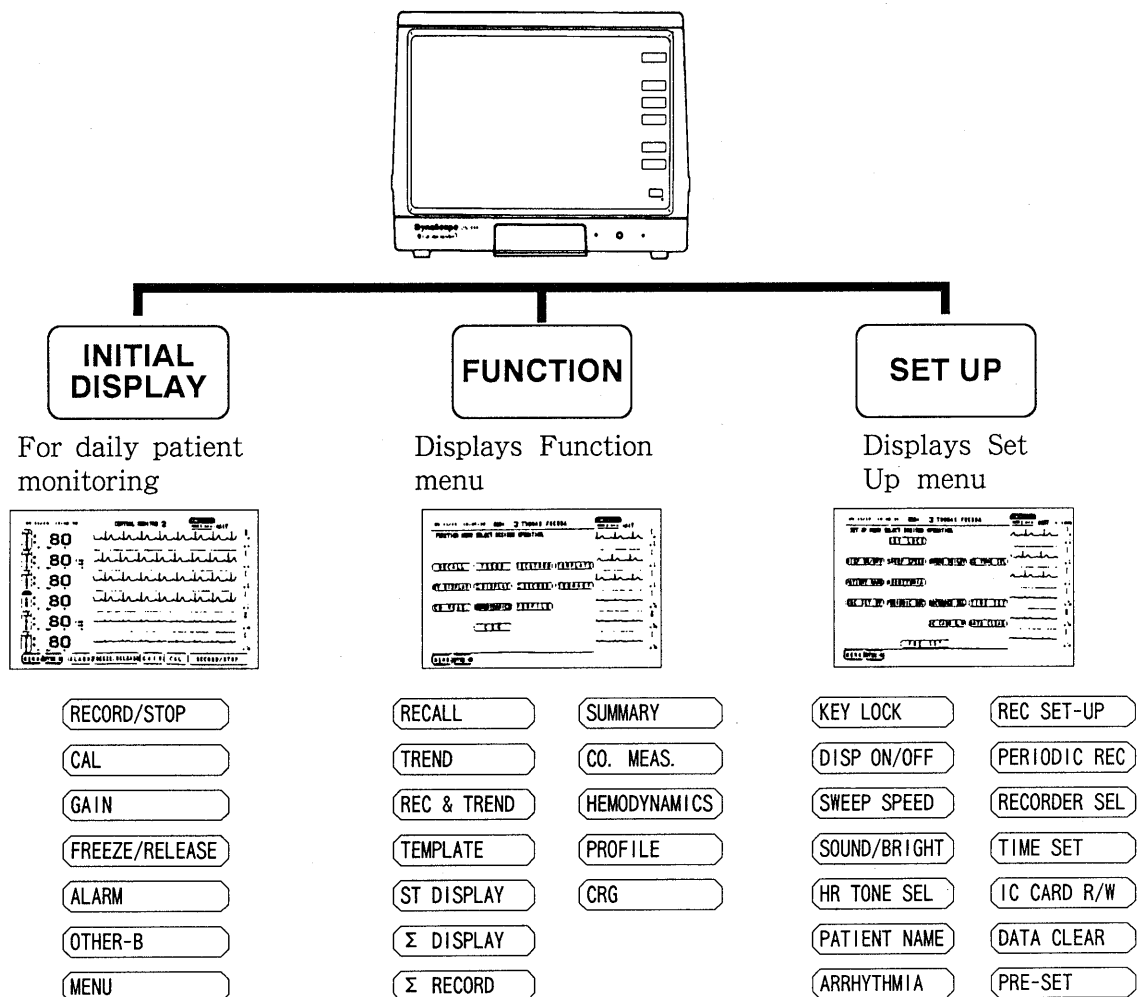
1. **INITIAL DISPLAY :** This is for daily patient monitoring. The fundamental functions for monitoring are all contained in the INITIAL DISPLAY.
2. **FUNCTION DISPLAY :** Other FUNCTIONS of the monitor, such as trend, recall, hemodynamic calculations etc. are controlled here.
3. **SET UP DISPLAY :** Display ON/OFF, clock setting and other functions are controlled through this switch.

Operation of these three switches produces useful menus on the display. The desired function is then selected via the touch keys.

All touch keys are displayed with an eight sided border and look like this: 

When a key is pressed, a tone is heard to confirm operation.

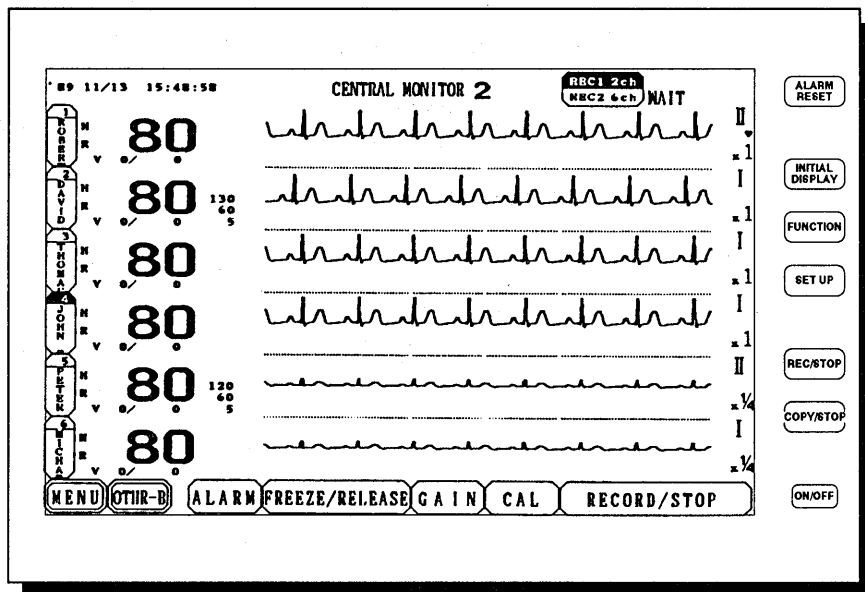
The menu selections for the three switches described above are outlined below,



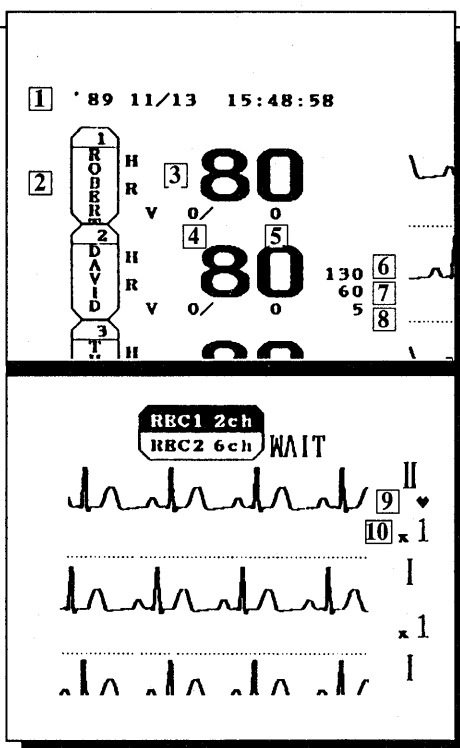
## 8.1 INITIAL DISPLAY

push **INITIAL DISPLAY**

Push the **INITIAL DISPLAY** switch and the all patient display mode will be shown. The display below is an example for a six patient display. For each patient, six seconds of ECG waveform, Heart Rate and alarm limits are displayed.



- 1 Date, time
- 2 BED SELECT key (patient Name)
- 3 Heart Rate



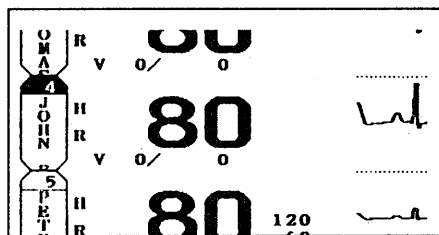
- 4 VPC Accumulated Number per minute
- 5 VPC Accumulated Number per hour
- 6 HR Upper Alarm Limit
- 7 HR Lower Alarm Limit
- 8 VPC Alarm Threshold (Number per minute)

- 9 HR Sync Mark
- 10 Waveform Gain

# (1) RECORD/STOP, CAL

from **INITIAL DISPLAY**  
push **RECORD/STOP** or **CAL**

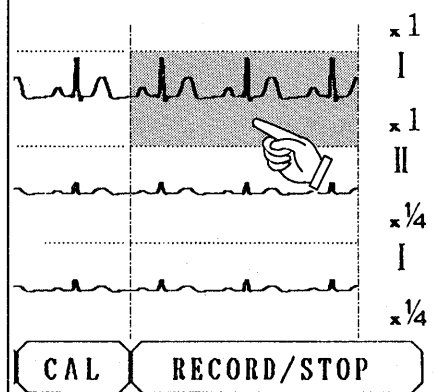
1. Bed is selected and waveform is recorded



**RECORD/STOP**

**REC1 2ch**  
**REC2 6ch**

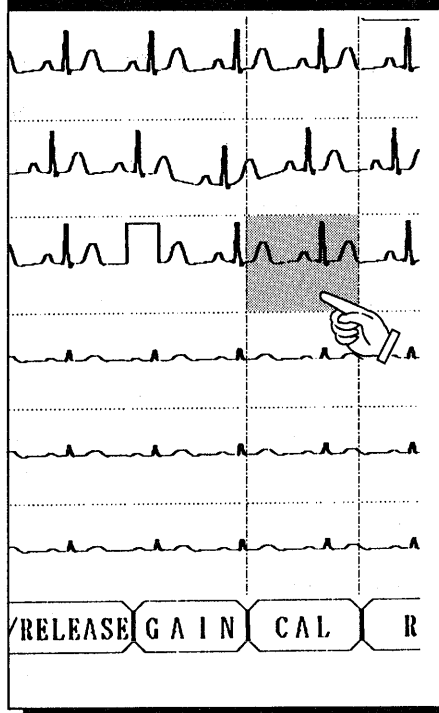
2. Waveform recording for individual bed



3. CALIBRATION  
Waveform

**CAL**

4. Individual Bed Calibration



◆ When the **RECORD/STOP** key at the bottom of the screen is pressed, the waveforms for the bed selected at the left of the screen will be recorded. When the 2 channel recorder is selected, those waveforms selected will be recorded. This is the same function as the **RECORD/STOP** switch on the front panel.

◆ When the RECORD/STOP area for an individual ECG is pushed, only that bed will be recorded.

◆ All bed can be calibrated by pushing the **CAL** key.

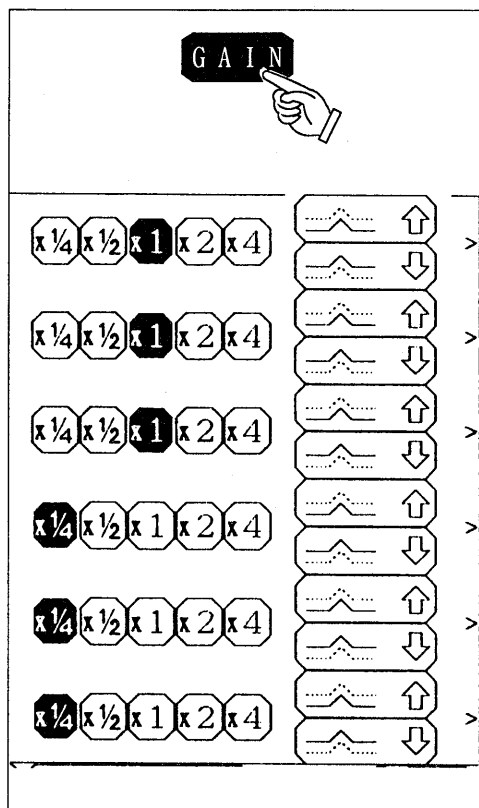
◆ When the CAL area for an individual ECG is pushed, only that bed will have a Calibration waveform.



## (2) GAIN, FREEZE/RELEASE

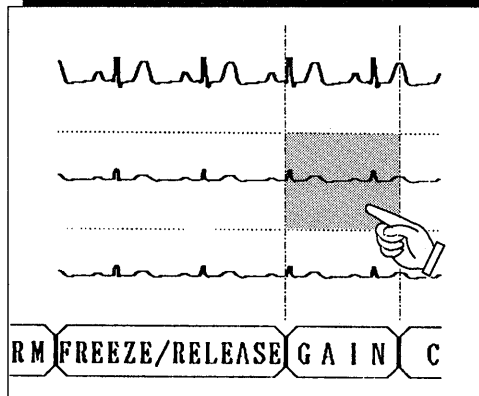
from **INITIAL DISPLAY**  
push **GAIN** or **FREEZE/RELEASE**

### 5. Gain and Positon



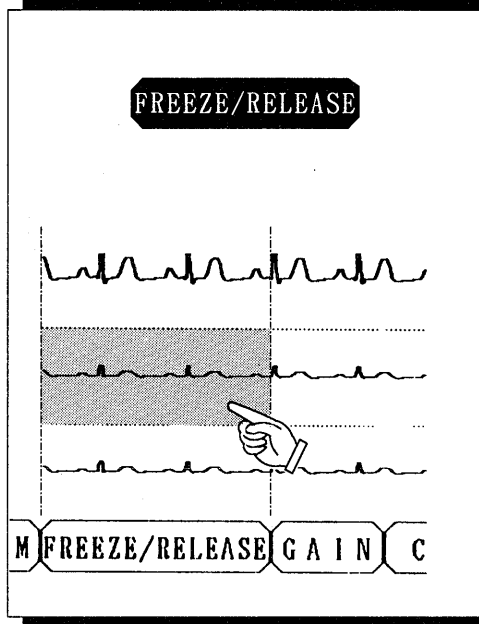
◆ Push the **GAIN** key to display the gain and position controls for all beds. For any or all beds, the gain or position can be set. Current waveform position is indicated by the ">" mark. Push the **GAIN** or **INITIAL DISPLAY** to return to the initial display.

### 6. Gain and Position for Individual Bed



◆ Push the **GAIN** key area of the ECG and the GAIN and position for only that bed can be changed.

### 7. Frozen Waveforms



◆ Push the **FREEZE/RELEASE** key to freeze all the waveforms simultaneously. Push again to release.

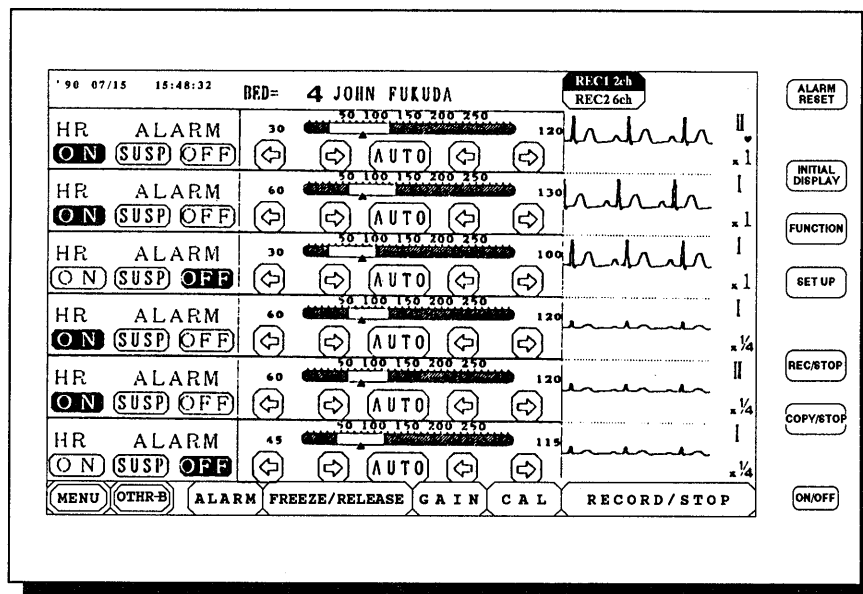
### 8. Freezing an Individual Bed

◆ Push the **FREEZE/RELEASE** area of the ECG will be frozen. The 2 second segment at right side will remain as real time ECG. Push the ECG key again to release.

### (3) ALARM SET UP

from **INITIAL DISPLAY** push **ALARM**

Push the **ALARM** key and the display will be as shown below. For each bed, you can select alarm ON/OFF, SUSPEND or set up the alarm limits. When finished, push the **ALARM** key again or the **INITIAL DISPLAY** switch to return the initial display.



#### 1. Alarm ON/OFF

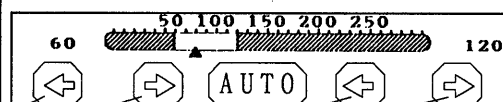


#### 2. Alarm suspend



◆ Push the **SUSP** key to silence the alarm for 3 minutes. This is used when alarm is unavoidable.

#### 3. Alarm Limits



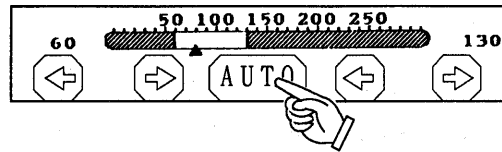
Lower limit

Upper limit

◆ Push the **←** or **→** keys at the left to set the lower limit and the **⇐** and **⇒** keys at the right to set the upper limit.

# ALRM SET UP

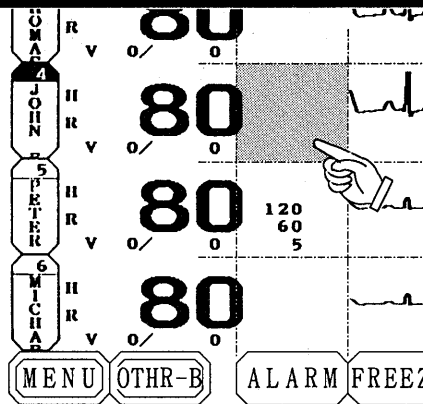
## 4. AUTO matic Limits



◆ Push the **AUTO** key and the limits will be automatically set to 20 beats below and 40 beats above the current heartrate.

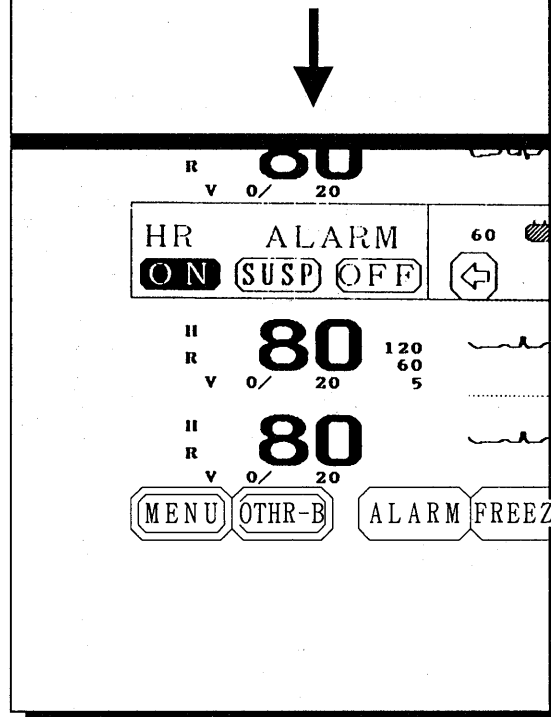
The current heartrate is indicated with a cursor.

## 5. Individual Bed alarm Limits



◆ Push the **ALARM** area in an individual channel and you can set the alarm limits for that individual bed. The same alarm functions as described above can be set.

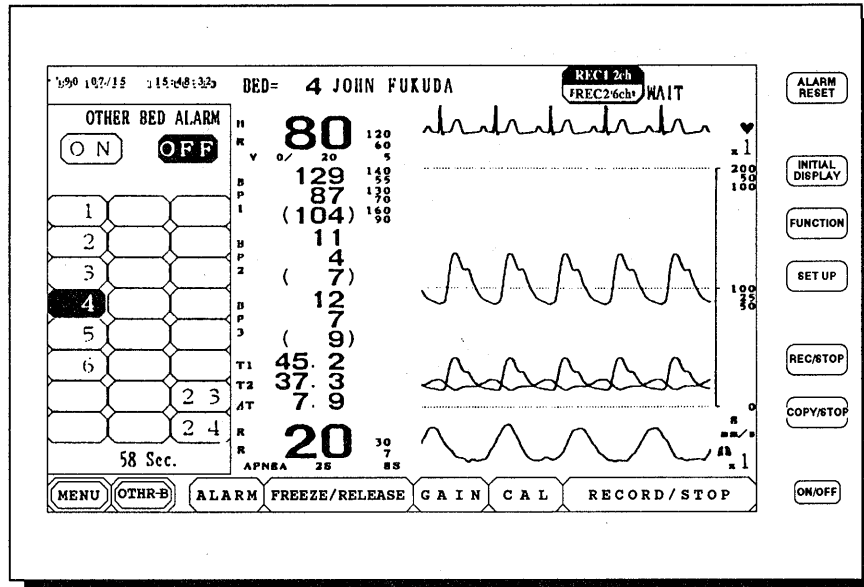
Note : To set alarm limits for other than heart rate, see section 8.2, **ALARM SET UP (INDIVIDUAL DISPLAY MODE).**



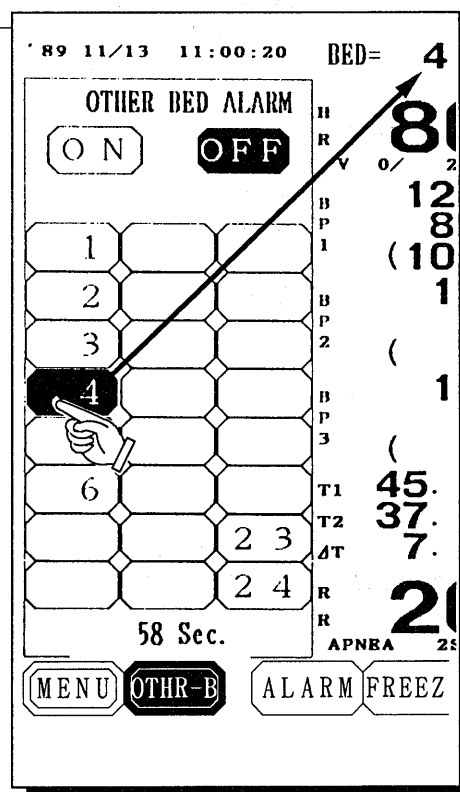
## (4) OTHER BED

from **INITIAL DISPLAY** push **OTHR — B**

When the DS — 3300 is connected in a network with multiple beds, any bed on the network can be viewed on the central monitor, not just the ones that are assigned to the INITIAL DISPLAY. Push the **OTHR — B** key and the following display is shown.



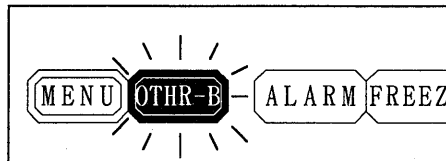
1. Selection of other bedside.  
(Beds not turned on or connected will not be displayed).



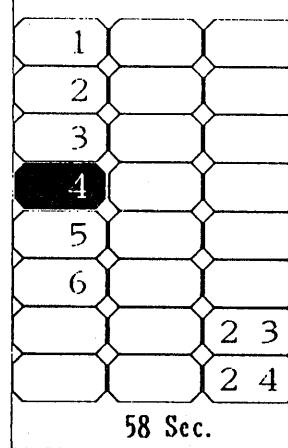
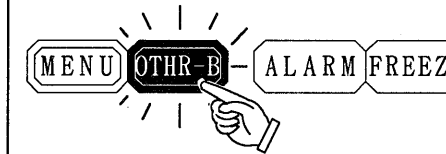
- ◆ Push the key for the bedside that you desire view. The key will be in reverse contrast and the bed number and patient's name will be displayed at the top of the screen.

## OTHER BED

2. When another bed is in alarm.



3. To display the bed in alarm.



4. Turning ON or OFF the OTHER BED alarm sound.



5. To record the waveform of the other bed.



◆ When an alarm is set off in another bed, a tone is heard and the **OTHR – B** key blinks.

◆ Push the **OTHR – B** key and that bedside will be displayed.

◆ When more than one bed is in alarm, the bed with the lowest assigned number will be displayed. The other beds in alarm will be displayed in reverse contrast.

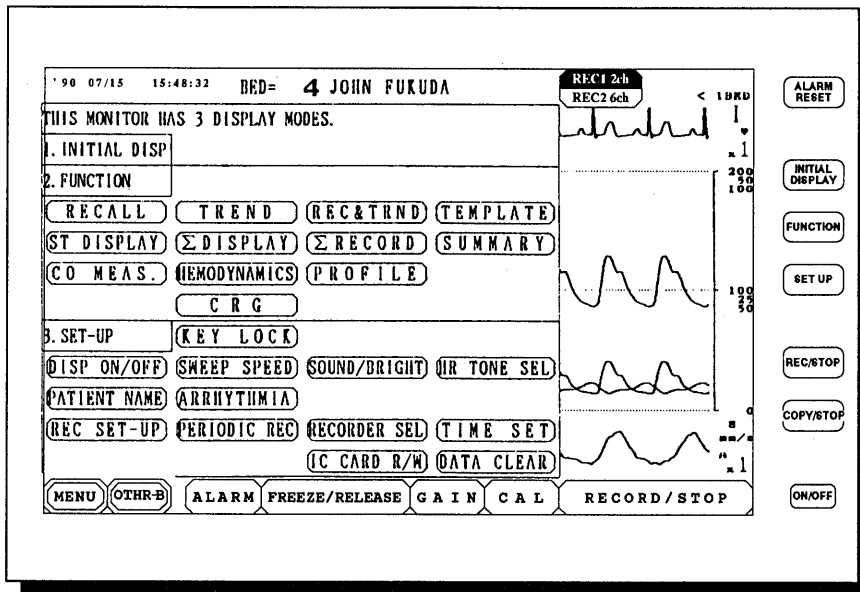
◆ Push the **ALARM RESET** switch to reset the alarm of that bed.

◆ By pushing the **RECORD/STOP** key, the waveforms for that bed can be recorded by the recorder for that bed.

## (5) MENU

from **INITIAL DISPLAY** push **MENU**

When the **MENU** key is pushed, the following display is shown. This shows the various function of the monitor. To select a function, simply push the desired key. By using the **MENU** key, it is not necessary to remember the selections from the **FUNCTION** or **SET UP** keys.

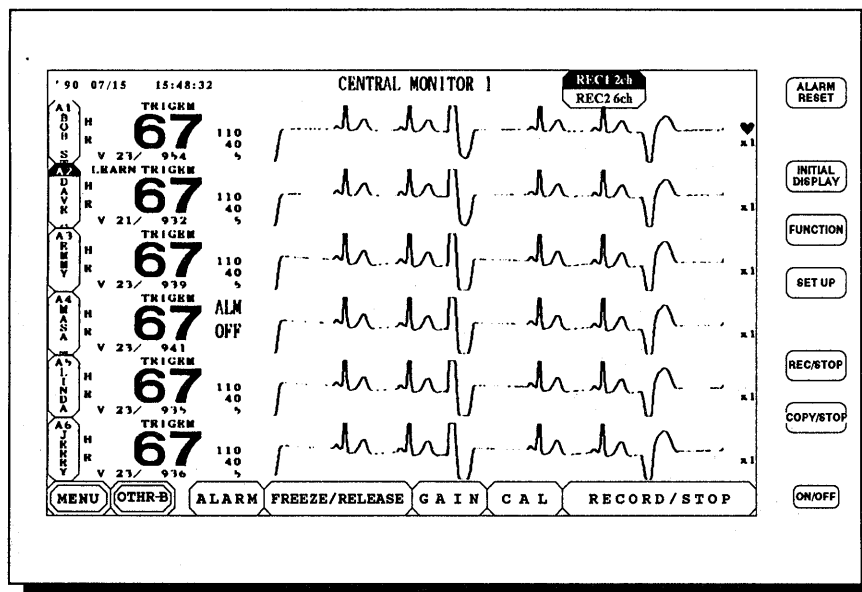


## (6) RECORDER CHANGE

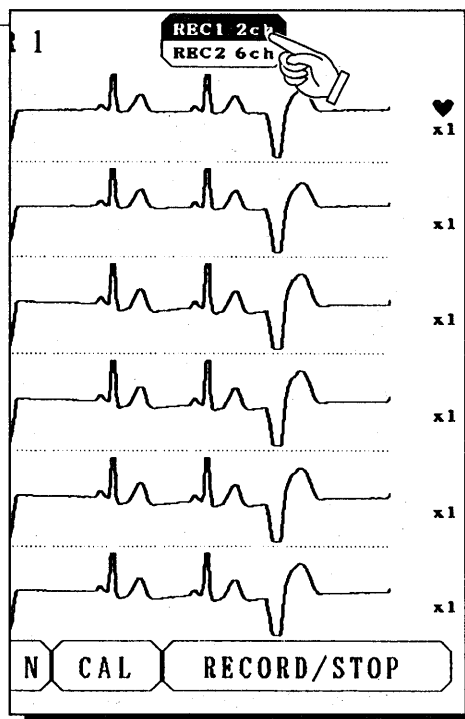
from INITIAL DISPLAY push

REC 1  
REC 2

When two recorders are connected to the monitor, recorder selection is obtained by the **REC1/REC2** key.



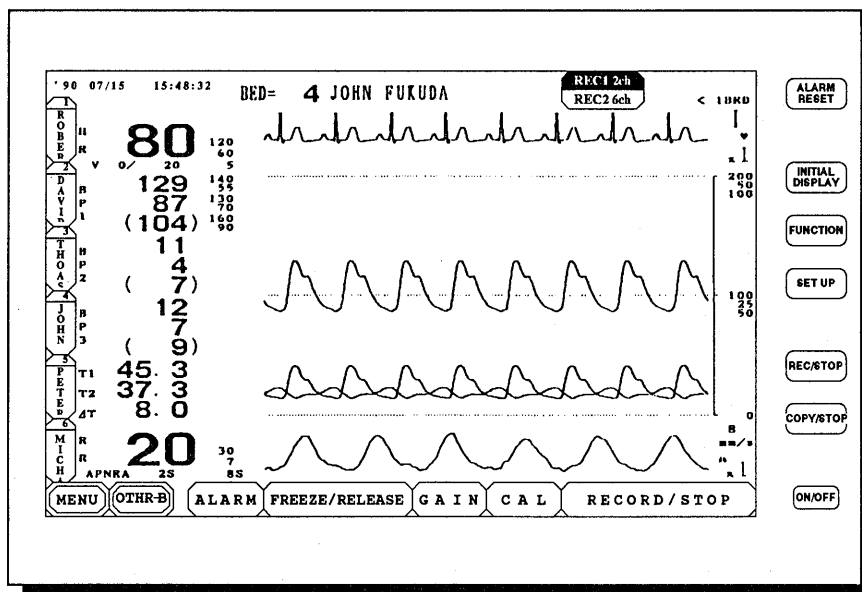
Selection of RECORDER 1  
or RECORDER 2.



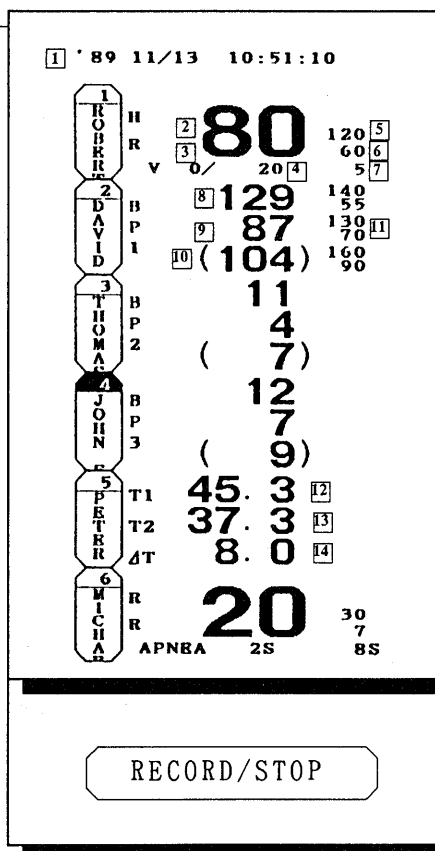
◆ The selected recorder will  
be in reversed contrast.

## 8.2 INDIVIDUAL DISPLAY MODE from **INITIAL DISPLAY** push **BED SELECT**

When the **INITIAL DISPLAY** switch and the **BED SELECT** key at the far left of the screen is pushed, the monitor will display the INITIAL DISPLAY of the individual bed. In the example below, ECG, blood pressure, respiration and body temperature are being monitored. Waveform displays for six seconds, digital measured values and alarm limits for each parameter are displayed.



1. Date and time
2. Heart Rate
3. VPC number for 1 minute
4. VPC number for 1 hour
5. Heart rate upper alarm limit
6. Heart rate lower alarm limit
7. VPC per minute alarm limit



8. Systolic Pressure value
9. Diastolic Pressure value
10. Mean Pressure value
11. B.P. Alarm Limits  
Upper Limit  
Lower Limit

12. Body Temperature 1
13. Body Temperature 2
14. Temp. (T1 - T2)

### Waveform Recording

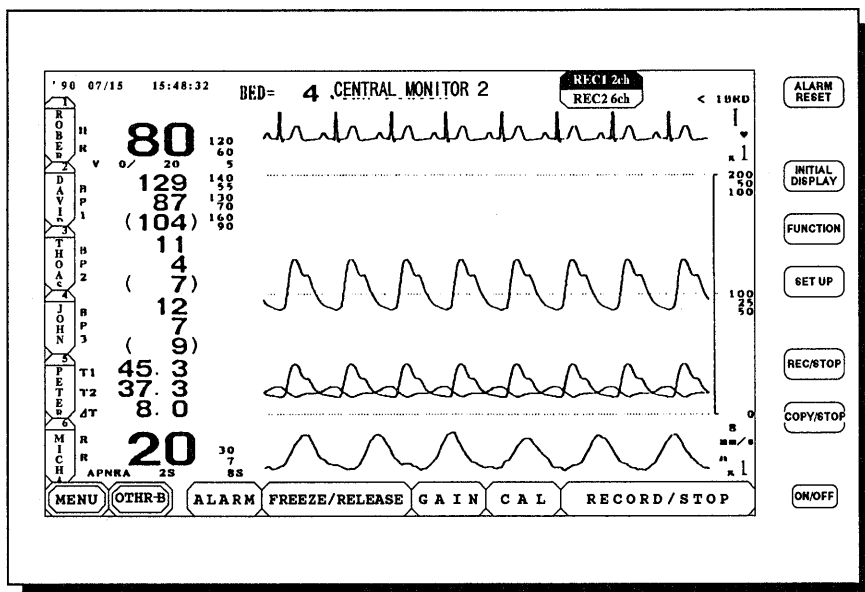
◆ Push the **RECORD/STOP** key to record the waveforms by the recorder. Push again to stop recording.



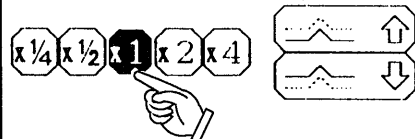
# (1) GAIN SETTING (INDIVIDUAL DISPLAY MODE)

from **INITIAL DISPLAY**  
push **BED SELECT** **GAIN**

When the **GAIN** key is pushed in the INDIVIDUAL DISPLAY MODE, you can set the gain for each parameter in the same manner as if you are at the bedside. Push the **GAIN** or **INITIAL DISPLAY** switch to return to the INITIAL DISPLAY.

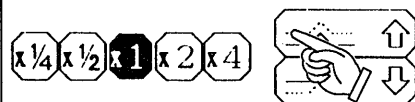


## 1. Adjust ECG GAIN



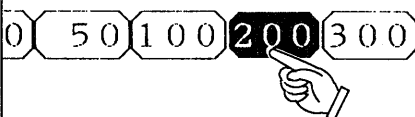
◆ Select the desired ECG waveform gain from 1/4, 1/2, 1, 2 or 4.

## 2. Adjust ECG position



◆ Push the **↑** or **↓** keys to position the ECG waveform.

## 3. Adjust Blood Pressure scale



◆ Select the desired scale for BP waveforms from 20, 50, 100, 200, or 300mmHg.



◆ Respiration gain and position is selected in the same manner ECG.

## (2) WAVEFORM FREEZE

(INITIAL DISPLAY MODE)

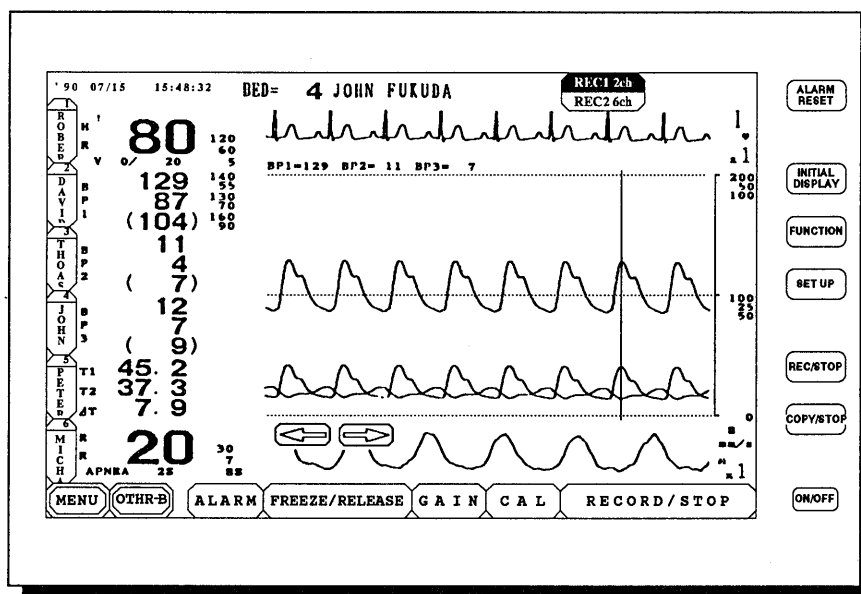
push

**BED SELECT**

from **INITIAL DISPLAY**

**FREEZE/RELEASE**

When the **FREEZE/RELEASE** key is pushed in the INDIVIDUAL DISPLAY MODE, all waveforms will be frozen. A cursor can be enabled to display the absolute pressure value where the cursor intersects the waveform. Push the **FREEZE/RELEASE** key again to return to normal monitoring. Push the **INITIAL DISPLAY** switch to return to the INITIAL DISPLAY.



From the INITIAL DISPLAY push the **SET UP** switch to display the set up menu. Then push the **PRE - SET** and **SOFT SWITCH** keys and the display will be shown right. Answer YES to item 5, "BP CURSOR FREEZE" mode to enable the cursor function.

ITEM	STANDARD	SELECTION
1		
2		
3		
4		
5	BP CURSOR AT FREEZE MODE	OFF <b>ON</b>
6		
7		
8		
9		
10		

(PAGE BACK) (PAGE FWD) PAGE 1 OF 2

This zoomed-in view shows the BP1, BP2, and BP3 waveforms. A vertical cursor is positioned on the BP1 waveform, and the value 'BP1=129 BP2= 11 BP3= 7' is displayed at the top. Navigation arrows are shown at the bottom.

◆ The BP cursor is shown intersecting the BP waveforms. The value at the point of intersection will be displayed above the cursor.

◆ The cursor is moved left and right with the and keys.

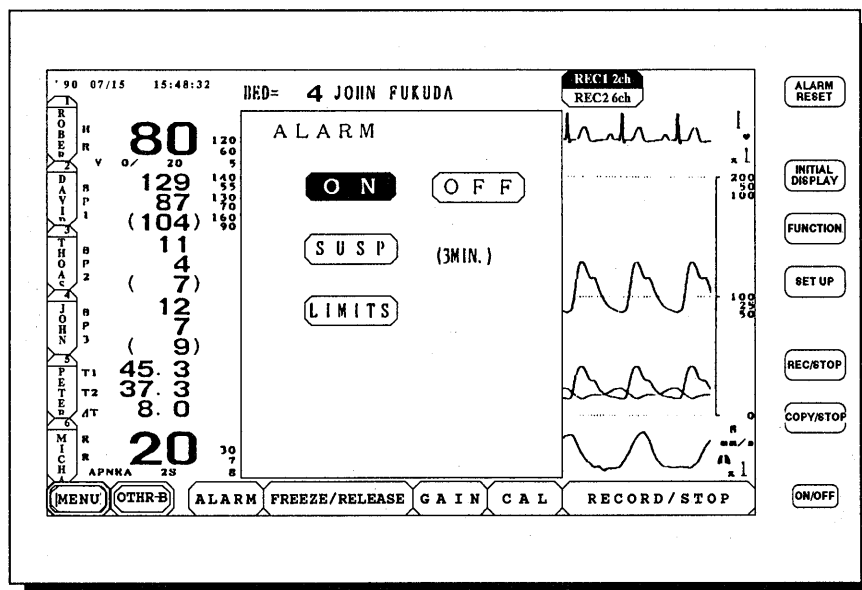
### (3) ALARM SET UP

from **INITIAL DISPLAY**  
push **BED SELECT** , **ALARM**

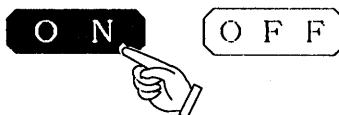
When the **ALARM** key is pushed in the INDIVIDUAL DISPLAY MODE, the following display is shown. Alarm ON/OFF, SUSPEND and ALARM LIMITS can be selected.

Push the **ALARM** key again and display returns to the INITIAL DISPLAY for the bedside.

Push the **INITIAL DISPLAY** switch to return to the central station INITIAL DISPLAY.



#### 1. Turnings ALARMS ON Turnings ALARMS OFF



#### 2. Alarm SUSPEND

**SUSP** (3MIN.)

◆ When the **SUSP** key is pushed, the alarms are suspended for 3 minutes.

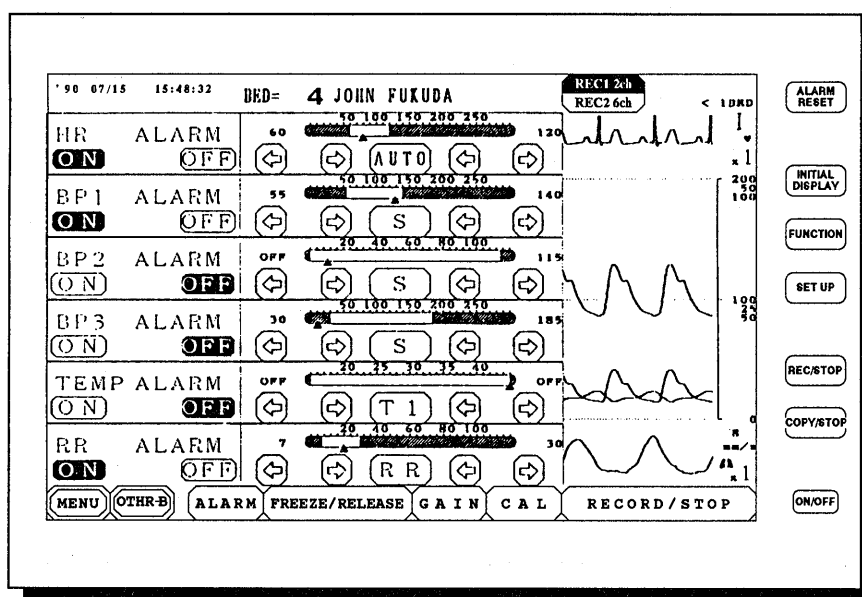
#### 3. Setting ALARM LIMITS

**LIMITS**

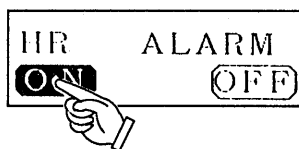
# ALARM LIMIT SET UP

from **INITIAL DISPLAY**  
push **BED SELECT** , **ALARM LIMITS**

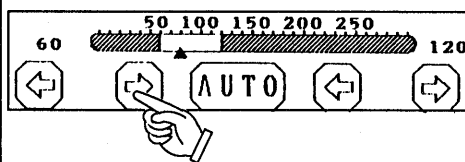
When the **ALARM** and **LIMITS** keys are pushed in the INDIVIDUAL DISPLAY MODE, the following display is shown. Alarms can be turned ON or OFF for each of the parameters. The keys in the center column allow you to set alarm limits for each parameter. Push the **ALARM** key to return to the INDIVIDUAL DISPLAY MODE or push the **INITIAL DISPLAY** switch to return to the central monitor INITIAL DISPLAY.



1. Turning ON or OFF the alarm limit for each parameter.

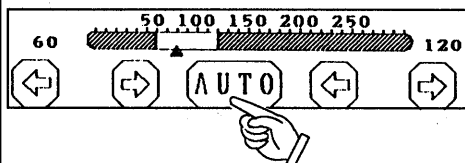


2. Setting Upper and Lower alarm limits.



◆ Use the and keys on the left to adjust the lower limit and those on the right to adjust the upper limit.

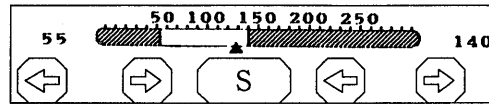
3. Automatic alarm limit (HR only)



◆ When the **AUTO** key is pushed, the lower HR limit is set to 20 beats below the current Heart Rate and the upper limit is set to 40 beats above the current Heart Rate.

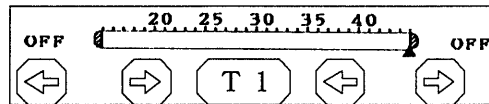
## ALARM LIMIT SET UP

### 4. Setting BP limits for Systolic, Diastolic, and Mean Pressures.



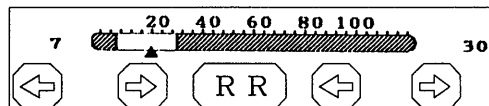
◆ By pushing the **(S)**, **(D)**, or **(M)** keys, the alarm limits for Systolic, Diastolic or Mean pressure can be set.

### 5. Setting Temperature alarm limits for T1, T2, or $\Delta T$ .



◆ By pushing the **(T1)**, **(T2)** or **( $\Delta T$ )** keys, the alarm limits for T1, T2 or  $\Delta T$  can respectively be set.

### 6. Setting Respiration and Apnea alarm limits.



◆ By pushing the **(RR)** or **(APN)** keys, the alarm limits for Respiration or Apnea can be set.

The current value for each parameter is shown by alarm slide indicator.

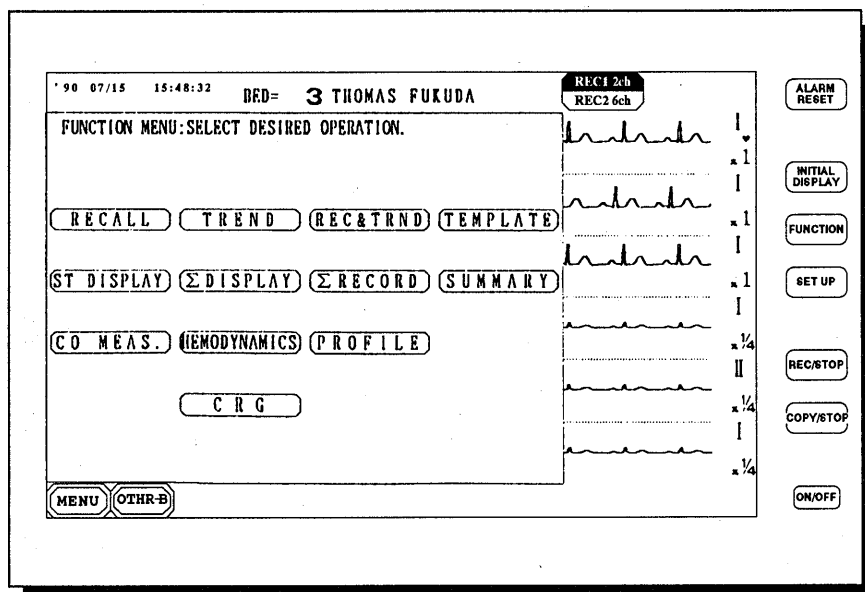


## 8.3 FUNCTION MENU

push **FUNCTION**

When the **FUNCTION** switch is pushed, the following display is shown. Push the appropriate key for the data that you wish displayed.

To select a patient, push the **BED SELECT** key at the far left of the screen.

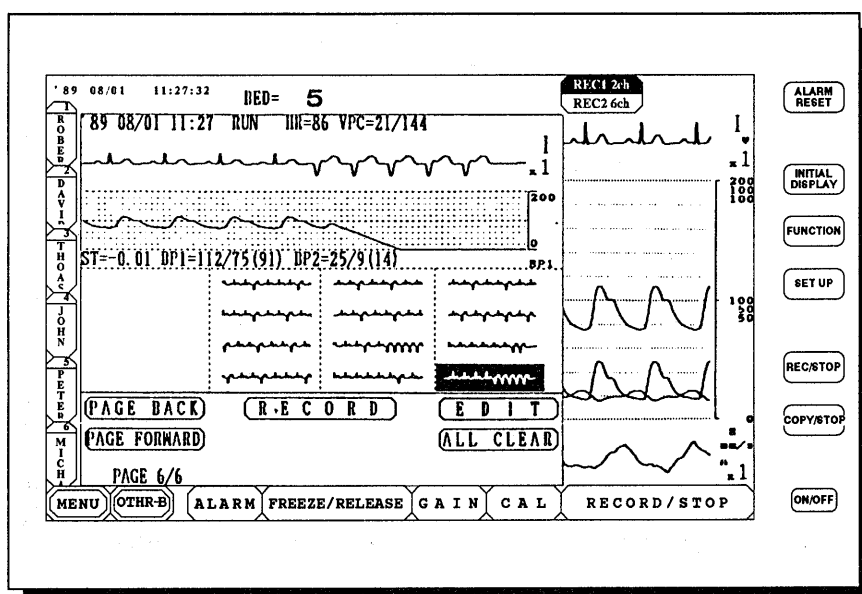


# (1) RECALL

from **FUNCTION** push **RECALL**

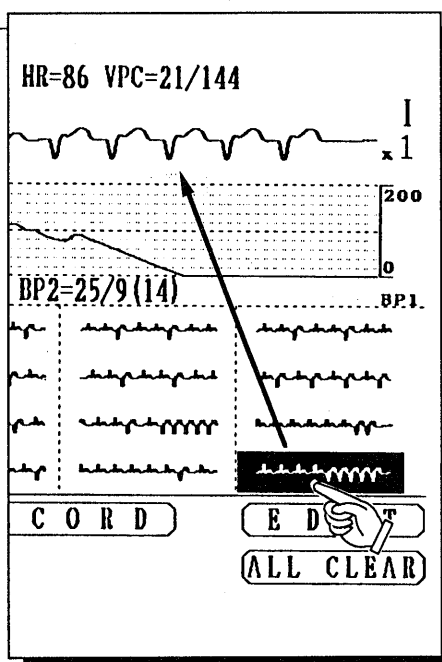
When the **FUNCTION** switch and the **RECALL** key are pushed, the following display is shown. The large waveform(s) at the top of the display is the latest stored in memory.

The 16 compressed waveforms below the large one are the next 16 in memory. In total, 192 waveforms can be stored if only the ECG is stored. If ECG and an other waveform are stored, the memory will hold 48 events(in case of 12 sec. waveform).



1. In the upper portion of the display, the latest recall event is displayed with the alarm name, date and time of the event, HR, VPC number and measured values of all measured parameters at the time of alarm.

2. To display one of the compressed waveforms in full size. The top left waveform is the oldest, the bottom right is the latest.



◆ Recall waveform length is selectable for 6 or 12 seconds. If desired, one other waveform besides ECG can be stored in the memory for recall.(see section RECALL SET - UP)

◆ Push the compressed waveform and it will be displayed in full size at the top of the screen. The waveform displayed in full size will be displayed in reverse contrast.



## **PAGE BACK** key:

Displays the previous 16 waveforms.

## **PAGE FORWARD** key:

Displays the next 16 waveforms.

## **RECORD** key:

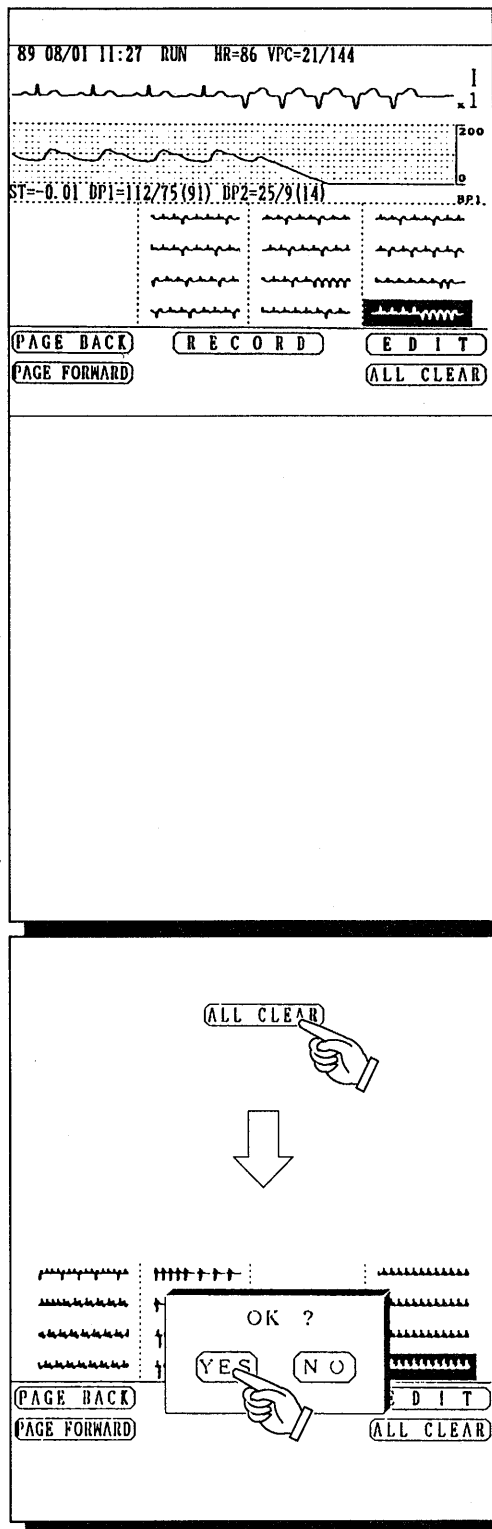
Waveform displayed in the upper area is recorded.

## **EDIT** key:

The waveform displayed in the upper area is cleared from memory.

## **ALL CLEAR** key:

All the recall waveforms are cleared from memory.

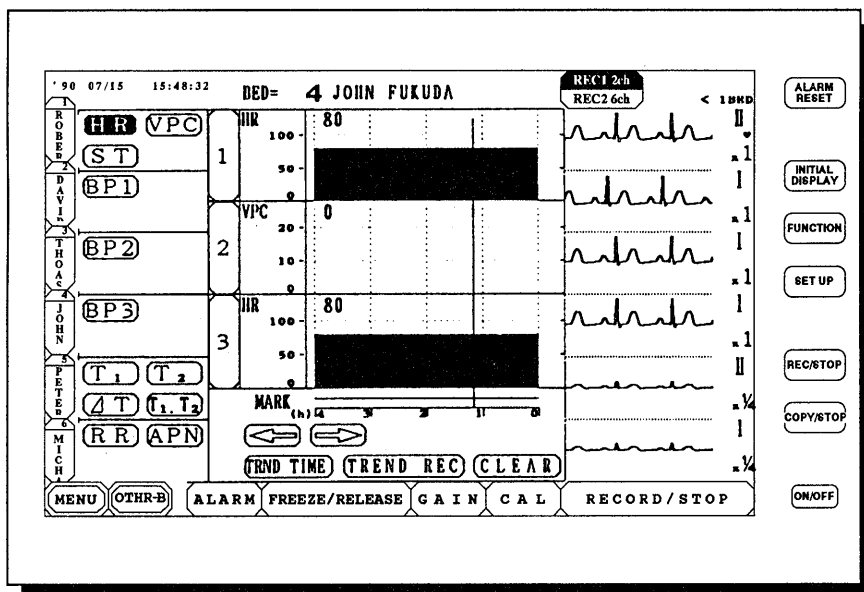


◆ When the **ALL CLEAR** key is pushed, a confirmation tool is displayed. Push **YES** to clear all data.

## (2) TRENDGRAM

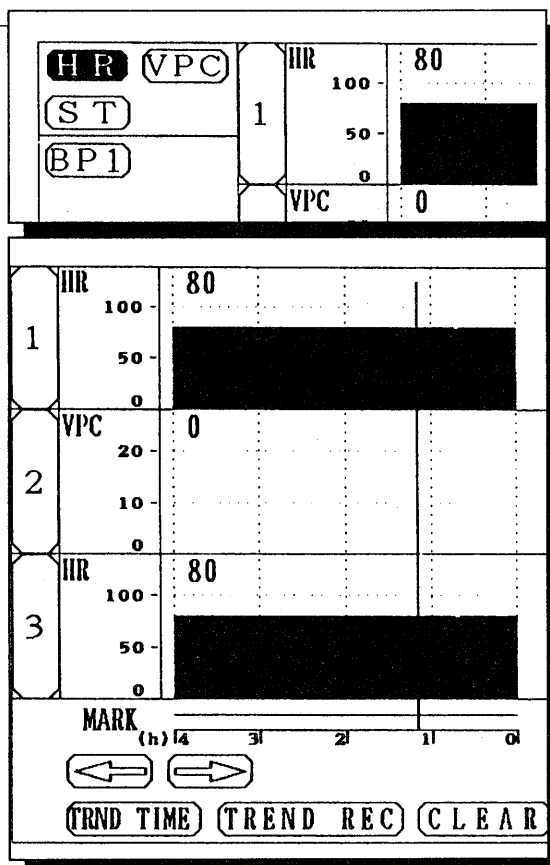
from **FUNCTION** push **TREND**

When the **FUNCTION** and the **TREND** key are pushed, the following display is shown. Three parameters can simultaneously be displayed on the trendgram.



1. Selection of trend parameter for display.

2. The  $\leftarrow$  and  $\rightarrow$  keys are to move the cursor left and right. The value of the trend data where the cursor intersects are displayed in the upper left corner of the trendgram.



◆ First push the display parameter, then push ①, ②, or ③ to assign it's display location.

# TRENDGRAM

## TRND TIME key:

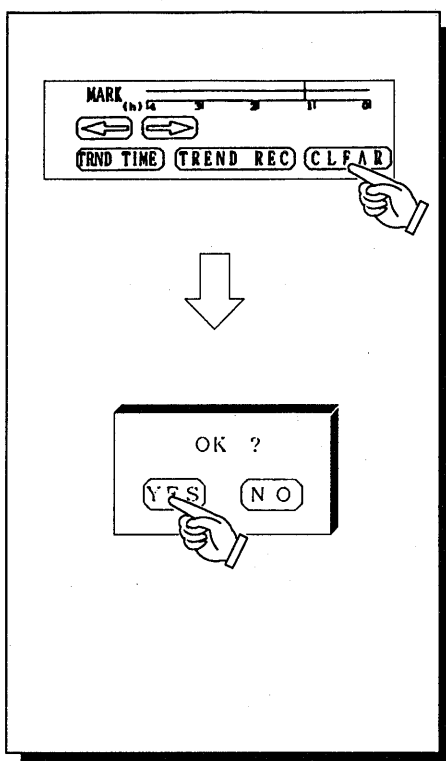
This key will change the trend time. Times of 1, 2, 4, 8 or 24 hours (or short term of 1, 5, 10, 30 or 60 minutes) can be selected. (See section SOFT SWITCH).

## TREND REC key:

This key will print the trendgram on the recorder.

## CLEAR key:

This will clear the trend data.

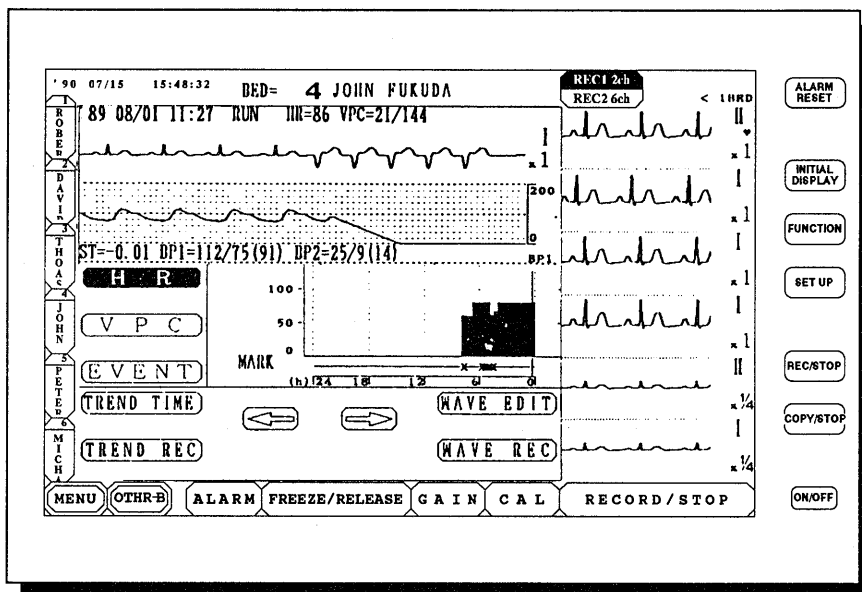


◆ When the **CLEAR** key is pushed, a confirmation tool will appear. Push **YES** to clear trend data.

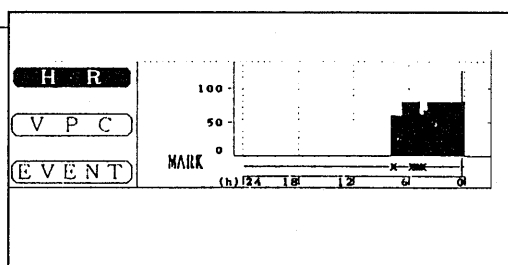
### (3) RECALL AND TREND

from **FUNCTION**  
push **REC & TRND**

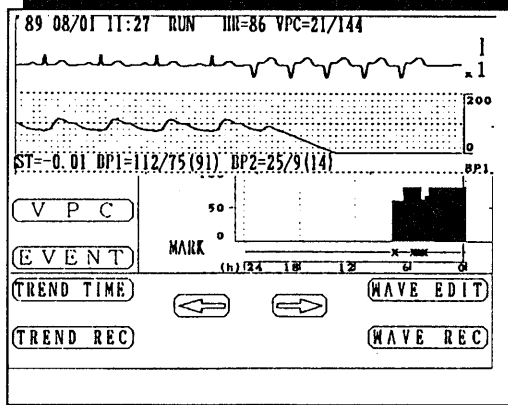
When the **FUNCTION** switch and the **REC & TRND** key are pushed, the following display is shown. A trendgram together with the recall waveform will be displayed along with a cursor.



#### 1. Selection of Trendgram



#### 2. A cursor is displayed onto the trendgram to show the position of recalled waveform in relation to the trend data.



◆ The trend data for HR, VPC, or EVENT can be displayed.

◆ When only ECG is stored in memory (RECALL SET – UP), only the ECG waveform will be displayed.

◆ Push the **←** key to show older recall waveforms and the **→** key to show newer ones.

## RECALL AND TREND

### **TREND TIME** key:

This key will change the trend time. Times of 1, 2, 4, 8 or 24 hours (or short term of 1, 5, 10, 30 or 60 minutes) can be selected. See section SOFT SWITCH.

### **TREND REC** key:

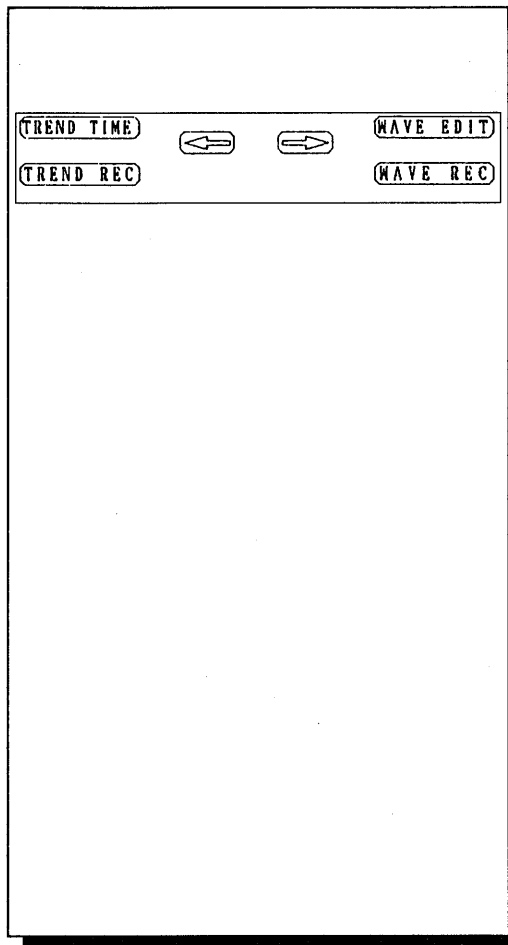
This key will print the trendgram on the recorder.

### **WAVE EDIT** key:

When this key is pushed, the recall waveform will be cleared from memory.

### **WAVE REC** key:

This key will record the recalled waveform on the recorder.

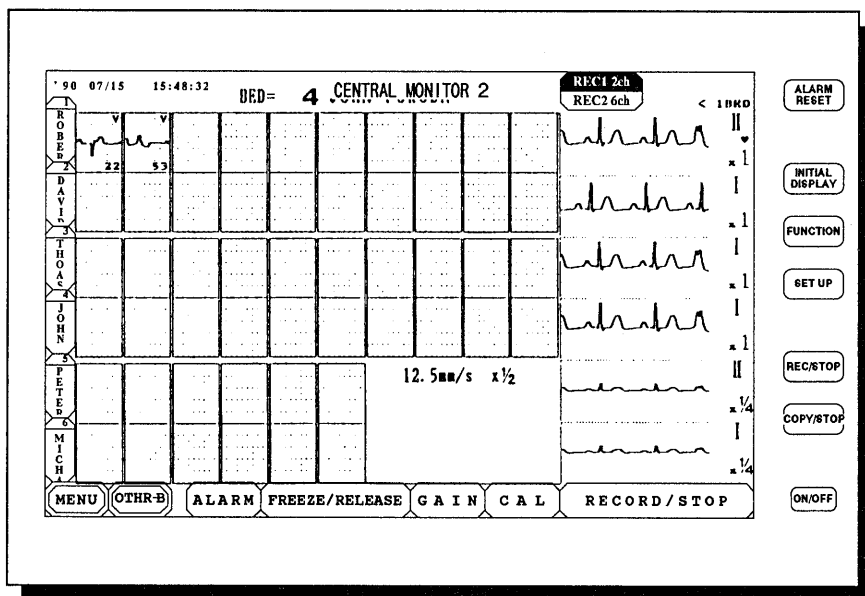




## (4) VPC TEMPLATE

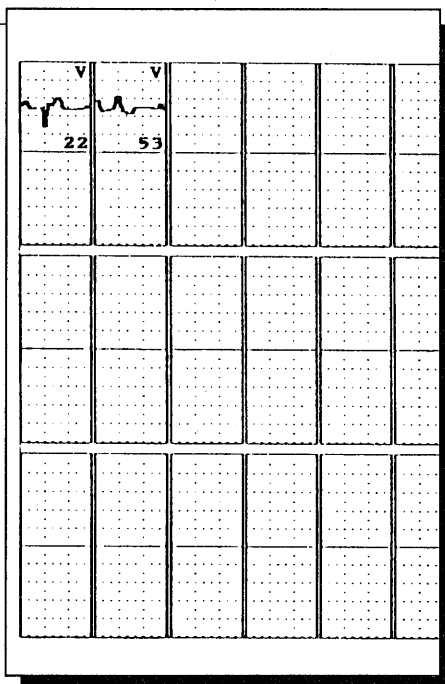
from **FUNCTION** push **TEMPLATE**

When the **FUNCTION** switch and the **TEMPLATE** key are pushed, the following display is shown. Up to 26 different templates of VPCs can be recognized and displayed.



Up to 26 different kinds of VPC morphology are recognized and displayed.

(Up to 13 kinds per channel)

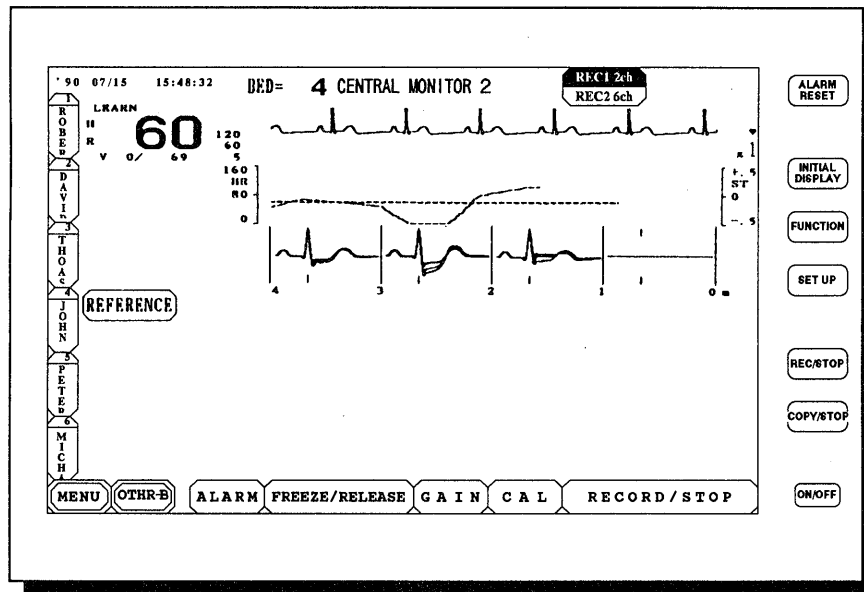


◆ The figure at the bottom right of the template waveform is the total number of times that this morphology has occurred.

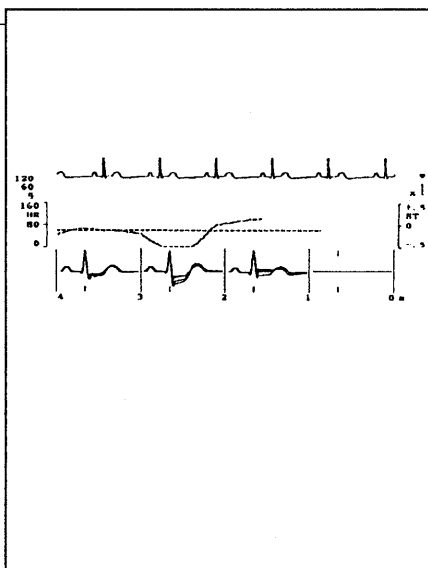
## (5) ST DISPLAY

from **FUNCTION** push **ST DISPLAY**

When the **FUNCTION** switch and the **ST DISPLAY** key are pushed, the following display is shown. The ST segment for two leads can be monitored.

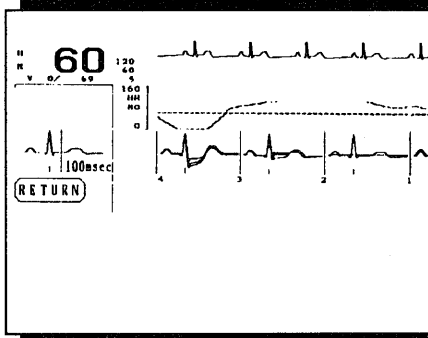


1. The current six seconds of ECG is displayed in the upper portion of the screen. The trendgrams of ST and instantaneous heart rate are in the center portion. The lower portion of the display is the superimposition of the past four minutes of the QRST segment. These are displayed in one minute sections, with the latest one minute on the right.



◆ The display is split in half, with two leads of ECG assigned to one area when dual lead ECG is selected.

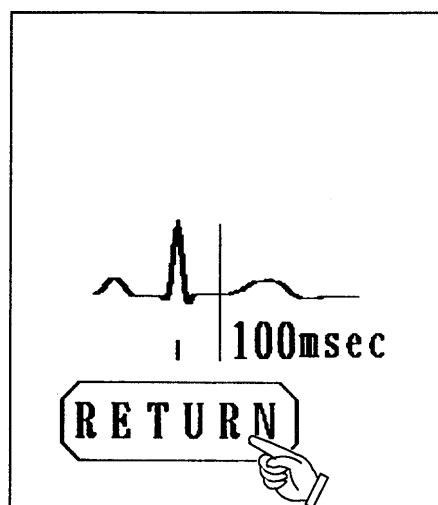
2. The left portion of the screen displays the current heart rate, the **REFERENCE** waveform for each lead and the time when it was selected.



◆ A trendgram of HR and ST is displayed along with the superimposed ST changes for easier understanding.

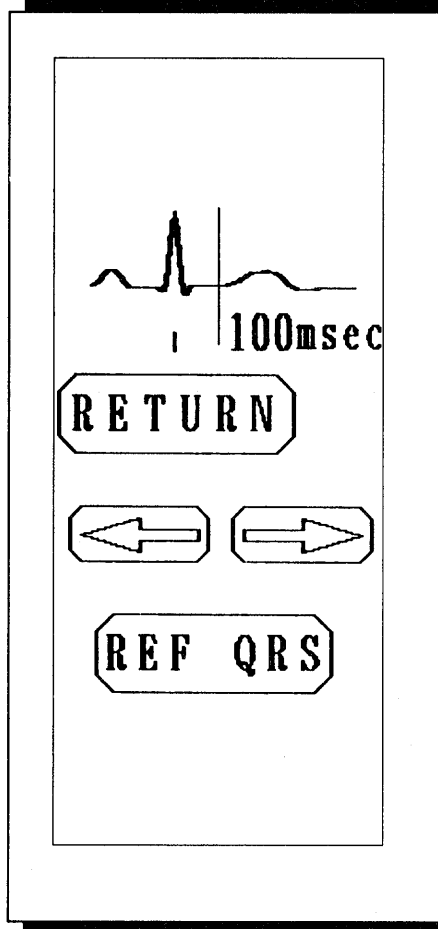


## 3. Selection of REFERENCE waveform.



◆ When the **REFERENCE** key is pushed, the display is changed to show the four keys at the left.

## 4. Changing the ST measurement point.



◆ When the **REF QRS** key is pushed, the waveform is averaged for 10 beats and displayed as the new REFERENCE QRS. At first, the number "10" is displayed in the key area, then 9, 8, 7 until it counts down to 0. At the time, the new reference QRS is displayed.

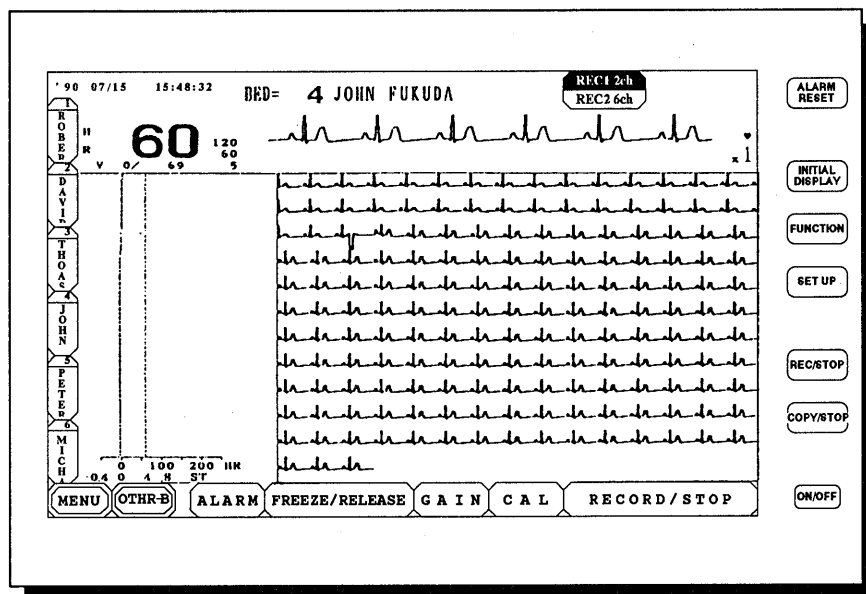
◆ By using the **←** or **→** keys, the ST measurement point can be moved. The measurement point in milliseconds past the R wave peak is displayed as the current measurement point.

Push the **RETURN** key to return to the ST display.

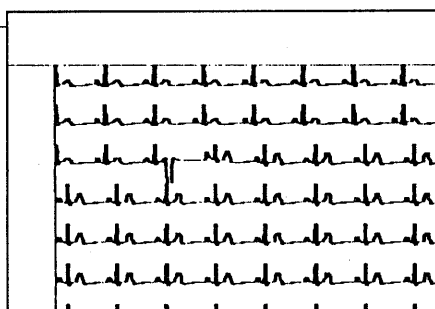
## (6) $\Sigma$ (SIGMA)DISPLAY

from **FUNCTION** push  **$\Sigma$  DISPLAY**

When the **FUNCTION** switch and the  **$\Sigma$  DISPLAY** key are pushed, the following display is shown. A long term compressed ECG display is shown along with a trendgram of instantaneous heart rate and ST elevation.

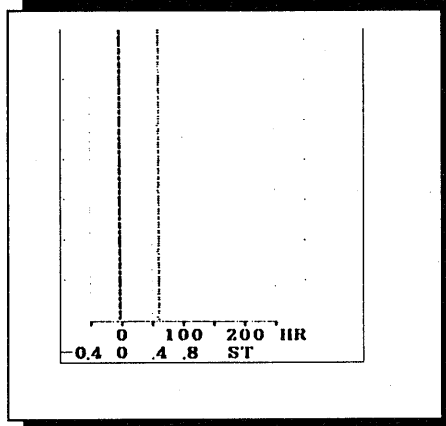


1. Long term compressed ECG display(  $\Sigma$  Display)



◆ The compressed ECG waveform totals about 3 minutes of ECG data, with 15 seconds per line.

2. Trend display of instantaneous HR and ST.

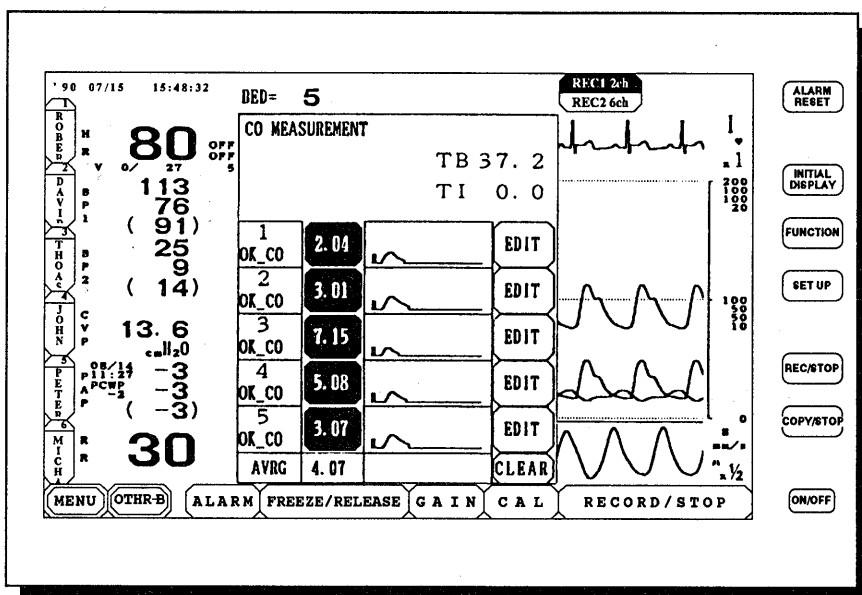




## (8) CO MEASUREMENTS

from **FUNCTION** push **CO MEAS**

When the HF – 300 Cardiac Output module is installed, pushing the **FUNCTION** switch and the **CO MEAS** key will present the following display. Blood temperature and injectate temperature are displayed along with five Cardiac Output values and their respective thermodilution curves.



### 1. Five Cardiac Output values and their respective thermodilution curves.

1 *	OK_CO	5.43	[Curve]	EDIT
2 *	OK_CO	5.41	[Curve]	EDIT
3 *	OK_CO	5.49	[Curve]	EDIT
4 *	OK_CO	5.29	[Curve]	EDIT
5 *	OK_CO	5.46	[Curve]	EDIT
	AVRG	5.42		CLEAR

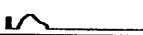




◆ “OK – CO” means the measurement was completed normally.

◆ “ \* ” means the measured value is within  $\pm 10\%$  of the average.

# CO MEASUREMENTS

from **FUNCTION** push **CO MEAS.**

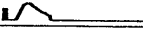
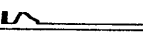
## 4. CO Average

1	OK_CO	2.04		EDIT
2	OK_CO	3.01		EDIT
3	OK_CO	7.15		EDIT
4	OK_CO	5.08		EDIT
5	OK_CO	3.07		EDIT
AVRG		4.07		CLEAR

◆ Select and push the CO value key for appropriate CO values to be averaged.


The selected values will be highlighted in reverse contrast and the average of those will be displayed at the bottom of the CO values. A CO value can be removed from the average by pushing the CO value key again.

## 5. Data Editing

1	OK_CO	3.01		EDIT
2	OK_CO	7.15		EDIT
3				EDIT
				EDIT
				EDIT
AVRG		4.07		CLEAR

OK ?

YES NO



◆ Push the **EDIT** key next to a displayed measurement and that data will be deleted.

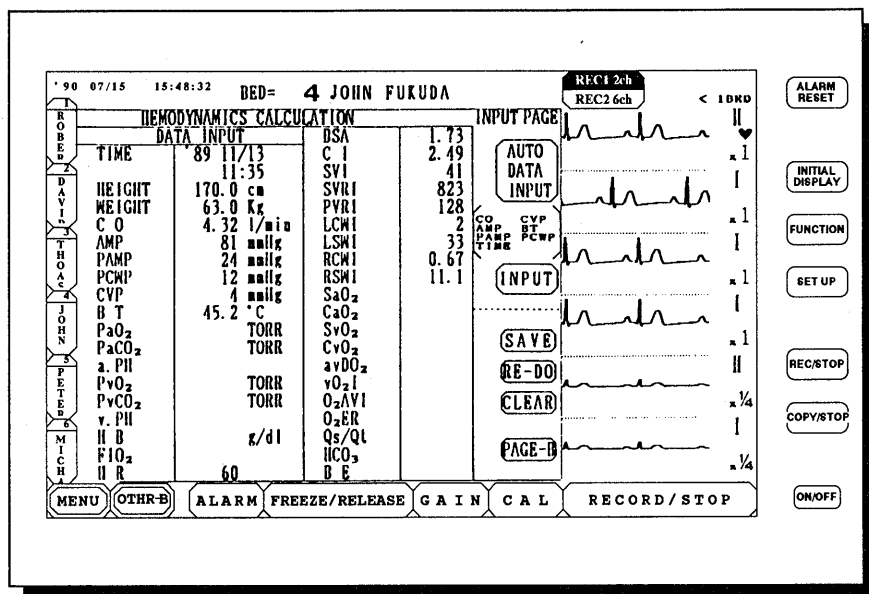
Push the **CLEAR** key and a confirmation tool will appear to clear all data. Push **YES** to clear all of the measured CO values.

## (9) HEMODYNAMICS

from **FUNCTION** push **HEMODYNAMICS**

When the **FUNCTION** switch and the **HEMODYNAMICS** key are pushed, the following display is shown.

Enter data for the items in the left column and the resultant calculations are displayed in the right column.

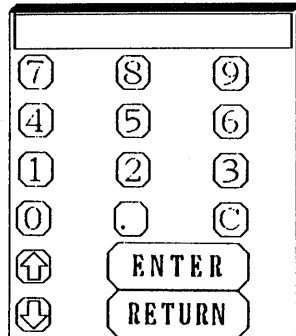
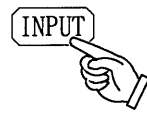


### 1. Automatic data input.



◆ When the **AUTO DATA INPUT** key is pushed, the latest values for CARDIAC OUTPUT (CO), CENTRAL VENOUS PRESSURE (CVP), MEAN ARTERIAL PRESSURE (AMP), BODY TEMPERATURE (BT), PULMONARY ARTERY MEAN PRESSURE (PAMP), PULMONARY CAPILLARY WEDGE PRESSURE (PCWP) and TIME are automatically input.

## 2. Manual data input.



◆ When the **INPUT** key is pushed, a ten key calculator is displayed. Select the item for data input with the **↑** and **↓** keys and enter the data with the numeric keys 0 – 9.

◆ Push the **ENTER** key to input the data into the calculation formula.

When all the data are inputted, or the **RETURN** key is pushed, the calculations are performed and the screen returns to the calculation table.

## 3. Storage of hemodynamics calculation data.



◆ By pushing the **SAVE** key, the hemodynamics data for the calculation just performed is stored in memory.

Data for five calculations can be stored.

## 4. To change data input and perform a different calculation.



◆ Push the **RE – DO** key to clear the data input for the calculation that is presently displayed.

A confirmation message will appear. Push **YES** to clear the present data displayed.

## 5. To clear all data in memory.



◆ Push the **CLEAR** key and a confirmation message will be displayed. Push **YES** to clear all data stored in memory.

## 6. To review previous data.



◆ Push the **PAGE – B** key to review previous data.

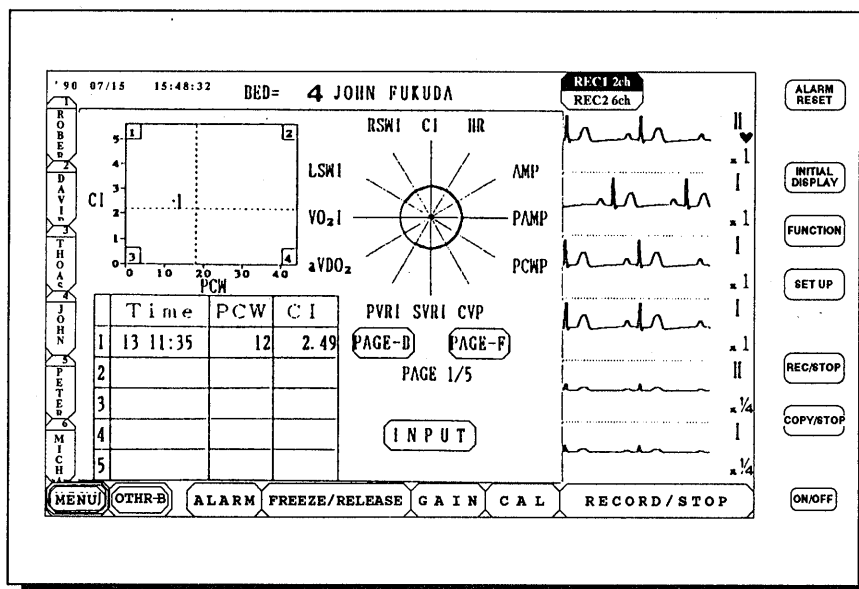
Data of five hemodynamic calculations are available for review.

## (10) PROFILE

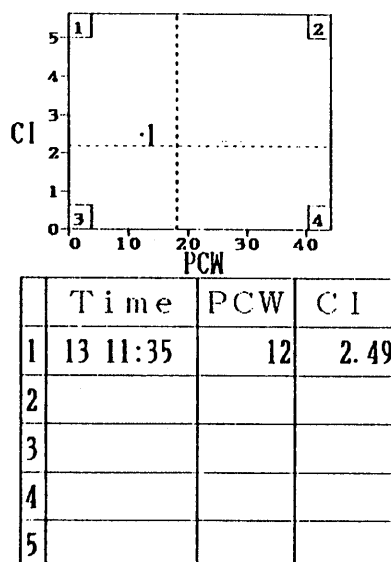
from **FUNCTION** push **PROFILE**

When the **FUNCTION** switch and the **PROFILE** key are pushed, the following display is shown. The display represents a graphic plot of CARDIAC INDEX versus PULMONARY CAPILLARY WEDGE PRESSURE along with presentation of the hemodynamic profile for the last hemodynamic calculation.

The profile can be reviewed for the last five calculations that are stored in memory.



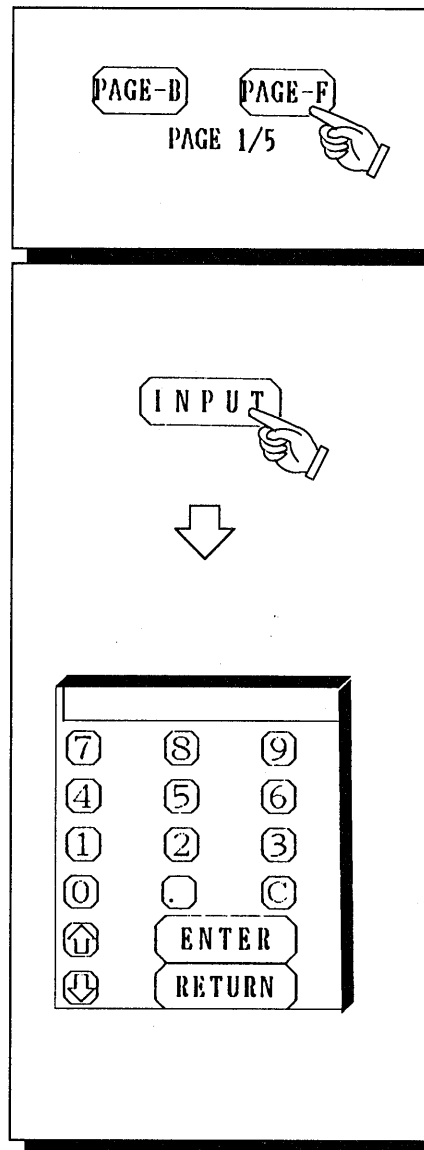
1. The graphic plot of CI vs. PCWP shows the last 5 values obtained from the calculations performed in the previous section.





## 2. Hemodynamic Profile of the latest data.

## 3. Manual Data Plotting



◆ When the **PAGE – F** key is pushed, newer DATA can be viewed. The **PAGE – B** key enables you to review older DATA.

◆ When the **INPUT** key is pushed, a ten key calculator will appear.

A plot of 5 CI vs PCW values labeled 6 – 10 will be enabled.

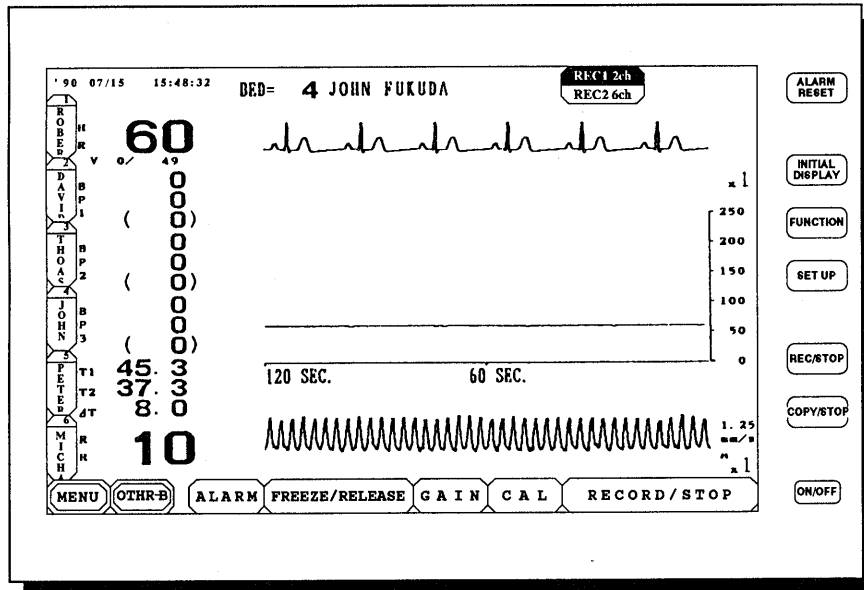
Use the **↑** and **↓** keys to the desired value for input and

**ENTER** the DATA desired.

When the **RETURN** key is pushed, the ten – key calculator disappears.

from **FUNCTION** push **CRG**

When the **FUNCTION** switch and the **CRG** keys are pushed, the following display is shown. The current ECG is displayed above a trendgram of the instantaneous heart rate for the last two minutes. The bottom trace is the respiration waveform displayed with a sweep speed of 1.25 millimeters per second for the two minute period.

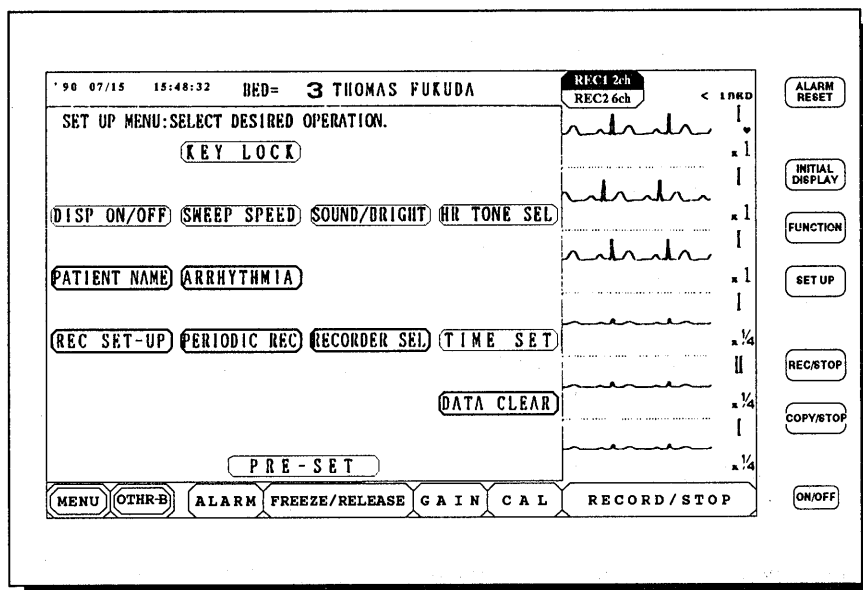


## 8.4 SET UP MENU

PUSH **SET UP**

When the **SET UP** key is pushed, the SET UP menu will appear on the screen as shown below.

This section of the manual describes the various set up functions for the central station monitor.

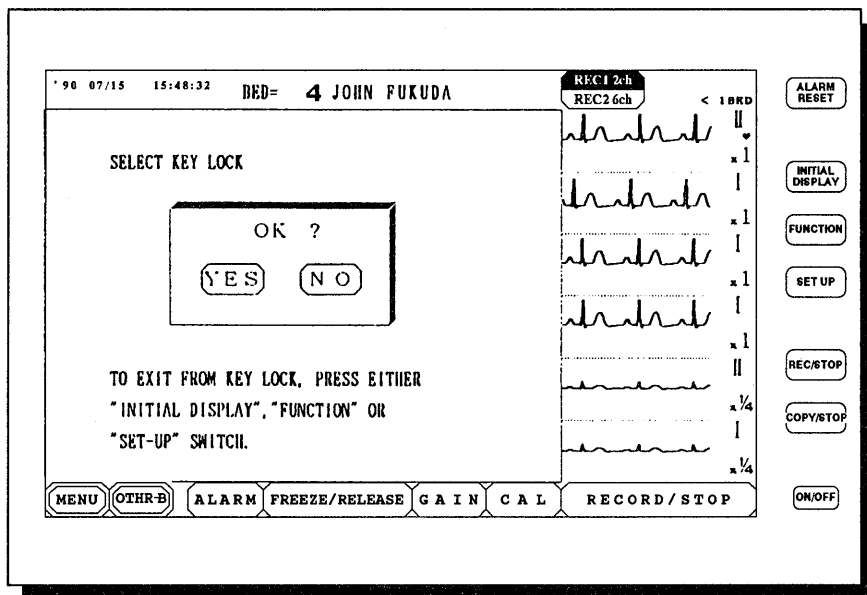


Some of the function keys are enclosed by bold line. It means that those function keys work as same as the Bedside Monitor.

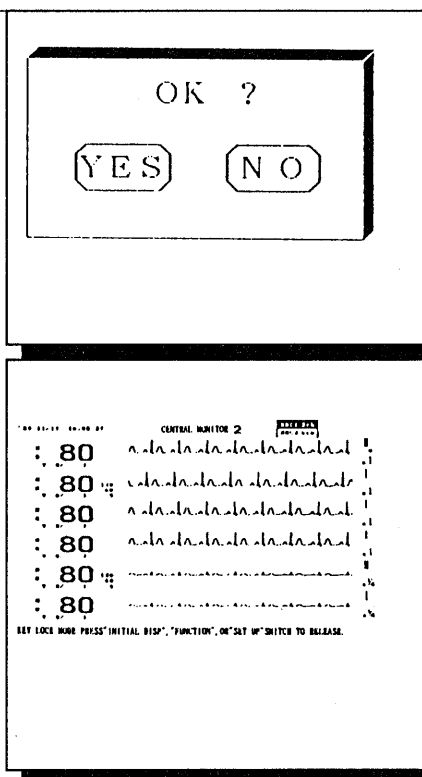
# (1) KEY ROCK

from **SET UP** push **KEY LOCK**

When the **SET UP** switch and the **KEY LOCK** keys are pushed, the following display is shown. When **YES** for key lock is selected, the functions of the touch keys of the monitor are disabled. This function can be initiated for cleaning of the monitor screen or when it is desirable to lock out the functions of the touch keys.



## 1. Initiating KEY LOCK



◆ When the **KEY LOCK** key is pushed, a confirmation tool is displayed. Push **YES** to initiate a KEY LOCK.

The screen will return to the initial display and the touch keys will be inoperative.

◆ At the bottom of the screen, the message "KEY LOCK MODE..." will be displayed instead of the normal touch keys.

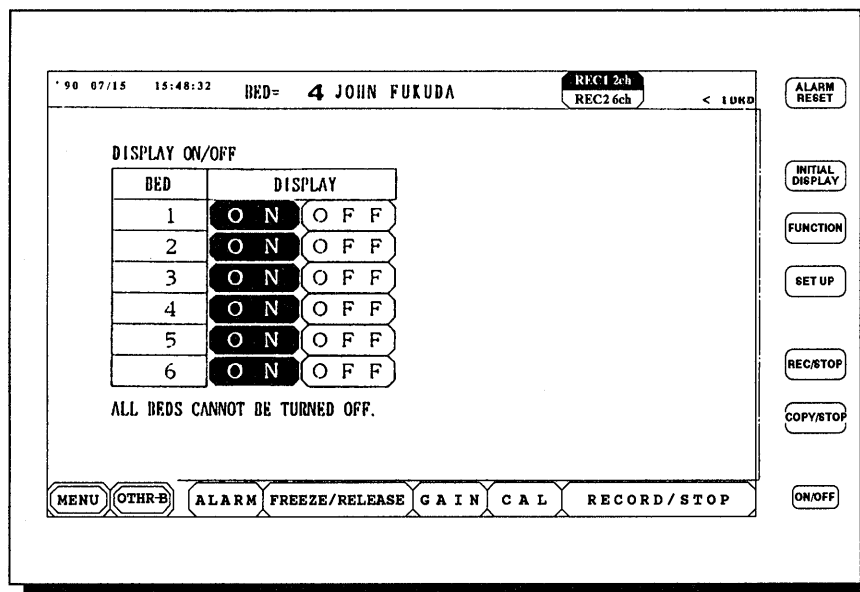
◆ To return to normal operation, push the **INITIAL DISPLAY**, **FUNCTION** or **SET UP** switch.

## (2) DISPLAY ON/OFF

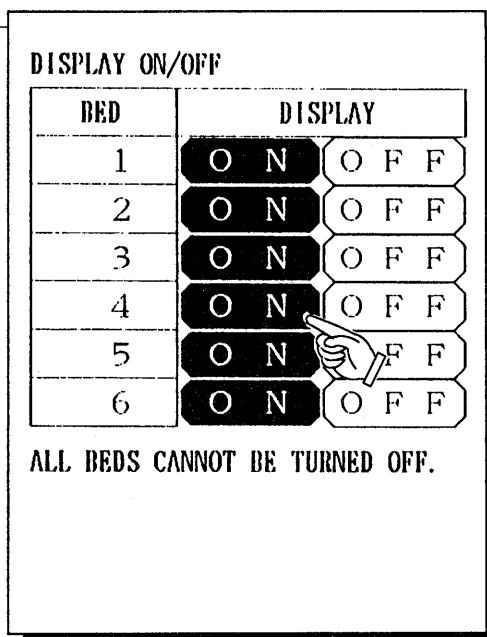
from **SET UP** push **DISP ON/OFF**

When the **SET UP** switch and the **DISP ON/OFF** key are pushed, the following display is shown.

Individual ECG can be turned ON or OFF.



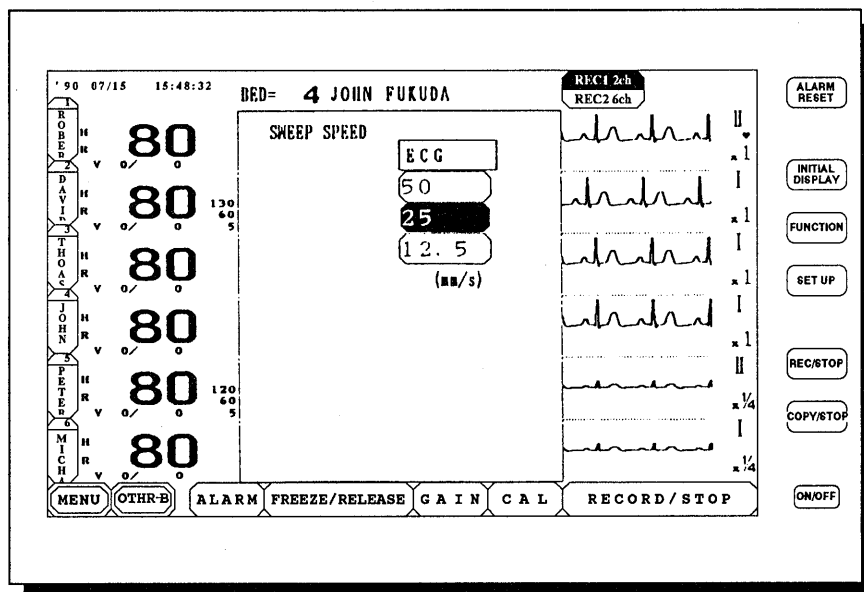
1. Turning ON or OFF each bed.



### (3) SWEEP SPEED

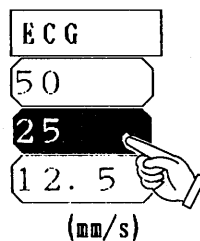
from **SET UP**  
push **SWEEP SPEED** **BED SELECT**

When the **SET UP** switch and the **SWEEP SPEED** keys are pushed, the following display is shown for the bed selected.  
Sweep speed for the ECG can be selected.



#### 1. Sweep speed for ECG.

SWEEP SPEED



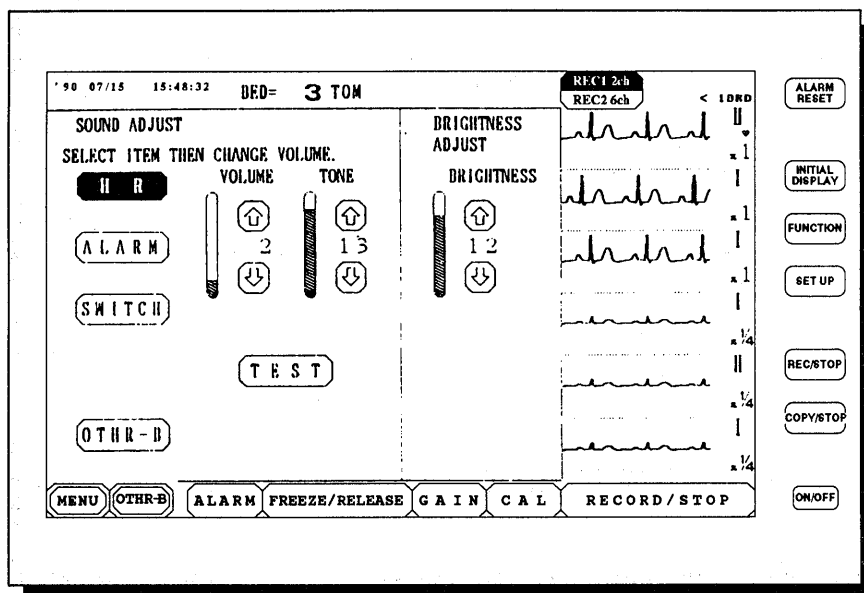
◆ Push **50**, **25** or **12.5** key to select a desired sweep speed for ECG waveforms.

## (4) SOUND/BRIGHTNESS

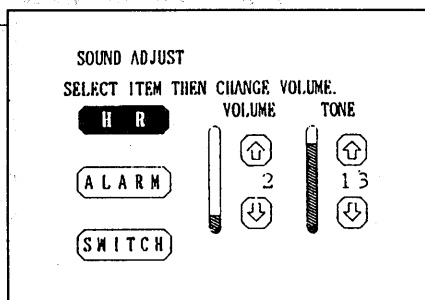
from **SET UP**  
push **SOUND/BRIGHT**

When the **SET UP** switch and the **SOUND/BRIGHT** keys are pushed, the following display is shown.

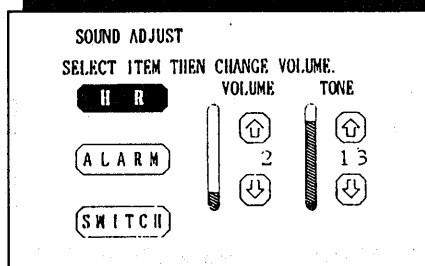
The sound level and tone for the alarm sound, heart rate sync sound and touch key tone as well as the brightness level of the monitor can be adjusted.



1. Select the item for sound adjustment.



2. Adjustment of volume and tone.



◆ Use the and keys to change the VOLUME level and TONE for the selected item.

3. Adjustment of brightness.



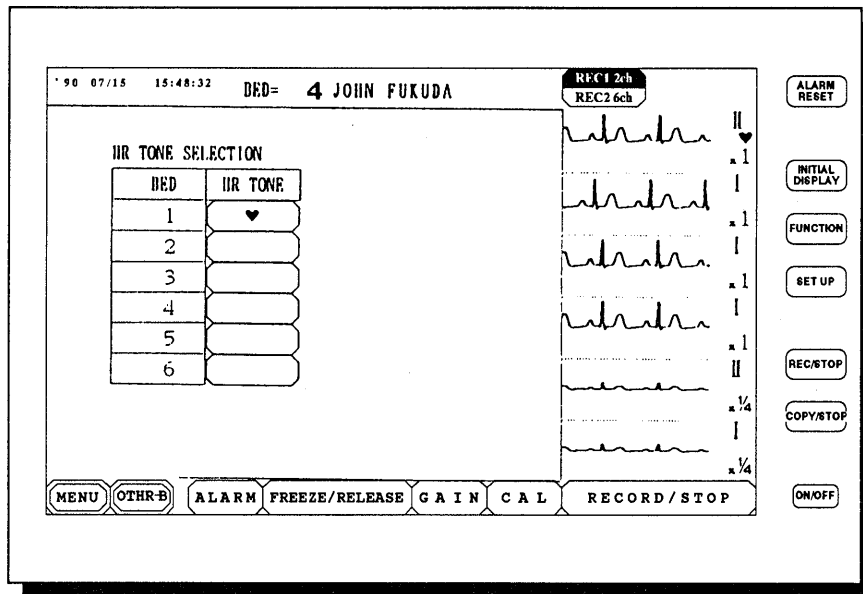
◆ Use the and keys to adjust the brightness level of the display.

The number displayed between the and keys is a reference number only.

## (5) HEART RATE TONE SELECT

from **SET UP** push **HR TONE SEL**

Push the **SET UP** switch and the **HR TONE SEL** key. The display will be as shown below. This example is for a six bed central monitor. By pushing the heart rate tone selection key, any one of the six beds can generate a synchronous tone in conjunction with the patients heart beat.



Bed to generate Heart Rate tone is selected.

### HR TONE SELECTION

BED	HR TONE
1	♥
2	
3	
4	
5	
6	

◆ The selected bed will be turned ON and display the “♥” mark.

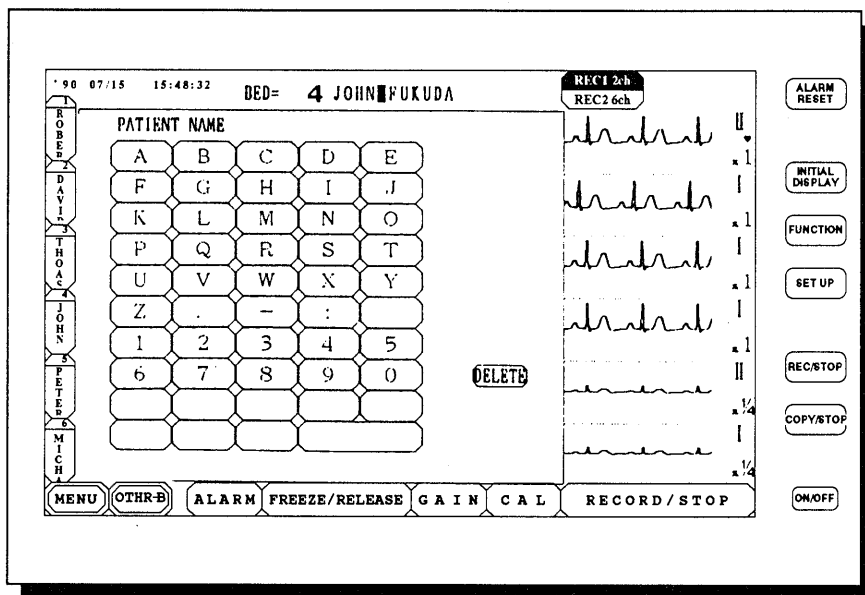


## (6) PATIENT NAME

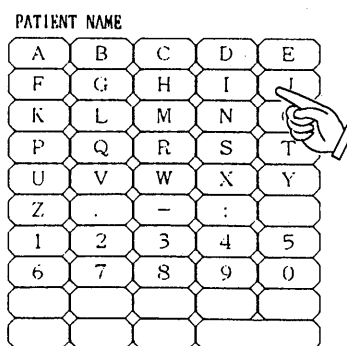
from **SET UP**  
push **PATIENT NAME**, **BED SELECT**

When the **SET UP** switch and the **PATIENT NAME** keys are pushed, the following display is shown for the bed selected.

The patient's name can be registered into the monitoring system.



### 1. Name Input



◆ Select the characters for the patient's name.

Push the **SPACE** key blank to place a space between first and last names.

Any character of the alphabet or numbers from 0 – 9 can be used.

### 2. Deletion of a character.



◆ A character can be deleted by pushing the **DELETE** key.

This will delete the last character input.

## (7) ARRHYTHMIA SELECTION

from **SET UP**  
push **ARRHYTHMIA** **BED SELECT**

When the **SET UP** switch and the **ARRHYTHMIA** keys are pushed, the following display is shown for the bed selected. The arrhythmia detection can be turned ON or OFF or the individual arrhythmia types can be turned ON or OFF. Limit settings for RUN and VPC's per minute can be selected. Also, you can tell the monitor if the patient is wearing a pacemaker.

ALARM	DETECTION	LIMIT
ARREST	O N	
V F	-	
V T	O N	
RUN	-	3
BIGEM	O N	
TRIGEM	-	
FREQNT	O N	5
MULTI	-	
PACE MAKER	UNUSED	USED

### 1. Arrhythmia detection ON/OFF

ALARM	DETECTION	LIMIT
ARREST	O N	
V F	-	
V T	O N	
RUN	-	3
BIGEM	O N	
TRIGEM	-	
FREQNT	O N	5
MULTI	-	
PACE MAKER	UNUSED	USED

◆ Select arrhythmia detection by pushing the **ON** or **OFF** key at the top of the screen next to the words **ARRHYTHMIA SELECT : ANALYSIS**.

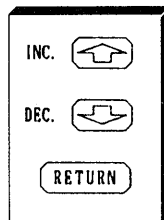
If this is turned OFF, alarms for the arrhythmia events and trend data for arrhythmia events is inhibited.

◆ Individual events can be turned ON or OFF by pushing the key next to the type of arrhythmia.

### 2. Selection of Individual events.

# ARRHYTHMIA SELECTION

## 3. Setting Threshold for RUN and FREQUENT VPC



◆ Push the limit number key for RUN or FREQUENT.

Increase or decrease the limit with the or keys.

## 4. Pacemaker Identification

PACE MAKER

◆ If the patient is wearing a pacemaker, push the **USED** key. If no pacemaker is worn, push the **UNUSED** key.

## 5. RELEARN



**LEARNING**

◆ To tell the monitor to RELEARN the normal QRS characteristics, push the **RELEARN** key.

The message “LEARNING” will be displayed for 30 – 60 seconds.

During this time, the arrhythmia detection will be stopped.

When the LEARNING message disappears the monitor will return to normal arrhythmia monitoring.

Use this process when there are false or inaccurate alarm messages or when the shape of the patient’s QRS has changed.

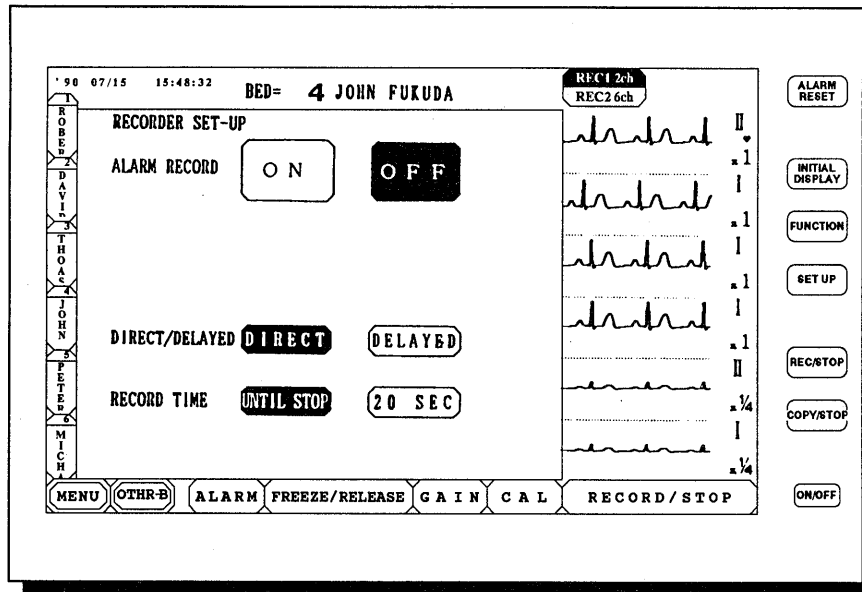


## (8) RECORDER SET UP

from **SET UP**  
push **REC SET – UP**, **BED SELECT**

When the **SET UP** switch and the **REC SET – UP** keys are pushed, the following display is shown.

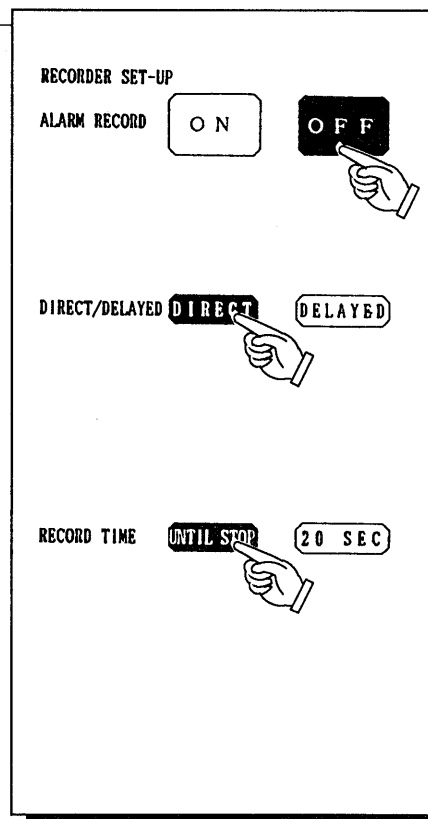
You can select alarm recording on or off, nurse call recording (for telemetry only), direct or delayed recording and the recording duration.



1. Select ON or OFF for  
ALARM RECORD and for  
NURSE CALL RECORD

2. DIRECT / DELAYED  
Selection

3. Manual or timed recording.



◆ Select **DIRECT** for real time recording.

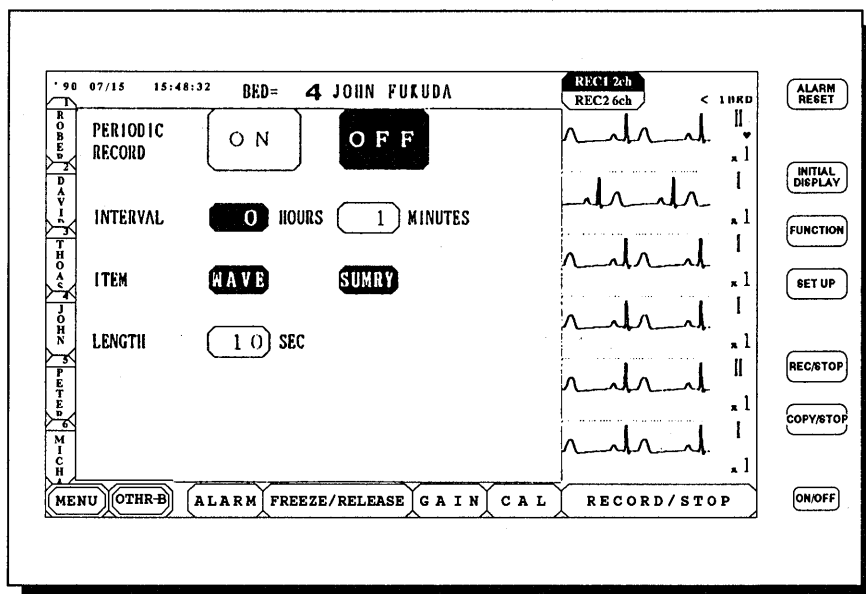
Select **DELAYED** for a delayed recording.

◆ If you select **UNTIL STOP** the recorder will run until you manually stop it.

If you select **20 SEC.**, the recorder will run for 20 seconds and stop automatically.

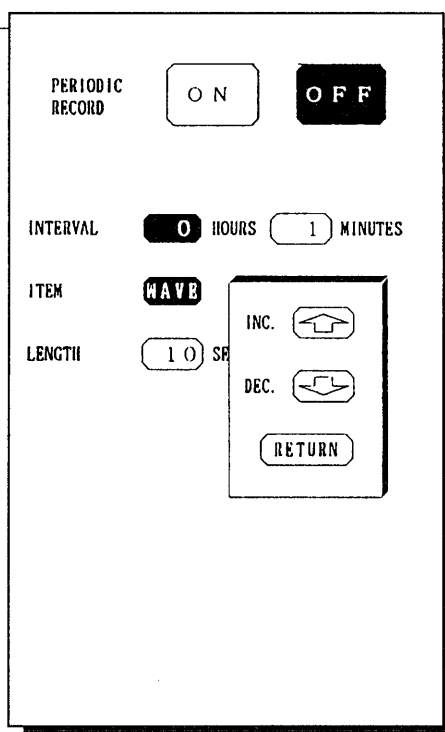
## (9) PERIODIC RECORDING push **PERIODIC REC** from **SET UP** **BED SELECT**

When the **SET UP** switch and the **PERIODIC REC** keys are pushed, the following display will be shown for the bed selected. An interval for automatic recording can be selected. The recorder will automatically start and run a strip for the specified length.



1. Select Periodic Recording  
ON or OFF.

2. Selecting the interval.



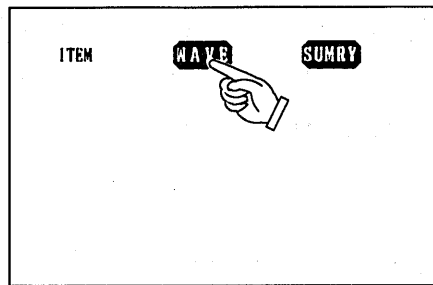
◆ The interval can be selected up to 24 hours.

When the “HOURS” or “MINUTES” keys are pushed, an increment/decrement tool will appear.

Use the or keys to increase or decrease the time interval.

## PERIODIC RECORDING

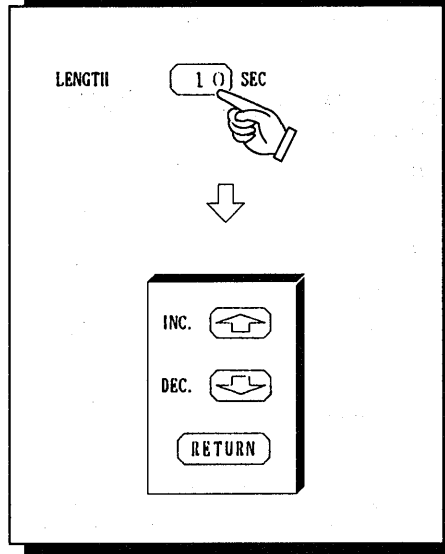
### 3. Select the recording item.



◆ Either **WAVE** or **SUMRY** or both can be selected for periodic recording.

When these keys are selected, they are displayed in reverse contrast.

### 4. Selecting recording length.



◆ The length of the strip can be selected up to 99 seconds.

When this key is pushed, an increment/decrement tool will appear.

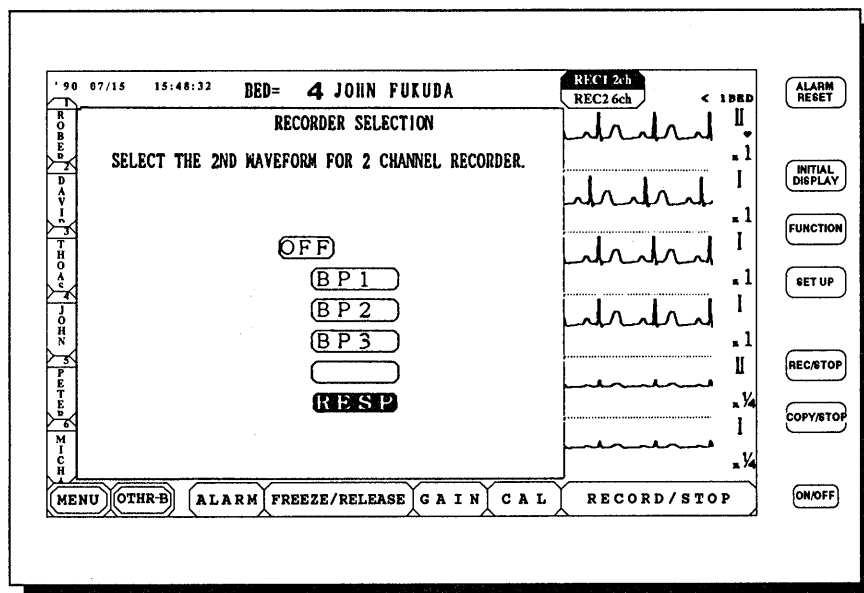
Use the **↑** or **↓** keys to increase or decrease the length.

Push the **RETURN** key on the tool to return to the normal display.

## (10) RECORDER SELECTION

from **SET UP** push  
**RECORDER SEL**, **BED SELECT**

When the **SET UP** switch and the **RECORDER SEL** key are pushed, the following display is shown. The second waveform for the 2 channel recorder AU – 3310 can be selected.



Waveform selection for the  
AU – 3310, 2 channel  
recorder.

**OFF**  
**BP 1**  
**BP 2**  
**BP 3**  
**RESP**

◆ You can select any desired waveform to be recorded on the second channel. ECG is dedicated to channel one.

◆ Push the desired waveform for recording on channel two. The selected item will be shown in reverse contrast.

◆ When the **OFF** key is pushed, no waveform is recorded on channel 2.

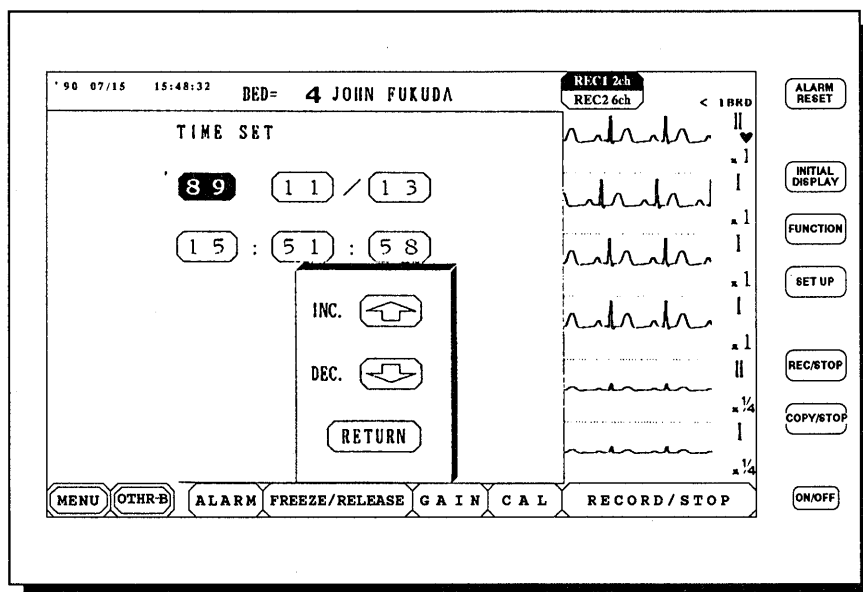


## (11) TIME SETTING

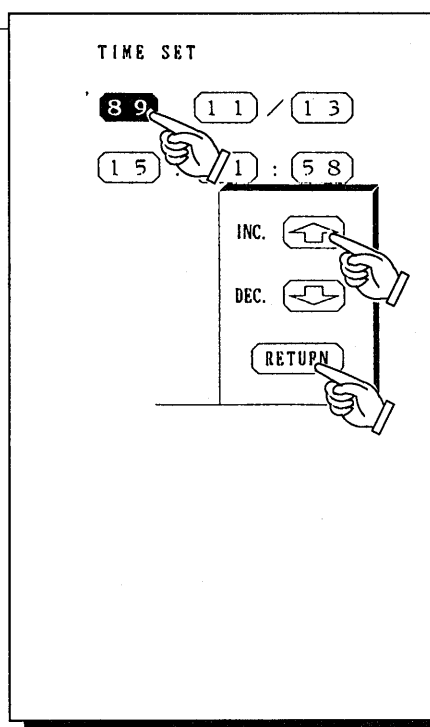
from **SET UP** push **TIME SET**

When the **SET UP** switch and the **TIME SET** keys are pushed, the following display is shown.

The year, month, day, hour, minute and second displayed in the upper left corner of the screen can be set.



### 1. Time set.



◆ Push the or key to increase or decrease the item selected.

◆ When the “seconds” key is pushed, the seconds display changes to “00”.

◆ Push the **RETURN** key to return to the time set display.

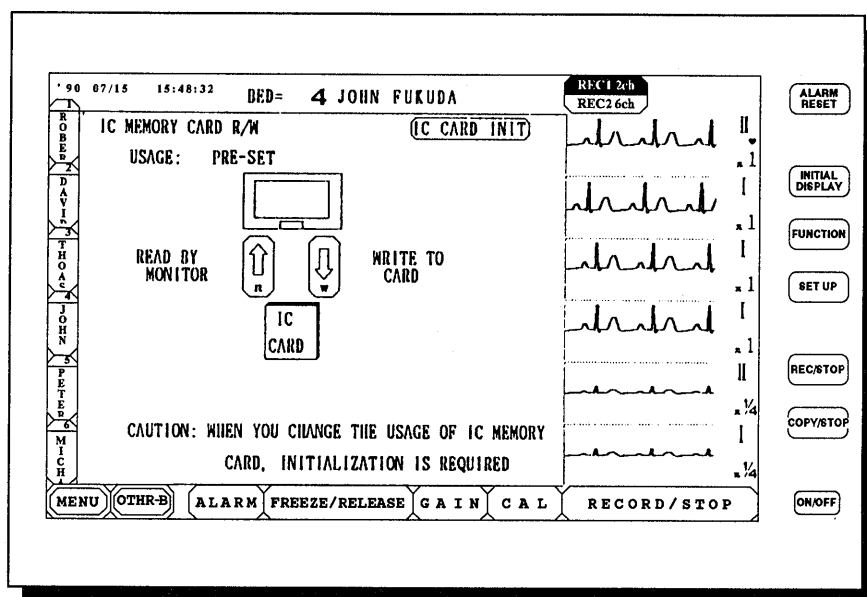
◆ Push **YES** in response to the question at the bottom of the screen if you wish to set all of the monitors on the network to this same time.(Only the central monitor labeled 1 can do this.)

## (12) IC MEMORY CARD

from **SET UP** push **IC CARD R/W**

When an initialized IC memory card is inserted into the monitor and the door is closed, or when the **SET UP** switch and **IC CARD R/W** key are pushed, the following display is shown.

Patient data can be stored by the card, or the data stored in the card can be transferred to the monitor.

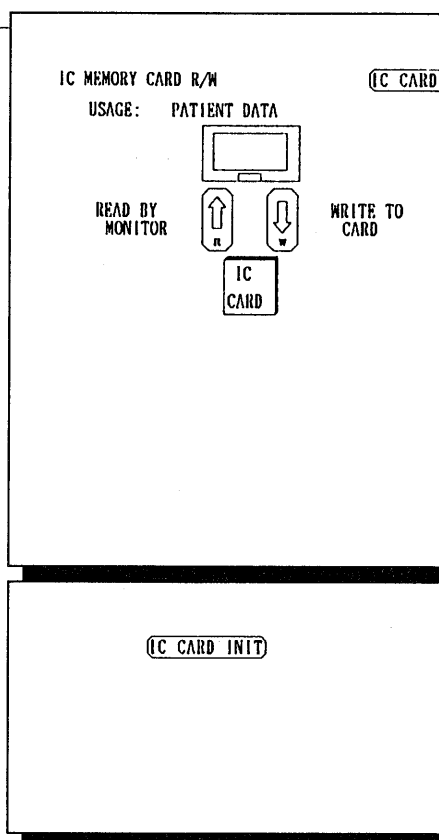


### 1. A purpose for usage

### 2. Data storage and data transferring.

### 3. Initialization of IC memory card.

**Note :** This mode is not displayed when the IC memory card of Patient data or Added recall memory is used.



◆ Usage for the Central Monitor is

**Preset(Configuration)**

only.

◆ Push key to transfer data into the monitor, push to store data in the card.

◆ Push the **IC CARD INIT** key.

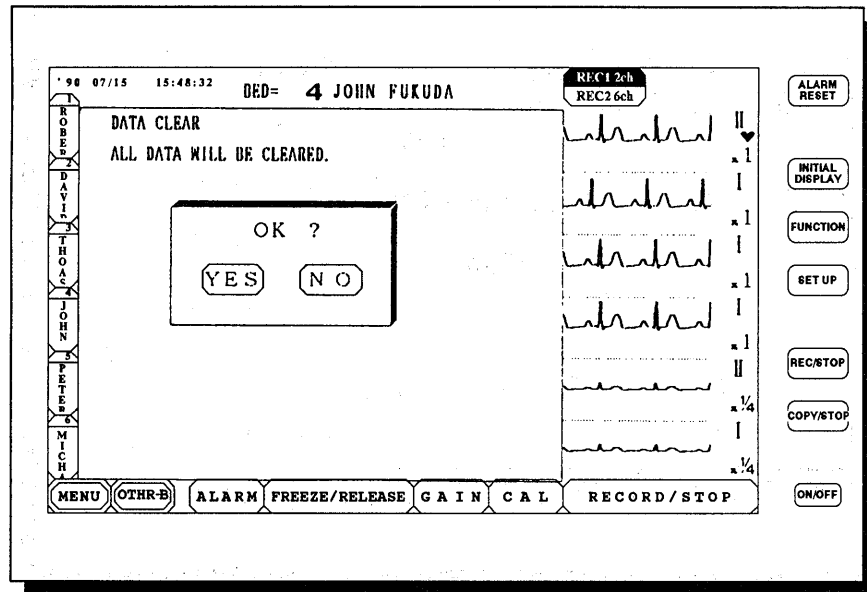
(See section IC MEMORY CARD INITIALIZATION)

## (13) Erasing DATA

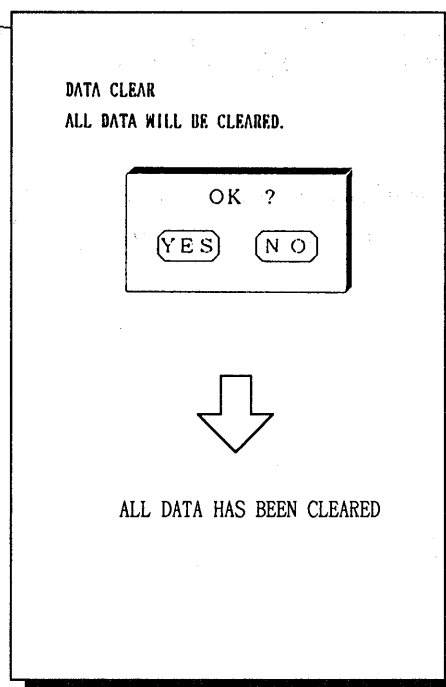
from **SET UP**  
push **DATA CLEAR** **BED SELECT**

When the **SET UP** switch and the **DATA CLEAR** keys are pushed, the following display will be shown for the bed selected.

All patient data that is stored in the monitors memory can be erased in preparation for the next patient.



### 1. Deletion of all patient data.



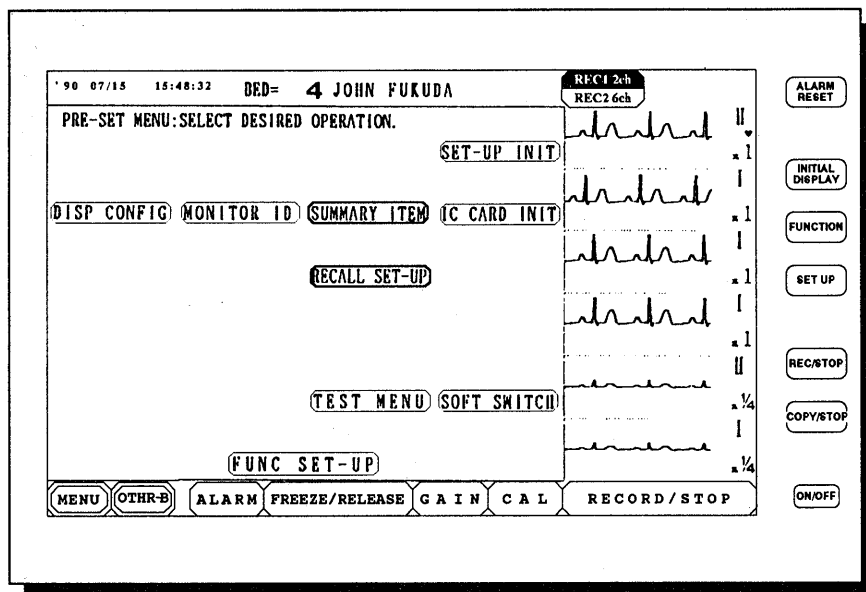
◆ When the **YES** key is pushed, the data will be erased.

This two step process is installed into the monitor to prevent accidental erasure of the patient's data.

◆ When the data has been erased, this message will appear.

When the **SET UP** switch and the **PRE — SET** keys are pushed, the following display is shown.

Contained in this menu selection are items that are not used very often and are for use primarily when the monitor is configured to the display characteristics that you desire.



Some of the function keys are enclosed by bold line. It means that those function keys work as same as the Bedside Monitor.

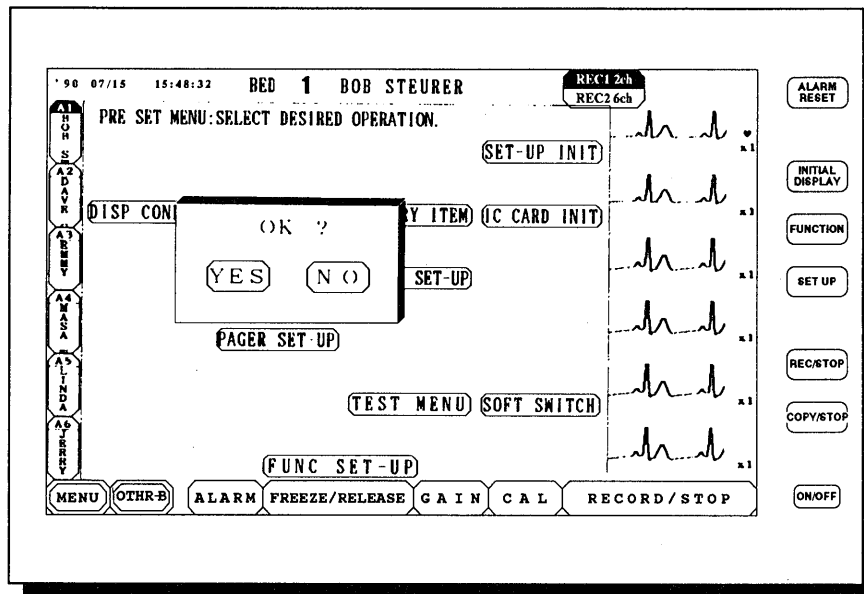
*If you have any doubt about any of the functions listed in this display, contact your local service representative for explanation.*

## (14.1) SET – UP INIT

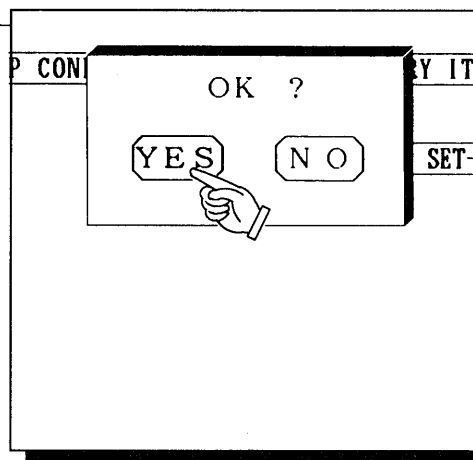
from **SET UP**  
push **PRE-SET** and **SET-UP INIT**

When the **SET UP** switch, the **PRE-SET** and **SET-UP INIT** keys are pushed, the following display is shown.

Set up data such as DISPLAY ON/OFF, SWEEP SPEED OR SOUND/BRIGHT can be initialized.



Initialize set up data



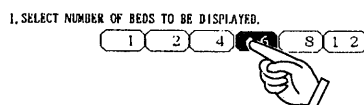
◆ When **YES** key is pushed, the data will be initialized.

## (14.2) DISPLAY CONFIGURATION

from **SET UP**  
push **PRE – SET** **DISP CONFIG**

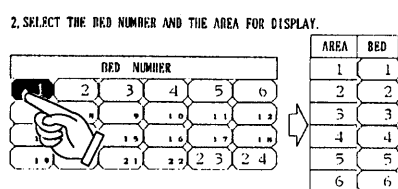
When the **SET UP** switch, the **PRE – SET** and **DISP CONFIG** keys are pushed, the following display is shown. This display allows for selection of the number of beds to be displayed on this central monitor and which bed number should be displayed on which trace.

1. Number of beds for display on this monitor.



◆ Push the ①, ②, ④, ⑥, ⑧ or ⑫ keys under item “1”.

2. Bed location on each trace.



◆ Push the desired bed number from the BED NUMBER table of 1 – 24. Then, push the key on the right of the table under the heading BED for the trace position under the heading AREA.

The selected bed will now be displayed in the corresponding trace AREA when you return to the INITIAL DISPLAY.

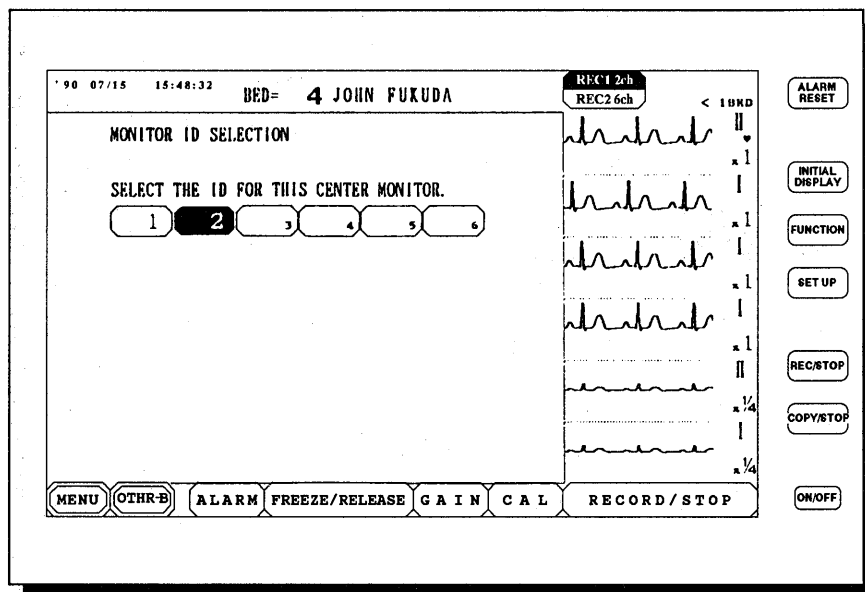
◆ The large letters in the BED NUMBER table of 1 – 24 mean that bedside monitors of those numbers are on – line in LAN.

## (14.3) MONITOR ID

from **SET UP**  
push **PRE - SET** **MONITOR ID**

When the **SET UP** switch, the **PRE - SET** and **MONITOR ID** keys are pushed, the following display is shown.

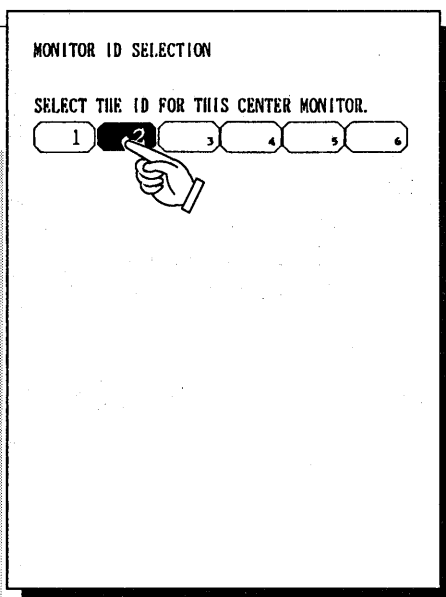
Since the network can contain up to 6 central monitors, an identification number for the central station must be selected for communications from the bedsides.



### 1. Select monitor ID

**Note :** One of the Central Monitors must be selected as ID 1. (The standard setting before shipment is ID 1.)

The Central Monitor of ID 1 works as a controller of total LAN system. Never select duplicate number to the different Central Monitors.



◆ Select any number of small letter from 1 – 6 for the Central Monitor ID number.

Numbers already selected will be displayed in large letters.

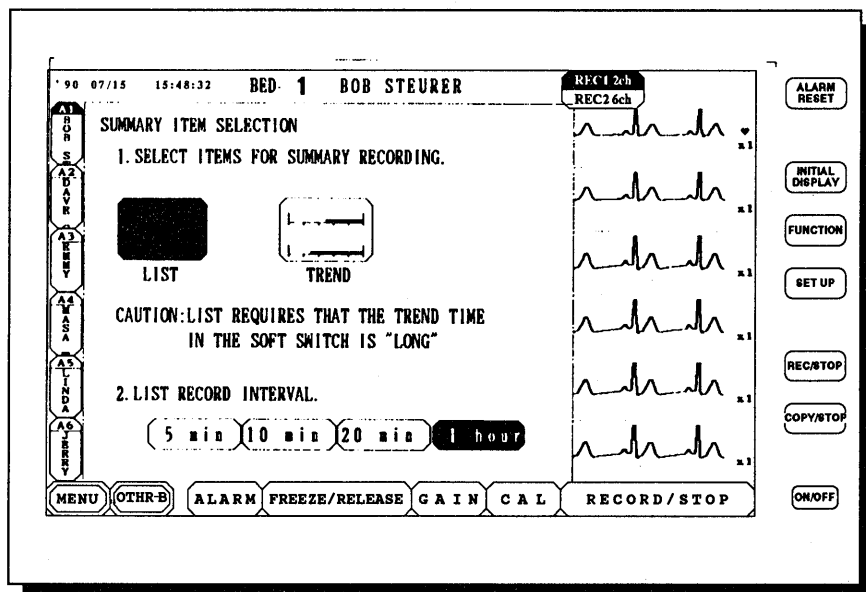
◆ When the selected number does not change to large letter, there is a possibility that number is doubly selected. Select the other number.

## (14.3) SUMMARY ITEM

from **SET UP** push **PRE - SET**  
**SUMMARY ITEM** **BED SELECT**

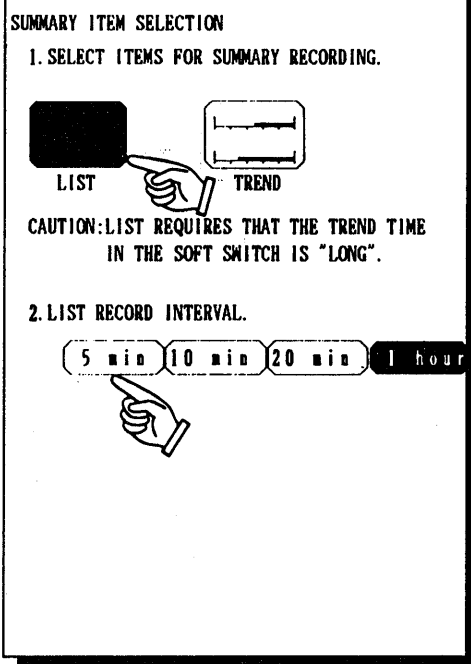
When the **SET UP** switch, the **PRE - SET** and **SUMMARY ITEM** keys are pushed, the following display is shown.

The items for summary recording and the interval of measured parameters can be selected.



1. Selection of the items for summary recording.

2. Selection of the interval of measured parameters.



◆ Either or both of LIST and TREND can be selected. The selected key is highlighted in reverse contrast. The presently measured parameters are recorded in LIST.

◆ Two hours to 24 hours data can be recorded by selecting "5 min" to "1hour" interval.

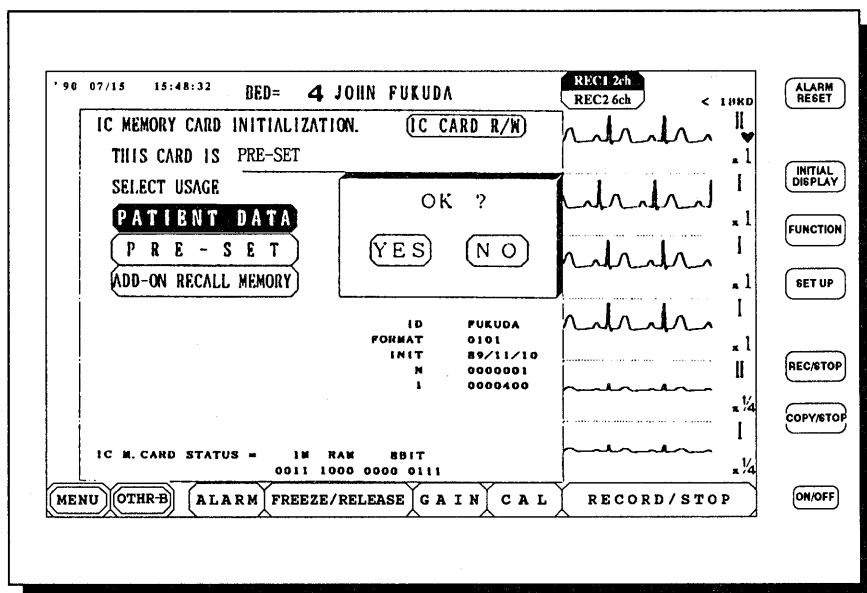


## (14.5) IC MEMORY CARD INITIALIZATION

from **SET UP**  
push **PRE - SET**, **IC CARD INIT**

When uninitialized IC memory card is inserted into the monitor and the door is closed, or the **SET UP** switch, the **PRE - SET** and **IC CARD INIT** keys are pushed, the following display is shown.

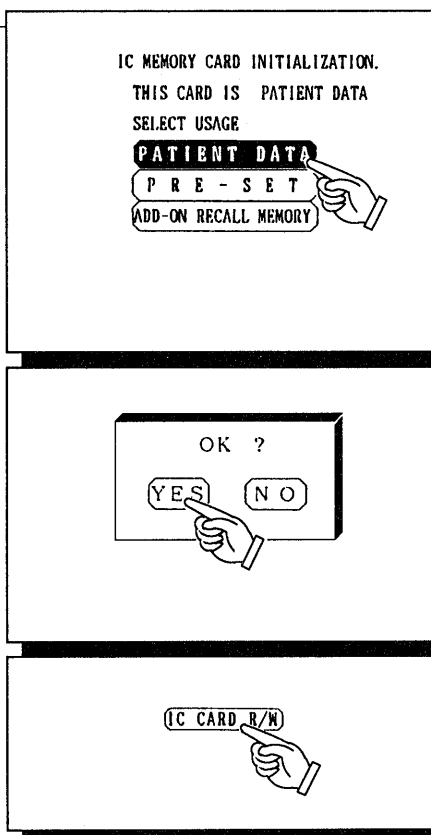
An IC Memory card can be initialized.



1. The display whether IC memory card has been initialized or not is shown. If it has been initialized, the purpose for usage will be shown.

2. Selection of the purpose for usage.

3. Data storage or data transferring.



◆ When the **IC CARD INIT** key is pushed also in the IC MEMORY CARD display, the display above will be shown.

◆ Push the key you desire, and push the **YES** key to initialize a IC memory card (Only PRE - SET is available for the Central Monitor).

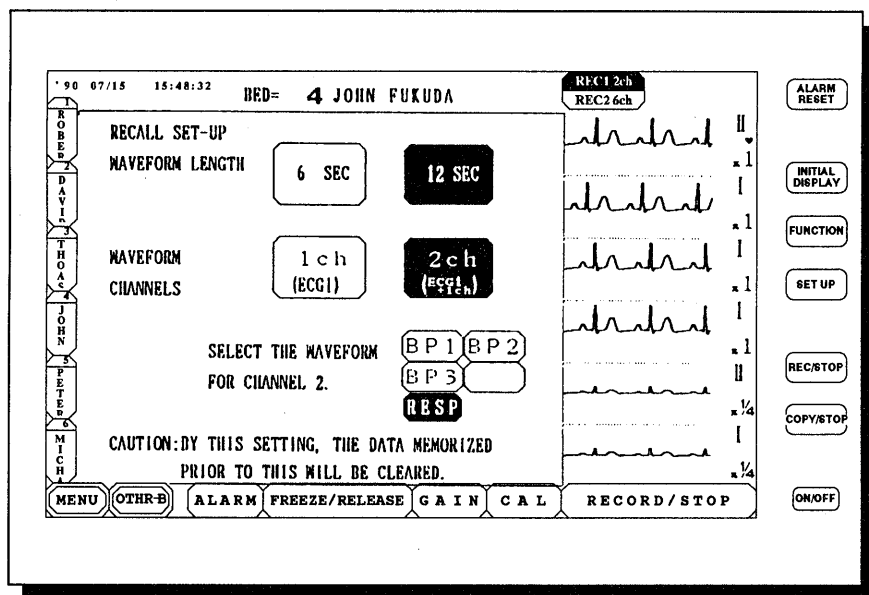
◆ Push the **IC CARD R/W** key.  
(See section IC CARD R/W.)

## (14.6) RECALL SELECTION

from **SET UP** push **PRE - SET**,  
**RECALL SET - UP**, **BED SELECT**

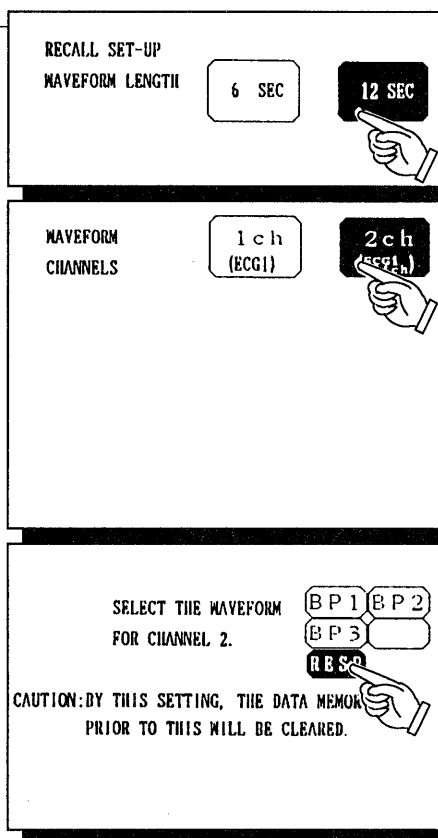
When the **SET UP** switch, the **PRE - SET** and **RECALL SET - UP** keys are pushed, the following display is shown for the bed selected.

The waveform length of 6 or 12 seconds and the number of channels to be stored in memory during an alarm event can be selected for an individual bed.



### 1. Waveform length.

### 2. Select 1 or 2



◆ Select either **6 SEC** or **12 SEC** for data storage and recall.

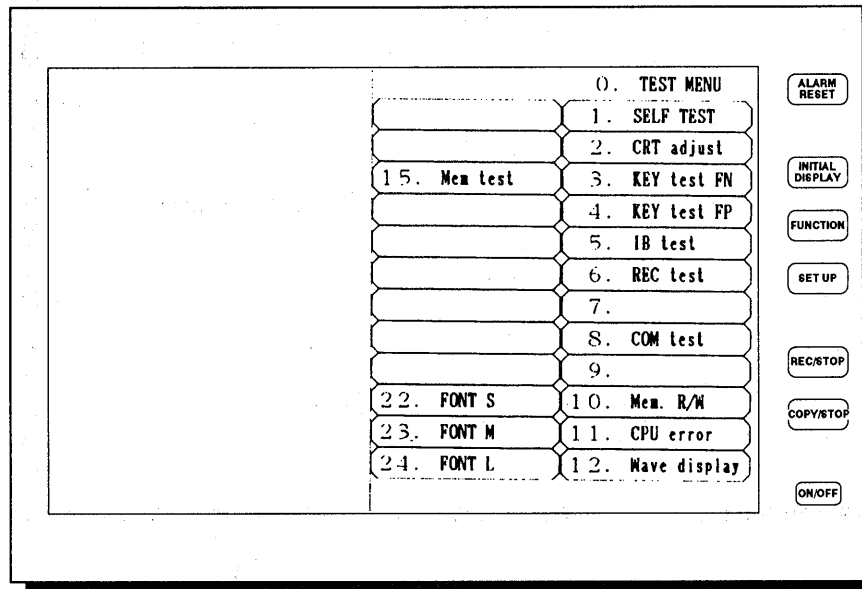
◆ If **1CH (ECG 1)** is selected, the monitor will store 192 six second segments that occur during alarm. If **2CH (ECG + 1CH)** and **12SEC** are selected, the monitor will store 48 six second segments of the two waveforms selected.

◆ When the **2CH** key is selected, you can select the waveform to be stored as the second waveform. The selected waveform will be displayed in reverse contrast.

## (14.7) TEST MENU

from **SET UP**  
push **PRE - SET** , **TEST MENU**

When the **SET UP** switch, the **PRE - SET** and **TEST MENU** keys are pushed, the following display will be shown. The displayed menu is for servicing purpose only. Leave its operation to the authorized agent.



## (14.8) SOFT SWITCH

from **SET UP**  
push **PRE - SET** **SOFT SWITCH**

When the **SET UP** switch, the **PRE - SET** and **SOFT SWITCH** keys are pushed, the following display is shown.

The various functions for the monitor can be selected.

'90 07/15 15:48:32 DED= 4 JOHN FUKUDA		REC1 2ch REC2 6ch		< 10SD		ALARM RESET
ITEM		STANDARD		SELECTION		INITIAL DISPLAY
1						FUNCTION
2						SET UP
3						REC/STOP
4						COPY/STOP
5 BP CURSOR AT FREEZE MODE		O F F		O N		ON/OFF
6						
7						
8						
9						
10						
PAGE BACK		PAGE FWRD		PAGE 1 OF 2		
MENU		OTHR-B		ALARM FREEZE/RELEASE GAIN CAL RECORD/STOP		

### 1. Selecting a function.

ITEM		STANDARD		SELECTION	
1					
2					
3					
4					
5 BP CURSOR AT FREEZE MODE		O F F		O N	
6					
7					
8					
9					
10					
PAGE BACK		PAGE FWRD		PAGE 1 OF 2	

↓

ITEM		STANDARD		SELECTION	
11					
12					
13 TREND SCALE		AUTOMATIC		FIXED	
14 TIME DISPLAY		YY.MM.DD		MM.DD.YY	
15					
16					
17					
PAGE BACK		PAGE FWRD		PAGE 2 OF 2	

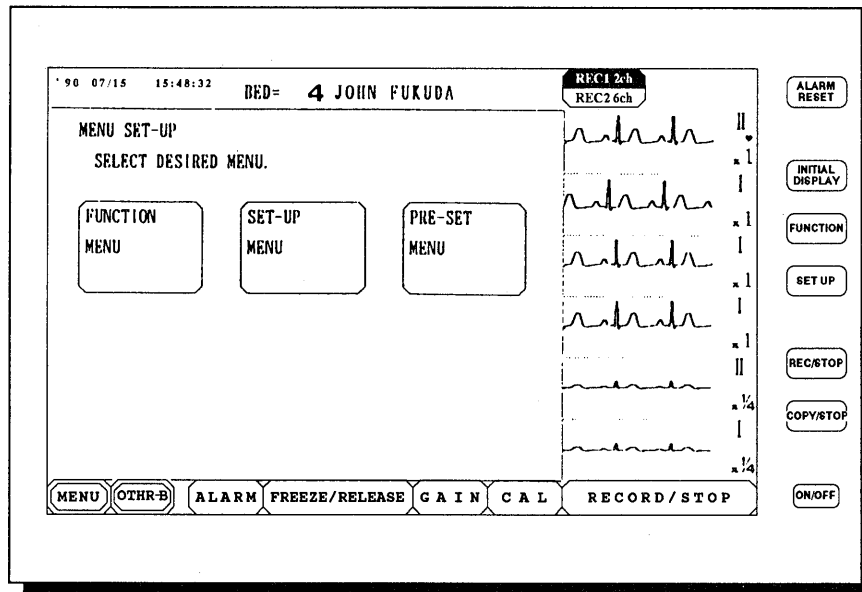
◆ The **STANDARD** settings for the monitor (as set at the factory) are listed on the left. To change a function, push the desired key under the **SELECTION** column.

Push the **PAGE FWRD** or **PAGE BACK** for more function selections.

## (14.9) FUNCTION MENU SET — UP

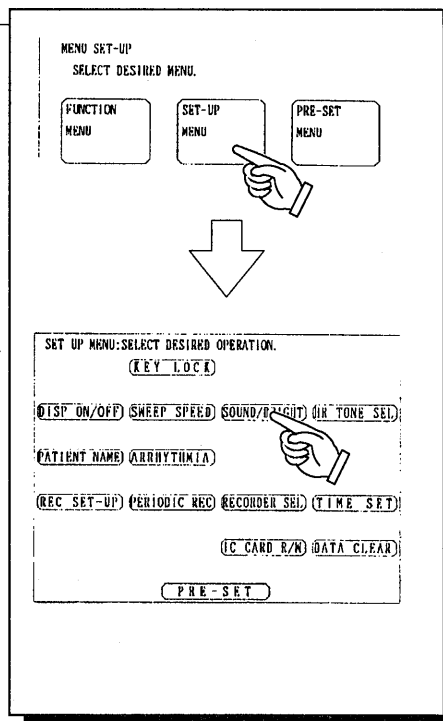
from **SET — UP**  
push **PRE — SET** **FUNC SET — UP**

When the **SET UP** switch, the **PRE — SET** and **FUNC SET — UP** keys are pushed, the following display is shown. For each of the menus, any function can be turned ON or OFF.



1. Select the menu.

2. Select the items to turn ON or OFF.



◆ Either the **FUNCTION**, **SET UP** or **PRE — SET** menu can be selected. Current effective function is displayed in reverse contrast.

◆ To eliminate a function from the menu selection, push the desired key. The key will be in normal contrast and the function will be disabled. To restore the function, push the key again.



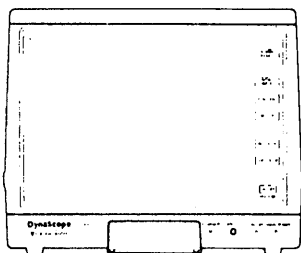
## 9. STORAGE AND MAINTENANCE

### STORAGE

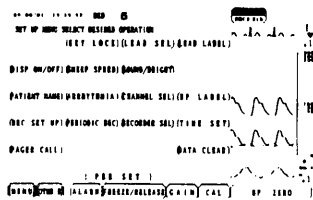
1. Install or store the instrument away from moisture, splashing water or chemicals.
2. Make sure the operating location has adequate ventilation and the unit is not in direct sunlight.
3. Avoid excess vibration and shock during transportation and operation.
4. Do not store near chemicals or where gasses are generated.
5. Note AC voltage and power line frequency.
6. Ensure proper grounding when applying power. If necessary, use the accessory ground cord supplied with the instrument.

### MAINTENANCE

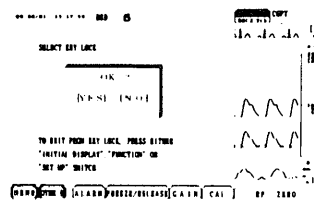
1. To clean the screen with power turned ON, lock the keys to prevent abnormal operation of the touch screen.



Push the SET UP switch

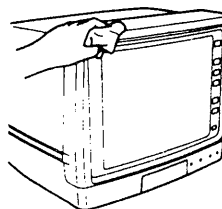
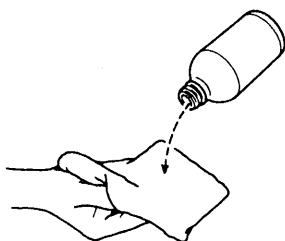


Push the KEY LOCK key



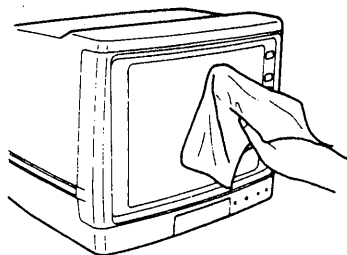
Push YES

### 2. Sterilization



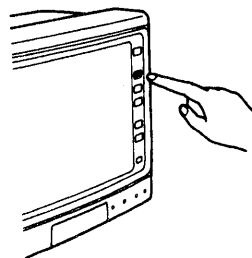
Wipe the monitor with gauze dampened with alcohol.

### 3. Cleaning



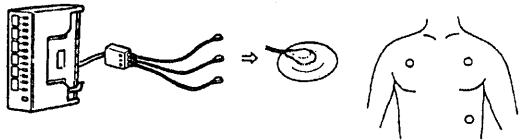
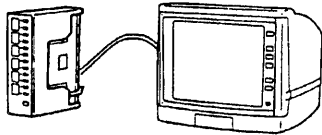
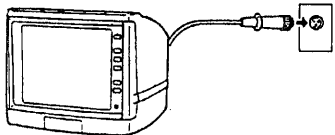
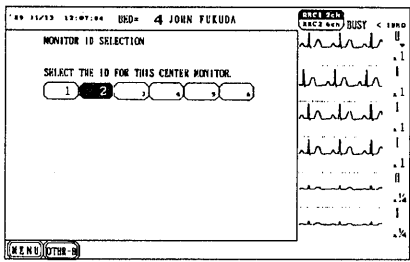
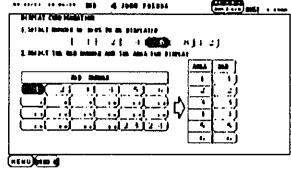
Use a soft cloth dampened with cleaner or alcohol. Do not use abrasive or chemical cleaner.

### 4. Release the KEY LOCK mode.



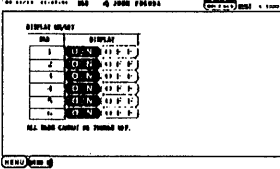
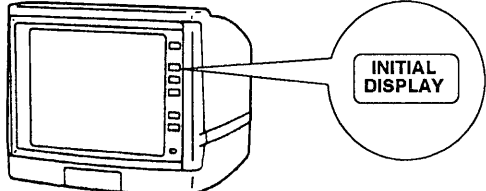

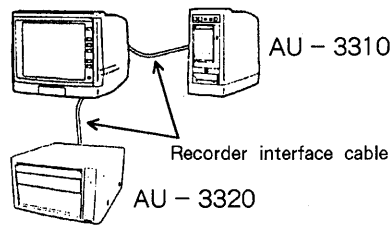
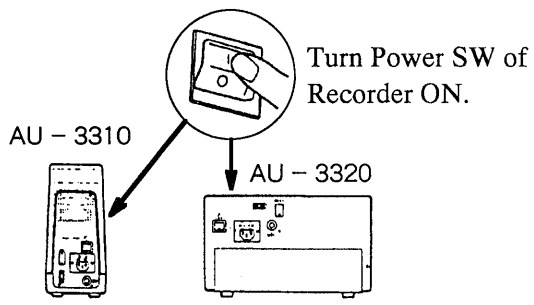
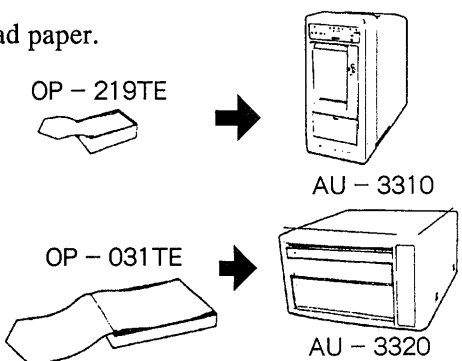
Push the INITIAL DISPLAY switch.

## 10. Troubleshooting

Problem	Check items	Treatment
The display does not appear on the screen.	Electrode, transducer, cables connected.	<p>Make sure that electrode, transducer, etc are securely connected to the Input box.</p> 
	The connection cable is disconnected from Input Box.	<p>Connect the connection cable between the Input Box and Bedside Monitor.</p> 
	LAN Interface cable is disconnected.	<p>Connect the Monitor to LAN with LAN Interface cable.</p> 
	Central Monitor ID number setting.	<p>Push the <b>SET UP</b> switch, the <b>PRE-SET</b> and <b>MONITOR ID</b> keys in sequence, then the display becomes as shown below.</p> <p>The ID number of the Central Monitor must be set ID 1. Never select duplicate number to the Central Monitors.</p> 
	Bed No. registration.	<p>Push the <b>SET UP</b> switch, the <b>PRE-SET</b> and <b>DISP CONFIG</b> keys in sequence, then the display becomes as follows. Number of Bed and Bed No. can be registered.</p> 

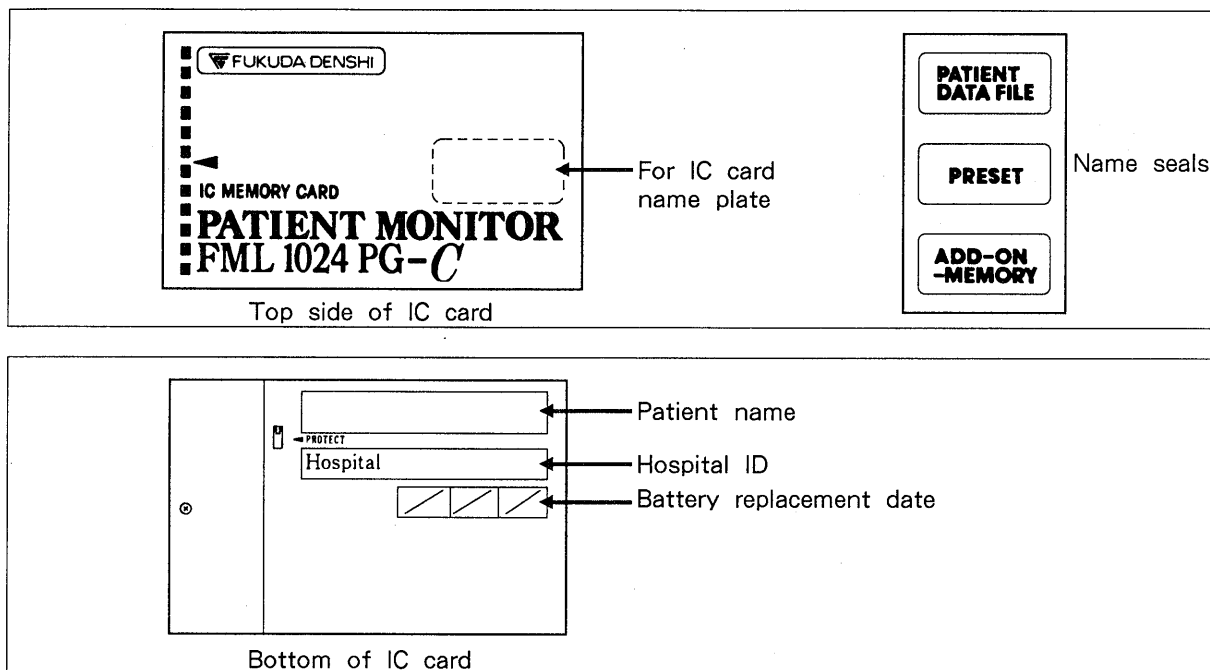


# Troubleshooting

Problem	Check items	Treatment
The display does not appear on the screen.	By setting DISPLAY ON Input parameter is "OFF"	 <p>Push <b>SET UP</b> switch, select <b>DISP ON/OFF</b> key and set to "ON" status.</p>
<b>INITIAL DISPLAY</b>  The screen touch key does not work.	The display is in "KEY LOCK" mode.	<p>Try to push <b>INITIAL DISPLAY</b> switch again.</p> 
<b>INITIAL DISPLAY</b> Other bed waveform does not show.	Necessary Bedside Monitor is connected to LAN.	 <p>Connect Bedside Monitor to LAN with LAN interface cable.</p>
Record and Copy not work.	Recorder is connected.	<p>Connect AU - 3310, AU - 3320.</p> 
	Recorder is turned ON.	 <p>Turn Power SW of Recorder ON.</p>
	Paper is loaded.	<p>Load paper.</p> 

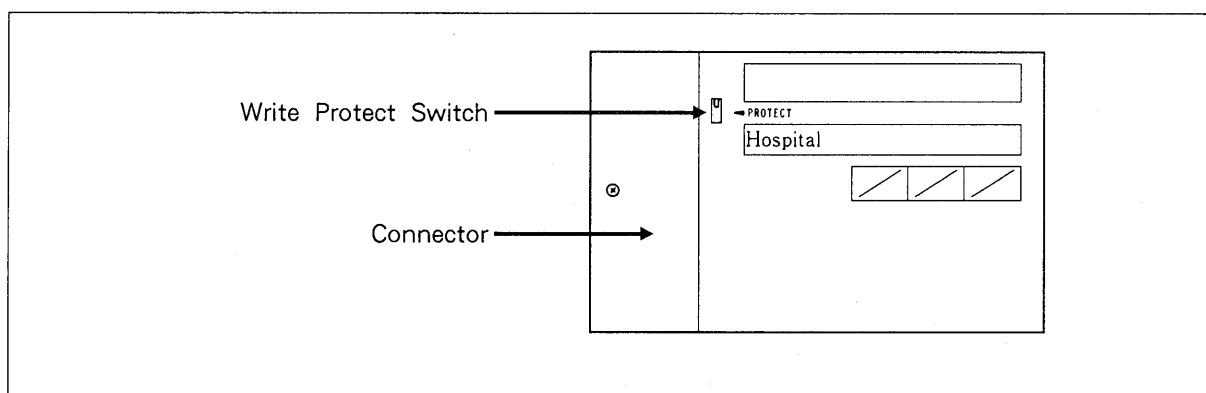
## 11. USE OF THE IC MEMORY CARD

### IC CARD IDENTIFICATION



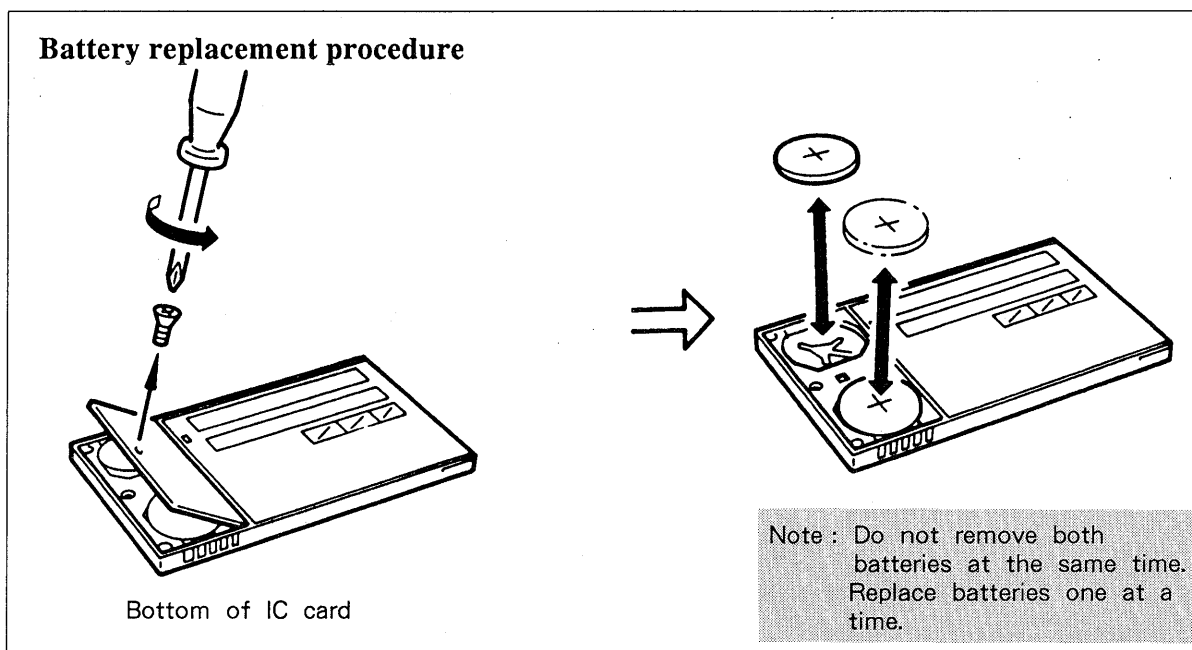
### CAUTIONS:

1. Turn the write protect switch on the bottom of the card to the "PROTECT" side to prevent erroneous writing of data.
2. Do not touch the connector or contact the connector with metal objects
3. Keep away from direct sunlight, excessive heat and moisture.
4. Do not drop, strike or impact. Do not bend or dismantle other than battery replacement.
5. Do not dispose of by fire.
6. Do not immerse or splash with water.
7. Life of batteries is one and half years. See next page for Battery Replacement.



# USE OF THE IC MEMORY CARD

## BATTERY REPLACEMENT



### CAUTIONS:

1. Inside the memory card, two lithium batteries (CR2025) are mounted.
2. Replace the batteries one at a time to insure the data is not erased.
3. Keep batteries out of reach of children. If swallowed, contact a physician immediately.
4. Do not open the battery cover unless replacing batteries.
5. Replace the batteries every one and half years.
6. Check the battery polarity before installation. See above figure.
7. Do not dispose of batteries in a fire, or they may explode.

## 12. SPECIFICATIONS

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### Display

<b>Screen:</b>	12 inch diagonal, Electromagnetic deflection CRT
<b>Display color:</b>	Amber
<b>Waveform display Method:</b>	Nonfade moving trace.
<b>Number of Bed display:</b>	6 sec 25mm/sec (1 to 6 beds display) 2 sec (8, 12 beds display)
<b>Sweeping speed:</b>	12.5, 25, 50mm/sec (1 to 6 beds display) 25mm/sec (8, 12 beds display)
<b>Waveform Freeze/Release:</b>	Each bed or All beds is available for FREEZE/RELEASE
<b>Frequency characteristics on the CRT:</b>	DC to 50Hz
<b>Brightness adjustment:</b>	Available on the Set — up display

**Control:** 7 fixed switches and touch screen.

**Signal Input:** All signals are input from Bedside Monitor.

### Network system

<b>LAN in use:</b>	Omninet II
<b>Communication bit rate:</b>	4 M bps
<b>Communication media:</b>	Shielded twist pair cable
<b>Communication distance:</b>	Max. 200m in total length
<b>The number of Bedside Monitor to be connected:</b>	Max. 24 sets
<b>The number of Central Monitor to be connected:</b>	Max. 6 sets

### Input/Output Connector

<b>LAN:</b>	Branch Cable of Omninnet II Connection to Local Area Network
<b>Slave monitor output:</b>	Connection to a slave monitor
<b>Recorder output 1:</b>	Connection to a recorder AU — 3310 or AU — 3320
<b>Recorder output 2:</b>	Connection to a recorder AU — 3310 or AU — 3320
<b>RS — 232C:</b>	Computer interface
<b>Alarm pole output:</b>	Connection to an alarm pole AP — 300

*This product is based in part on OMNINET™ technology licenced under the authority of Corus System, Inc.*

# SPECIFICATIONS

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## Power

Voltage:	AC 115 or 230V $\pm$ 10% 50/60Hz
Power consumption:	Max. 180VA

## Environment Condition

Operation temperature:	10 – 40 °C
Operation relative humidity:	30 – 85%, non – condensing
Operation atmospheric pressure:	70 – 106 kPa (700 – 1060 mBar)

## Safety (with Input box IB – 3300 connected)

Power protection:	Class I, type CF
Patient leakage current:	10 $\mu$ A or less
GND leakage current:	100 $\mu$ A or less
Withstanding Voltage:	AC 1500V/minute

Storage temperature:	– 10 – +60 °C
Storage humidity:	30 – 95%
Storage atmospheric pressure:	70 – 106kPa(700 – 1060 mBar)

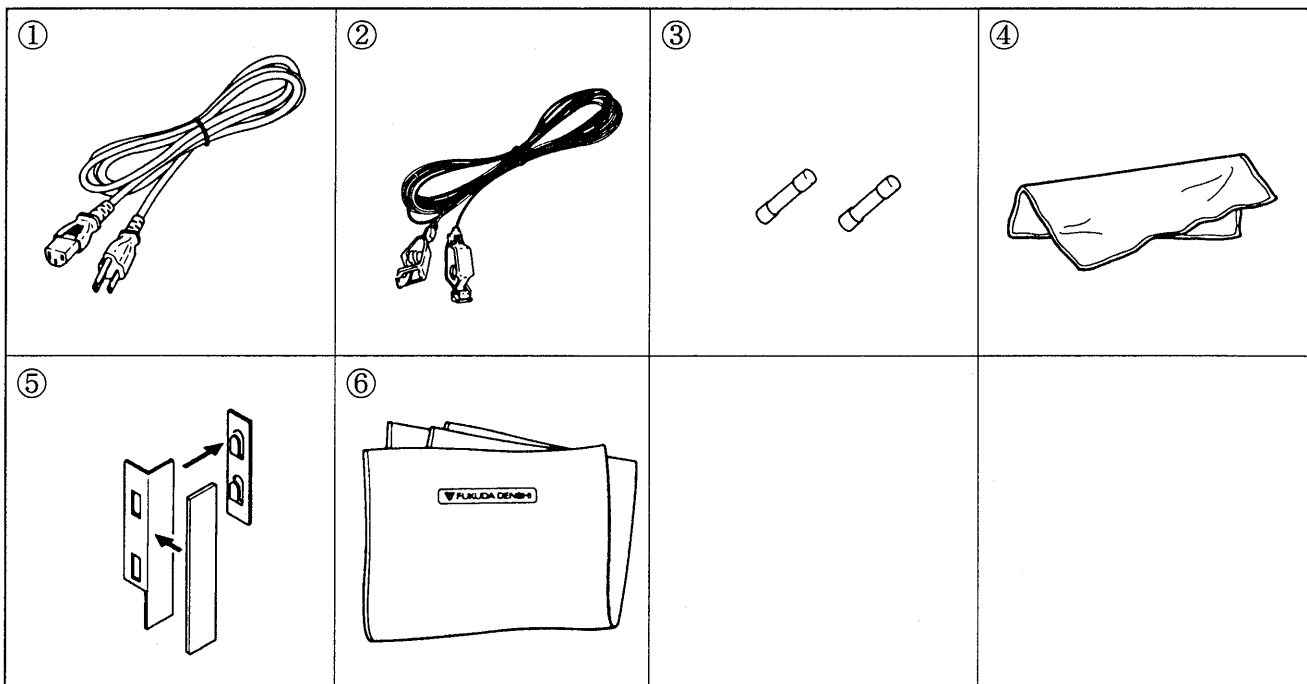
Dimension:	318(W) $\times$ 262(H) $\times$ 341(D)mm 12.5(W) $\times$ 10.3(H) $\times$ 13.4(D)inches
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Weight:	About 12 kg. 26.4 lbs
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# 13. ACCESSORIES

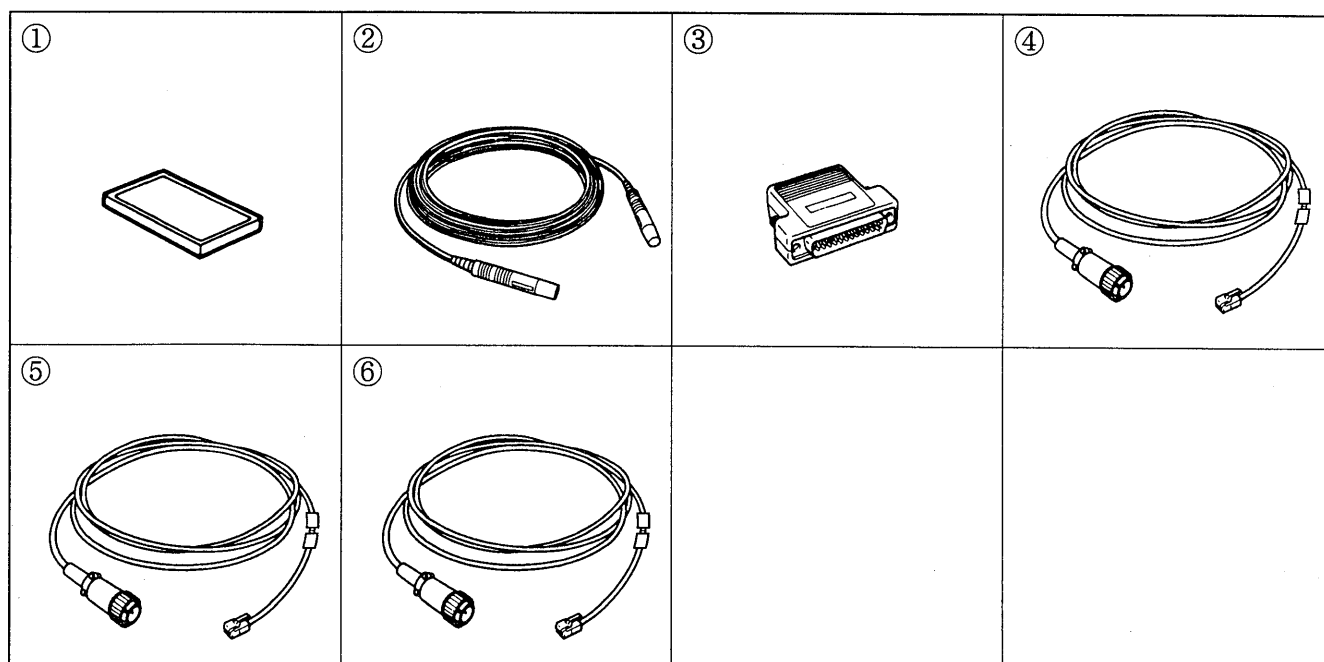
## STANDARD

No.	Item	Model	Q'ty	Remarks
①	Power cable	CS - 18 or CS - 24	1 1	230V standard USA , 115V standard
②	Grounding cable	CE - 01A	1	
③	Power fuses	313002 (2A) or 313001(1A)	2 2	115V 230V
④	Cleaning cloth	OA - 57	1	
⑤	Name plate set	OA - 437	1	
⑥	Dust proof cover		1	



## OPTIONAL

No.	Item	Model	Remarks
①	IC memory card	FML1024PG – C	
②	Optical activate plug cable	HAC105	
③	RS – 232C optical adaptor	RS1101 – P	
④	Branch cable	CJ – 323A	1m / 3.3ft
⑤	Branch cable	CJ – 323B	2m / 6.6ft
⑥	Branch cable	CJ – 323C	4m / 13.1ft



# 14. INDEX

## DISPLAY SCREEN AND OPERATION

Switch	Key	Description	Page
INITIAL	RECORD/STOP	Waveform Record/Stop	8 – 3
	CAL	Calibration waveform	8 – 3
	GAIN	Gain setting. Waveform position adjustment	8 – 4
	FREEZE/RELEASE	Waveform Freeze/Release	8 – 4
	ALARM	ON/OFF setting, suspend, alarm limits	8 – 5
	OTHR – B	Display of other beds. ON/OFF of alarm sound of other bed	8 – 7
	MEMU	Display of menus for operation	8 – 9
	BED SELECT	Individual display mode Bedside Monitor screen display, Control	8 – 11
	REC 1/REC 2	Recorder change	8 – 10
FUNCTION	RECALL	Display, record, editing, of waveforms	8 – 19
	TREND	Display of trendgram, selection of trend time, recording, data clear	8 – 20
	REC & TRND	Simultaneous display of recall waveform and trendgram. Selection of trendgram and trend time. Recording	8 – 22
	TEMPLATE	Display of VPC template and number of occurrence	8 – 26
	ST DISPLAY	Trendgram of ST and instantaneous heart rate. Setting of standard waveform. Super imposition display of ST at every one minute.	8 – 27
	Σ DISPLAY	Display of long term compressed ECG	8 – 29
	Σ RECORD	Record of long term compressed ECG	8 – 30
	SUMMARY	Record of summary report	8 – 30
	CO MEAS	Display of CO measurements and thermodilution curves	8 – 31
	HEMODYNAMICS	List of hemodynamics	8 – 33
	PROFILE	Forrester chart. Cardiac function list. Hemodynamic profile	8 – 35
	CRG	Display of ECG (six seconds), instantaneous heart rate trend (two minutes), and respiration waveform	8 – 37



## DISPLAY SCREEN AND OPERATION

Switch	Key	Description	Page
SET – UP	KEY LOCK	Locking of operation of touch keys	8 – 39
	DISP ON/OFF	ON/OFF of display items	8 – 40
	SWEEP SPEED	Selection of sweep speed	8 – 41
	SOUND/BRIGHT	Adjustment of tone of sound and brightness	8 – 42
	H.R. TONE SEL	Selection of the bed to generate H.R. sound	8 – 43
	PATIENT NAME	Registration of a patient's name/ID number	8 – 44
	ARRHYTHMIA	ON/OFF of arrhythmia detection Setting of a threshold	8 – 45
	REC SET – UP	Setting of recording function	8 – 48
	PERIODIC REC	Setting of periodic recording	8 – 49
	RECORDER SEL	Selection of second waveform for 2 ch recorder	8 – 51
	TIME SET	Date, time set	8 – 52
	IC CARD R/W	Loading or saving of data for IC memory card	8 – 53
	DATA CLEAR	Erasure of all of patient data	8 – 54
	PRE – SET	Display of preset menu	8 – 55
SET – UP + PRE – SET	SET – UP INIT	Initialization of set up data	8 – 56
	DISP CONFIG	Selection of display configuration	8 – 57
	MONITOR ID	Number assignment to a central monitor	8 – 58
	SUMMARY ITEM	Selection of items for summary report	8 – 59
	IC CARD INIT	Initialization of IC card	8 – 60
	RECALL SET – UP	Selection of recall length, channel, and parameter for 2nd channel	8 – 61
	TEST MENU	Menu display for servicing	8 – 62
	SOFT SWITCH	Selection of monitoring condition	8 – 63
	FUNC SET – UP	ON/OFF operation of item in each menu	8 – 64

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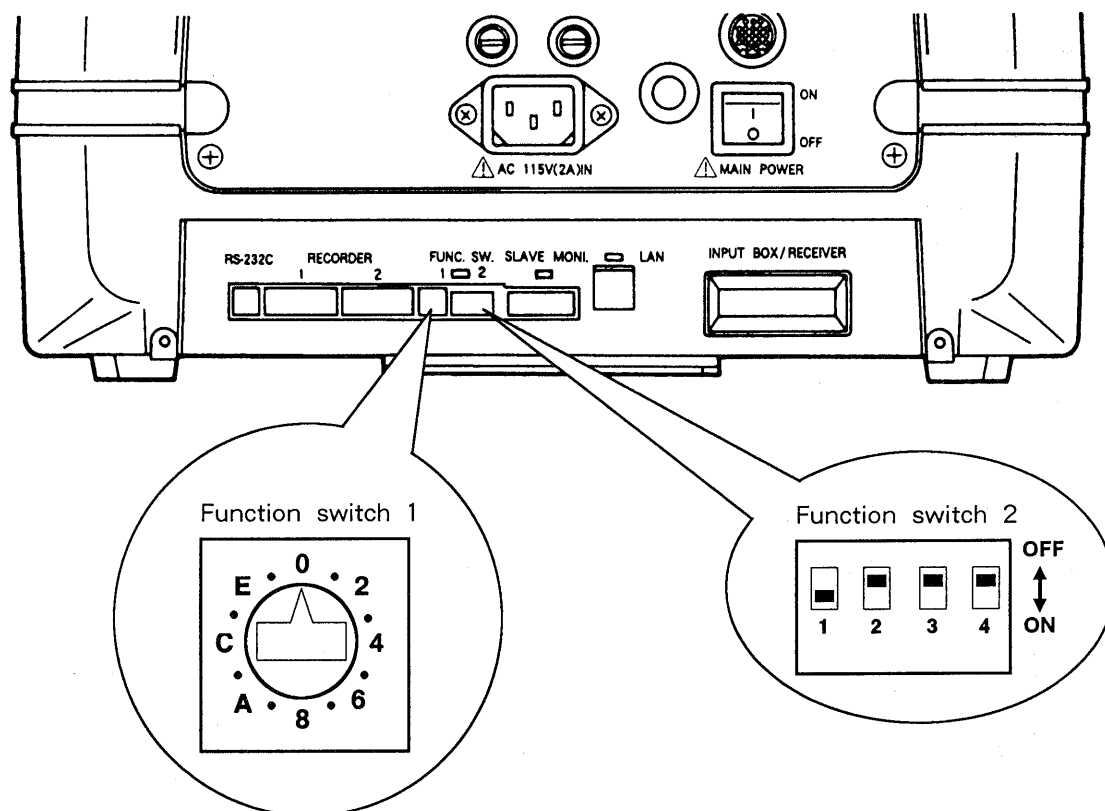
# Installation

# CONTENTS

<b>Preparation Before Use .....</b>	<b>1</b>
<b>System Configuration .....</b>	<b>2</b>
<b>Mounting the name plate to the monitor .....</b>	<b>3</b>
<b>Mounting the AU – 3310 to the Monitor .....</b>	<b>4</b>
<b>Setting the IC Memory Card .....</b>	<b>5</b>
<b>Interconnections .....</b>	<b>6</b>
<b>Connectors and Function Setting .....</b>	<b>7</b>
<b>Installation &amp; Testing of LAN Cable System .....</b>	<b>8</b>
<b>Setting of the Monitor ID and Display Configuration .....</b>	<b>18</b>
<b>LAN Assignment .....</b>	<b>19</b>

# PREPARATION BEFORE USE

Check the function setting switch on the back panel so the DS - 3300 meets your needs.



**Function setting 1**

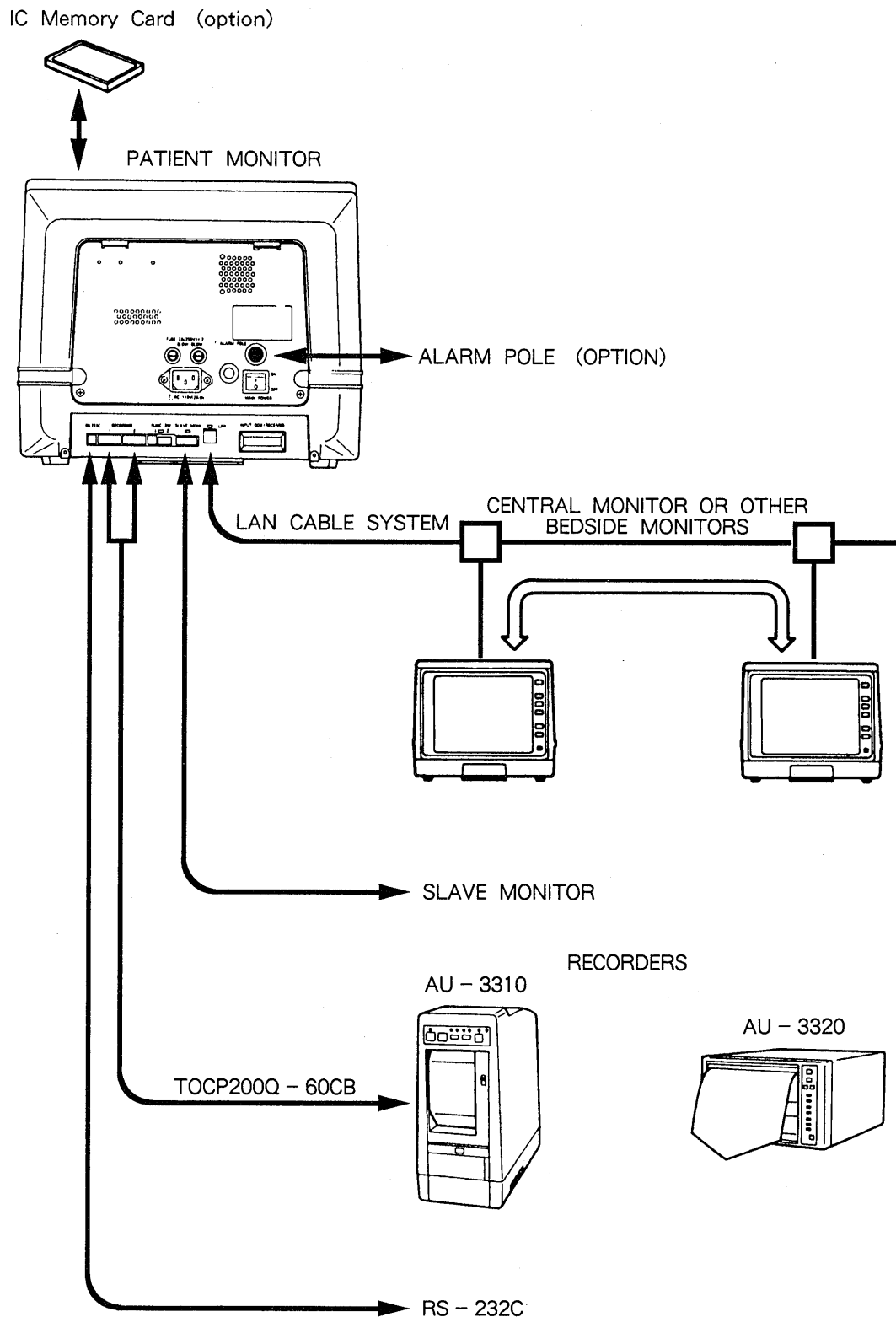
Position	Model
0	CMW(Central Monitor)
1	ETR(Telemetry Monitor)
2	BMW(Bedside Monitor)
3 ~ F	Undefined
※ F	System Initialization (Having been done at shipment)

※ As system initialization has been done at shipment, there is no need to set to the F position. Set to the F position momentarily in the case of no display, so that a display might be shown. Set to the position(0~2) for the appropriate monitor configuration. When initialization is made, the previously established function items such as the sound and the brightness will all return to the setting at the time of shipment.

**Function setting 2**

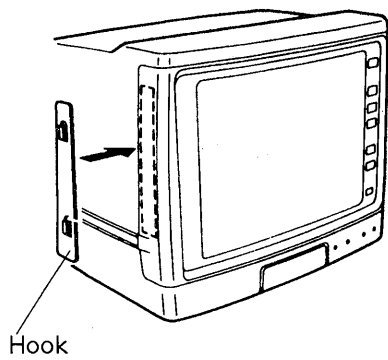
No.	ON	OFF
1	English	Japanese
2	NA	
3	Display Freeze	Normal
4	Test mode	Normal

Turn No.1 to ON side and the others to OFF side for daily monitoring.

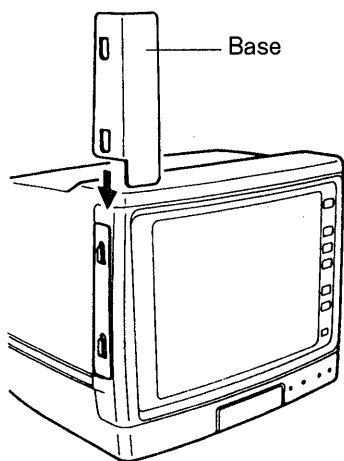


# INSTALLATION

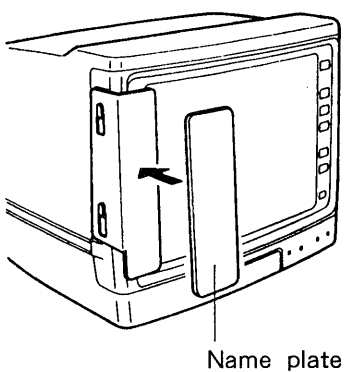
## Mounting the name plate to the monitor



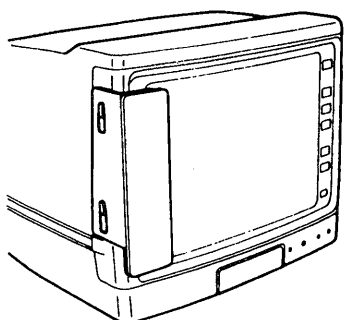
Apply the hook on the left of the monitor.  
Adhesive tape is put on the hook.



Slide down the base to the hook.



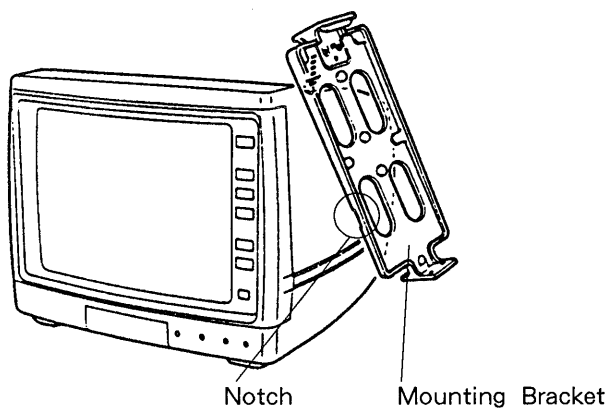
Attach a name plate on the base. The name plate  
has a adhesive tape on the surface.



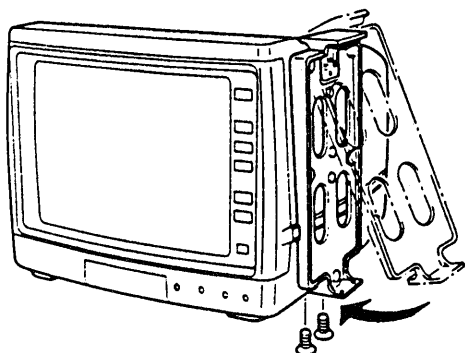
A name plate is applied.

# INSTALLATION

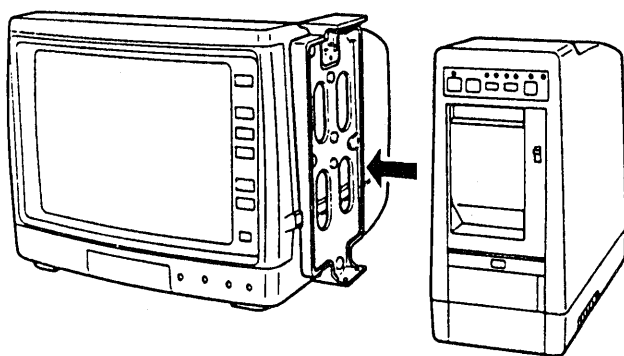
## Mounting the AU - 3310 to the monitor



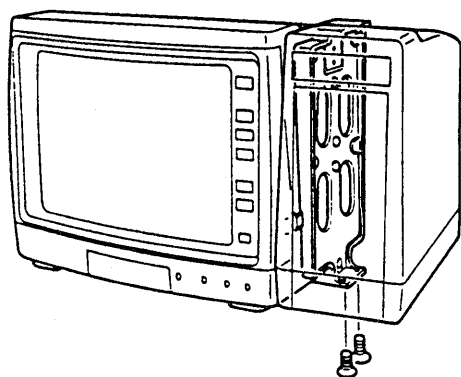
Attach the mounting bracket to the side of the monitor by locating the top of the mounting bracket into the concave area on the top of the monitor.



Move the bottom of the bracket to the bottom of the monitor and secure it with two mounting screws.

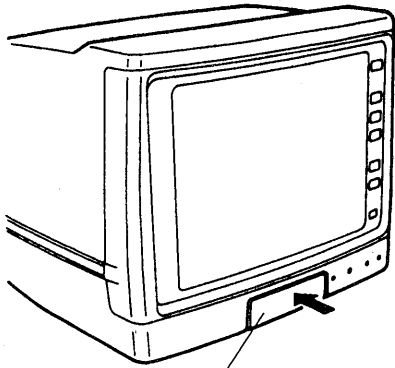


Using the same procedure, mount the AU - 3310 into the mounting bracket by locating the top of the bracket into the concave area on the top of the recorder.



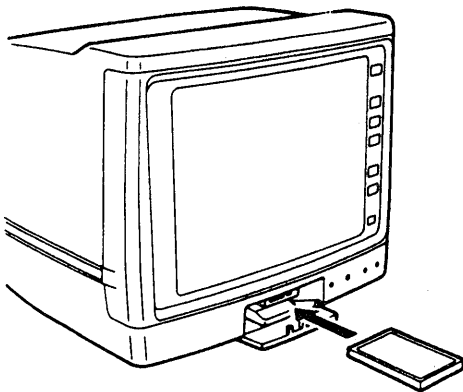
Move the bottom of the recorder to the bottom of the bracket and secure it with two mounting screws.



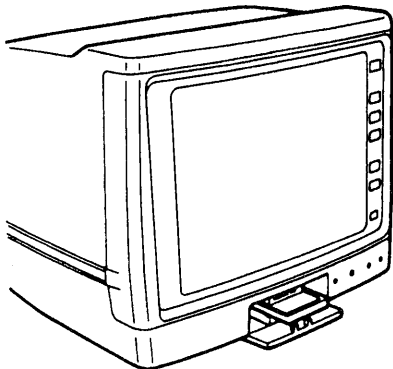


IC memory card door

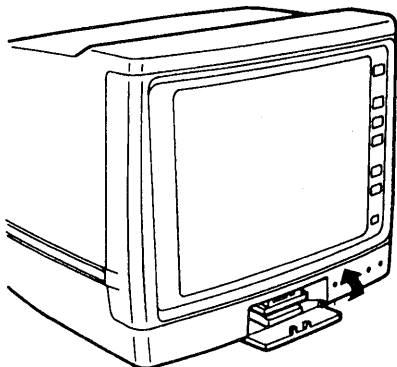
Push and open the door for IC memory card.



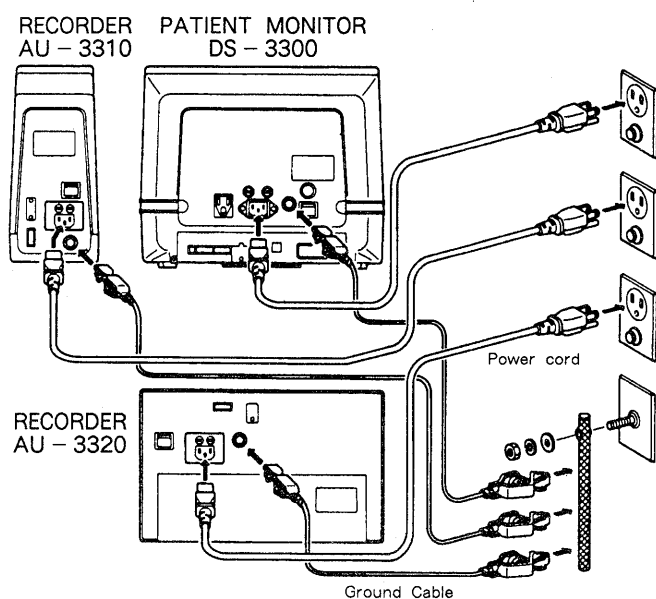
Insert the IC memory card into the slot.



Left figure shows the condition that the IC memory card is being inserted.



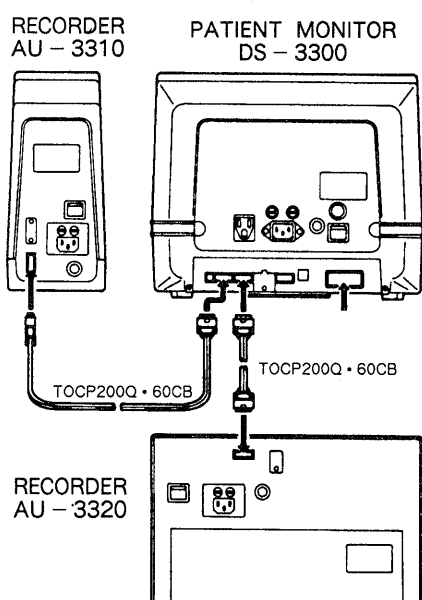
Close the door after fully inserting the IC memory card.



### Power cord

Connect the power cord to a proper AC wall outlet. Make sure the main power switch is in the OFF position before connecting to AC power.

If necessary, connect the accessory ground cables to a ground terminal.

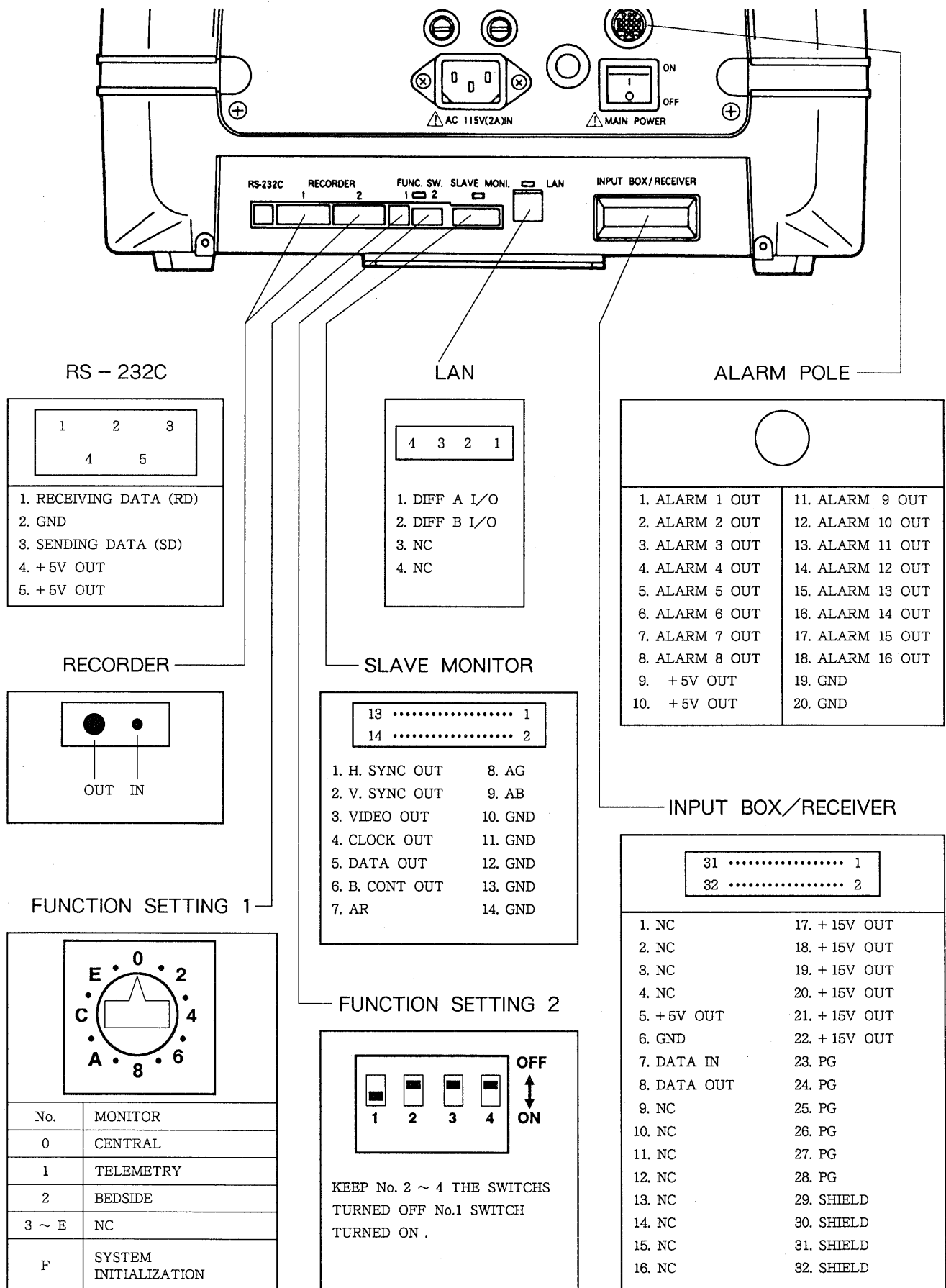


### Recorder Connection

The monitor has two recorder interface connectors. They can be used for either recorder.

# CONNECTORS AND FUNCTION SETTING

## PIN ASSIGNMENT AND SIGNAL I/O

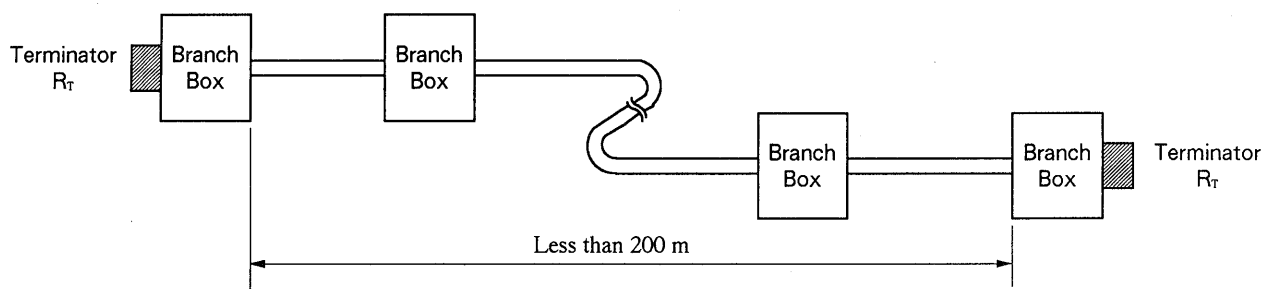


### 1. Laying Trunk Cable

#### 1.1 Limitation of Total Length of Trunk Cable

Design the patient monitoring network in such a configuration that the total length of trunk cable does not exceed 200m.

The trunk cable should be the Fukuda DS-TRK (parts number 6G0413), which has the proper electrical characteristics (insulation resistance, conductor resistance, characteristic impedance, etc.) to ensure the specified transmission distance and proper suppression of reflection.

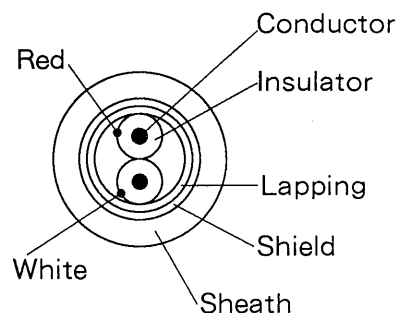


#### DS-TRK Trunk Cable Specifications

##### Structure

Item		Unit	Description
Number of Pair		Pair	1
Conductor	Material	—	Tin-plated mild copper twisted wire
	Nominal Section	mm <sup>2</sup>	0.75
	Composition	wires/mm	30/0.18
	External Diameter	mm	1.1
Insulator	Material	—	Cross-linked polyethylene
	Thickness	mm	0.63
Line Configuration		—	Paired twisted (pitch=50mm max.)
Lapping		—	Polyethylene tape lapped winding
Shield		—	Tin-plated mild copper mesh (density 90% min.)
Sheath	Material (Color)	—	Vinyl (Yellow)
	Thickness	mm	0.9
Finished External Diameter, Approx.		mm	7.5
Approximated Mass		kg/km	70

Remarks: The cable may have a proper inclusion inserted as required.



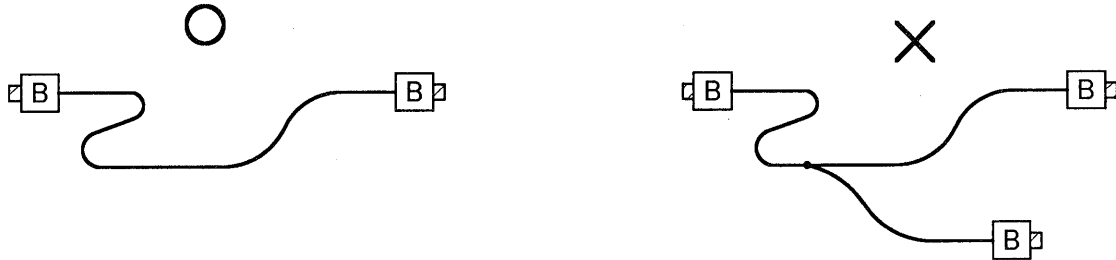
##### Characteristics (at 20 °C)

Item	Unit	Characteristic Value
Maximum Conductor Resistance	Ω /km	26.0
Minimum Insulation Resistance	M Ω •km	1,000
Withstand Voltage	AC. Volts/min.	1,500
Static Capacitance	aF/km, less	60
Characteristic Impedance	Ω (4 MHz)	120 standard

### 1.2 Wiring

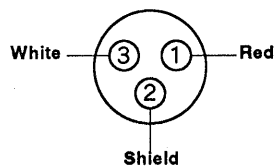
#### 1) Non-branched Wiring of Trunk Cable

The trunk cable must not be branched to ensure impedance matching in the trunk cable.



#### 2) Connection of Trunk Cable to Branch Box

3-pin connector : Hirose RM12BRB-3S



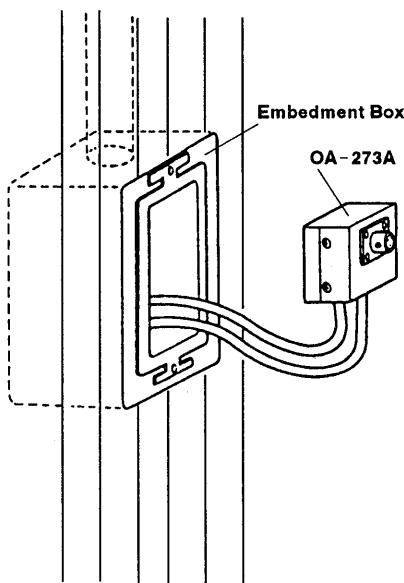
Red, white and shield wires should be connected to corresponding pins of the branch box connector.

#### 3) Branch Box Installation

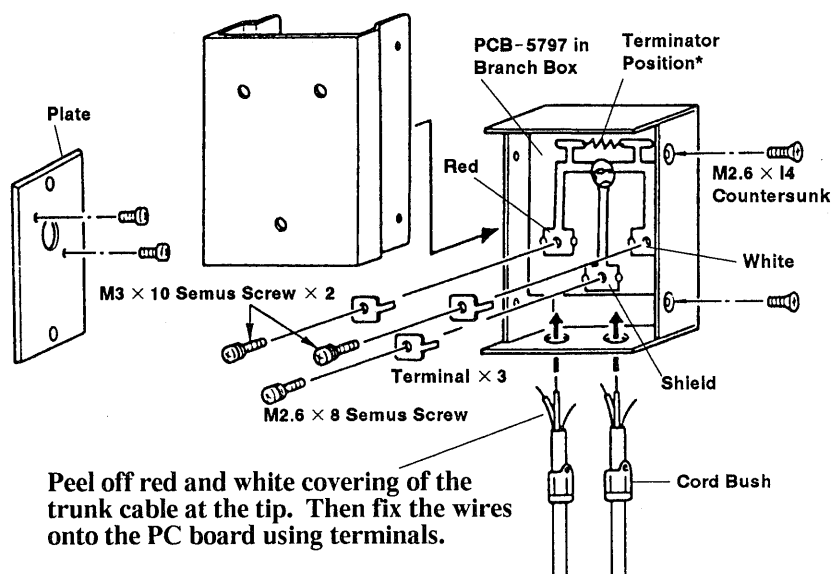
##### (1) With Standard Internal Branch Box (OA-273A)

This box can be installed inside an embedment box which conforms to JIS.

##### Installing Plate



##### Connecting Trunk Cable to Branch Box



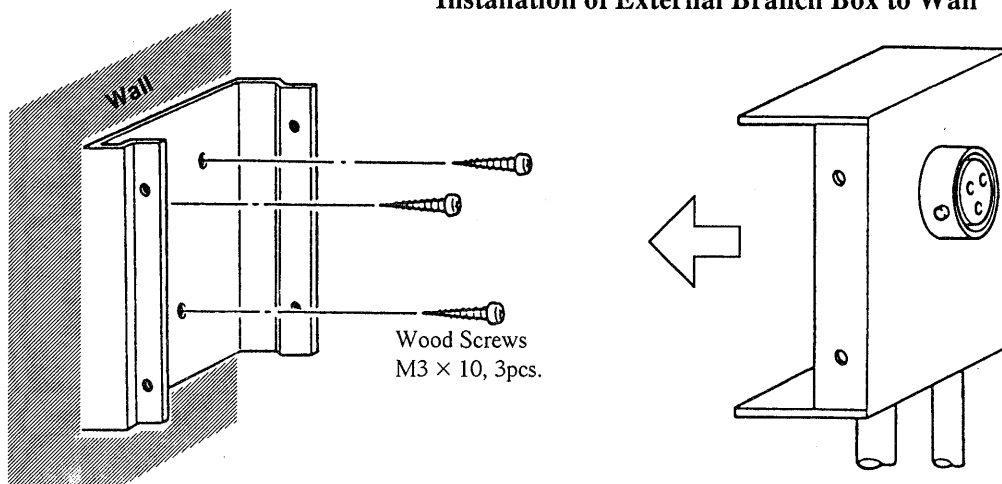
Peel off red and white covering of the trunk cable at the tip. Then fix the wires onto the PC board using terminals.

\* Install a terminator only at the ends of both sides (120  $\Omega$  1/4W).

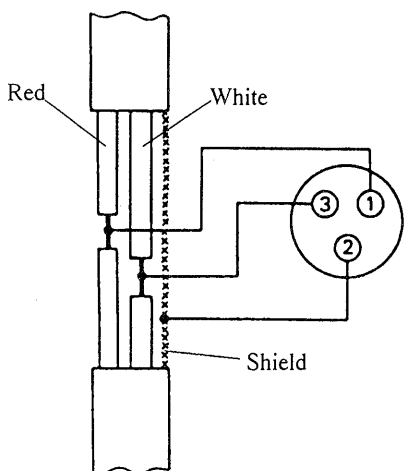
### (2) With Standard External Branch Box (OA-273B)

Difference from the OA-273A internal branch box is that the external casing of OA-273B is painted. Connection to the trunk cable is made with the same manner as for the internal branch box.

#### Installation of External Branch Box to Wall



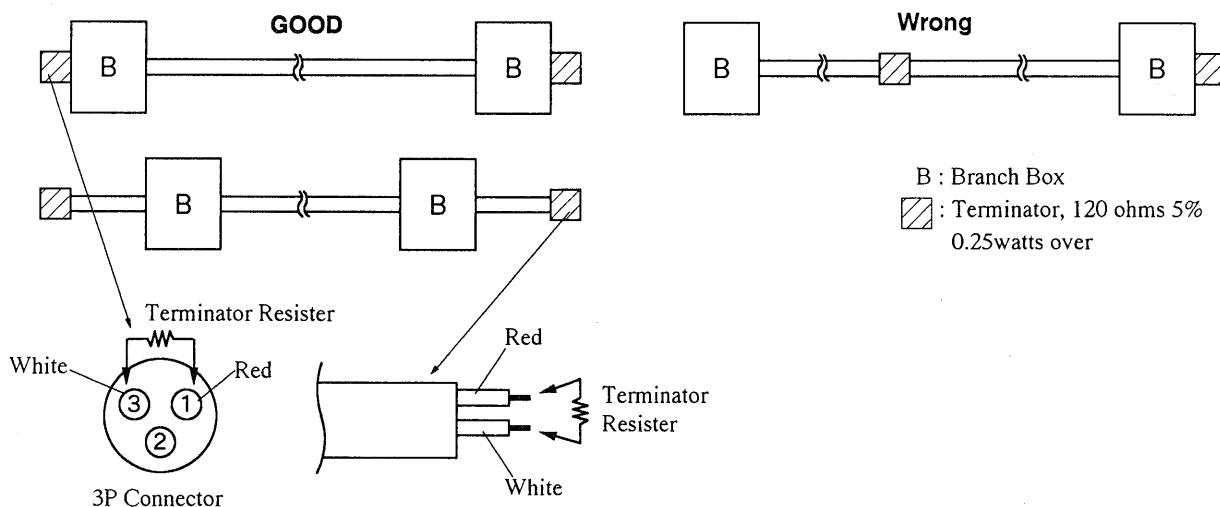
### (3) Simplified Connection (Branching Exceptionally Allowable)



- ※ Taking some appropriate measure, fix the trunk cable in such a manner that any stress is not applied to connector pins.
- ※ When mounting a terminator resistor ( $120\ \Omega$  1/4W) to both ends, solder it between pins 1 (red) and 3 (white) of the connector.
- ※ For branching cable, use the same cable as for the trunk cable. The branching cable length shall be within 5cm.

### 1.3 Mounting Terminator Resistor

Be sure to mount a terminator to both ends and not a middle point.



### 1.4 Grounding Shield Wire of Trunk Cable

The shield wire of the trunk cable shall be grounded. The grade of grounding point is desired to be of the first grade. But if such facility is not available, check with the tester that the grounding wire potential has no problem. Also take care not to connect the shield wire to the grounding conductor to which a large-capacity equipment is connected.

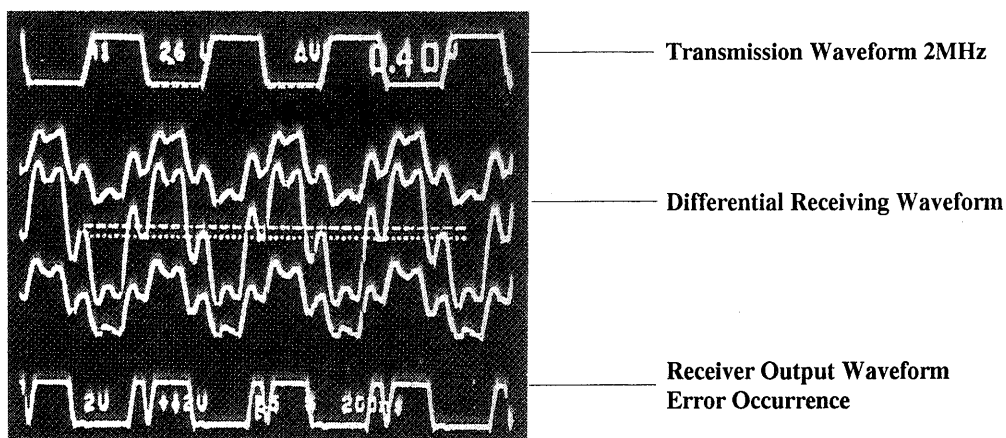
If the total length of the trunk cable is within 50m, ground the shield wire at a middle point. If the length is longer than 50m, it is desirable to ground at 2 or more points, provided that the grounding points have the same potential. In any case, evaluation of the grounding is required with the communications test at the trial operation after system installation.

### 1.5 Distance between Branch Boxes

There are very delicate factors in deciding the distance between branch boxes. Depending on the distance in relation with the LAN's signal transfer rate and signal transmission time, signals may be distorted or corrupted. This is because even a proper termination does not ensure a complete suppression of reflection and it occurs when reflection from another branch cable reaches some point of the trunk cables in the same phase.

While there are kinds of countermeasures, we recommend you here to install branch boxes in a minimum of over 5m distance. Also, the shorter the trunk cable, the lesser the signal attenuation becomes.

However, if the trunk cable is commonly used in 2 or more areas and many units of monitors are connected in an area, an irrational effect may be caused. In such the case, refer to Section 2 "Branch Cable Installation."



Example of Reception Error due to Reflection  
(obtained through test)

### 1.6 Waterproofing Branch Box Connector

In environments where the inside of connector is afraid of being corroded due to splashing water, use the RM12BR-C connector cap.

### 2. Branch Cable Installation

#### 2.1 Making Branch Cables Shortest Possible

The most effective measure for suppression of reflection in the cable system is a proper termination. The secondly effective measure is to make the branch cable length shortest possible. According to test results and literatures, a limit of the branch cable length is approximately 60cm with a transfer rate of 4Mbps. However, it is difficult to apply such a short branch cable to all monitor systems.

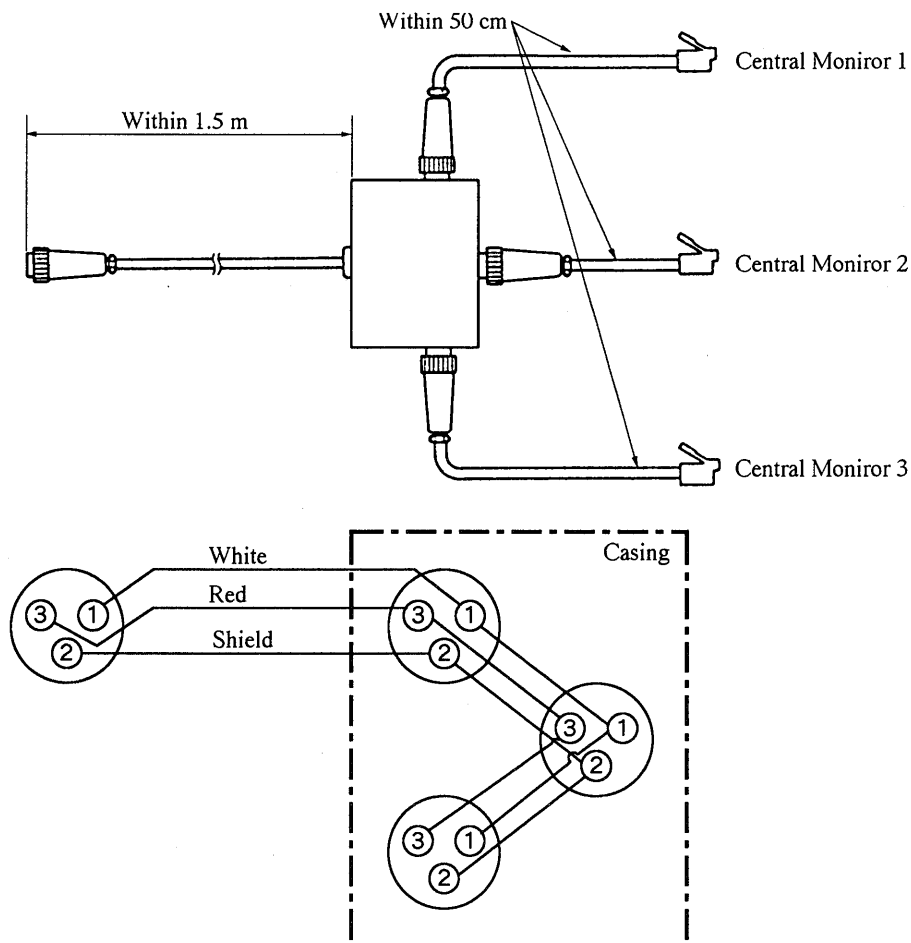
So, the standard DS-BRC branch cable is supplied 1m, 2m or 4m long.

Naturally, branch cables of 2 and 4m long bring some disadvantages against reflection, so a resistor is provided for attenuation of reflection wave. Since this causes signal attenuation, the 4m long branch cable should be used only in a middle point of the total cable length.

From the above viewpoint, it is recommended to shorten the standard branch cable to a length of 1m or shorter. If the cable is made shorter than 1m, the reflection attenuation resistor is not required. Remove it.

#### 2.2 If Distance between Branch Boxes Cannot be Made Longer

If 2 or more central monitors are placed on an identical table, it is expected difficult to ensure a desirable distance between branch boxes described in Section 1.5. In such a case, an adaptor may be produced as follows.





### Standard Branch Cables Available

Model	Length	Parts Number
CJ – 323A	1 m	9D8285
CJ – 323B	2 m	9D8286
CJ – 323C	4 m	9D8287

**Note:** The 4m long CJ- 323C will be selected only when it is indispensably required. It should be used at a middle point of the total cable length.

### DS- BRC Branch Cable Specifications

#### Structure

Item		Unit	Description
Number of Pair		Pair	1
Conductor	Material	—	Tin-plated mild copper wire
	Norminal Sectional Area	AWG	28
	Composition	Wires/mm	7/0.127
	External Diameter	mm	0.38
Insulator	Material	—	Cross-linking polyethylene
	Thickness	mm	0.35
Wire Configuration		—	Paired twisted (pitch=50mm max.)
Lapping		—	Polyethylene tape lapped wiring
Shield		—	Tin-plated mild copper mesh (density 90% min.)
Sheath	Material (Color)	—	Soft vinyl (Ivory white)
	Thickness	mm	0.4
Finished External Diameter, Approx.		mm	3.6 (finished external diameter 3.3 to 3.9)
Approximated Mass		kg/km	15

**Remarks :** The cable may have a proper inclusion inserted as required.

#### Characteristics (at 20 °C )

Item	Unit	Characteristic Value
Maximum Conductor Resistance	$\Omega$ /km	226
Maximum Insulation Resistance	M $\Omega$ •km	2,500
Withstand Voltage	AC. Volts/min.	1,500
Static Capacitance	aF/km, less	75
Characteristic Impedance	$\Omega$ (4 MHz)	120 standard

### 3. Testing Cable System

#### 3.1 Trunk Cable System

After laying the trunk cable system, conduct the following test on connectors of all branch boxes connected.

Using the tester, measure the resistance between pins 1 and 2 of each branch box connector.

Resistance	Indication	Countermeasure
$60 \Omega \pm 5 \Omega$	Wiring is correct.	
Less than $60 \Omega$	<ul style="list-style-type: none"> <li>Red and white wires are shorted or about to be shorted.</li> <li>Terminator resistance is not proper (low).</li> <li>3 or more terminator resistors are connected.</li> </ul>	<p>Check wiring.</p> <p>Check terminator resistance which should be <math>120 \Omega</math>.</p> <p>Check the inside of each branch box.</p>
More than $65 \Omega$	<ul style="list-style-type: none"> <li>The cable is disconnected or about to be disconnected.</li> <li>No terminator resistor is inserted.</li> <li>Terminator resistance is not proper (high).</li> <li>Total length of trunk cable exceeds the specification.</li> </ul>	<p>Check wiring.</p> <p>Check terminator resistance which should be <math>120 \Omega</math>.</p> <p>Shorten the total length of trunk cable.</p>

**Note:** The abovementioned resistances cannot be measured with the monitor connected.

#### 3.2 Communications Test

Conduct the following test with monitors connected to the LAN system.

- 1) Initiate the test mode on the monitor to be tested by pressing the **SET UP** switch and **PRESET** and **TEST MENU** keys in that order. Or set bit 4 of function setting switch 2 to the lower position (ON). (To escape from the test mode, press the **INITIAL DISPLAY** switch or set bit 4 of function setting switch 2 to the upper position (OFF).)
- 2) On the test menu page, press the **COM test** key. The COM test page will appear. See the column concerning the "LAN" on that screen page.

Meanings and display examples are shown on the next pages. In testing, mainly monitor the error column.

### “8. COM test” Page

This screen page shows communications line test results including the number of errors occurred and the number of transmission/reception times.

Subject communications circuits include:

LAN (OMNINET II 4Mbps)  
IB (HDLCL 500Kbps)  
REC1 (HDLCL 500Kbps)  
REC2 (HDLCL 500Kbps)  
PC (RS232C conformed)

The number of errors occurred and the number of transmission/reception times are as follows:

STATUS-- Communications circuit test status, displayed for other than normal status.

? : Tx is 0.  
OPEN : Rx is 0.  
OK : Tx = Rx and there is no error.  
ERROR : Tx  $\neq$  Rx or there is an error.

Tx-- Number of transmission times

UNDERRUN : Transmission underrun error (transmission data size lacks) This indicates that the 72001 sends DMARE but the DMAC does not write data in the 72001 within xx\*  $\mu$  s.

Rx-- Number of reception times

ABORT : Abort error (interruption of reception)  
This indicates Tx underrun at the transmission side or that data becomes marks on the half way in the frame.  
CRC/FAME : CRC or FAME error (abnormal communications data). This indicates that data in the frame gets out of order.  
OVERRUN : Rx overrun error (missed reception data)  
This indicates that the 72001 sends DMARE but the DMAC does not read data from the 72001 within xx\*\*  $\mu$  s.  
SHORT FAME : The communications frame is too short.  
PARITY : Parity error.  
DATA ERROR : Reception data size error.

\*72001 : 16  $\mu$  s, 72105 : 5  $\mu$  s  
\*\*72001 : 48  $\mu$  s (3 buffers), 72105 : 5  $\mu$  s

Prior to starting the test, make sure that all instruments concerned are powered. Or otherwise, depending on the timing of turning on the power, communication may start from a halfway.

# INSTALLATION

## Installation & Testing of LAN Cable System

Communications line test method and control are described below. The NORMAL means the mode where the system operates for normal monitoring and the STOP means stop of communication.

Test Method	LAN	IB	REC 1	REC 2	PC
LOOP BACK	The loopback test is made using the loopback function of the $\mu$ PD72105 LAN controller. The $\mu$ PD72105 sends 16-byte data from the memory and receives the same data.	100 Byte Enables data reception and sends data at 60ms cycles.	16 Byte	16Byte	None
ECHO BACK	The monitor sends the echo packet to monitor ID 1 (management station) of the LAN center. (Place monitor ID 1 at the center in the ECHO BACK mode beforehand.)	Places the $\mu$ PD72001 in the echo loop test. In this mode, data input to the Rx terminal of the $\mu$ PD72001 is output from the Tx terminal as it is.			None

TEST MODE	LAN	I B	REC 1	REC 2	P C
NORMAL					
LOOP BACK					
ECHO BACK					
STOP					
STATUS	?	?	?	?	?
Tx	487	1494	437	0	0
UNDER RUN	0	0	0	0	0
Rx	438	17945	921	0	0
ABORT	0	0	0	0	0
CRC/FRAME	0	0	0	0	0
OVER RUN	0	0	0	0	0
SHORT FRAME	0	0	0	0	0
PARITY	0	0	0	0	0
DATA ERROR	0	0	0	0	0

### 4. General Precautions

- 1) Branch cables should be made as shortest possible.
- 2) Unused monitors should be disconnected from the LAN cable system together with the branch boxes to eliminate unwanted extra reflection.
- 3) A branch cable may be connected or disconnected during operation of the LAN system.
- 4) With the DS - LAN system, the central monitor labelled "center 1" is the station which manages all monitors in the LAN system. So any one of central monitors shall be designated and labelled as center 1.
- 5) Cable extension to over 200m is available through use of a repeater.

# 

Set the central monitor number and the display configuration with the following procedures.

MONITOR ID SELECTION

SELECT THE ID FOR THIS CENTER MONITOR.

1 2 3 4 5 6

**Caution:** Be sure to label one of central monitors as "1". (All monitors are labelled as "1" under default.) Central monitor 1 plays a role to control the whole system. Also, do not apply an identical number to 2 or more monitors.

### 1. Setting Monitor Number

Press the **SET UP** switch, then press the **PRE - SET** and **MONITOR ID** keys. The screen page will be as shown at the left.

◆ Label the central monitor by a number selected from 1 through 6 by pressing the numeric key.

◆ The numbers, which are already used for other monitors in the LAN system, are displayed in a large size. So, select a number from those displayed in a small size. The selected number will be displayed in a large size.

◆ If pressing a small size number does not change it to a large size one, the number may be used for 2 or more monitors. Select another number.

### 2. Setting Display Configuration

Press the **SET UP** key, then press the **PRE - SET** and **DISP CONFIG** keys. The screen page will be as shown at the left.

◆ Numeric keys 1 through 12 are displayed at the upper portion of the screen. Select the number of beds to be displayed by pressing the numeric key.

◆ Select a desired bed number from 1 through 24 by pressing the bed number key. Then select the display position for the bed by pressing the numeric key in the "AREA/BED" column at the right portion of the screen.

◆ Bed numbers are available from 1 through 24 and those in a large size indicate that the bedside monitors are connected to the LAN system.

◆ If the bedside monitor of which the bed number is selected, is not connected to the LAN system (if the LAN cable is connected but the monitor is not turned on, the bedside monitor is regarded not connected to the LAN system), no waveform nor alphanumeric data is displayed at the position on the basic display, but message "LAN" is shown.

DISPLAY CONFIGURATION

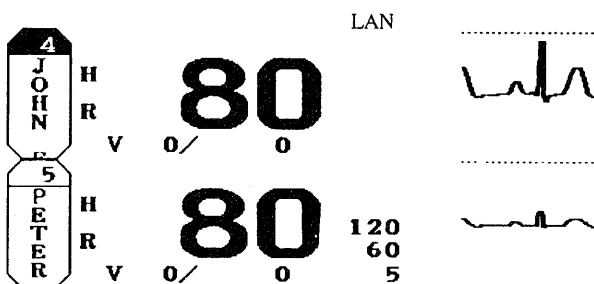
1. SELECT NUMBER OF BEDS TO BE DISPLAYED.

1 2 4 6 8 12

2. SELECT THE BED NUMBER AND THE AREA FOR DISPLAY.

BED NUMBER					
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

AREA	BED
1	1
2	2
3	3
4	4
5	5
6	6



### Line Assignment in Whole LAN System

Physically, communication in the LAN system is made through a pair of twisted wires. But logically, the LAN system involves many internal lines, to which various functions are assigned as follows.

No.	Line Assignment	Number of Beds Maximum
1	ECG display on Initial Display	24
2	Individual Initial Display (including Other Bed Display)	6
3	Function Display	4
4	Set Up Display	2
5	Central Monitor Recording (including recording for Other Bed)	6

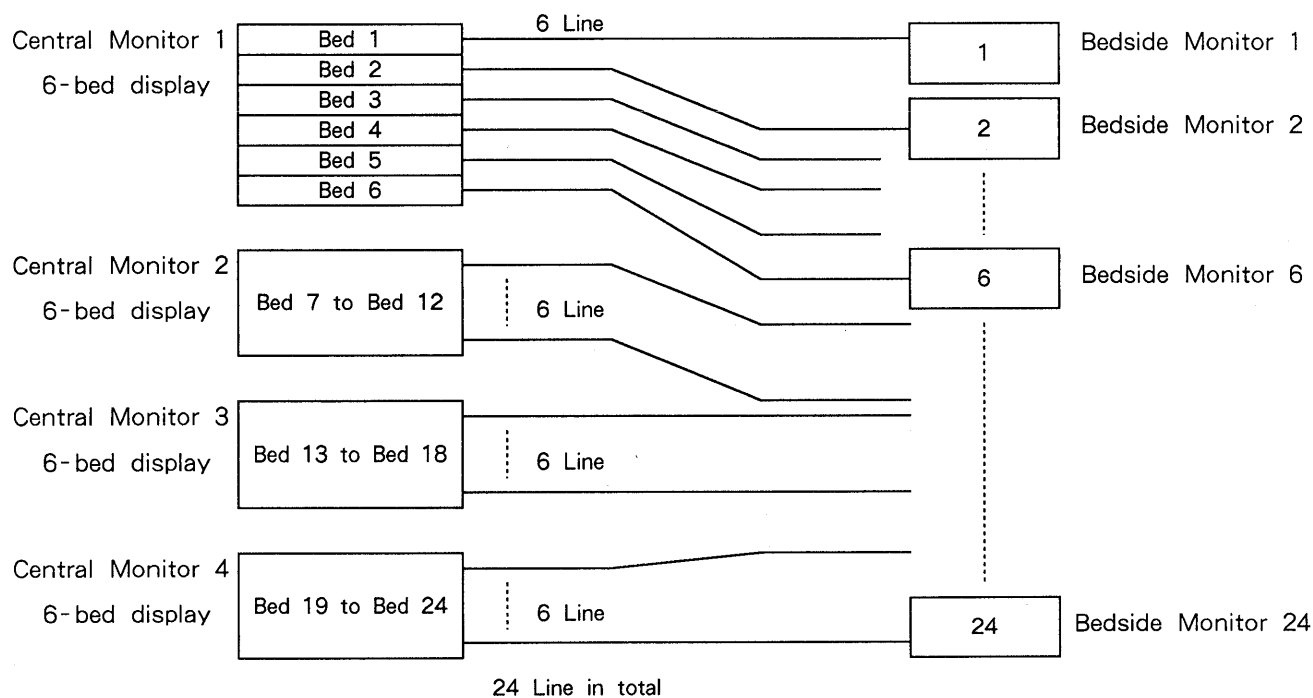
### Explanation

#### 1. Lines for ECG display on Initial Display are available for a maximum of 24 beds

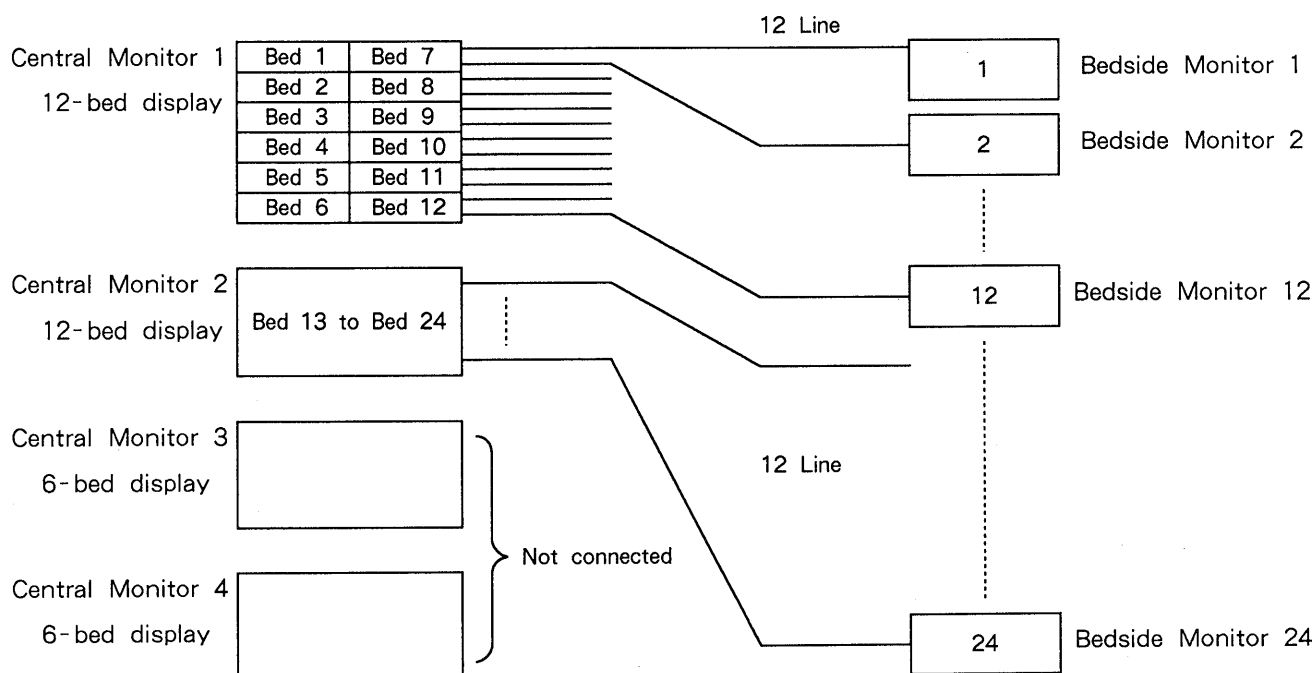
If 4 central monitors are provided, 6 beds can be displayed on each central monitor, thereby allowing a total of 24 beds to be monitored on 4 central monitors. If one of central monitors is set for 12- bed display, each of remaining 3 central monitors can be set for 4- bed display, thereby allowing a total of 24 beds to be displayed on 4 central monitors.

Also, if 2 central monitors are individually set for 12- bed display, other 2 central monitors cannot be set for any bed display. Refer to drawings on the next page.

**If all central monitors 1, 2, 3 and 4 are set to 6- bed display.**



**If all central monitors 1 and 2 are set to 12- bed display.**





### **2. Lines for Individual Display on the Initial Display are available for a maximum of 6 beds.**

The Individual Display mode can be simultaneously initiated on up to 6 monitors. The Other-Bed Display uses this individual display line.

### **3. Lines for Function Display are available for a maximum of 4 beds.**

The Function Display mode like recall waveform or trendgraph monitoring can be simultaneously initiated on up to 4 central monitors.

### **4. Lines for Set Up Display are available for a maximum of 2 beds.**

The Set Up Display like patient name entry or arrhythmia set up, etc. can be simultaneously initiated on 2 central monitors.

### **5. Lines for recording at central station are available for a maximum of 6 beds.**

Each central monitor can connect 2 recorders and up to 6 recorders at the central station can be simultaneously activated.

#### **Line assignment for bedside monitor**

Line assignment for input/output between a bedside monitor and the LAN system is as follows.

No.	Function	Number of Lines
1	Output to Central Monitor	2
2	Output to Other Bed	2
3	Input from Other Bed	1

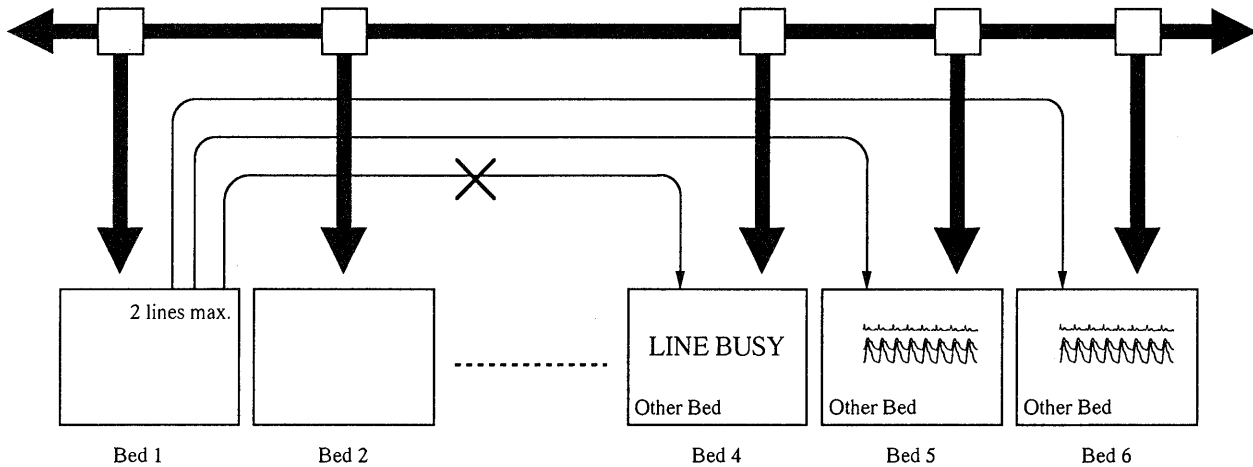
#### **Explanation**

##### **1. Two output lines to central monitor**

The 2 output lines to central monitor allow 2 central monitors to display parameters on a bedside monitor.

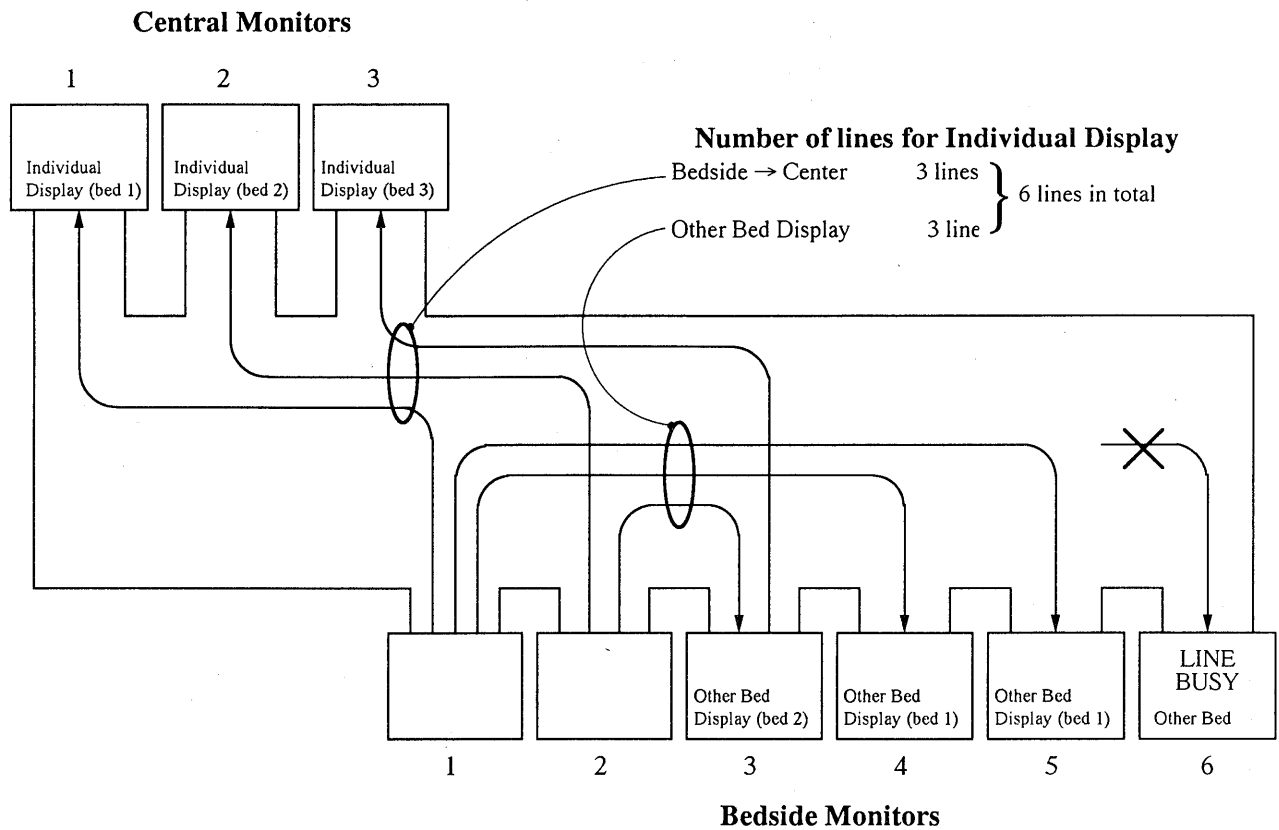
### 2. Two output lines to other bed

The two output lines to other bed allow 2 monitors to display parameters on a bedside monitor. If parameters on bed 1 are tried to be monitored on three bedside monitors (6, 5 and 4), no waveform is displayed but message "LINE BUSY" is displayed on the third bedside monitor (4).



But waveforms on bed 2 can be displayed on bedside monitor 4.

Also, the number of lines for individual patient display is 6 in the whole LAN system. So, if a 7th other bed display is tried, it is not made valid and message "LINE BUSY" is displayed.



With the above figure, all 6 lines for individual patient display are used, so if other bed display is tried at bedside 6, no waveform is displayed but message "LINE BUSY" appears on bedside monitor 6.

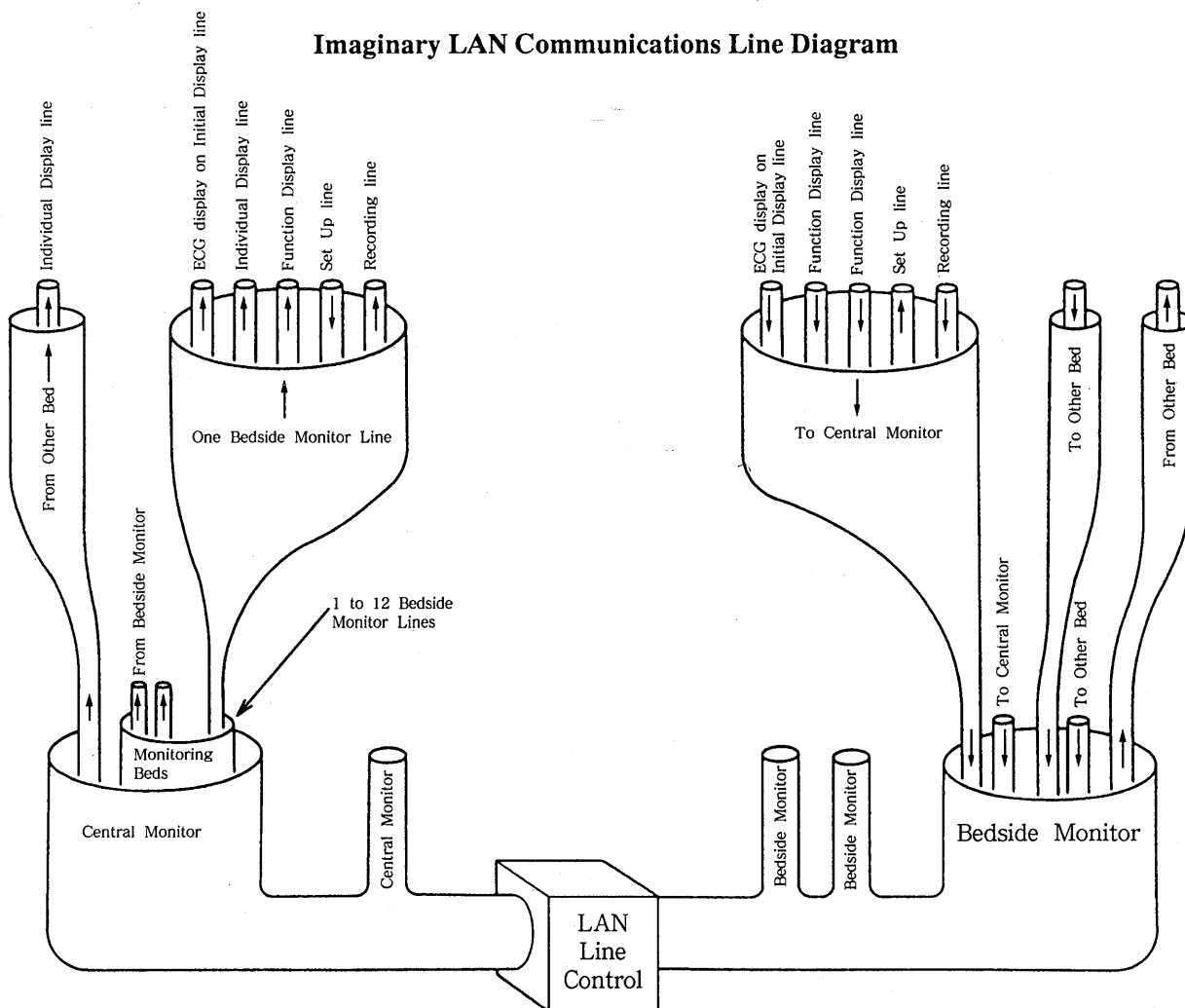
The other-bed display is automatically cancelled in 1 minute, thereby making the line free. So, in usual monitoring, it is not considered that other bed display is not possible for several minutes.

The concept of the LAN line assignment may be illustrated as follows.

Number of input/output lines between bedside and LAN

Line Name	Number of Line
Output to Central Monitor	2
Output to Other Bed	2
Input from Other Bed	1

**Imaginary LAN Communications Line Diagram**



The LAN line control connects/disconnects lines in the whole LAN system. Maximum numbers of simultaneously connectable lines are as follows.

Line name	Maximum Number of Line
ECG display (on Initial Display)	24
Individual display (all waveforms of a patient)	6
Function display (trendgraphs, recall waveforms, etc.)	4
Set Up	2
Central Monitor Recording	6