Patient Monitoring System
DynaScope DS-3300

TELEMETRY BEDSIDE MONITOR

Operator's Manual

FUKUDA DENSHI CO., LTD.

4L2275 9303Ⓔ
Printed in Japan

DS-3300 英文

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

This page is only for the USA.

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 benzine.

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 units 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.

PREFACE

This operator's manual is for the DS-3300 when used as a Telemetry Bedside Monitor.
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 Telemetry Bedside Monitor.

The Applied Operation section of this manual provides more detailed information for the DS-3300 Telemetry Bedside 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 Telemetry Bedside Monitor, the connections to the communications network and the connections for external recording devices.

Basic Operation

Basic Operation

Telemetry Bedside Monitor 4L2275

DS-3300 英文

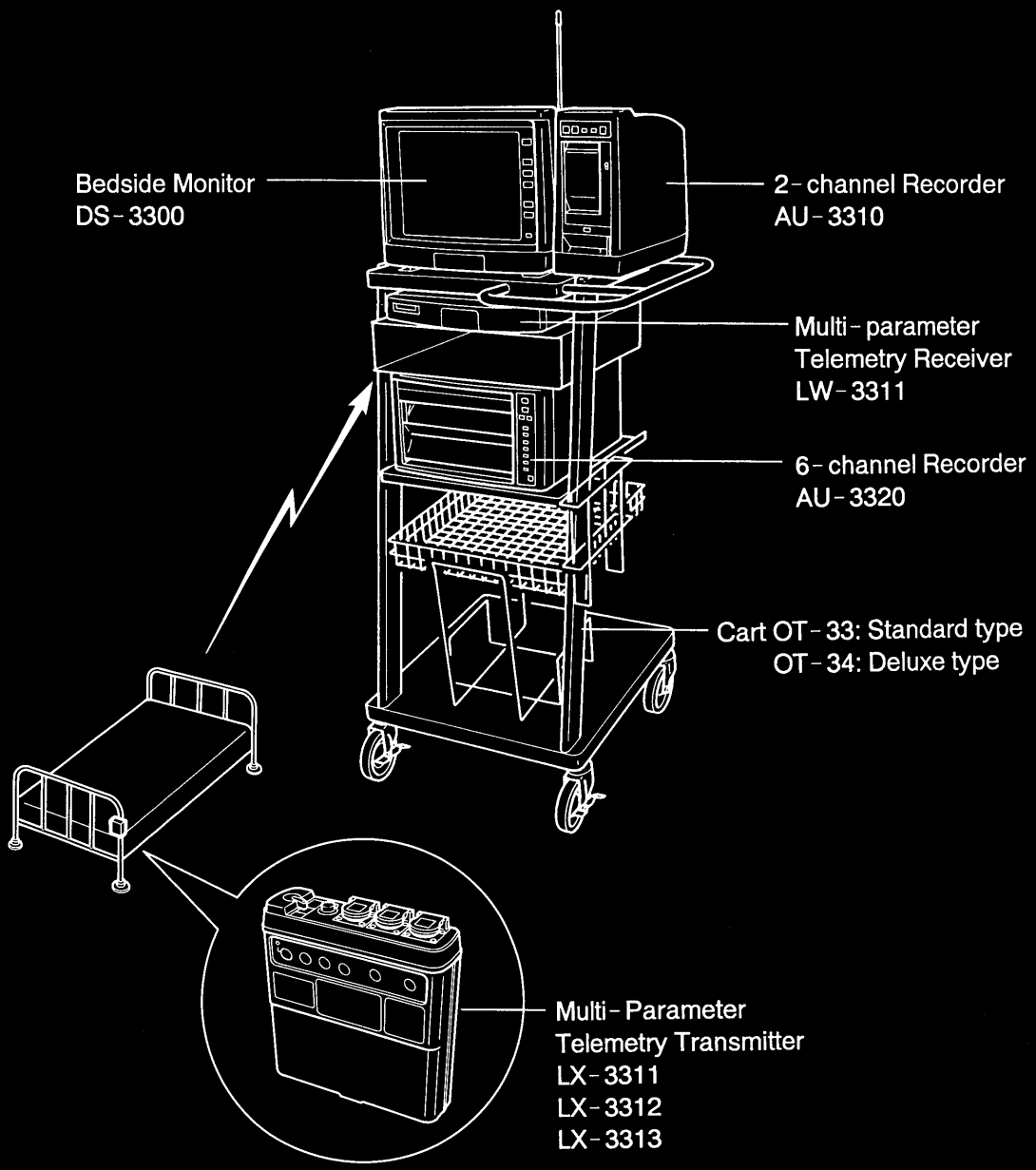
Basic Operation

CONTENTS

1. GENERAL DESCRIPTION

The DynaScope DS- 3300 BMT system is a telemetry bedside monitor. It allows the nursing staff to monitor ECG, respiration, blood pressure and/or body temperature according to each individual patient situation. The system is composed of a multi- parameter telemetry transmitter (LX- 3311, LX- 3312 or LX- 3313), a multi- parameter telemetry receiver (LW- 3311), the main monitor (DS- 3300), and recorders (AU- 3310 and / or AU- 3320).

The main monitor provides a 12- inch touch- sensitive screen for utmost ease of operation. A local area network (LAN) permits a monitoring configuration in the hospital using multiple units of the DS- 3300.



2. EASY OPERATION !

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

The number of fixed switches is 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:

ALARM RESET	INITIAL DISPLAY	FUNCTION	SETUP	REC/ STOP	COPY/ STOP	ON/OFF

These seven switches are typically sufficient for daily operation !

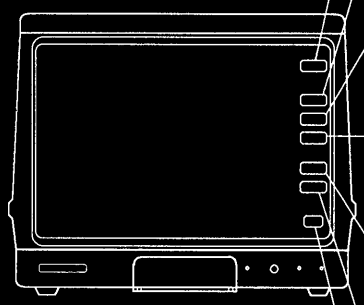
Pushing the INITIAL DISPLAY switch always returns the display to the initial display.

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

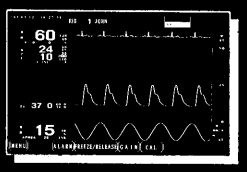
The basic operation of the DS-3300 patient monitor is realized with the seven dedicated switches on the right of the display and the touch keys shown on the display itself. The diagram below shows the operation of the seven fixed switches:



ALARM RESET

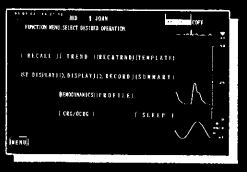
Stops alarm sound.

INITIAL DISPLAY



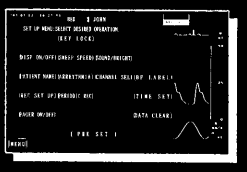
Returns the monitor to the Initial Display.

FUNCTION



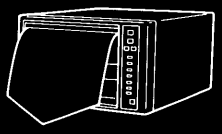
Displays the FUNCTION menu.

SET UP



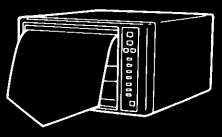
Displays the SET UP menu.

REC/STOP



Records waveforms.

COPY/ STOP



Copies information as displayed on the screen when the AU-3320 recorder is used.

ON/OFF

When the main power switch is turned ON, this switches on or off the power.
Push for 2 or more seconds to switch off.

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

4. DISPLAYS

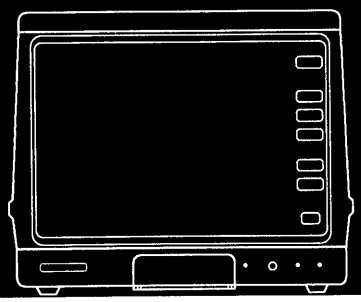
There are three main screen displays for the DS-3300.

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: 

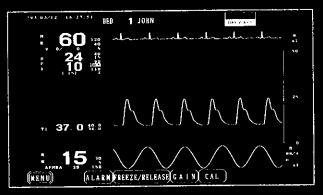
When a key is pressed, a tone is heard to confirm operation.

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



INITIAL DISPLAY

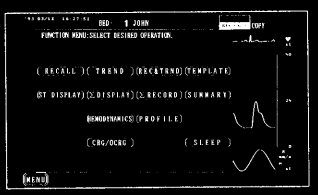
For daily patient monitoring



- CAL
- GAIN
- FREEZE/RELEASE
- ALARM
- OTHER-B
- MENU
- LEAD

FUNCTION

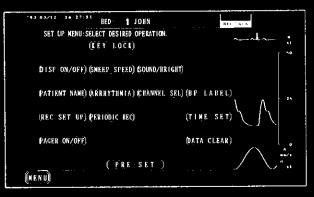
Displays Function menu



- RECALL
- TREND
- REC & TREND
- TEMPLATE
- ST DISPLAY
- Σ DISPLAY
- Σ RECORD
- SUMMARY
- HEMODYNAMICS
- PROFILE
- CRG/OCRG
- SLEEP

SET UP

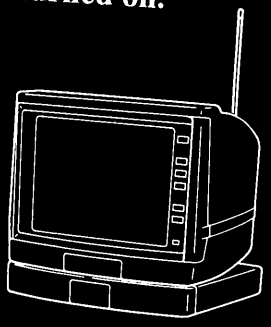
Displays Set Up menu



- KEY LOCK
- DISP ON/OFF
- SWEEP SPEED
- SOUND/BRIGHT
- PATIENT NAME
- ARRHYTHMIA
- CHANNEL SEL
- BP LABEL
- REC SET-UP
- PERIODIC REC
- RECORDER SEL
- TIME SET
- IC CARD R/W
- DATA CLEAR
- PRE-SET

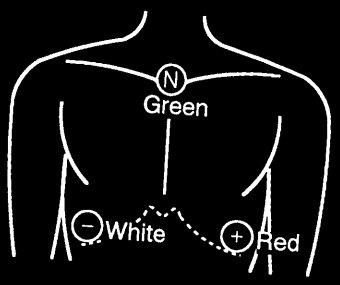
DS-3300 英文

1. Make sure the monitor has the telemetry receiver connected and an antenna installed and the power is turned on.



2. Attach Electrodes

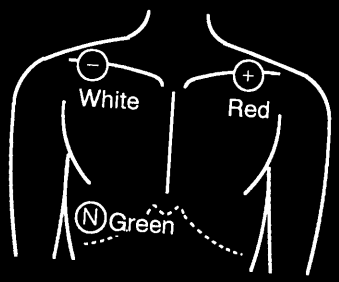
(1) CC5 Lead



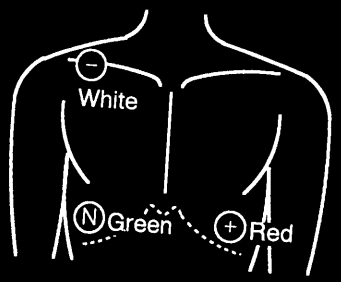
Similar to V5 lead

(2) Simulated I, II and III Leads

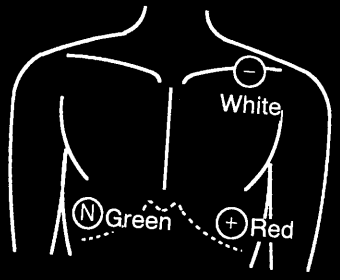
I Lead



II Lead

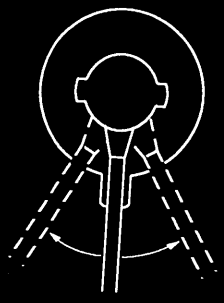


III Lead

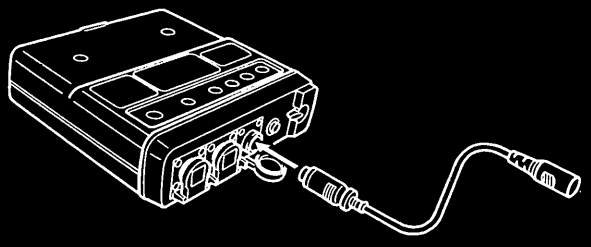


3. Connect leadwires to electrodes.

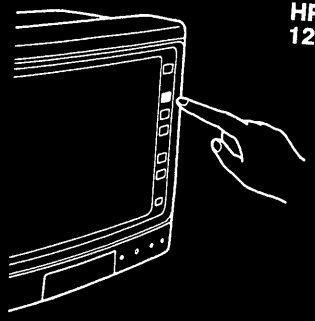
Snap the tip of leadwire to the center of electrode and slightly swing the leadwire left and right.



4. Turn the transmitter on, then connect the lead cable to the transmitter.



5. Push the INITIAL DISPLAY switch.



HR measurement range: 12 to 300 beats/minute.

INITIAL DISPLAY for daily monitoring.

Telemetry Bedside Monitor 4L2275

ECG MONITORING

To verify CALIBRATION

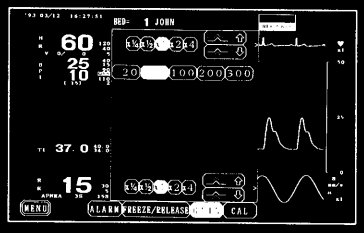
From INITIAL DISPLAY Push CAL

1mV

Calibration waveform is displayed.

To adjust Gain

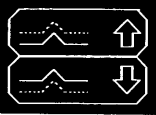
From INITIAL DISPLAY Push GAIN



Select GAIN

x¼ x½ x1 x2 x4

Adjust waveform position.



To FREEZE waveform

From INITIAL DISPLAY Push FREEZE/RELEASE

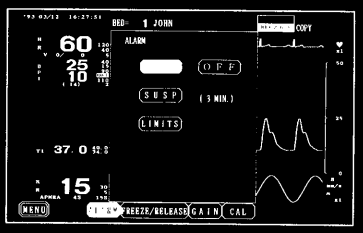
All waveforms frozen

Push FREEZE/RELEASE again to RELEASE.

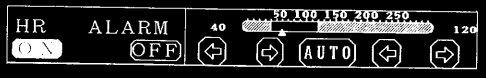
To set ALARM

From INITIAL DISPLAY Push ALARM

You can select alarm ON/OFF, SUSPEND or LIMITS.



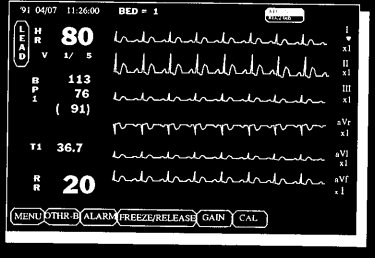
Push the LIMITS key and set alarm limits. The left side of the display selects ON/OFF for each parameter.



Lower limit is set with the ⇦ ⇨ keys on the left, upper limit with ⇦ ⇨ keys on the right. Auto key adjusts HR limits to 20 below and 40 above current rate.

To select LEAD

From INITIAL DISPLAY Push LEAD

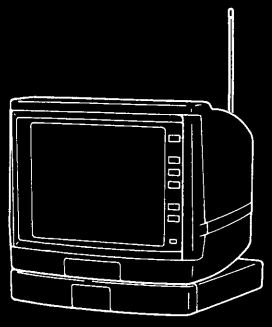


The lead selection window will appear, thereby allowing you to select lead/s. Selection is effective only if the transmitter is the LX-3312 which features dual ECG output.

Refer to "6.1 (6) LEAD SLECTION" of Applied Operation.

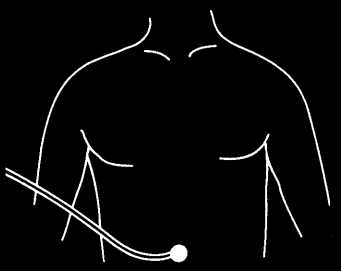
RESPIRATION MONITORING

1. Make sure the monitor has the telemetry receiver connected and an antenna installed and the power is turned on.



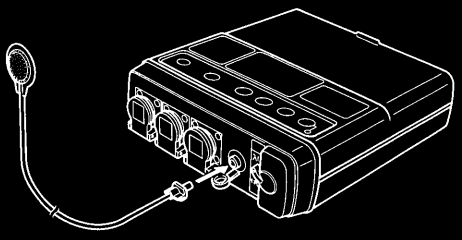
2. Attach a Resprode to the patient.

Select a location that is not affected by excess patient motion. The area above the liver is recommended for most cases.



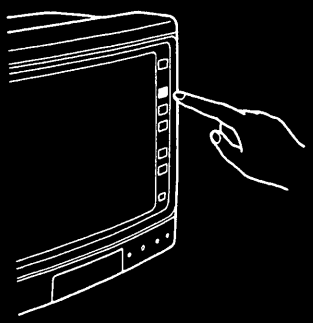
Resprode
TR-04

3. Connect the cable of the Resprode to the transmitter and turn the transmitter on.



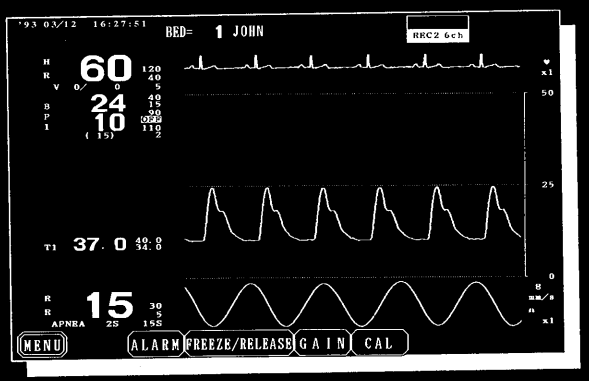
Note: The ECG lead cable must be connected to the transmitter. It serves as the transmitting antenna.

4. Push the INITIAL DISPLAY switch.



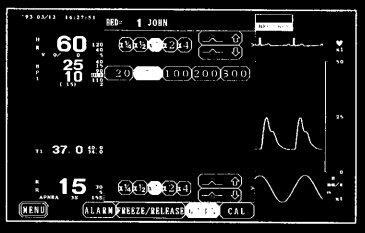
Respiration measurement range: 4 to 150 breaths/minute.

INITIAL DISPLAY for daily monitoring.



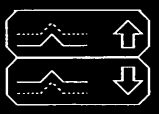
RESPIRATION MONITORING

To adjust Gain — **From INITIAL DISPLAY Push GAIN**



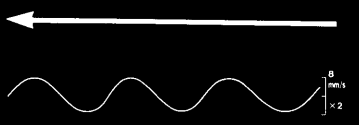
Select GAIN

Adjust waveform position.



To FREEZE waveform — **From INITIAL DISPLAY Push FREEZE/RELEASE**

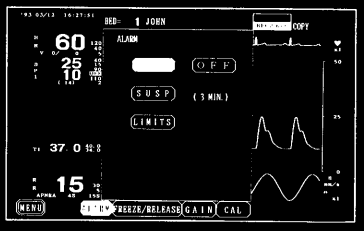
All waveforms frozen



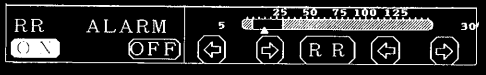
Push FREEZE/RELEASE again to RELEASE.

To set ALARM — **From INITIAL DISPLAY Push ALARM**

You can select alarm ON/OFF, SUSPEND or LIMITS.



Push the LIMITS key to set alarm limits. The left side of the display selects ON/OFF for each parameter.

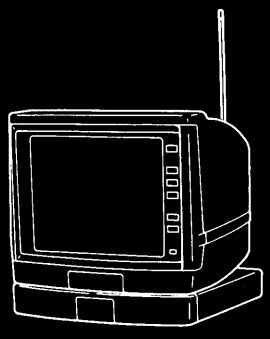


Lower limit is set with the ⇦ ⇨ keys on the left, upper limit with ⇦ ⇨ keys on the right. Push the RR key and the time period for APNEA(APN) can be set.

Respiration alarm limit range: 5 to 120 breaths/minute.
Apnea detection range: 1 to 40 seconds.

BLOOD PRESSURE MONITORING

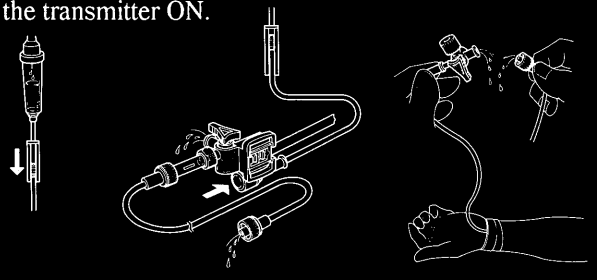
1. Make sure the monitor has the telemetry receiver connected and an antenna installed and the power is turned on.



2. Have the BP monitoring kit ready for use.

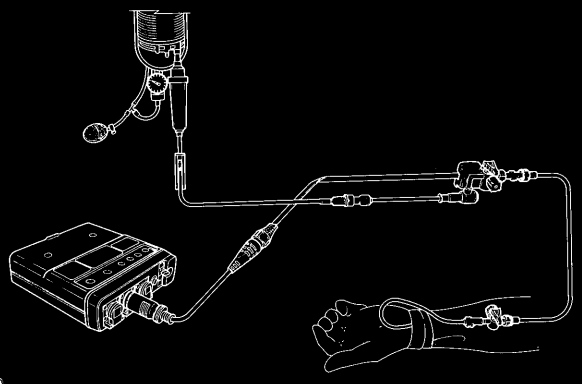
- **Do not generate bubbles during assembly or this will take time.**

To avoid bubbles, allow the solution to drip naturally without pressure and fill each part with solution.
Allow 2 or 3 drops of solution to contact the diaphragm.
Connect the transducer to the transmitter and turn power to the transmitter ON.

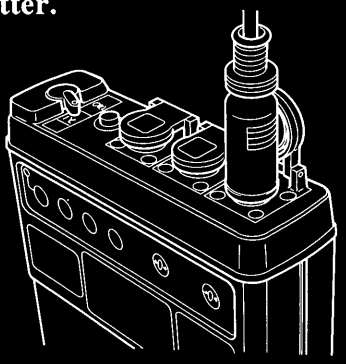


3. Watch for the following during monitoring:

As time passes minute bubbles will migrate together, creating a large bubble that interferes with monitoring.
Check the transducer set up about 30 minutes after monitoring begins and periodically there after.
Flush the solution by pressing lightly on the chamber when a bubble is present. Do not press too hard or a bubble will be generated.

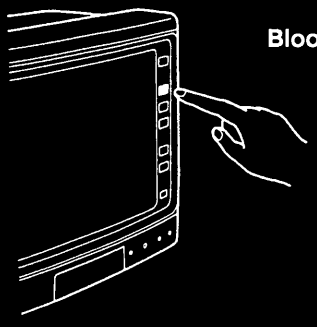


4. Turn the transmitter on. Then, open the blood pressure circuit to the atmosphere and push the ZERO balance button on the transmitter.



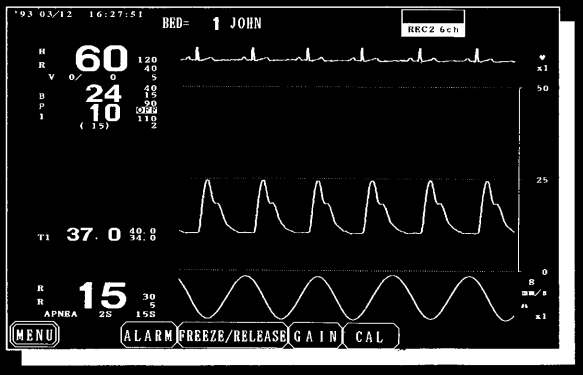
Note: The ECG lead cable must be connected to the transmitter. It serves as the transmitting antenna.

5. Push INITIAL DISPLAY switch.



Blood Pressure measurement range: – 50 to 300mmHg

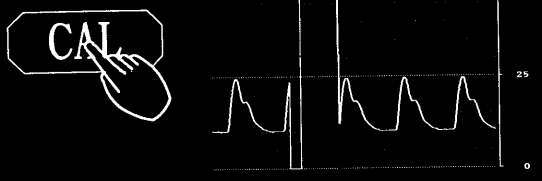
INITIAL DISPLAY for daily monitoring.



BLOOD PRESSURE MONITORING

To verify CALIBRATION

From INITIAL DISPLAY Push CAL

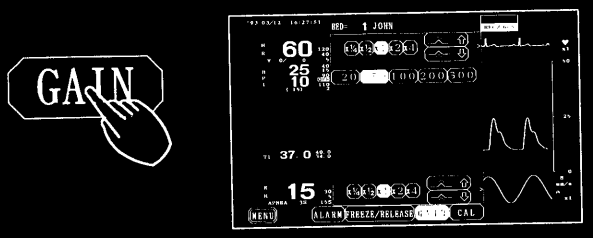


Push CAL key and a calibration waveform is superimposed on the BP waveform.
Step are at zero and full scale.

Figure at left is for 50 mmHg full scale.

To adjust Gain

From INITIAL DISPLAY Push GAIN

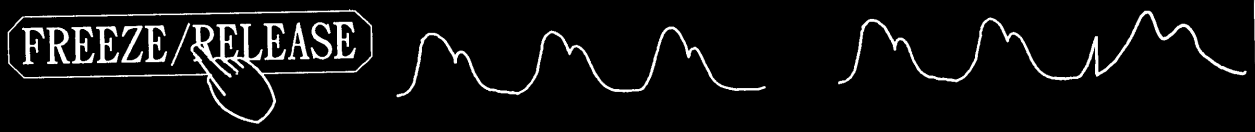


Select pressure scales from the list below.

20 50 100 200 300

To FREEZE waveform

From INITIAL DISPLAY Push FREEZE/RELEASE



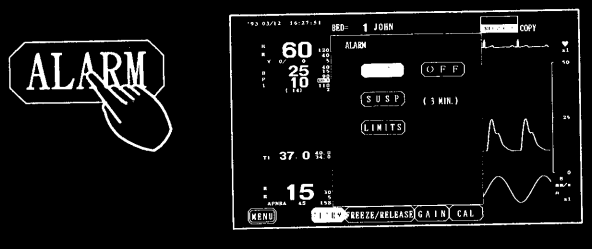
All waveforms frozen

Push FREEZE/RELEASE again to RELEASE.

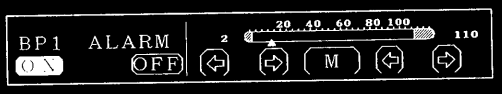
To set ALARM

From INITIAL DISPLAY Push ALARM

You can select alarm ON/OFF, SUSPEND or LIMITS.



Push the LIMITS key to set alarm limits. The left side of the display selects ON/OFF for each parameter.

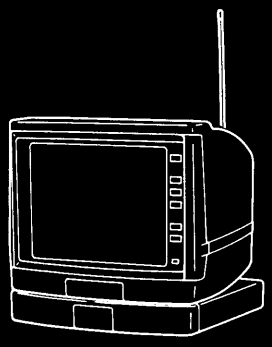


Lower limit is set with the ⇦ ⇨ keys on the left, upper limit with ⇦ ⇨ keys on the right.
Push S to change to DIASTOLIC limits. Then push D for the MEAN limits. Push M to return to SYSTOLIC.

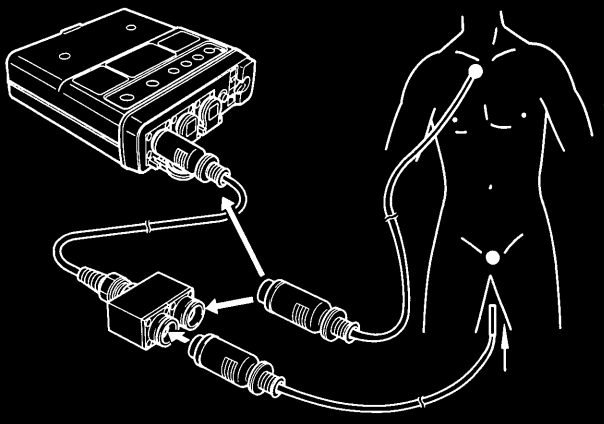
Blood Pressure alarm limit range: 0-300 mmHg.

BODY TEMPERATURE MONITORING

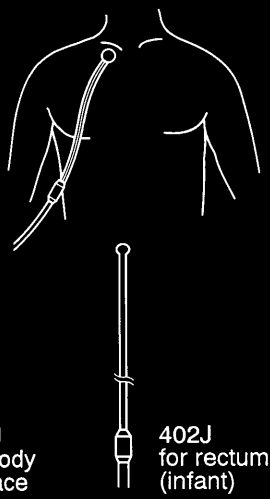
1. Make sure the monitor has the telemetry receiver connected and an antenna installed and the power is turned on.



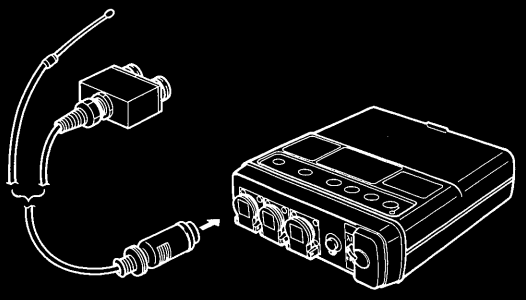
2. Attach the body temperature sensor(s) to the patient.



3. Type and location for the body temperature sensors.

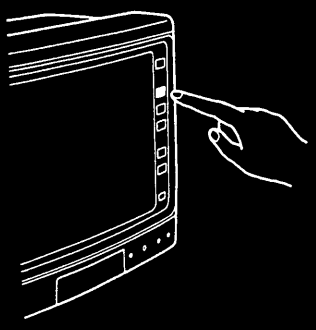


4. Turn the transmitter on and connect the cable of temperature sensor to the LX-3313 transmitter, either directly or via the dual transducer adaptor.



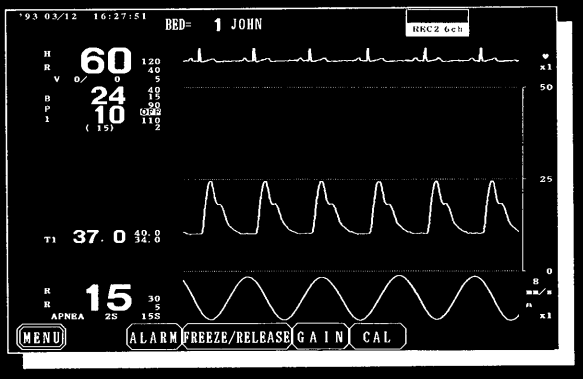
Caution:
The ECG lead cable must be connected. It serves as the transmitting antenna.

5. Push INITIAL DISPLAY switch.



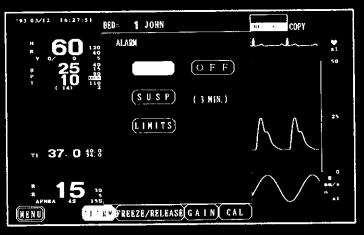
Body Temperature measurementrange: – 10 to +50 degrees Centigrade.

INITIAL DISPLAY for daily monitoring.



BODY TEMPERATURE MONITORING

You can select alarm ON/OFF, SUSPEND or LIMITS.



Push the LIMITS key and set alarm limits.

The left side of the display selects ON/OFF for each parameter.

Lower limits is set with the ⇦⇨ keys on the left, upper limit with ⇦⇨ keys on the right.

Push T1 to change to T2 limits. Then push T2 for the △T limits.

- **Body Temperature alarm limit range : 20 to 45 degrees centigrade.**

5. Specifications

DS-3300 Bedside monitor	
Display	12 inch Amber
No. of waveform	6
Waveform display	6 sec/waveform
Time	25mm/sec. standard

LX-3311 Multi Telemetry Transmitter	
Measurement Parameter	ECG × 1, Respiration × 1, Blood Pressure × 2

LX-3312 Multi Telemetry Transmitter	
Measurement Parameter	ECG × 2, Respiration × 1, Blood Pressure × 1

LX-3313 Multi Telemetry Transmitter	
Measurement Parameter	ECG × 1, Respiration × 1, Blood Pressure × 1, Body Temperture × 2

AC Adaptor Set	
XAC-300	
XDC-310	

LW-3311 Multi Telemetry Receiver	
Receiving Parameter	ECG × 2, Respiration × 1, Blood Pressure × 2 Body Temperture × 2

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

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

Measurement parameter

ECG
With Bipolar lead, one lead is selected.
H.R. measurements range : 12-300 beats/min.
H.R. alarm limit : 20-250 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

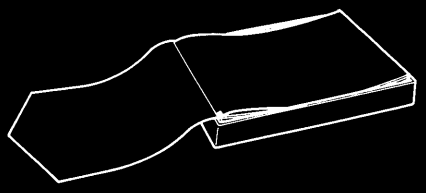
Blood Pressure
Measurement range : -50 - 300 mmHg
Alarm limit : 0-300 mmHg

Body Temperature
Measurement range : -10 - 50 ℃
Alarm limit : 20-45 ℃

Supplies

1. 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

Applied Operation

Telemetry Bedside Monitor 4L2275

DS-3300 英文

CONTENTS

1. GENERAL DESCRIPTION

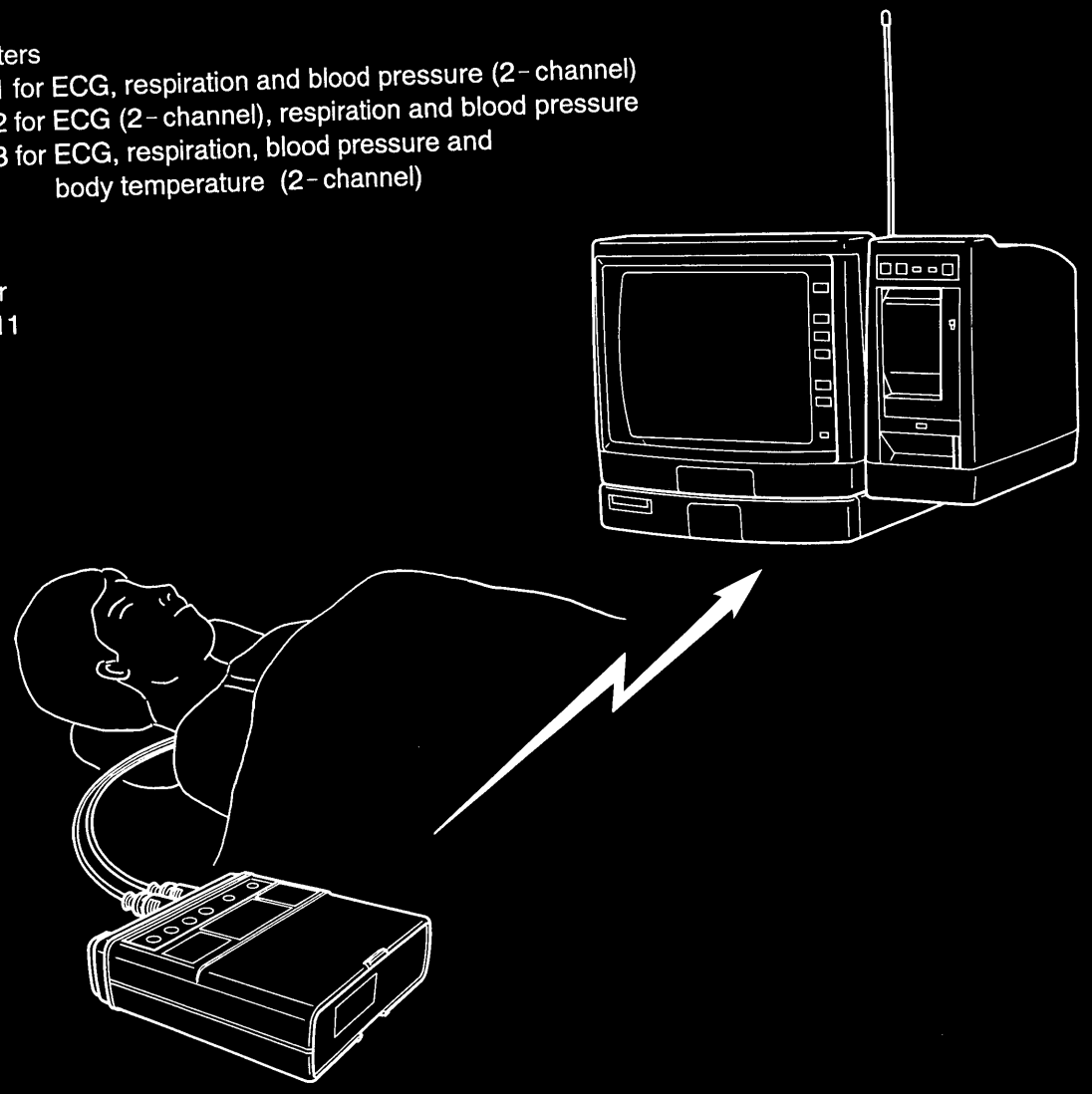
The DynaScope 3300 Telemetry Bedside Monitor is designed to monitor ECG, respiration, blood pressure and/or body temperature transmitted from a telemetry transmitter.

While the monitor can be used as a single independent unit, a local area network (LAN) allows the user to connect up to 24 monitors. In this system configuration, the nursing staff can monitor vital signs information of an unattended bed or be alerted to an alarm condition of any bed through the monitor they are attending or through the central monitor.

In addition, the user can extend the system by adding options including the AU-3310 2-channel recorder, AU-3320 6-channel recorder, FLM1024PG-C IC memory card and cart OT-83 or OT-84.

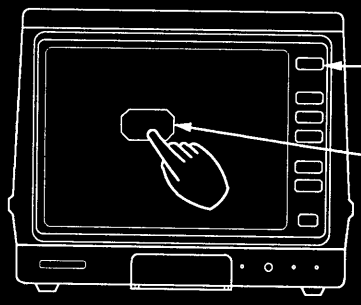
Transmitters
LX-3311 for ECG, respiration and blood pressure (2-channel)
LX-3312 for ECG (2-channel), respiration and blood pressure
LX-3313 for ECG, respiration, blood pressure and body temperature (2-channel)

Receiver
LW-3311



2. FEATURES

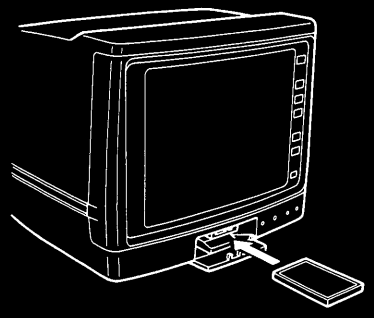
● Simplified operation with touch screen



Touch screen technology allows for only 7 fixed function switches.

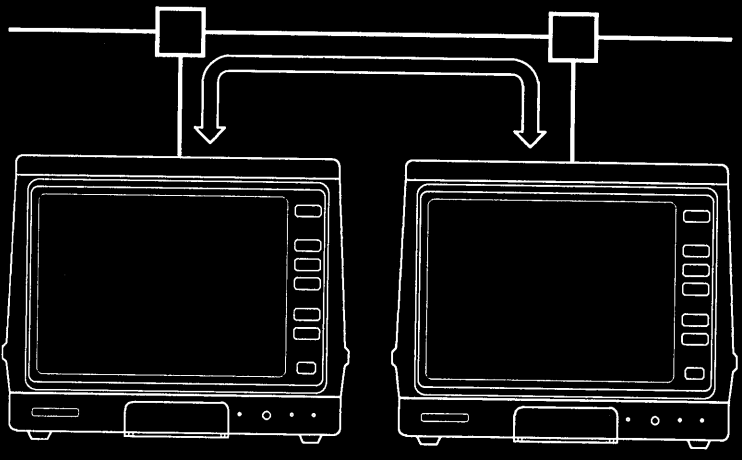
All other function keys are displayed on the screen only when needed.

● Memory expansion with the IC memory card.



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

● Highly systemized with Local Area Network



Communication capability through a powerful Local Area Network (LAN) allows up to 24 bedside monitors to be connected to the central station monitor. The telemetry bedside monitor can review any waveforms from any bedside monitor. Up to 6 central monitors can be connected to the LAN.

Multi-parameter Telemetry System

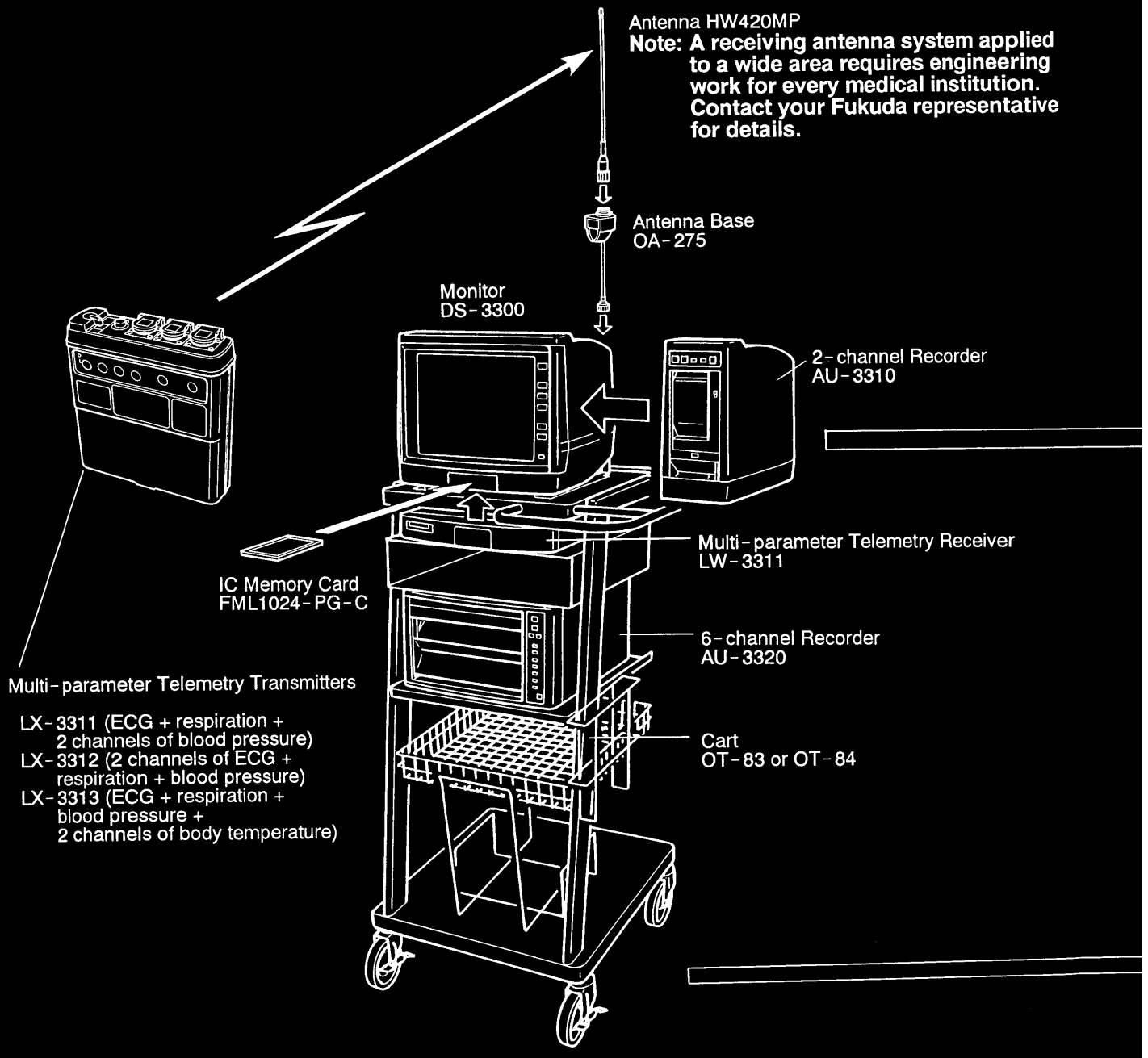
1. The front panel of the transmitter has a moisture resistant design.
2. An AC adaptor and rechargeable battery unit are optionally available for the power supply.
3. The multi-parameter receiver can receive signals from an ECG telemetry transmitter.
4. The recorder can be operated from the transmitter.
5. The single receiver is compatible with many types of transmitters.
6. Battery check is possible on the transmitter.
7. A slight BP zero unbalance on the receiver can be corrected through the monitor.
8. The front panel of the receiver is equipped with an ECG output.
9. The transmitter is equipped with an alarm suspend button.
10. Input connectors are color-coded to prevent erroneous connection.

3. BASIC CONFIGURATION

The DynaScope 3300 Telemetry Bedside Monitor is composed of a main monitor and multi-parameter telemetry receiver and transmitter. Parameters available are ECG, respiration, blood pressure and body temperature.

A local area network (LAN) allows the user to connect up to 24 bedside monitors for bed-to-bed communication of vital signs and alarm information as well as concentrated monitoring at the central station.

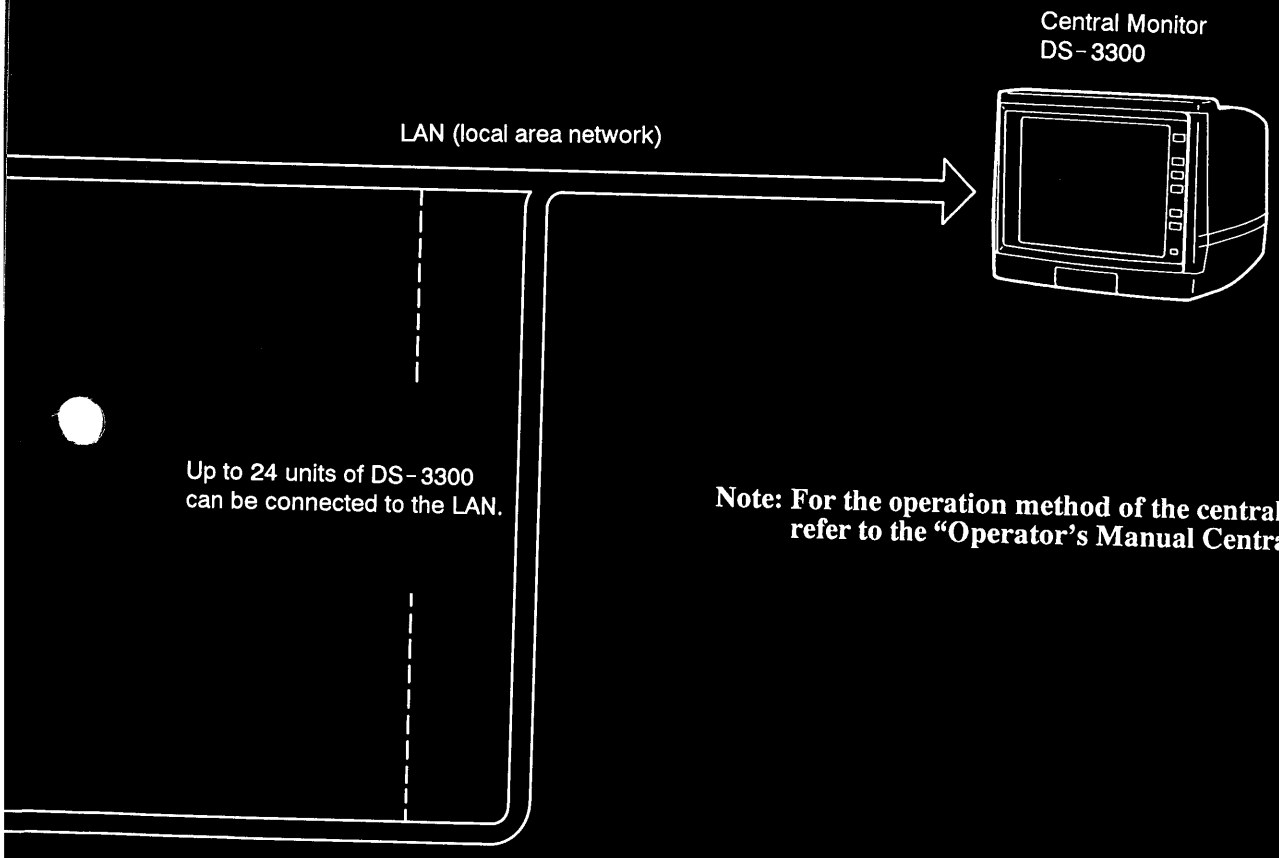
Composition of Telemetry Bedside Monitor



The following options extend the system function.

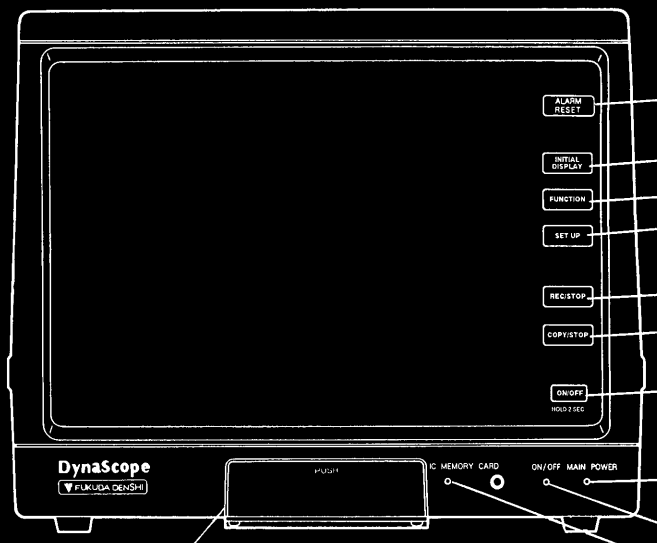
Product Name	Model	Description
IC Memory Card LAN Cable System	FML1024-PG-C	Can be used to file measured data and extend the monitor function. For concentrated monitoring on central monitor and bed-to-bed communication.

Central Monitor System



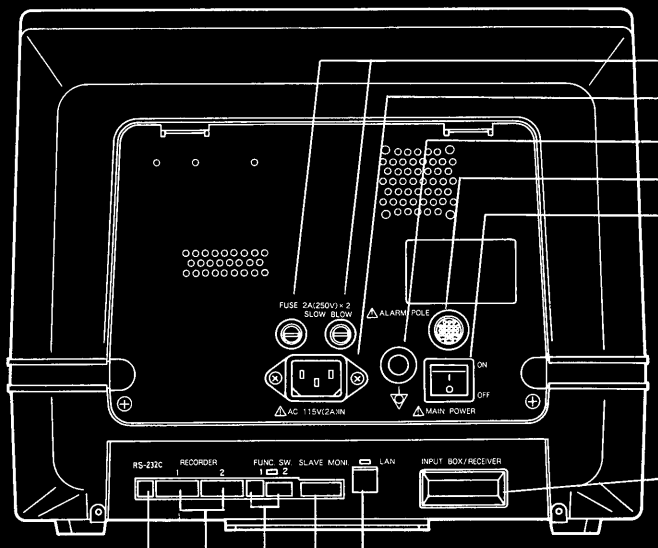
Note: For the operation method of the central monitor, refer to the "Operator's Manual Central Monitor."

Front View



① Operation switches
ALARM RESET
INITIAL DISPLAY
FUNCTION
SET UP
REC/STOP
COPY/STOP
ON/OFF
② Main POWER lamp
③ ON/OFF lamp
⑤ IC memory card lamp
⑥ IC memory card door

Rear View



⑧ Fuses
⑨ AC input connector
⑩ Ground terminal
⑪ ALARM POLE connector
⑫ Main power switch
⑬ Receiver Connector
⑭ Connectors
LAN
Recorder 1, 2
Slave monitor connector
RS-232C
⑮ FUNCTION SW 1, 2

19

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** : 2A × 2 for 115V (1A × 2 for 230V).

⑨ **AC input connector** : Mains power input, AC 50/60Hz.

⑩ **Ground terminal** : Connect to the grounding system.

⑪ **ALARM POLE connector** : For the AP－300 ALARM POLE.

⑫ **Main power switch** : Turns power ON or OFF.

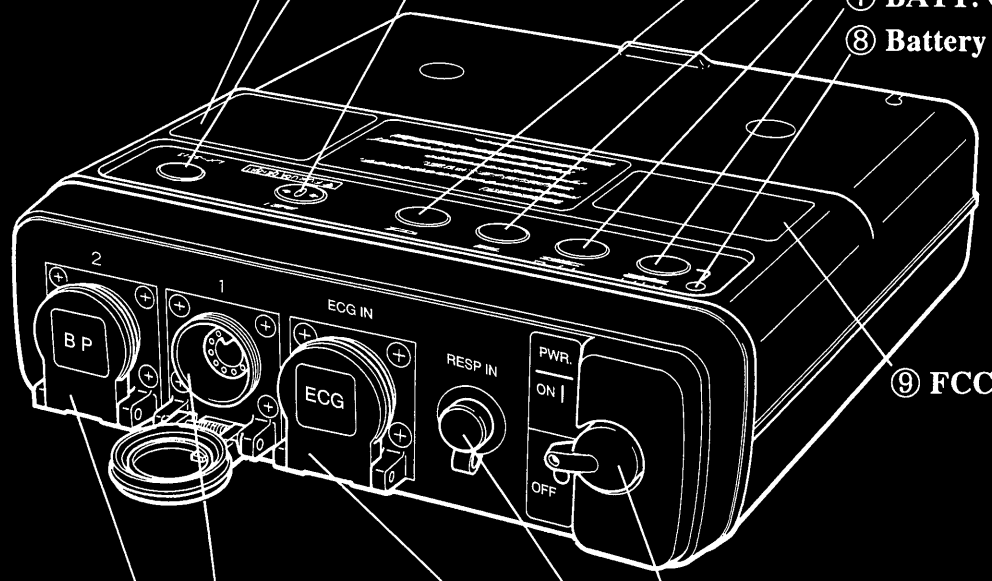
⑬ **Receiver Connector** : For the receiver.

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.
RS－232C	: Connectors for the RS－232C interface.

⑮ **FUNCTION switch 1, 2** : Set up the function of the DS－3300. See " Installation ".

TOP PANEL



① Erasable Nameplate
② BP2 Zero Balance Switch
③ BP1 Zero Balance Switch
④ MARK Switch
⑤ REC Switch
⑥ ALM SUSP. Switch
⑦ BATT. CHECK Switch
⑧ Battery Check Lamp
⑨ FCC ID Label

FRONT PANEL

⑩ BP1 Input Connector
⑪ BP2 Input Connector
⑫ PWR. ON/OFF Switch
⑬ RESP IN Connector
⑭ ECG IN Connector

TOP PANEL

① **Erasable Nameplate:** The white board permits the staff to write the bed number, identification code, etc.

② **BP2 Zero Balance Switch:** Permits automatic zero balancing of the BP2 measuring circuit.

③ **BP1 Zero Balance Switch:** Permits automatic zero balancing of the BP1 measuring circuit.

④ **MARK Switch:** Enters an event mark in the trend data compiled at the monitor. The event mark is entered only at the time the switch is pressed.

⑤ **REC Switch:** Initiates the recorder at connected to the monitor to record a 20-second waveform.

⑥ **ALM SUSP. Switch:** Permits the staff to suspend the alarm on the monitor for three minutes.

⑦ **BATT. CHECK Switch:** Permits the staff to check the state of the battery.

⑧ **Battery Check Lamp:** If a press of the BATT. CHECK switch illuminates the lamp for a brief period of time, the battery capacity is sufficient. If a press of the BATT. CHECK switch does not illuminate the lamp, the battery is low. Replace the battery.

⑨ **FCC ID Label**

FRONT PANEL

⑩ **BP1 Input Connector:** Connects to the BP1 transducer.

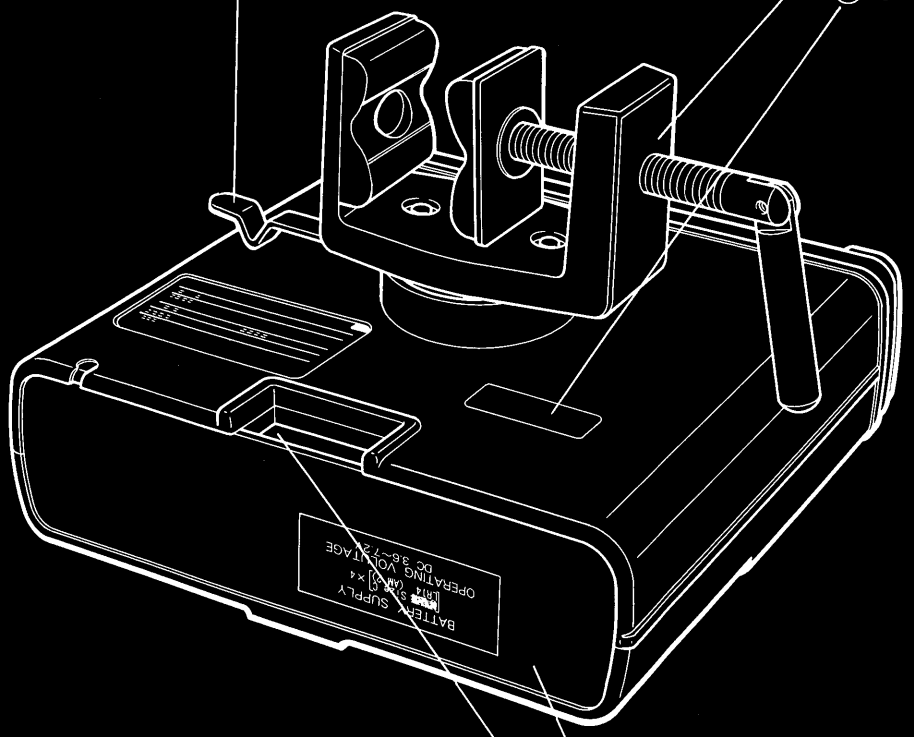
⑪ **BP2 Input Connector:** Connects to the BP2 transducer.

⑫ **PWR. ON/OFF Switch:** Turns on/off the power.

⑬ **RESP IN Connector:** Connects to "Resprode" respiration transducer.

⑭ **ECG IN Connector:** Connects to the CI-160 ECG relay cord.

BOTTOM PANEL



REAR PANEL

BOTTOM PANEL

⑮ **Cable Clamp:** Used to clamp the lead cable.

⑯ **Mounting Clamp:** Used to mount the transmitter onto an arm or pole.

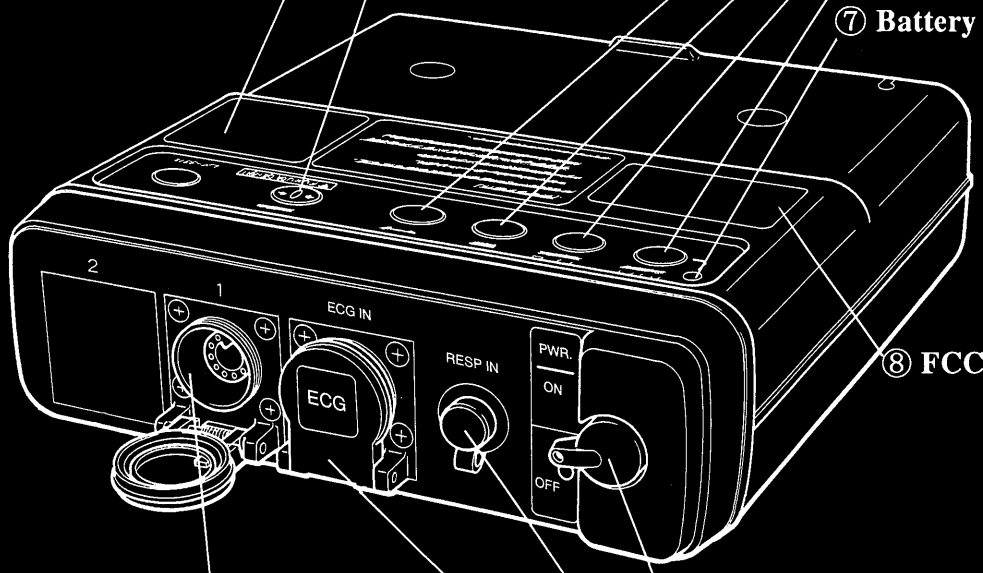
⑰ **Channel Label:** Indicates the channel number of the transmitter.

REAR PANEL

⑱ **Battery Case:** Houses four size C (LR14) alkaline dry cells.

⑲ **Removal Lever:** When removing the battery case, pull it out while pushing up on the removal lever.

TOP PANEL



① Erasable Nameplate
② BP Zero Balance Switch
③ MARK Switch
④ REC Switch
⑤ ALM SUSP. Switch
⑥ BATT. CHECK Switch
⑦ Battery Check Lamp
⑧ FCC ID Label

FRONT PANEL

⑨ BP Input Connector
⑩ PWR. ON/OFF Switch
⑪ RESP IN Connector
⑫ ECG IN Connector

TOP PANEL

① **Erasable Nameplate:** The white board permits the staff to write the bed number, identification code, etc.

② **BP Zero Balance Switch:** Permits automatic zero balancing of the BP measuring circuit.

③ **MARK Switch:** Enters an event mark in the trend data compiled at the monitor. The event mark is entered only at the time the switch is pressed.

④ **REC Switch:** Initiates the recorder at the monitor to record a 20- second waveform.

⑤ **ALM SUSP. Switch:** Permits the staff to suspend the alarm on the monitor for three minutes.

⑥ **BATT. CHECK Switch:** Permits the staff to check the state of the battery.

⑦ **Battery Check Lamp:** If a press of the BATT. CHECK switch illuminates the lamp for a brief period of time, the battery capacity is sufficient. If a press of the BATT. CHECK switch does not illuminate the lamp, the battery is low. Replace the battery.

⑧ **FCC ID Label**

FRONT PANEL

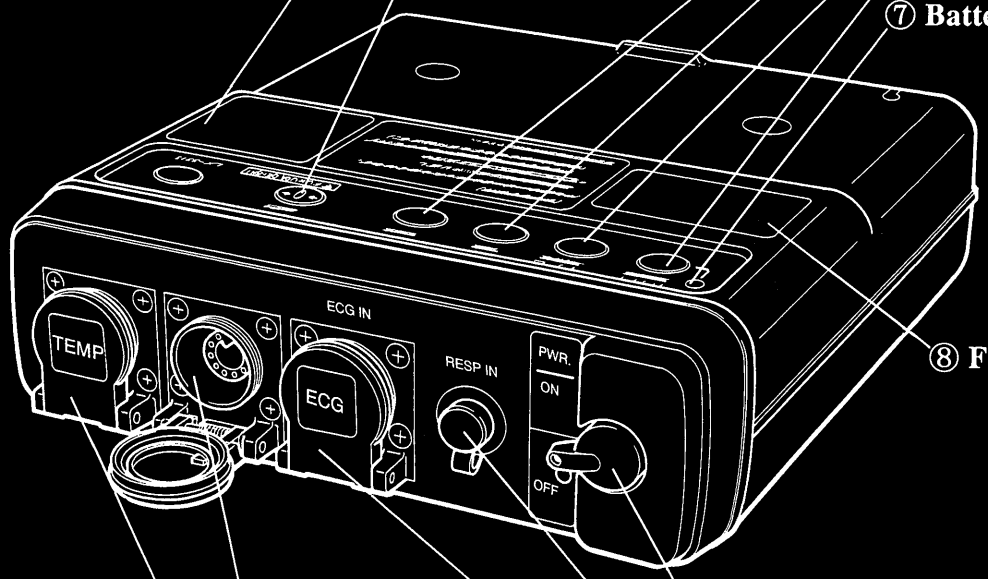
⑨ **BP Input Connector:** Connects to the BP transducer.

⑩ **PWR. ON/OFF Switch:** Turns on/off the power.

⑪ **RESP IN Connector:** Connects to "Resprode" respiration transducer.

⑫ **ECG IN Connector:** Connects to the CI- 160 ECG relay cord.

TOP PANEL



① Erasable Nameplate
② BP Zero Balance Switch
③ MARK Switch
④ REC Switch
⑤ ALM SUSP. Switch
⑥ BATT. CHECK Switch
⑦ Battery Check Lamp
⑧ FCC ID Label

FRONT PANEL

⑨ BP Input Connector
⑩ BT Input Connector
⑪ PWR. ON/OFF Switch
⑫ RESP IN Connector
⑬ ECG IN Connector

TOP PANEL

① **Erasable Nameplate:** The white board permits the staff to write the bed number, identification code, etc.

② **BP Zero Balance Switch:** Permits automatic zero balancing of the BP measuring circuit.

③ **MARK Switch:** Enters an event mark in the trend data compiled at the monitor. The event mark is entered only at the time the switch is pressed.

④ **REC Switch:** Initiates the recorder at the monitor to record a 20- second waveform.

⑤ **ALM SUSP. Switch:** Permits the staff to suspend the alarm on the monitor for three minutes.

⑥ **BATT. CHECK Switch:** Permits the staff to check the state of the battery.

⑦ **Battery Check Lamp:** If a press of the BATT. CHECK switch illuminates the lamp for a brief period of time, the battery capacity is sufficient. If a press of the BATT. CHECK switch does not illuminate the lamp, the battery is low. Replace the battery.

⑧ **FCC ID Label**

FRONT PANEL

⑨ **BP Input Connector:** Connects to the BP transducer.

⑩ **BT Input Connector:** Connects to the temperature sensor or the CJ- 312 two channel relay cord.

⑪ **PWR. ON/OFF Switch:** Turns on/off the power.

⑫ **RESP IN Connector:** Connects to "Resprode" respiration transducer.

⑬ **ECG IN Connector:** Connects to the CI- 160 ECG relay cord.

5. PREPARATION

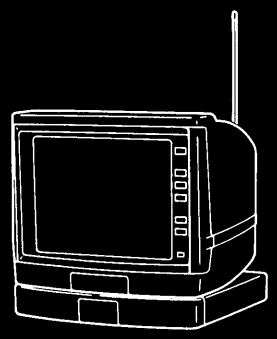
(1) Installation Precautions

- Avoid installing near equipment which generates high temperatures.
- Ensure a free space between the telemetry transmitter and the receiving antenna
- The telemetry receiver is highly sensitive. Take caution that it may not receive interference from other instruments, such as an electrosurgical unit, which causes radiant waves.

---

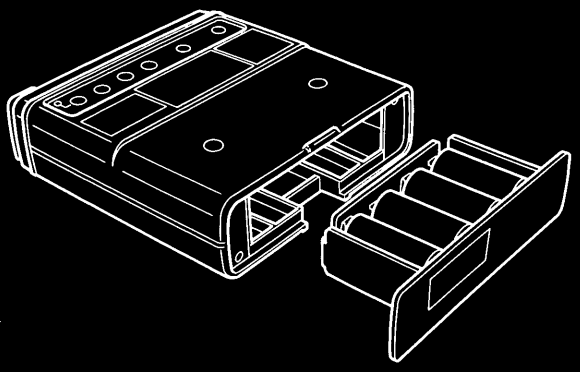
(2) Make sure the monitor is connected to the receiver and has an antenna installed.

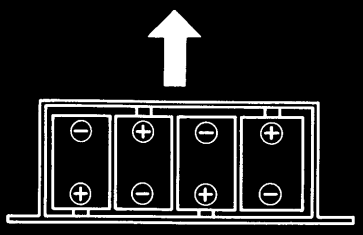
Note: For connection of instruments, refer to the chapter "Installation" of this manual.



---

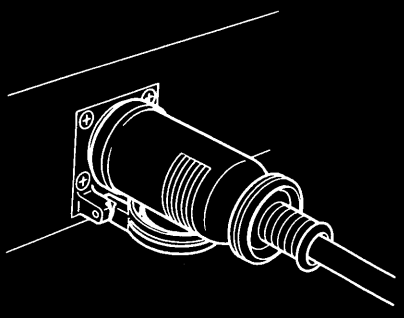
(3) Make sure the transmitter has batteries loaded.



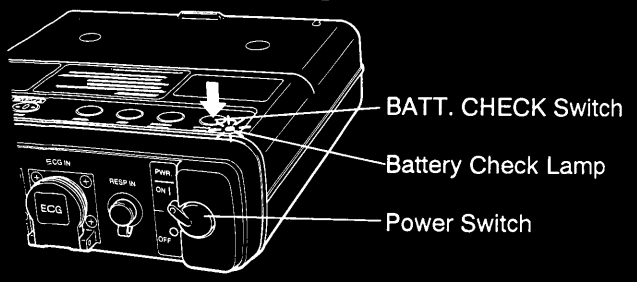


---

(4) Connect the lead cable to the transmitter.

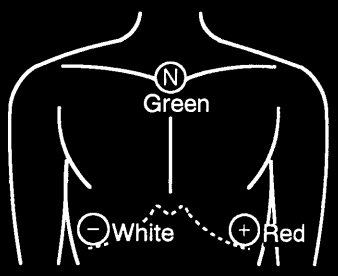


(5) Switch the power switch on the transmitter to ON. Push the battery check button and make sure the lamp illuminates.



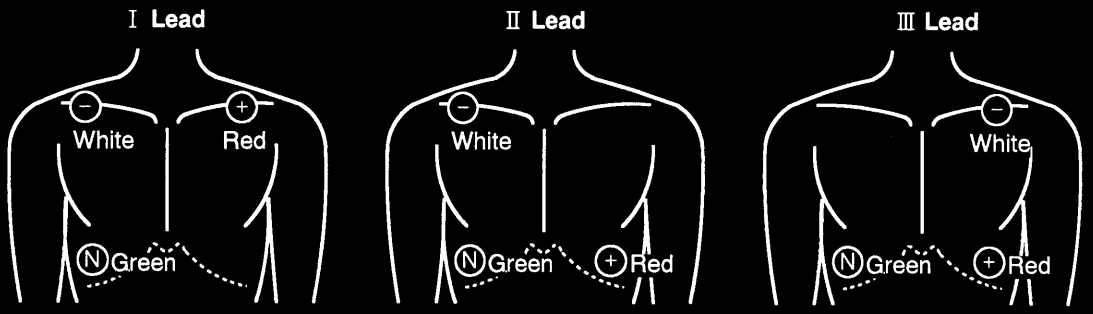
6. Attach Electrodes.

(1) CC5 Lead



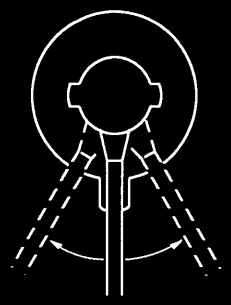
Similar to V5 lead

(2) Simulated I, II and III Leads



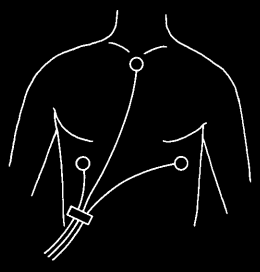
(7) Connect leadwires to electrodes.

Click the snap of leadwire to the center of the electrode and gently swing the leadwire left and right.

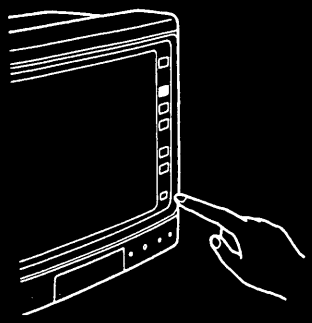


Electrode
TE-18H-3

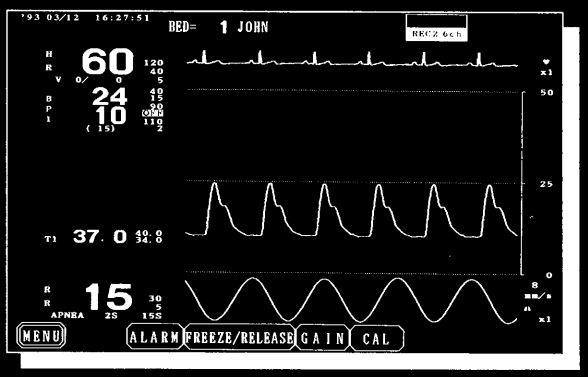
Using an adhesive tape, fix three leadwires at an appropriate position so that they may not swing.



(8) Push the ON/OFF switch of the monitor to ON.



INITIAL DISPLAY for daily monitoring.



TO MONITOR ECG

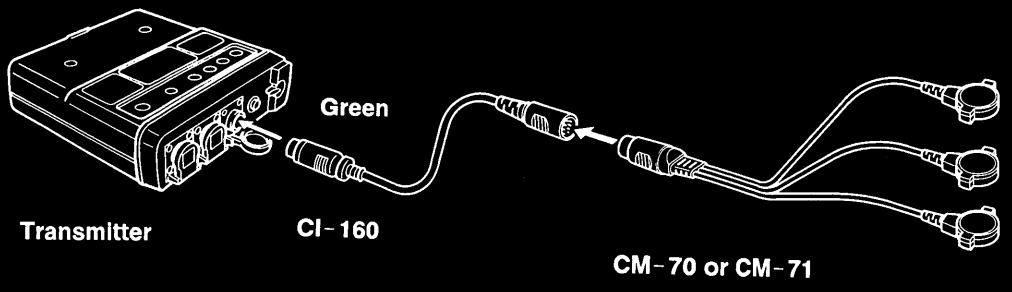
1. Select a transmitter.

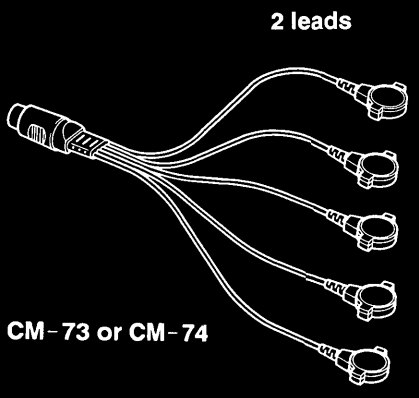
(1) Select the LX- 3311 or the LX- 3312 for 1- lead ECG monitoring.

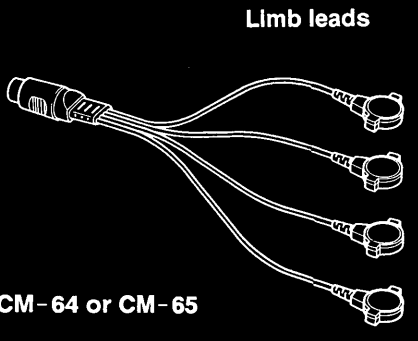
(2) Select the LX- 3312 for 1- lead, limb lead or 2- lead ECG monitoring.

---

2. Connect Leadwires to the lead cable.

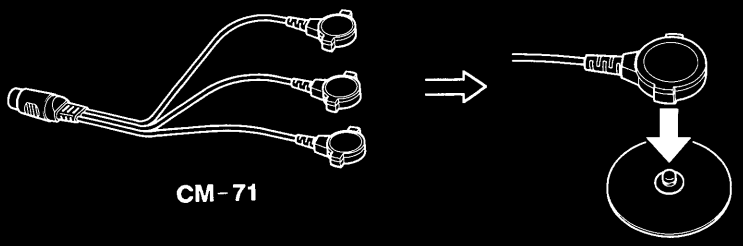




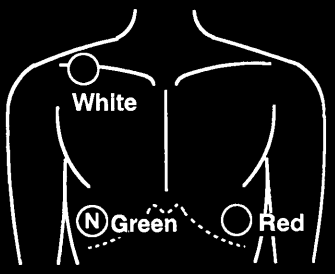


TO MONITOR ECG

3. Place electrodes and connect leadwires to them.

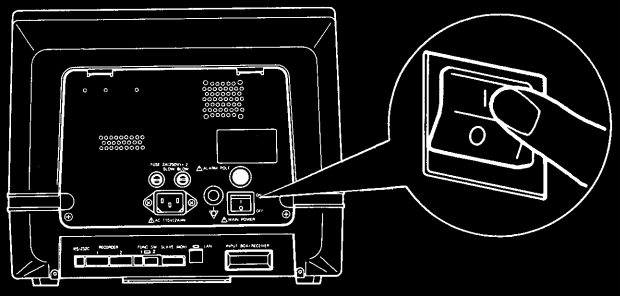


CM-71

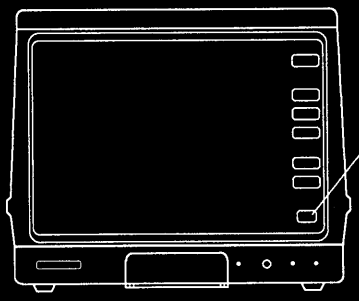


For electrode positions, refer to the Operator's Manual for the Multi-parameter Telemetry Transmitter.

4. Push the rear panel ON/OFF switch to ON.



Rear View of DS-3300

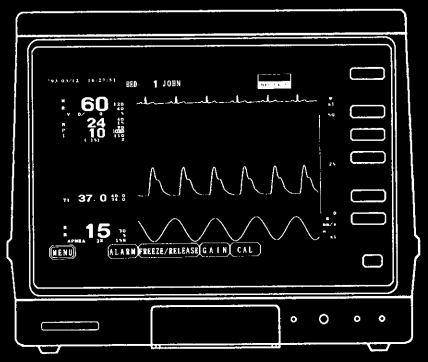


Front View of DS-3300

To turn off, push and hold the front panel ON/OFF switch for two seconds.

You need not push the front panel ON/OFF switch when switching the main power switch on the rear panel from ○ (OFF) to | (ON). In this case, the monitor will be powered without pushing the front panel ON/OFF switch.

5. Monitor ECG.



- A few seconds after the power is turned on, the INITIAL DISPLAY is initiated.
- On the INITIAL DISPLAY, ECG waveform, heart rate, high/low alarm limits for heart rate, (HR alarm condition), VPC alarm threshold, (VPC alarm condition), etc. are available for routine patient monitoring.

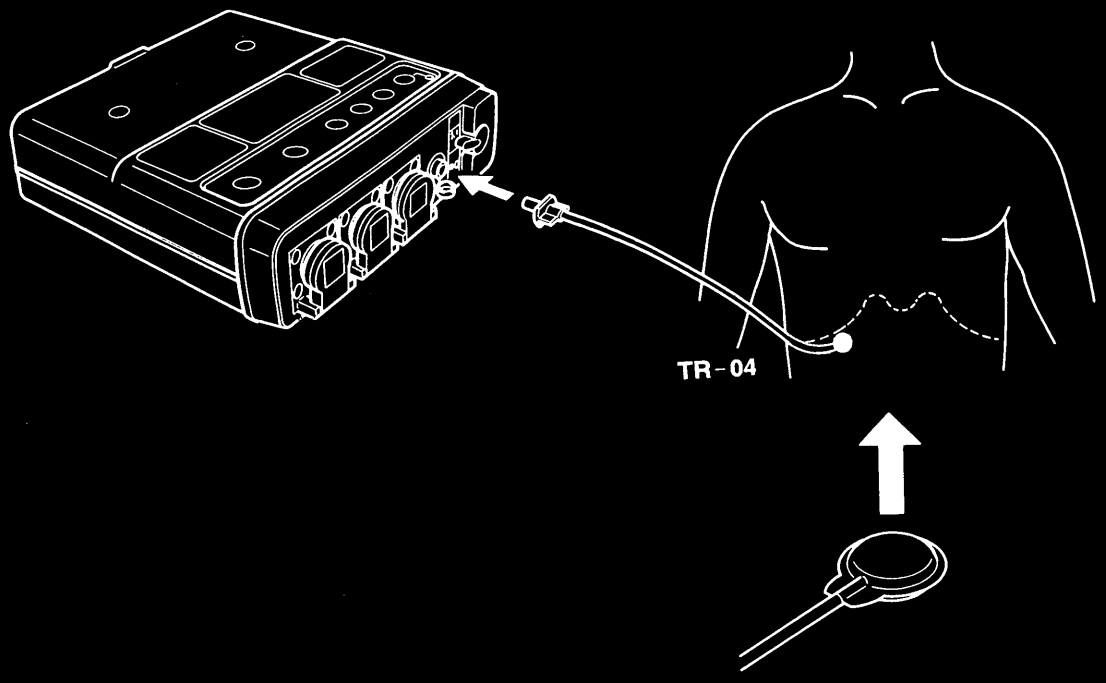
TO MONITOR RESPIRATION

1. Select a transmitter.
   You can select any of the transmitters, LX-3311, LX-3312 and LX-3313.

2. Connect a respiration sensor (Resprode).

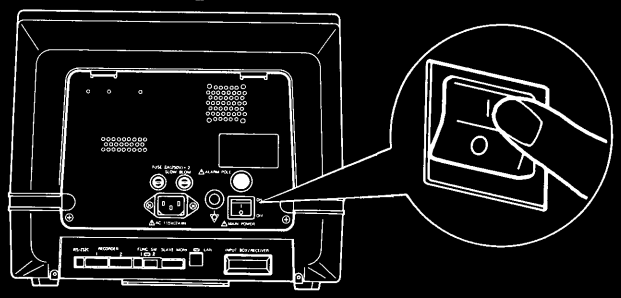
   The Resprode picks up respiration movement.

   Caution: The ECG lead cable serves for the transmitting antenna.
   Be sure to measure respiration together with ECG.

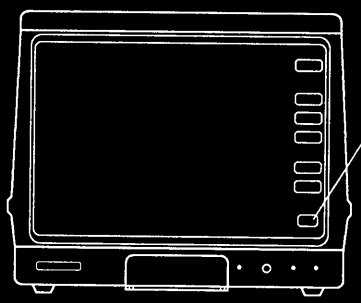


TO MONITOR RESPIRATION

3. Push the rear panel ON/OFF switch to ON.



Rear View of DS-3300

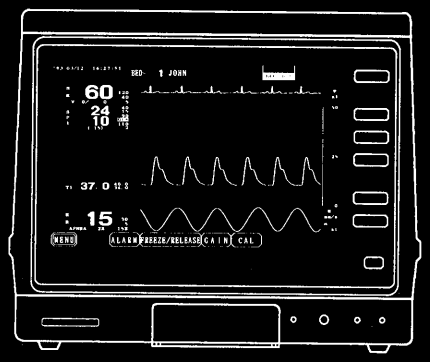


Front View of DS-3300

To turn off, push and hold the front panel ON/OFF switch for 2 seconds.

You need not push the front panel ON/OFF switch if switching the main power switch on the rear panel from ○ (OFF) to | (ON). In this case, the monitor will be powered without pushing the front panel ON/OFF switch.

4. Monitor respiration curve and rate.



- A few seconds after the power is turned on, the INITIAL DISPLAY is initiated.
- On the INITIAL DISPLAY, respiration curve and rate, RR alarm limits, apnea time for alarm are available together with ECG and related data for routine patient monitoring.

TO MONITOR BLOOD PRESSURE

1. Select a transmitter.

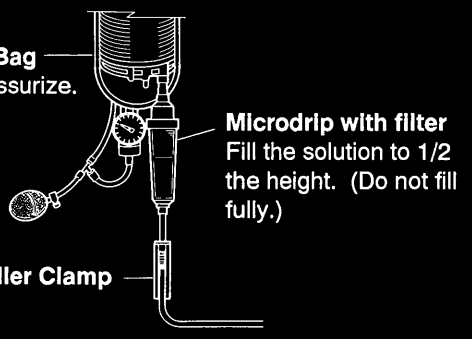
1) Select the LX- 3312 or the LX- 3313 for monitoring of one blood pressure waveform.

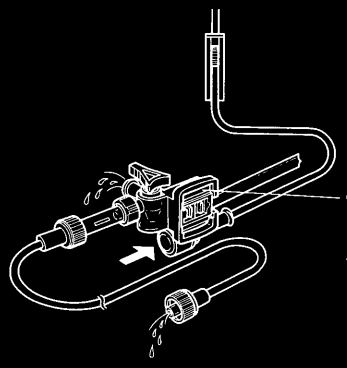
2) Select the LX- 3313 for monitoring two blood pressure waveforms.

2. Prepare BP monitoring kit and connect blood pressure transducer/s.

● **Assembling Precaution**

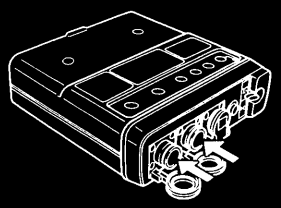
A key to quickly set up the kit is to avoid air bubbles in the circuit. For this purpose, fill the circuit with physiological saline solution by dripping it naturally without pressurizing.



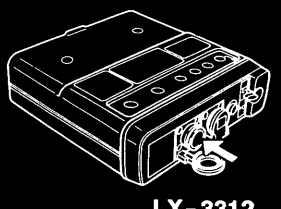


Transducer
Connect the transducer to the transmitter and warm it up for five minutes minimum in advance.

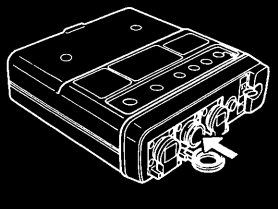
By pushing the flush button, fill the measuring circuit with the physiological saline solution.
(If air bubbles enter, flush them out by snapping.)



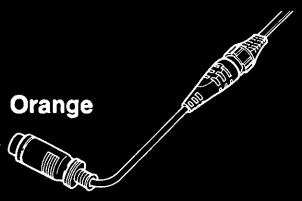
LX-3311



LX-3312



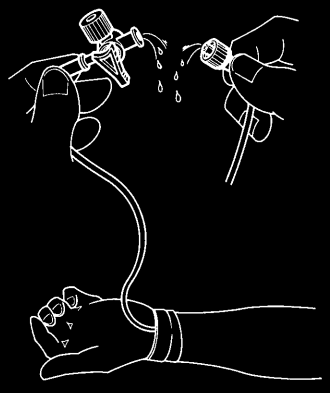
LX-3313



Orange

Note: The ECG lead cable serves for the transmitting antenna. Be sure to measure blood pressure together with ECG.

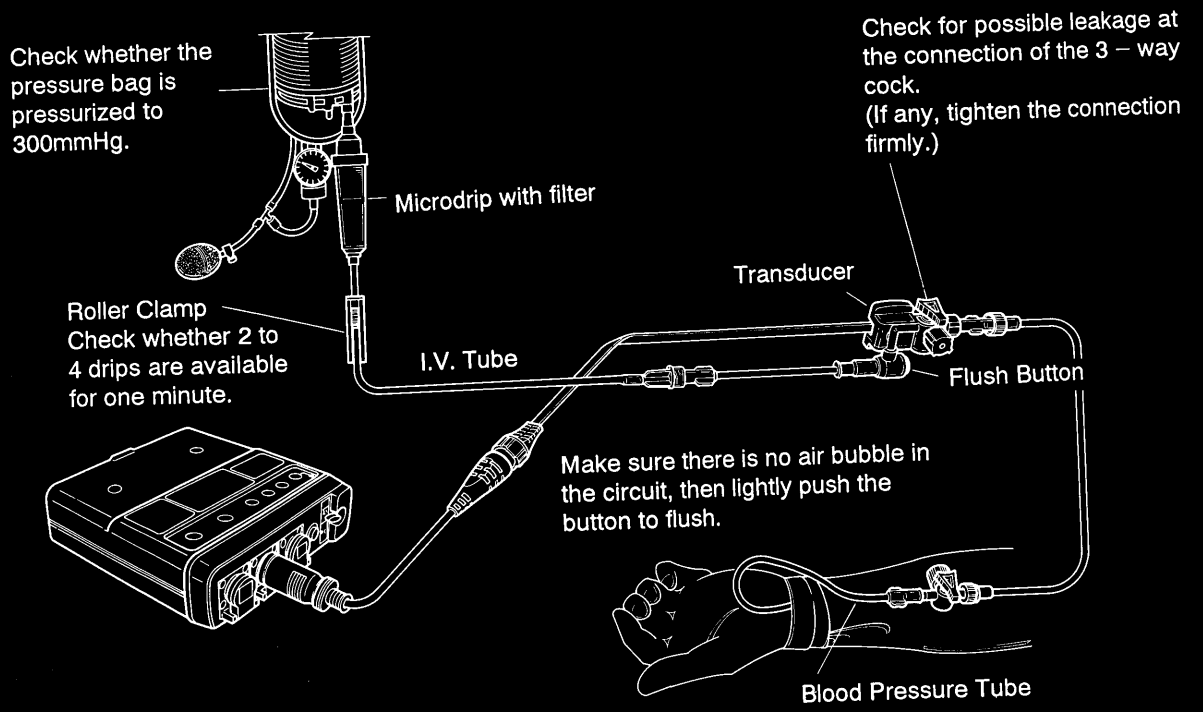
Connect while taking care not to enter air into the circuit.



TO MONITOR BLOOD PRESSURE

Precaution during Measurement

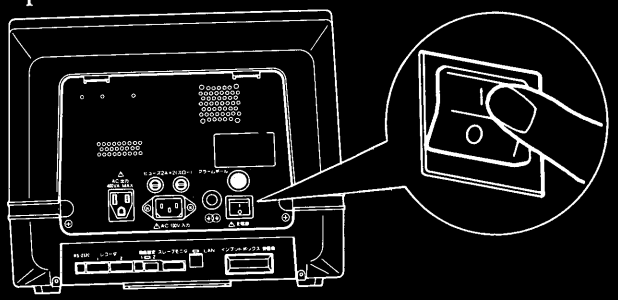
Minute air bubbles will accumulate over time. Check each section 30 minutes after the start of measurement.



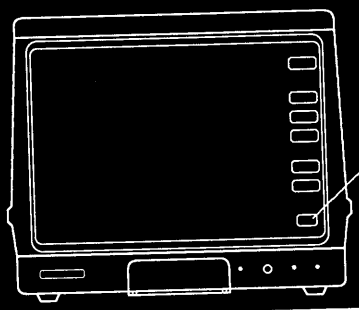
3. Push the rear panel ON/OFF switch to ON.

Confirm that the power ON/OFF switch on the rear panel is in the ON position. The main power lamp on the front panel will be lit. If the monitor is not ON, push the ON/OFF switch on the front panel.

Rear View of DS-3300

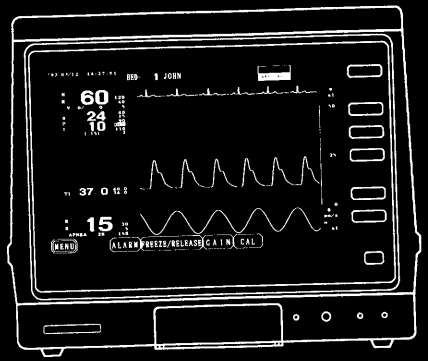


Front View of DS-3300



To turn off, push and hold the front panel ON/OFF switch for 2 seconds.

4. Monitor blood pressure waveform and values.

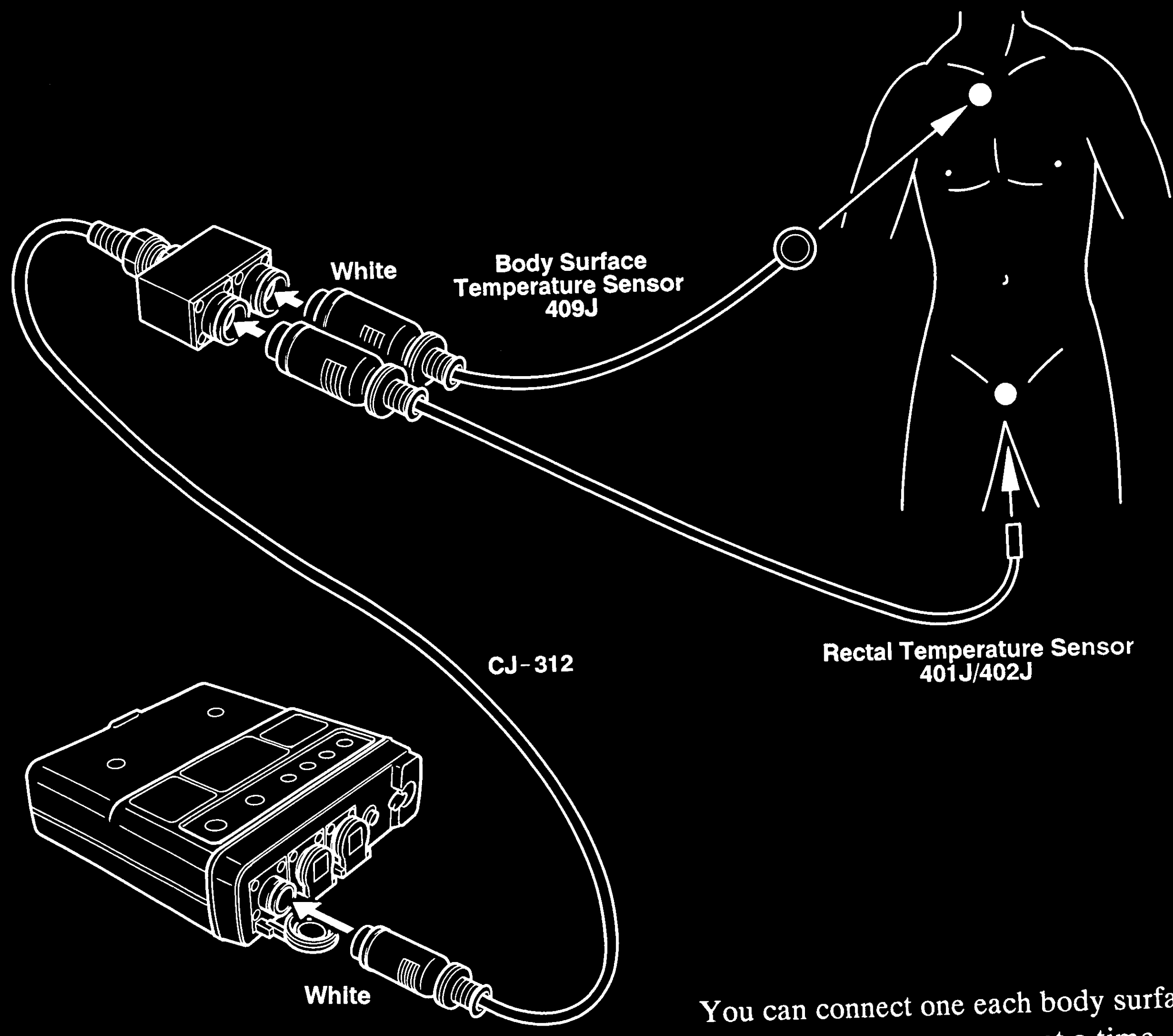


- The INITIAL DISPLAY is initiated in few seconds after the power is turned on.
- On the INITIAL DISPLAY, blood pressure waveform, label, systolic/diastolic/mean values, high/low alarm limits and (alarm condition) are available together with ECG and related data for routine patient monitoring.

TO MONITOR BODY TEMPERATURE

1. Select the LX-3313 transmitter.

2. Prepare and connect the temperature sensor(s).



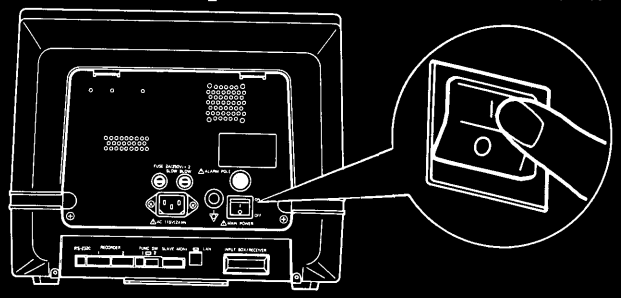
You can connect one each body surface and rectal temperature sensors at a time.

**Note: The ECG lead cable serves for the transmitting antenna.
Be sure to measure body temperature together with ECG.**

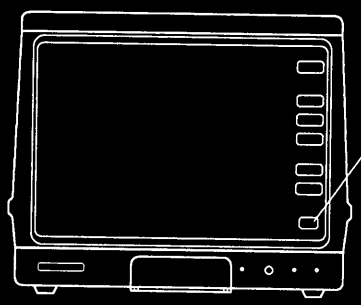
DS-3300 英文

TO MONITOR BODY TEMPERATURE

3. Push the rear panel ON/OFF switch to ON.



Rear View of DS-3300

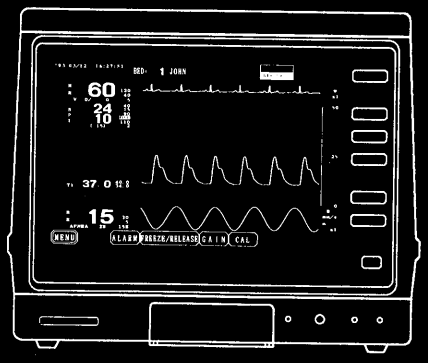


Front View of DS-3300

To turn off, push and hold the front panel ON/OFF switch for 2 seconds.

You need not push the front panel ON/OFF switch if switching the main power switch on the rear panel from ○ (OFF) to | (ON). In this case, the monitor will be powered without pushing the front panel ON/OFF switch.

4. Monitoring Body Temperature



1. Several seconds after turning the power on, the monitor will display the INITIAL DISPLAY.

2. In the INITIAL DISPLAY, T1, T2, △ T (absolute value of difference between T1 and T2), and temperature alarm limits for daily monitoring are displayed.

6. DISPLAYS

There are three main displays for the DS-3300.

1. INITIAL DISPLAY : This is the main display 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 etc. are controlled from this display.

3. SET UP DISPLAY : The function needed to SET UP the monitor are contained in this display. Clock Setting, Display ON/OFF, Patient Name input etc. are controlled through the SET UP display.

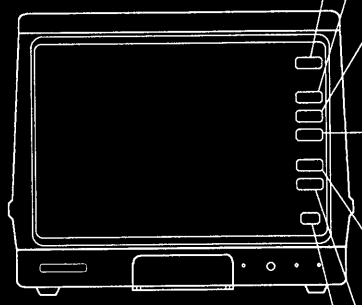
Operation of these three switches produces the useful menus on the display. The desired function is then selected with the touch keys.
The touch keys shown on the display appear like this:

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

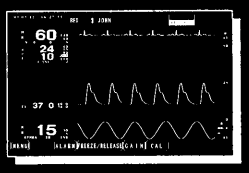
The menu selections for the three switches described above are outlined below.

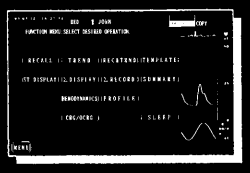
BASIC OPERATION

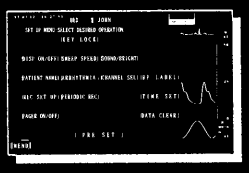
The basic operation of the DS-3300 patient monitor is realized with the seven dedicated switches on the right of the display and the touch keys shown on the display itself. The diagram below shows the operation of the seven fixed switches:

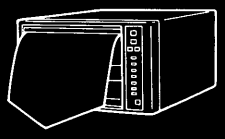


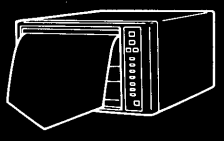
ALARM RESET — Stops alarm sound.

INITIAL DISPLAY —  Returns the monitor to the Initial Display.

FUNCTION —  Displays the FUNCTION menu.

SET UP —  Displays the SET UP menu.

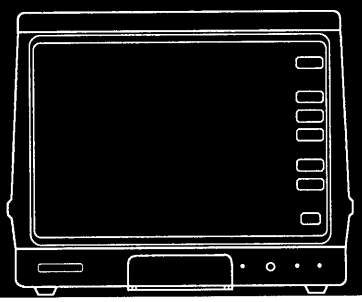
REC/STOP —  Records waveforms.

COPY/ STOP —  Copies information as displayed on the screen when the AU-3320 recorder is used.

ON/OFF — When the main power switch is turned ON, this switches on or off the power.
Push for 2 or more seconds to switch off.

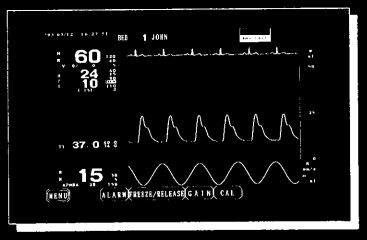
The main power switch is located on the rear panel of the DS-3300.

The menu selections INITIAL DISPLAY, FUNCTION and SET UP switches are outlined below:



INITIAL DISPLAY

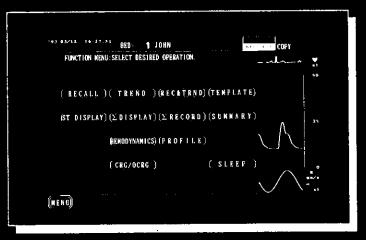
For daily patient monitoring



- CAL
- GAIN
- FREEZE/RELEASE
- ALARM
- OTHER-B
- MENU
- LEAD

FUNCTION

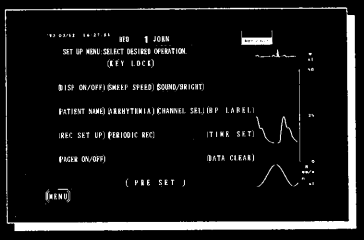
Displays Function menu



- RECALL
- TREND
- REC & TREND
- TEMPLATE
- ST DISPLAY
- Σ DISPLAY
- Σ RECORD
- SUMMARY
- HEMODYNAMICS
- PROFILE
- CRG/OCRG
- SLEEP

SET UP

Displays Set Up menu

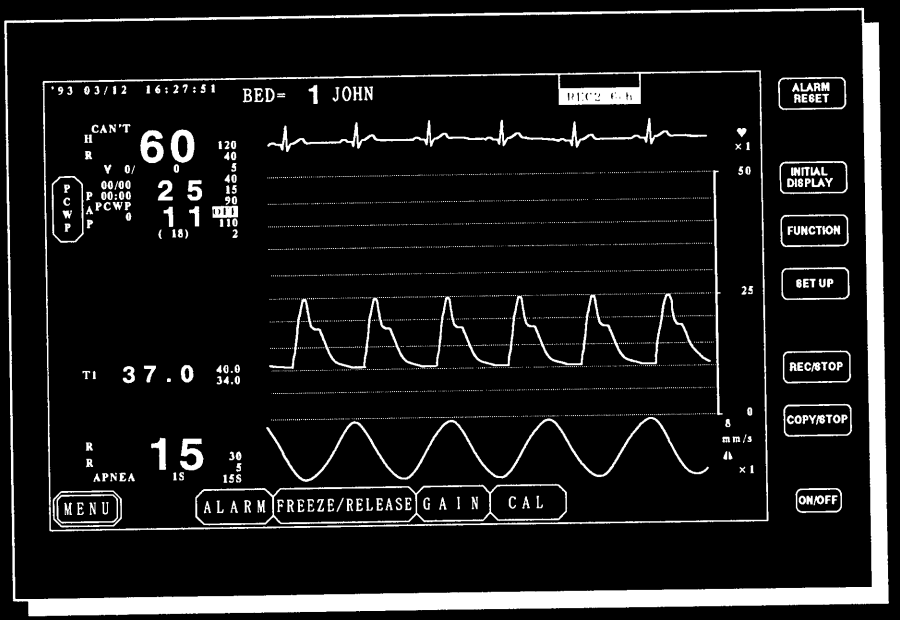


- KEY LOCK
- DISP ON/OFF
- SWEEP SPEED
- SOUND/BRIGHT
- PATIENT NAME
- ARRHYTHMIA
- CHANNEL SEL
- BP LABEL
- REC SET-UP
- PERIODIC REC
- RECORDER SEL
- TIME SET
- IC CARD R/W
- DATA CLEAR
- PRE-SET

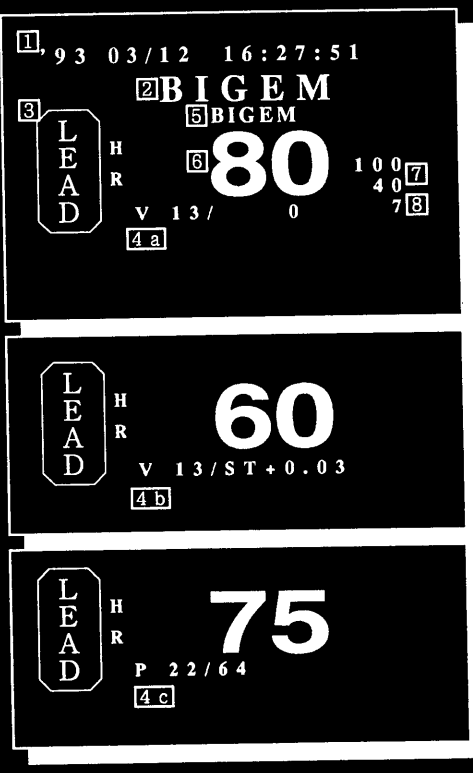
6.1 INITIAL DISPLAY

push INITIAL DISPLAY

When the INITIAL DISPLAY switch is pushed, the DS-3300 always returns to the INITIAL DISPLAY configuration. In this display example, ECG, blood pressure(PAP), respiration and body temperature are being monitored.
Waveform displays for six seconds, digital measured values and alarm limits for each parameter are displayed.



1. ECG
   - 1 Date/time
   - 2 Alarm name
   - 3 Lead select keys
   - 4a VPC number per minute and hour
   - 4b VPC number per minute and ST level
   - 4c Pacing beats and total beats per minute



5. Arrhythmia analysis status display
6. Heart rate
7. Heart rate alarm limits
   - High
   - Low
8. VPC alarm high limit (counting per minute)

4a, 4b or 4c is selected using the SOFT SWITCH function. (Refer to page x − x.)

Note:
Seconds in the date/time column may be renewed at different speeds. This does not indicate any trouble.

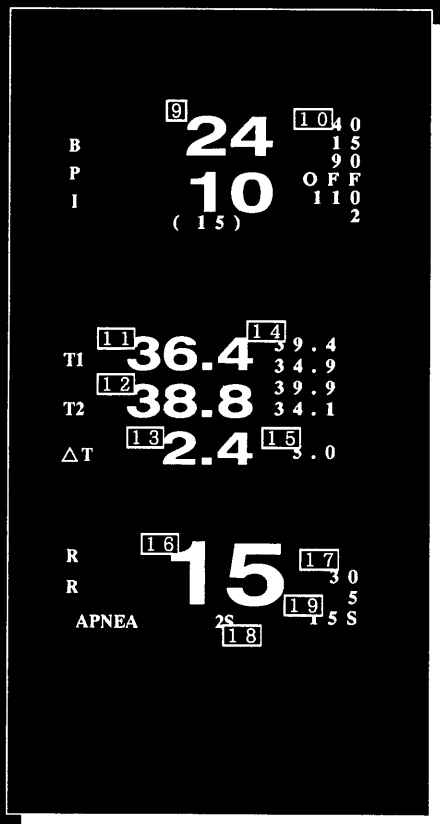
6.1 INITIAL DISPLAY

push INITIAL DISPLAY

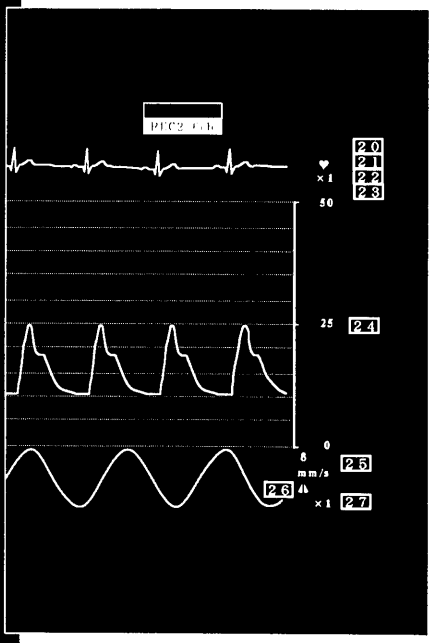
2. Blood Pressures (Invasive)
   - [9] Blood pressures
     - Systolic pressure
     - Diastolic pressure
     - (Mean pressure)

3. Body Temperatures
   - [11] Body temperature 1
   - [12] Body temperature 2
   - [13] Δ T (|BT1 − BT2|)

4. Respiration
   - [16] Respiration rate
   - [18] Apnea time

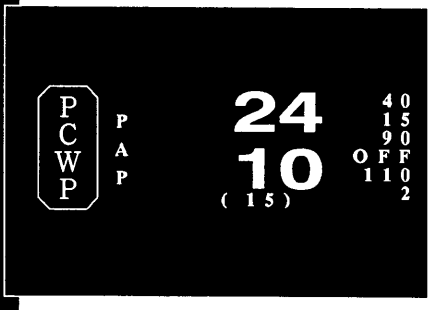


- [10] Alarm limits
  - High
  - Low
- [14] Alarm limits
  - High
  - Low
- [15] Δ T alarm high limit
- [17] Respiration alarm limits
  - High
  - Low
- [19] Apnea alarm high limit



- [20] ECG lead
- [21] QRS synchronized mark
- [22] Gain
- [23] Channel number
- [24] BP scale
- [25] Sweep speed of respiration curve
- [26] Respiration synchronized mark
- [27] Respiration gain

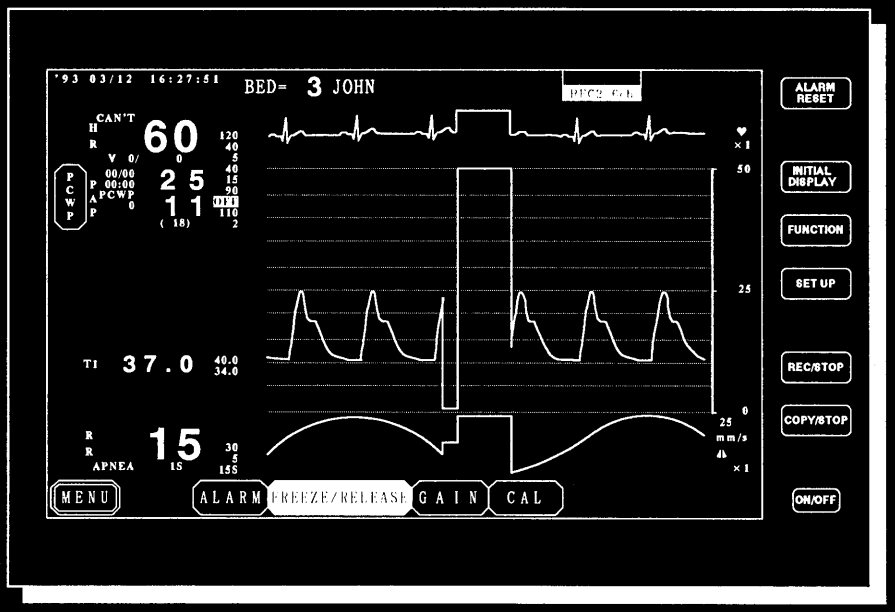
(PCWP) Key:
This key is displayed when the blood pressure is labelled PAP. When the this key is pushed, the mean blood pressure at that time is stored and displayed as PCWP. The stored PCWP can be automatically entered in the hemodynamics calculation.



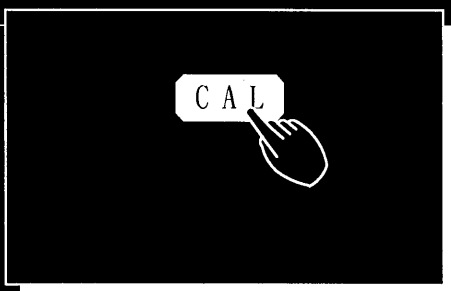
(1) CALIBRATION

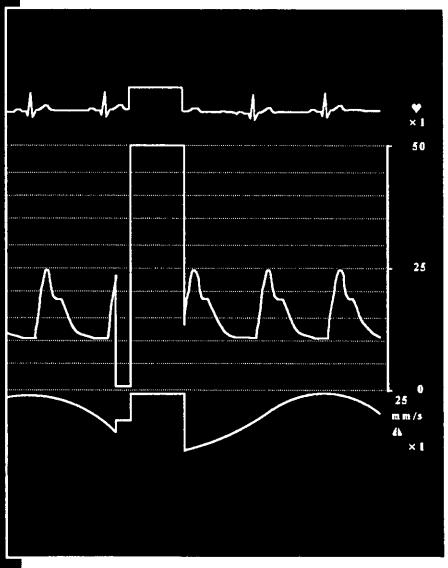
from [INITIAL DISPLAY] push [CAL]

When the [CAL] key is pushed, the following display is shown. Calibration waveforms will be applied to ECG, blood pressure and respiration waveforms.



Application of Calibration Waveforms to ECG, Blood Pressure and Respiration Waveforms





◆ Push the [CAL] key. Calibration waveforms will be applied to ECG, blood pressure and respiration waveforms.

ECG: 1mV

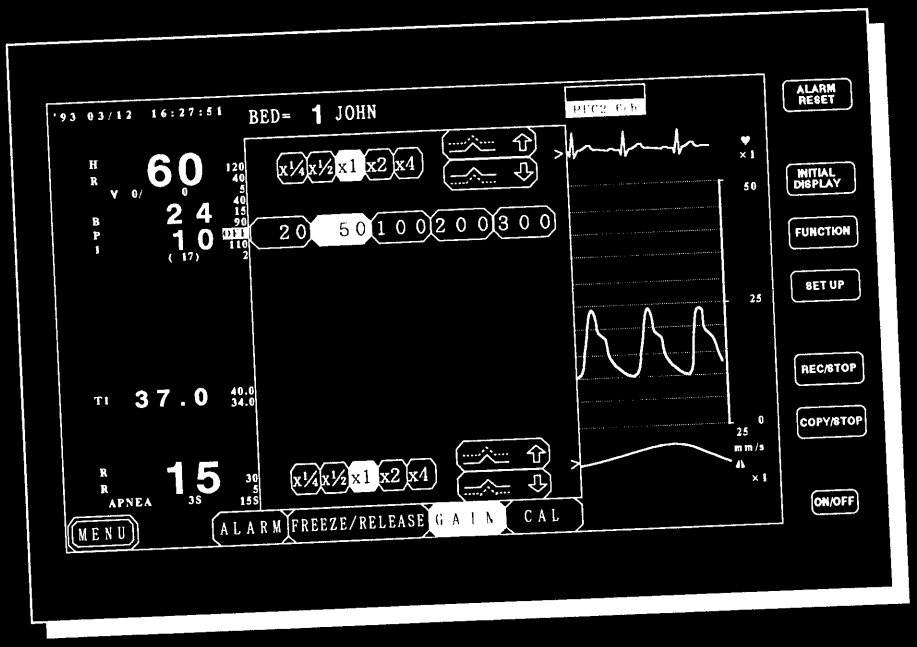
Blood pressure waveform:
0 to full scale in 2 steps

Respiration waveform:
Zero and then a rectangular wave

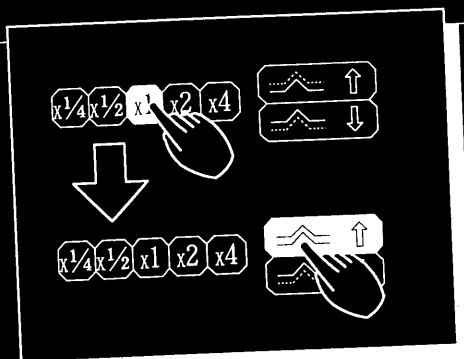
(2) GAIN SETTING

from [INITIAL DISPLAY] push [GAIN]

When the [GAIN] key is pushed, the following display is shown. You can adjust the gain of each waveform for each parameter. Push the [GAIN] key again and the display will return to the INITIAL DISPLAY.



1. Adjust ECG Gain and Position.



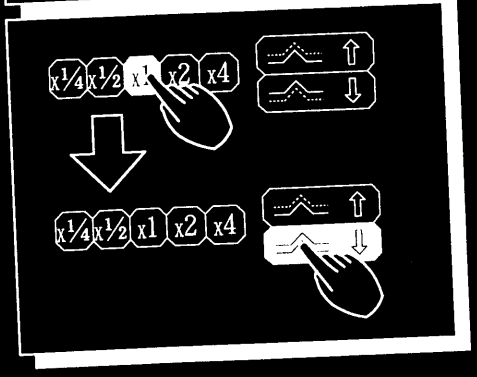
◆ Select a desired ECG gain from 1/4, 1/2, 1, 2, or 4.

◆ Push the ⇧ or ⇩ keys to adjust the position of the ECG waveforms.

2. Adjust full scale for Blood Pressure waveforms.

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

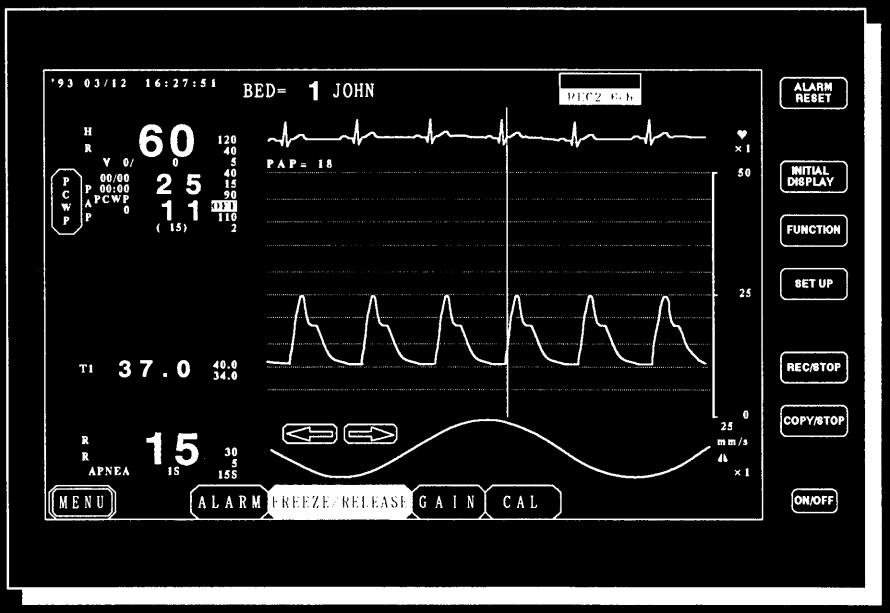
3. Adjust Respiration waveform Gain.



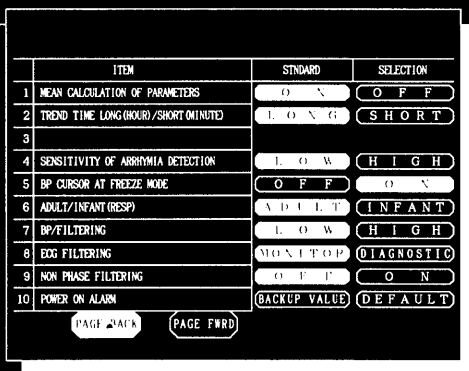
◆ Respiration waveform gain and position are selected in the same manner as ECG.

(3) FREEZE — from [INITIAL DISPLAY] push [FREEZE/RELEASE]

When the [FREEZE/RELEASE] key is pushed, all waveforms are frozen. A cursor appears that enables you to read the absolute value of the pressure waveforms where the cursor crosses. Push the [FREEZE/RELEASE] key again to return to the normal moving display.



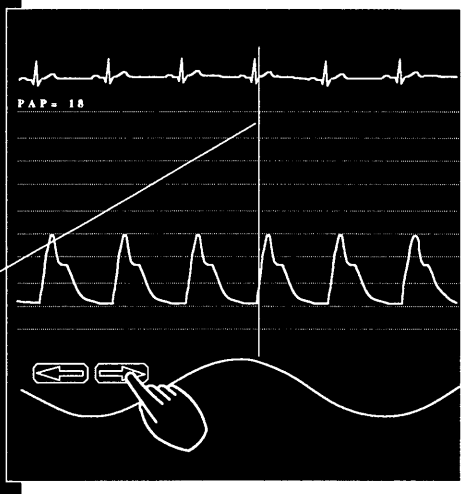
Push the [SET UP] → [PRE-SET] → [SOFT SWITCH] keys
The SOFT SWITCH setting window will appear as shown at the right.



	ITEM	STNDARD	SELECTION
1	MEAN CALCULATION OF PARAMETERS	ON	OFF
2	TREND TIME LONG(HOUR)/SHORT(MINUTE)	LONG	SHORT
3			
4	SENSITIVITY OF ARRHYMIA DETECTION	LOW	HIGH
5	BP CURSOR AT FREEZE MODE	OFF	ON
6	ADULT/INFANT(RESP)	ADULT	INFANT
7	BP/FILTERING	LOW	HIGH
8	ECG FILTERING	MONITOR	DIAGNOSTIC
9	NON PHASE FILTERING	OFF	ON
10	POWER ON ALARM	BACKUP VALUE	DEFAULT

PAGE BACK PAGE FWRD

Push the [ON] key in the column "BP cursor at freeze mode." This setting allows the staff to search for a blood pressure value on a frozen waveform.



◆ A cursor appears on the frozen blood pressure waveform. A blood pressure value at the point where the cursor crosses the waveform is indicated above the waveform.

◆ The cursor can be move using the arrow keys [←] and [→] below the waveform.

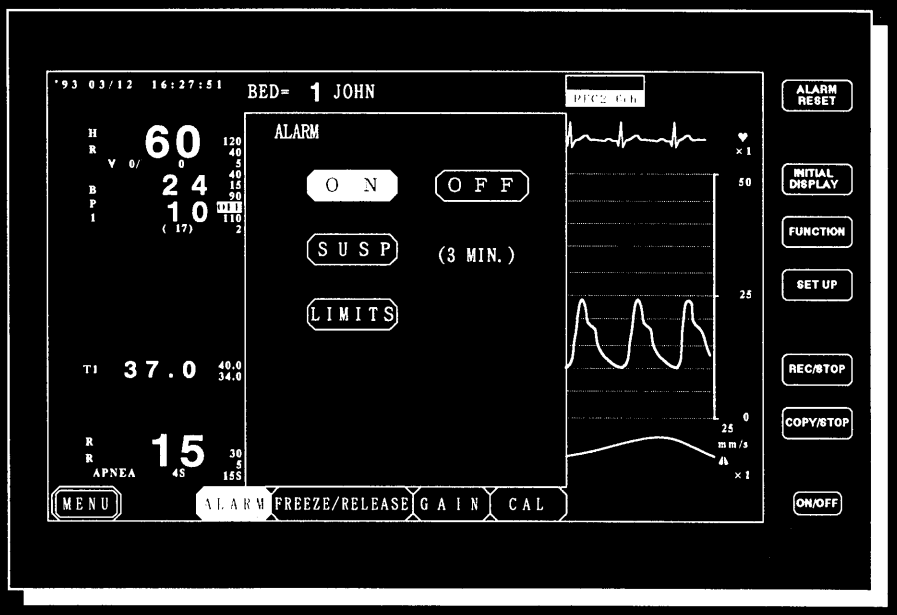
DS-3300 英文

41

(4) ALARM

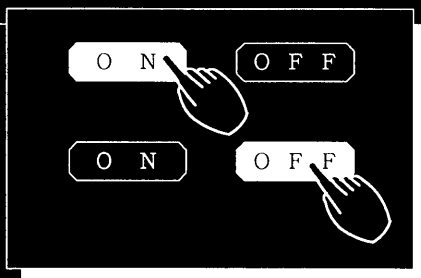
from [INITIAL DISPLAY] push [ALARM]

When the [ALARM] key is pushed, the following display is shown. Alarm ON/OFF, alarm SUSPEND and alarm LIMITS can be selected. Push the [ALARM] key again and the display returns to the INITIAL DISPLAY.

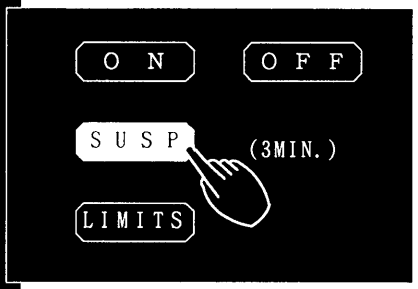


1. Turning ALARM ON.

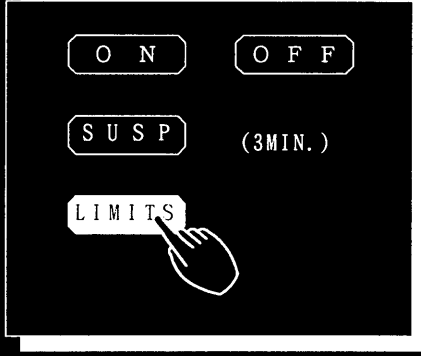
Turning ALARM OFF



2. Alarm SUSPEND. (Alarms are OFF for 3 minutes)



3. Setting ALARMS LIMITS
(See next page)



◆ Push the [SUSP] key.
Alarms will be suspended for three minutes and the remaining time for alarms to be reactivated will be shown on the initial display.

◆ While the default suspended time is 3 minutes, it can be changed in the range of 1 to 10 minutes using the [ALARM OPTION] key from the PRE-SET menu.

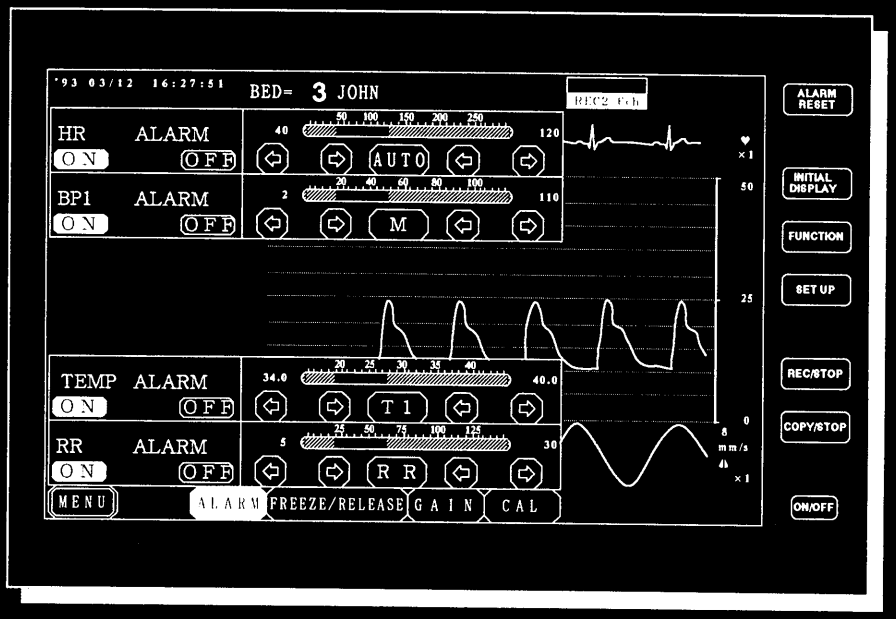
◆ The [SUSP] key can be conveniently used when you cannot avoid a false alarm due to replacement of electrodes, etc.

◆ The [SUSP] key function is directly accessible through the alarm suspend button on the transmitter.

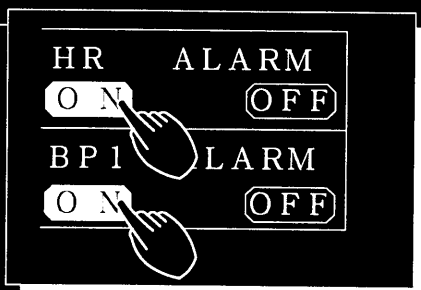
ALARM LIMIT SET UP

from [ALARM] push [LIMITS]

When the [ALARM] and the [LIMITS] keys are pushed, the following display is shown. Alarms can be turned ON or OFF for each parameter. The keys in the center column allows you to set limits for each parameter. Push the [ALARM] key again to return to the INITIAL DISPLAY.

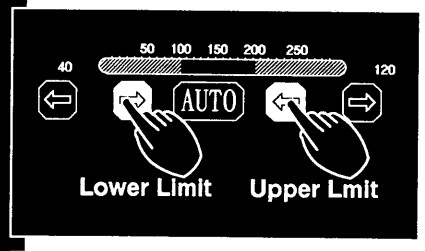


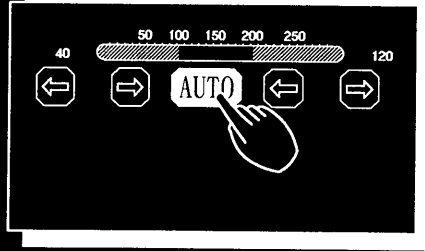
1. Turning ON or OFF the alarm limit for each parameter.



2. Setting upper and lower alarm limits.

3. Automatic alarm limit (for heart rate only)





◆ Use the [⇦] and [⇨] keys on the left to adjust the lower limit and those on the right for the upper limit.

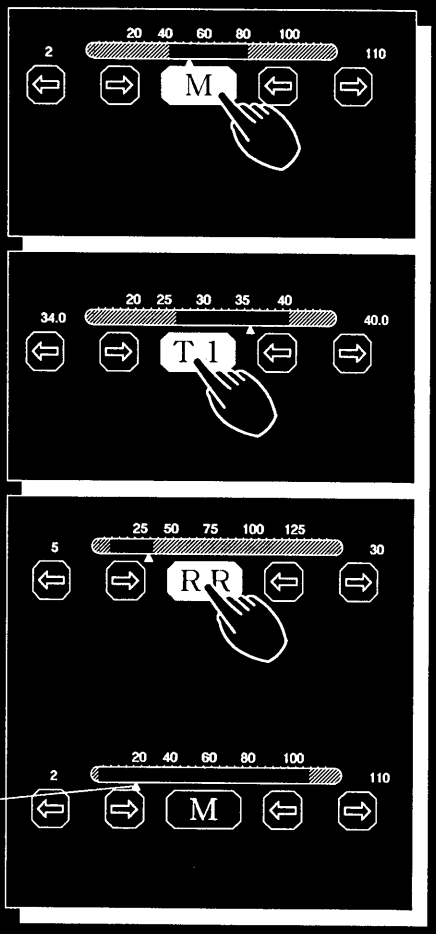
◆ When the [AUTO] key is pushed, the lower limit is set to 20 BPM below the current heart rate and the upper limit is set to 40 BPM above the current heart rate (ECG only).

ALARM LIMIT SET UP

4. **Setting BP alarm limits for Systolic, Diastolic and Mean pressures. (The symbol S, D or M displayed is the parameter to be set).**

5. **Setting Temperature alarm limits for T1, T2 or △ T. (The symbol T1, T2 or △ T displayed is the parameter to be set).**

6. **Setting Respiration alarm limits for RR (respiration rate) and APN (apnea time). (The symbol RR or APN displayed is the parameter to be set)**



◆ By pushing the "S", "D" or "M" key, the alarm limits can be set for Systolic, Diastolic or Mean, respectively.

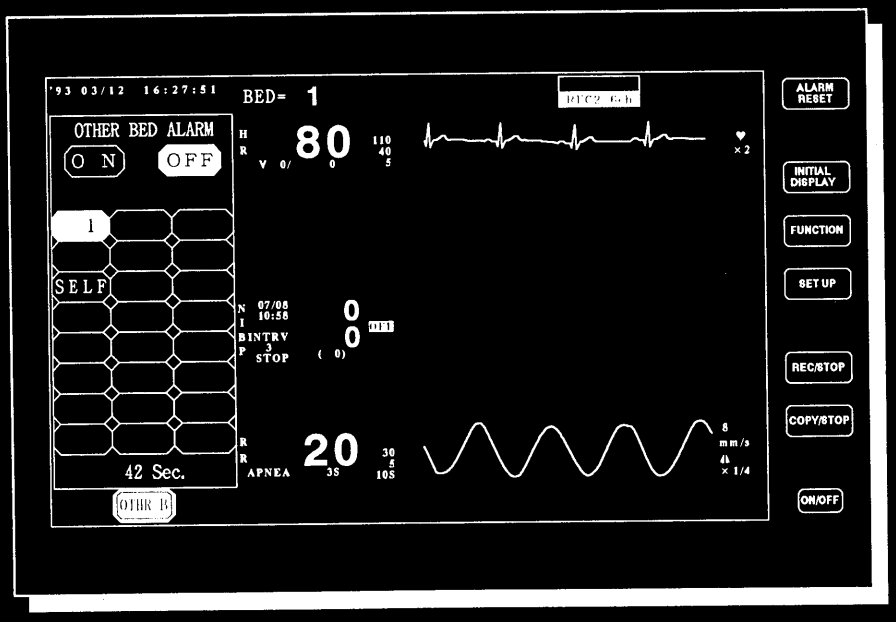
◆ By pushing the "T1", "T2" or "△ T" key, the alarm limits can be set for T1, T2 or △ T respectively.

◆ By pushing the "RR" key or "APN" key, the alarm limits can be set for RR or apnea time respectively.

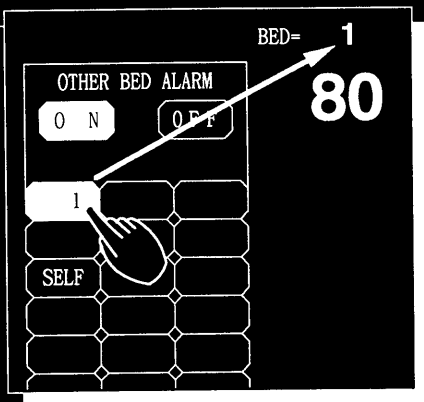
The current value of each parameter is shown by the ▲ cursor displayed below the slide alarm indicator.

(5) OTHER BED — from [INITIAL DISPLAY] push [OTHER-B]

When the DS-3300 is connected in a network with multiple bedside monitors, the other beds on the network can be viewed from any bedside. When the [OTHR-B] key is pushed, the following display is shown.

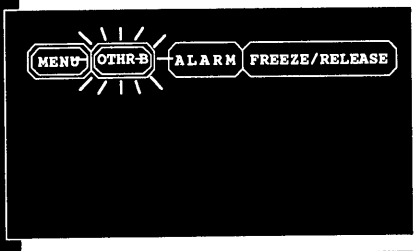


1. Selection of other bedside by number. (Bedside not connected or turned on will not be displayed).



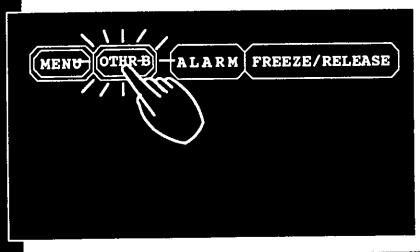
◆ Push the key for the bedside that you desire to view. The key will change to reverse contrast and the bed number and patient's name will be displayed at the top of the screen.

2. When another bed is in alarm.



◆ When an alarm is generated in another bed, an alarm sound is initiated and the [OTHR-B] key blinks

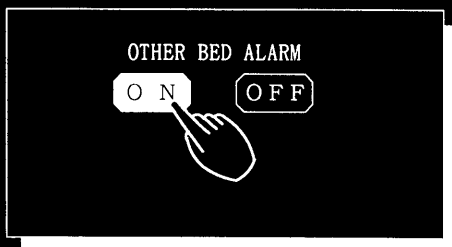
3. To display the alarming bedside.



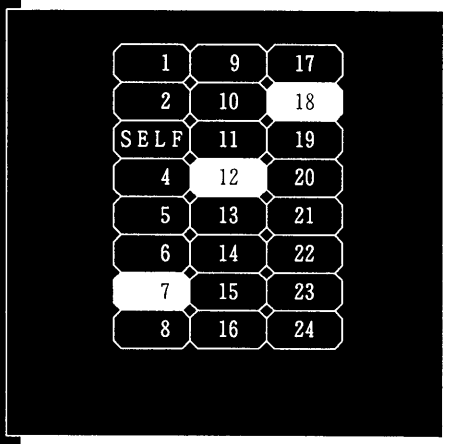
◆ Push the [OTHR-B] key and the bedside information is displayed from the bed in alarm.

OTHER BED

4. Turning ON or OFF the other beds alarm sound.

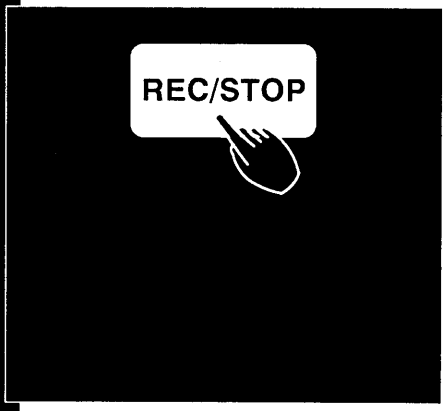


5. Alarms occurring at more than one bedside.



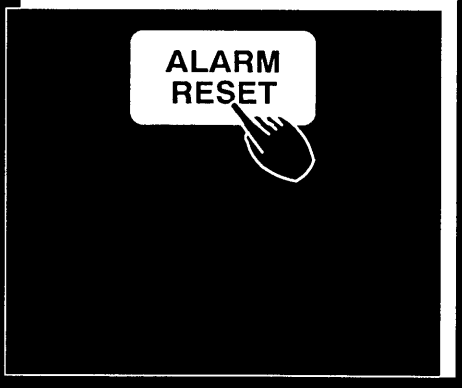
◆ If alarms are generated at two or more beds, vital signs information of a bed bearing a lower number is displayed with all alarm generating bed number keys reverse-lit.

6. The recorder at other bed can be operated.



◆ If the **REC/STOP** switch is pressed during other bed display, the recorder at the other bed records the waveform or if no recorder is connected to the monitor, the recorder at the central monitor records the waveform.

7. Reset an alarm generated at other bed.

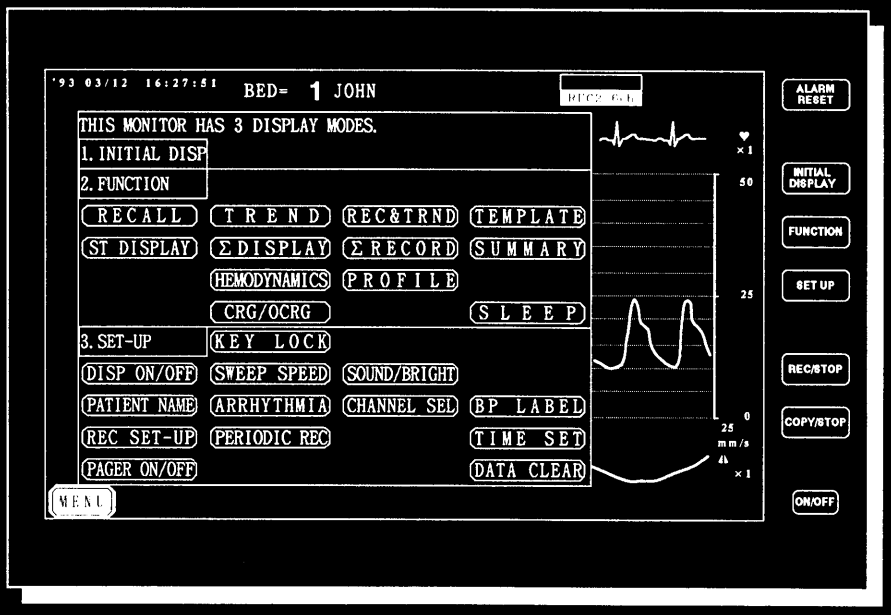


◆ When you monitor vital signs information of another bed, you can reset (silence) the alarm generated at that bed by pushing the **ALARM RESET** switch on the monitor you are attending.

(6) MENU

from [INITIAL DISPLAY] push [MENU]

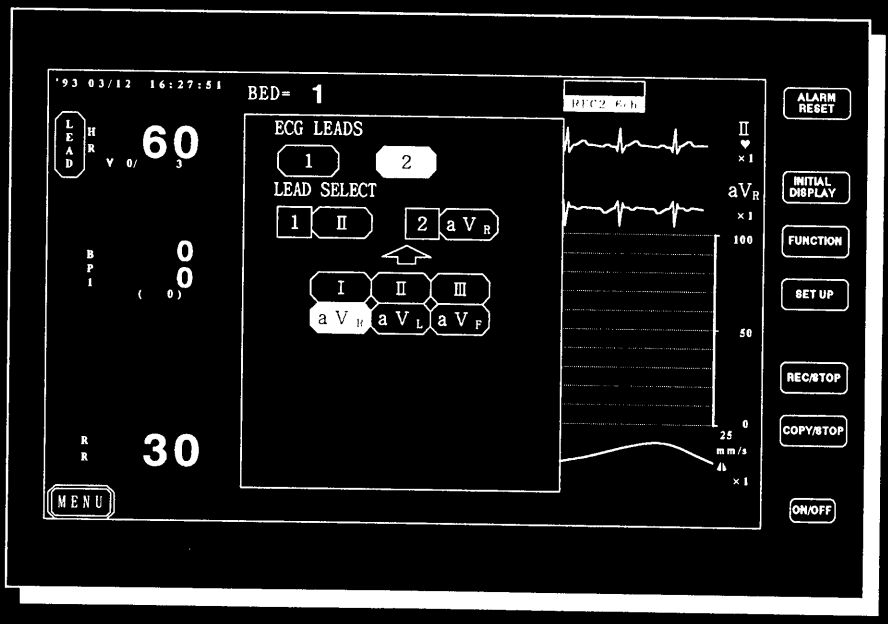
When the [MENU] key is pushed, the following display is shown. This shows the various functions of the monitor. To select a function, simply push the desired key. By using the [MENU] key, it is not necessary to remember the selections from the [FUNCTION] or [SET UP] keys.



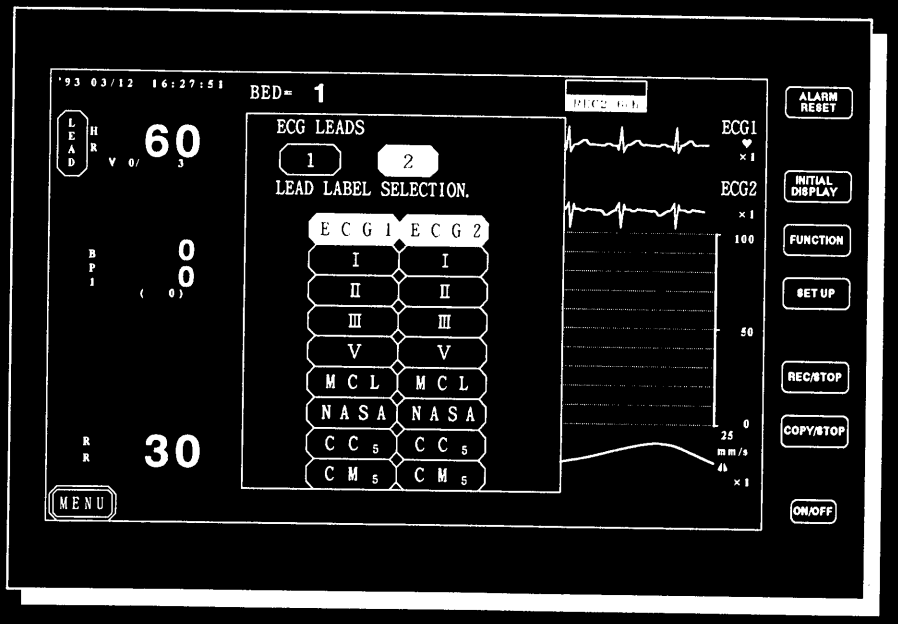
(7) LEAD SELECTION

from [INITIAL DISPLAY] push [LEAD]

Push the [LEAD] key on the INITIAL DISPLAY. The lead selection window will appear as shown below, thereby allowing you to select the number of leads and leads displayed.
This window is available only when the monitor receives 2-lead ECG.



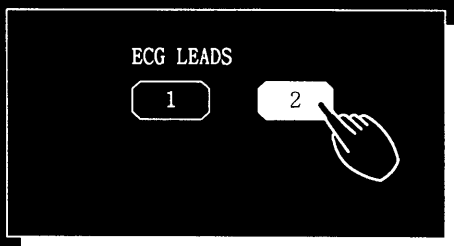
When the limb lead cable is connected (4 electrodes).



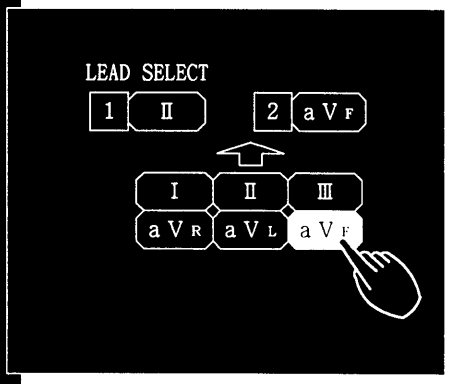
When the 2-lead cable is connected (5 electrodes).

LEAD SELECTION

1. Select the number of waveforms displayed.

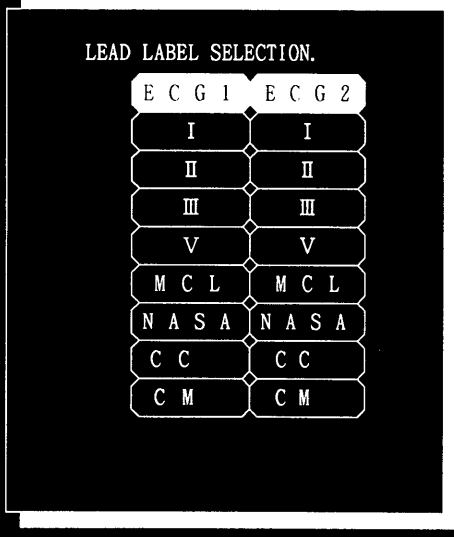


2. Select leads for the 1st and 2nd traces.



◆ Select a lead, then select whether it is to be displayed on the 1st or 2nd trace.
(only available with the limb lead cable connected [4 electrodes])

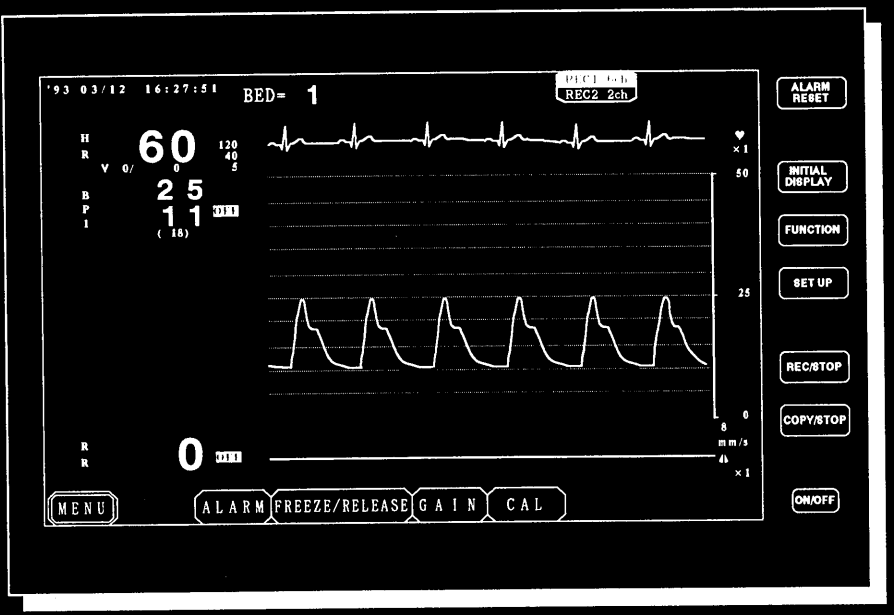
3. Select leads.



◆ Selection can be made from eight leads.
(with the 2- lead cable connected [5 electrodes])

(8) RECORDER SELECTION from [INITIAL DISPLAY] push [REC1/REC2]

When two recorders are connected to the monitor, recorder selection is obtained by the [REC1/REC2] key in the upper right of the display.



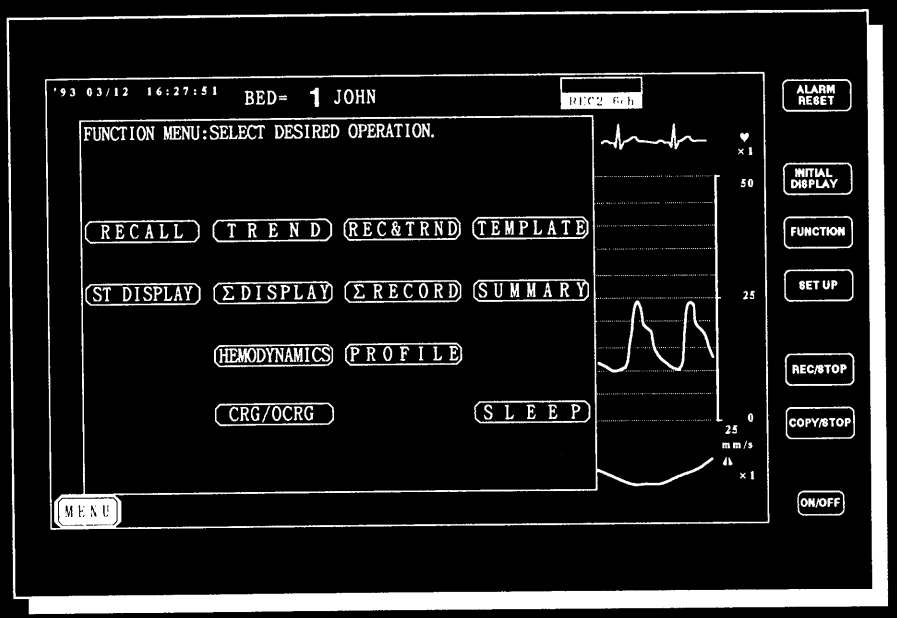
1. Select recorder 1 or 2.

◆ Push the [REC1/REC2] key. Recorder 1 or 2 will be selected and the selection will be indicated by reverse-contrast of the label.

6.2 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.

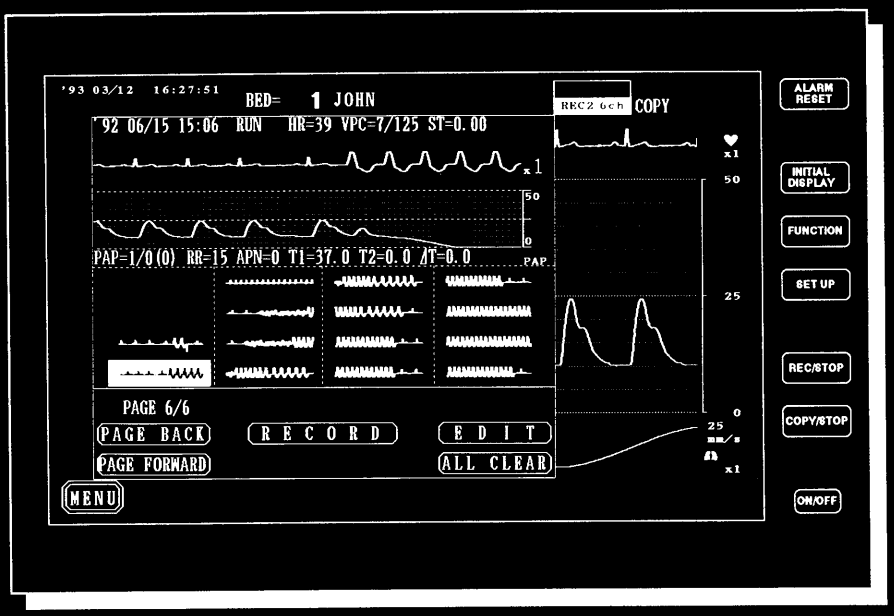


(1) RECALL

from [FUNCTION] push [RECALL]

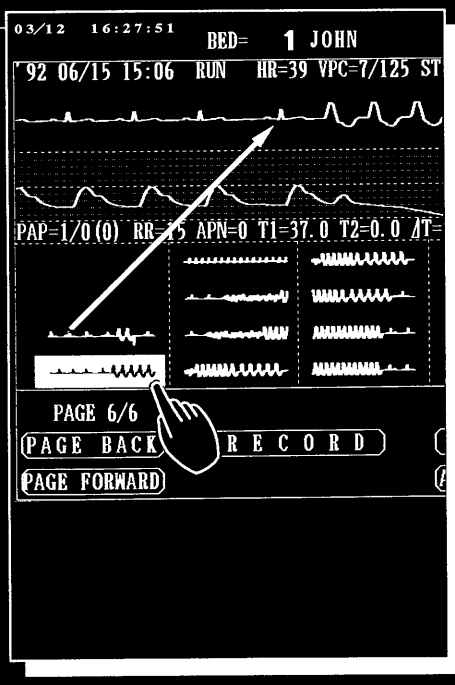
When the [FUNCTION] switch and the [RECALL] key are pushed, the following display is shown. The large waveform(s) at the top of the display is the latest stored in memory.

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 (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.)



◆ The 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.

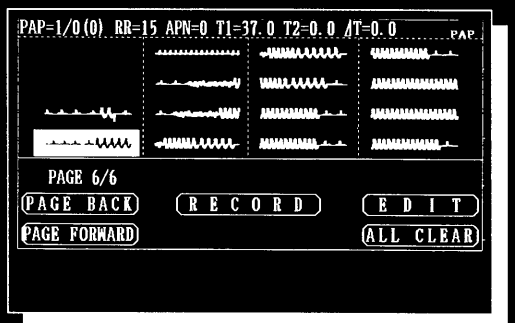
PAGE BACK key:
Displays the previous 16 waveforms.

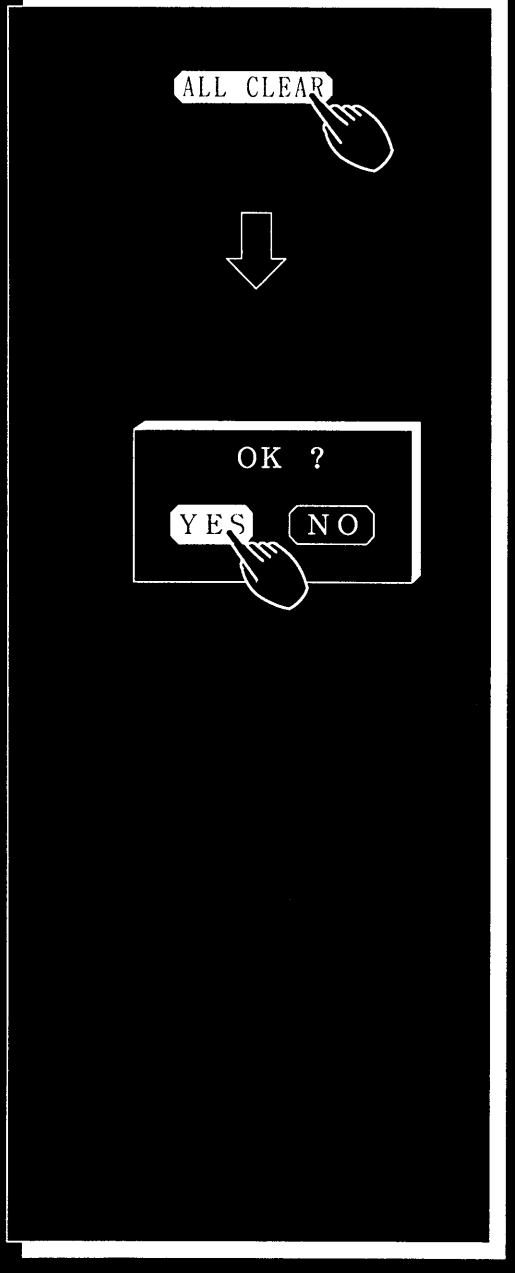
PAGE FORWARD key:
Displays the next 16 waveforms.

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.

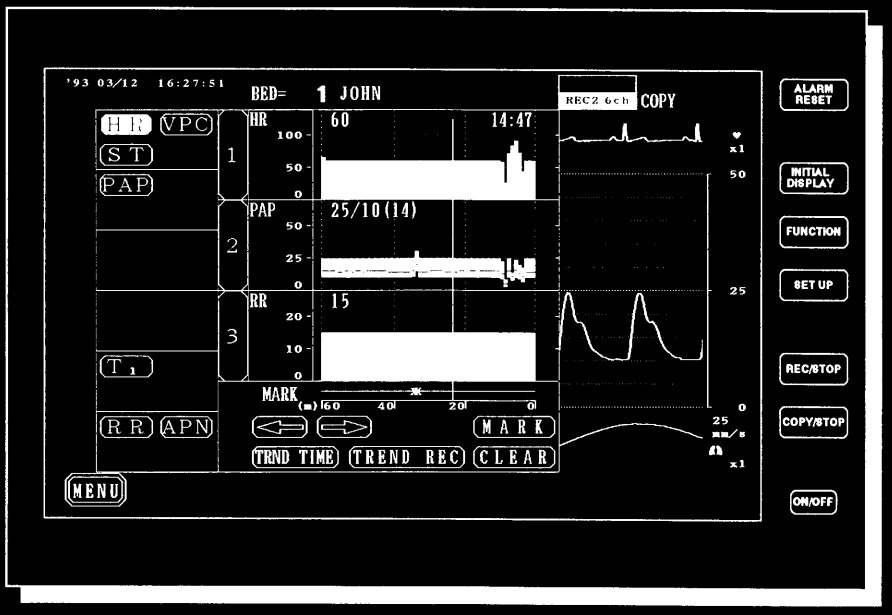
The memory can store up to 192 events of recall waveforms.
If the IC memory card is used for extended memory, up to 704 events can be stored for recall. (Note, however, the number of events which can be stored in the memory is reduced to 1/2 if 2 channels of waveforms are stored, and to 1/4 if 2 channels of 12-second waveforms are stored.)

Memory Mode	Std.	IC Memory Card (1Mbyte)
6 seconds, 1 channel	192	704
6 seconds, 2 channel	96	352
12 seconds, 1 channel	96	352
12 seconds, 2 channel	48	176

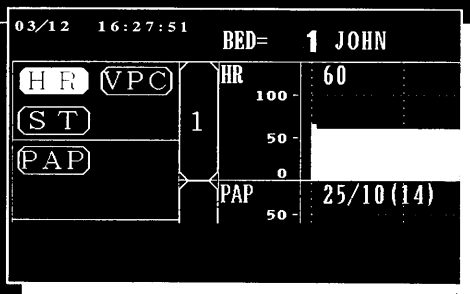
(2) TRENDGRAM

from [FUNCTION] push [TREND]

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

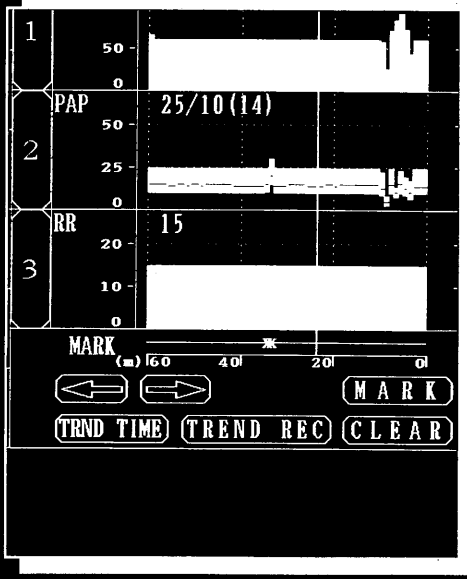


1. Selection of trend parameter for display.



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

2. The [⇦] and [⇨] 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.



Cursor

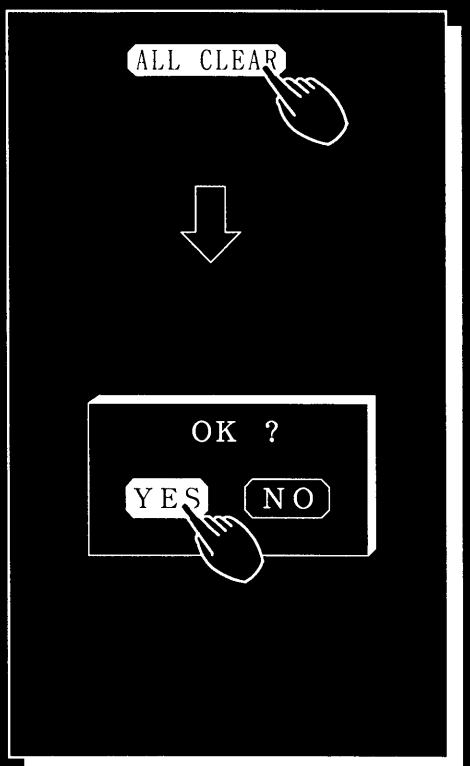
◆ An event mark is put on the MARK line each time the mark button on the transmitter is pushed.

◆ An event mark is entered automatically if the mark button was pushed, when the monitor was placed in the LEARN or CAN'T status for arrhythmia analysis, or when the alarm was suspended.

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).

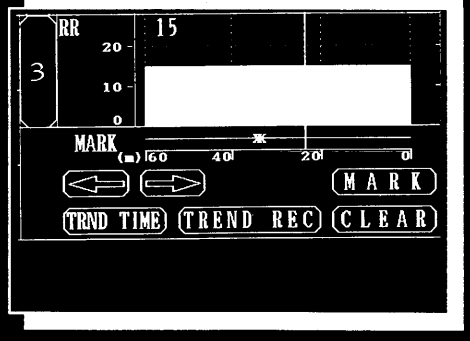
TREND REC key:
This key will print the trendgram on the recorder.

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.

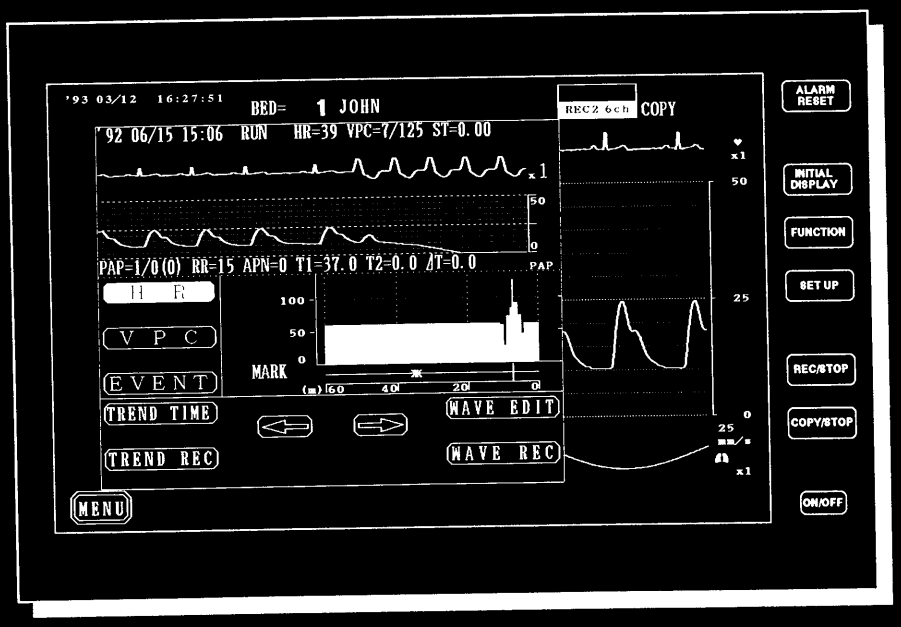
MARK Key: Displays event marks on the MARK line.



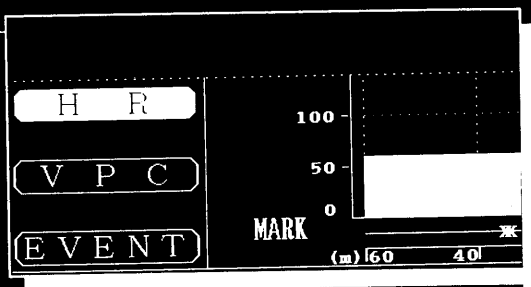
◆ Push the (MARK) key. The key will be reverse - lit and event marks will be put on the MARK line.
Push the (MARK) key once more.
Marks will disappear.

(3) RECALL AND TREND — from FUNCTION push REC & TRND

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

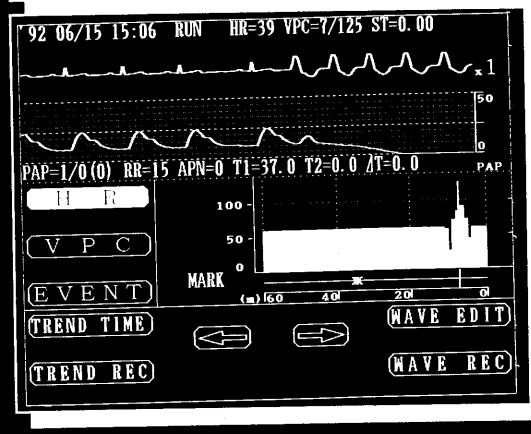


1. Selection of Trendgram



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

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



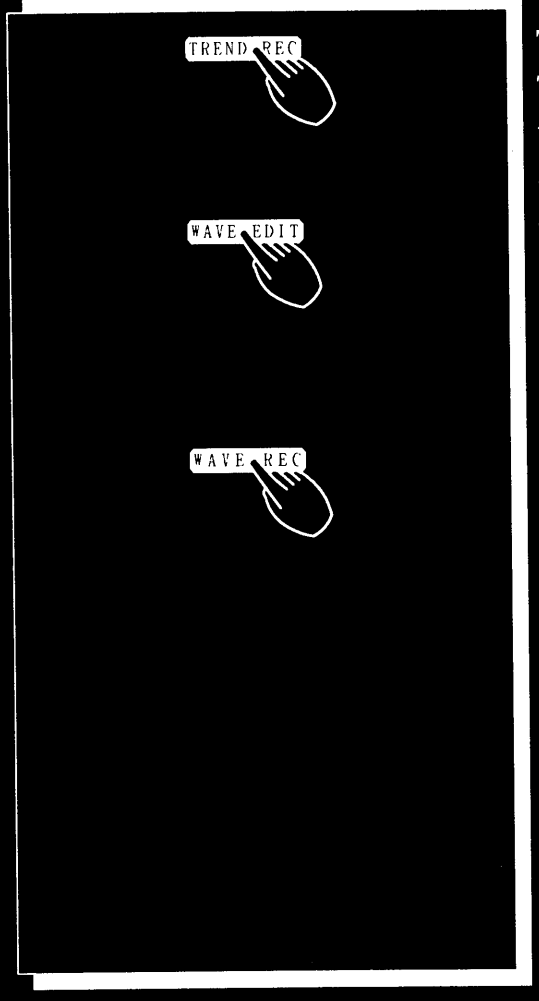
◆ When only ECG is stored in memory (RECALL SET – UP), only the ECG waveform will be displayed.

◆ Push the ⇦ key to show older recall waveforms and the ⇨ key to show newer ones.

Note: If the cursor is moved to the far left of the trendgram and pushing the ⇦ key continues to change the recall waveform, it indicates the alarm occurred prior to the time displayed for the trendgram. In this case, push the TREND TIME key to expand the trend time.

3. Select a trend time.

4. Select or clear a recall waveform.



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 trend-gram on the recorder.

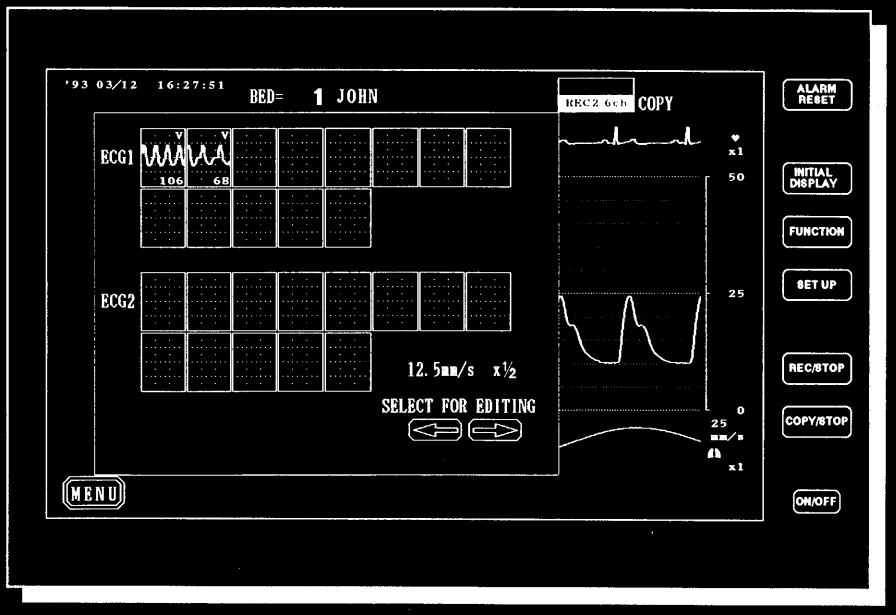
WAVE EDIT key:
When this key is pushed, the recall waveform will be cleared from memory.

WAVE REC key:
This key will record the recalled waveform on the recorder.

(4) VPC TEMPLATE

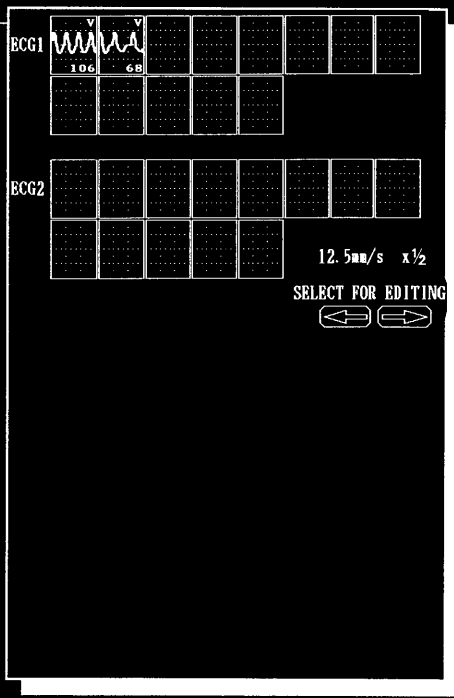
from [FUNCTION] push [TEMPLATE]

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.



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

(Up to 13 types per channel)

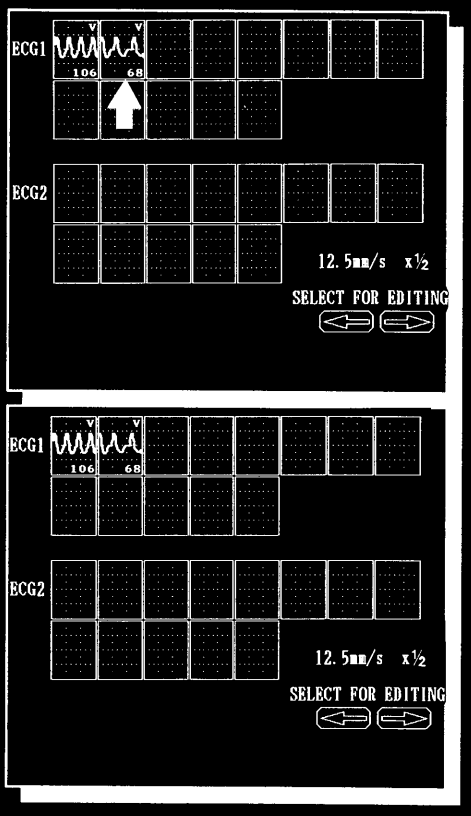


◆ The figure at the bottom right of the template waveform is the total number of times that this morphology has occurred.

◆ Each waveform on the display is sampled from what was first matched with the template.

DS-3300 #4

2. To clear waveforms.



◆ Select the waveform to be cleared using either of SELECT FOR EDITING arrow keys.

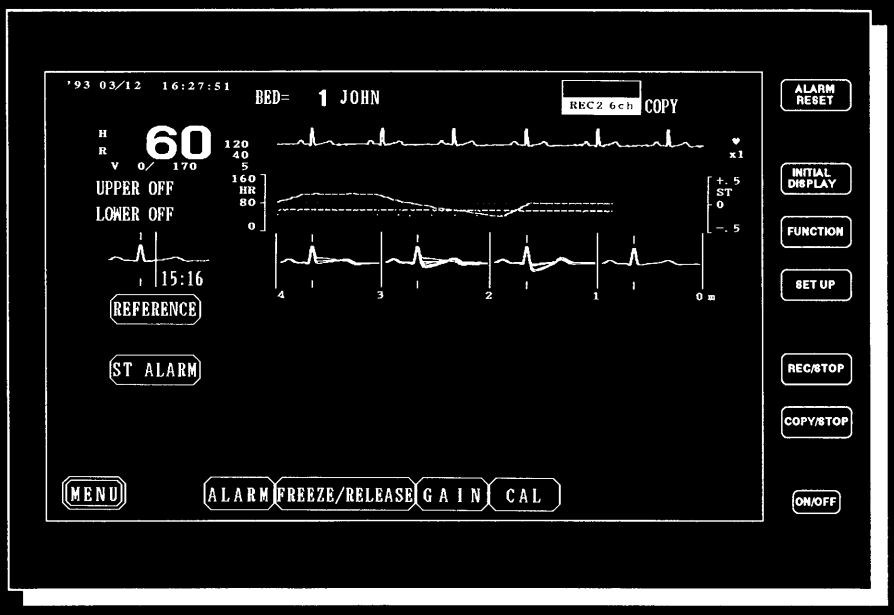
◆ Push the [EDIT] key to clear the waveform from the memory.

◆ When the waveform is cleared, the [EDIT] key disappears automatically.

(5) ST DISPLAY

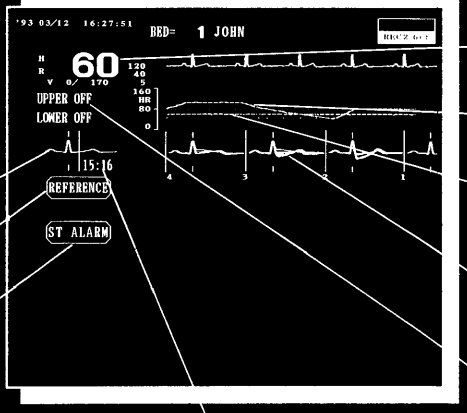
from [FUNCTION] push [ST DISPLAY]

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.



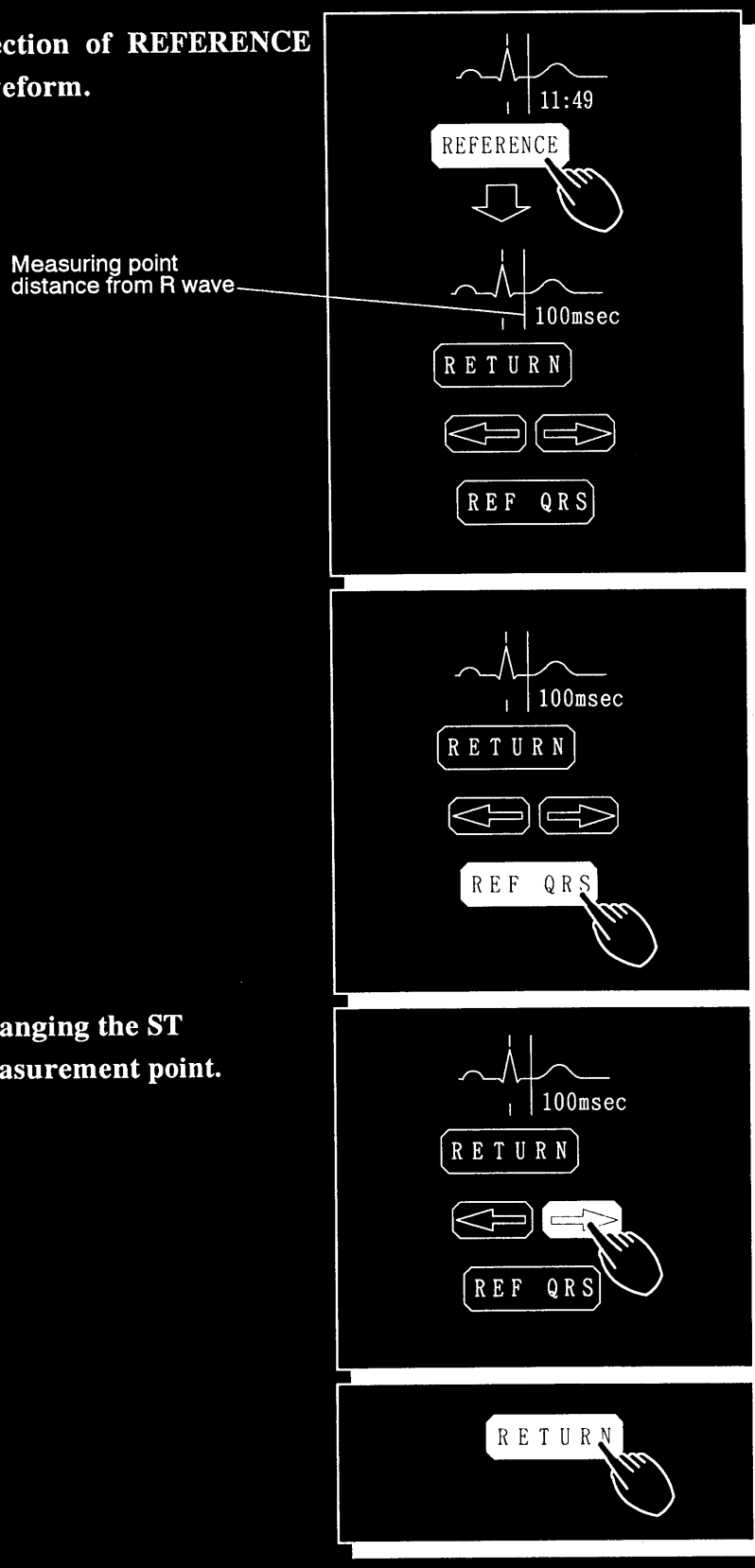
1. . The real- time 6- second ECG waveform is displayed at the top, a 4- minute ST level trendgraph and instantaneous heart rate trendgraph at the center, and four one- minute superimposed QRS- T waves, at the bottom.

2. The reference waveform, the time it was learned and ST level high/low alarm limits are displayed.



◆ By comparing the trendgraph with superimposed QRS – T waves, you can clearly grasp how the ST level has changed.

3. Selection of REFERENCE waveform.



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

◆ 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 that time, the new reference QRS is displayed.

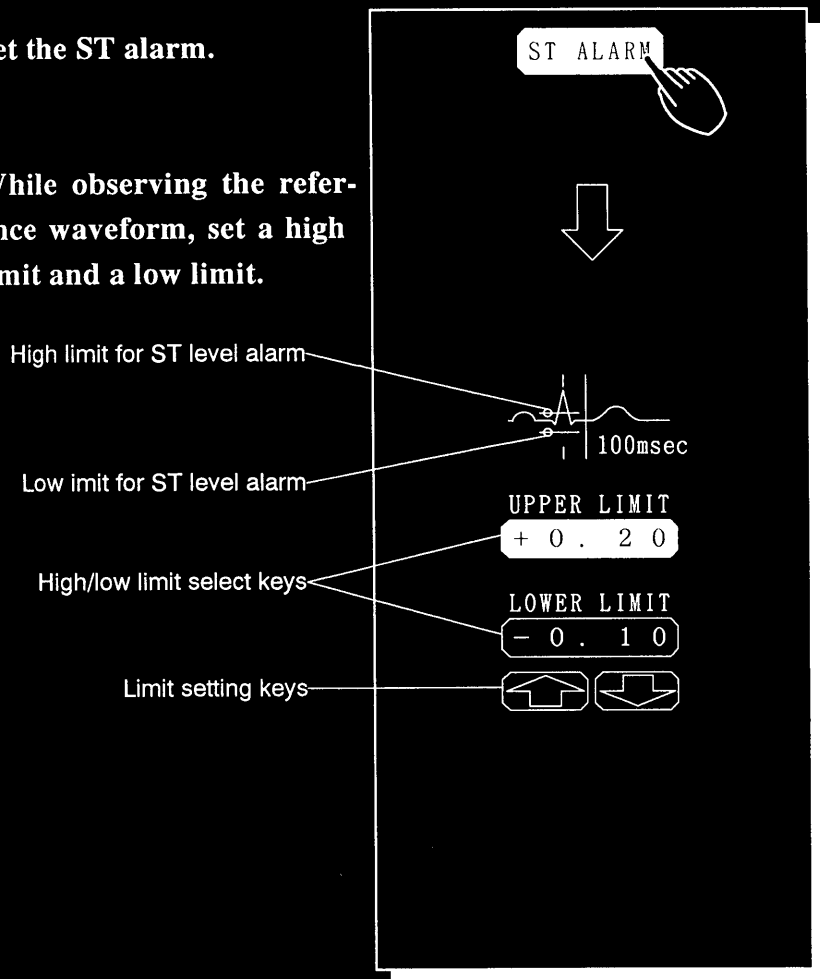
4. Changing the ST measurement point.

◆ 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.

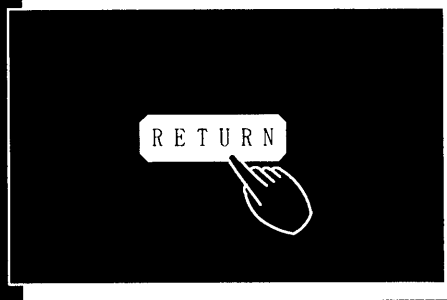
Push the **RETURN** key to return to the ST display.

5. Set the ST alarm.

6. While observing the reference waveform, set a high limit and a low limit.



7. Set the ST alarm function to ON/OFF.



◆ Push the (ST ALARM) key. ST alarm limit keys will appear.

◆ Select the high or low limit by pressing the key which is labelled, for example, (+0.20) or (-0.10).

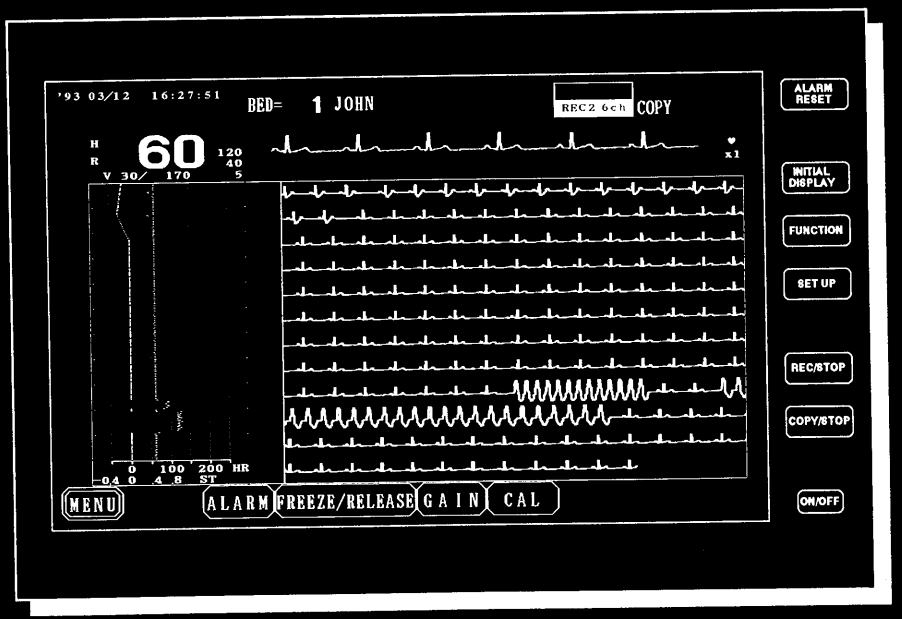
◆ Arrow keys (⇧) and (⇩) allow you to set the limit in 0.05mV steps.
Setting ranges:
High limit;
- 1.00 to +2.00mV
Low limit;
- 2.00 to +1.00mV

◆ If you use the presently selected limits, push the (ON) key. If you need not use the ST alarm function, push the (OFF) key.

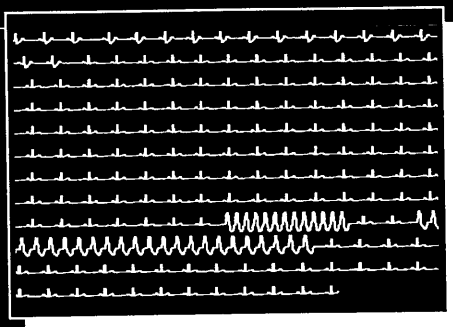
◆ Push the (RETURN) key. The initial ST display will return.

(6) Σ (SIGMA)DISPLAY from [FUNCTION] push [Σ DISPLAY]

When the [FUNCTION] switch and the [Σ 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.

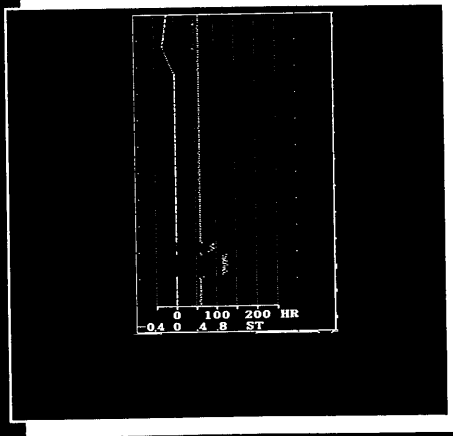


1. Long term compressed ECG display(Σ Display)



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

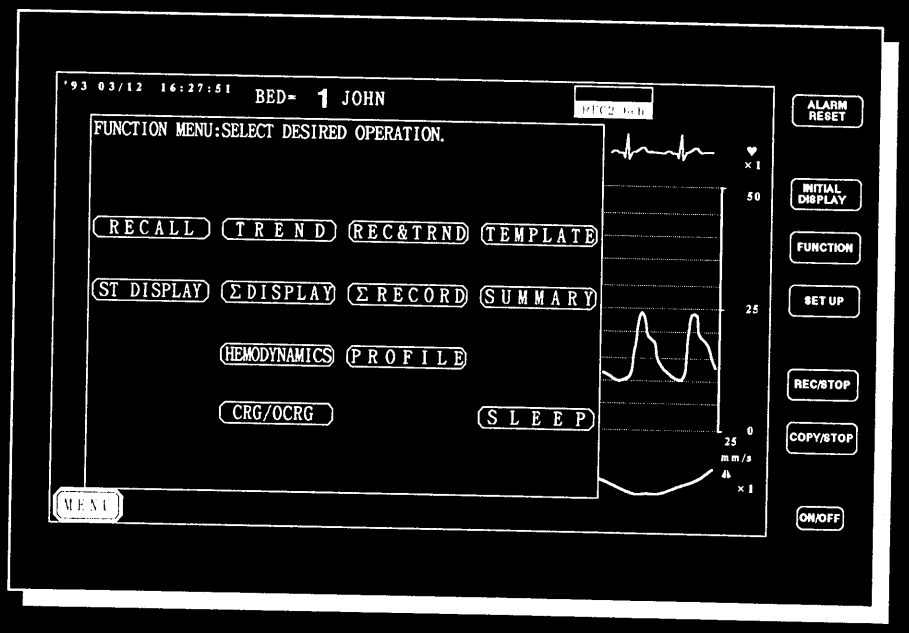
2. Trend display of instantaneous HR and ST.



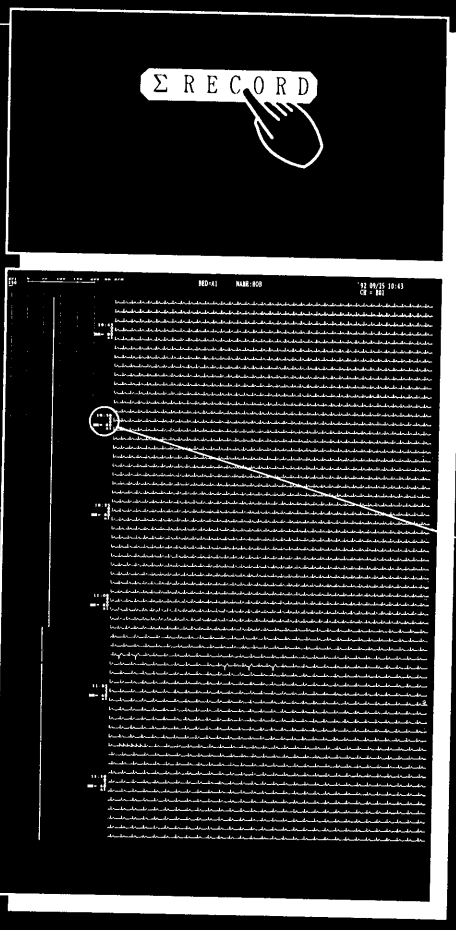
DS-3300 英文

(7) Σ (SIGMA)RECORD from FUNCTION push Σ RECORD

When the **FUNCTION** switch and the **Σ RECORD** key are pushed, the long term ECG can be recorded by the AU-3320 six channel recorder.



Σ record.



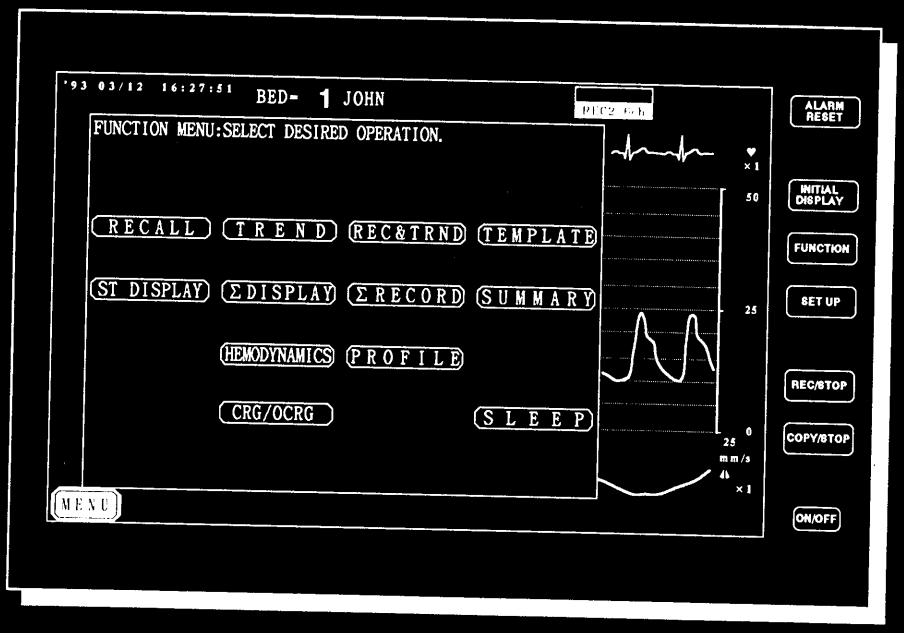
◆ The 6-channel recorder AU-3320 permits you to record the long-term compressed ECG waveform.

◆ The recorder records a 30-minute waveform on a page. The length of the waveform on one line is 30 seconds.

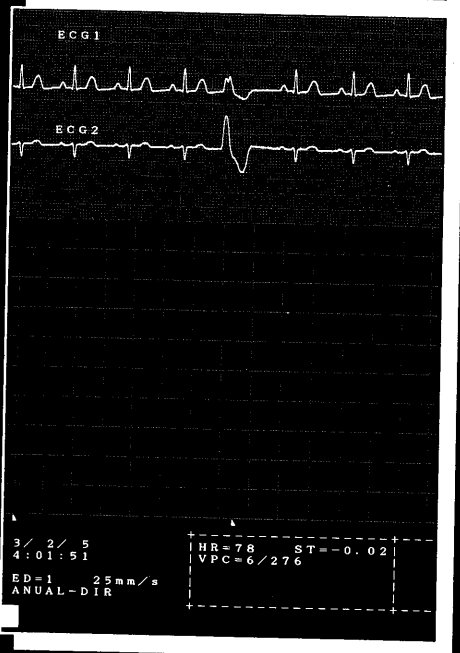
(8) SUMMARY RECORD

from FUNCTION push SUMMARY

The recorder will record measurements, (maximum, minimum and mean values of heart rate, ST level, blood pressure, body temperature and respiration rate) taken over a maximum of 24 hours, and trendgraphs. If desired, the summary report can be made only for measurements or include trendgraphs by utilizing the PRE-SET function.



Record a summary report.



◆ Only the AU-3320 the 6-channel recorder permits you to record a summary report.

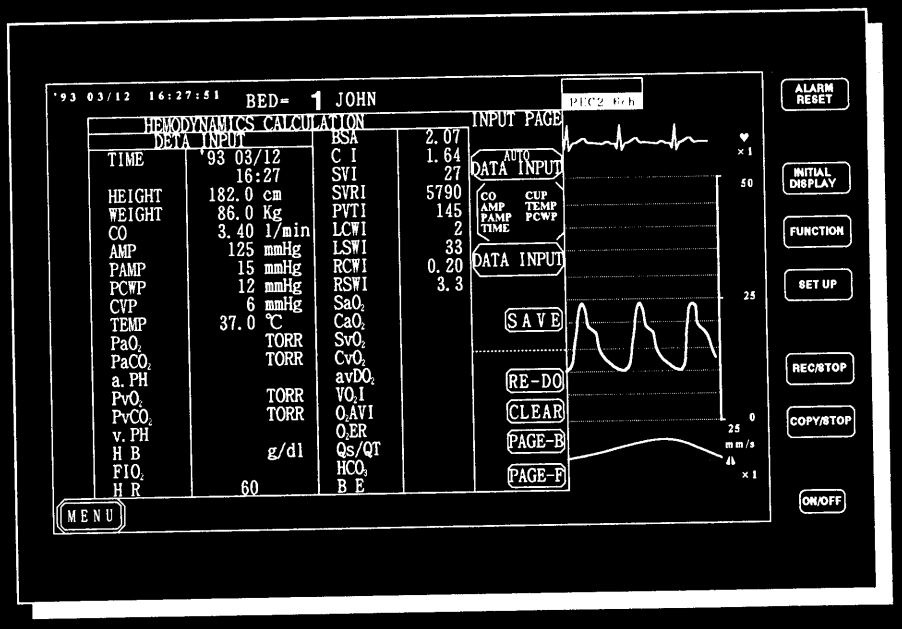
◆ Time intervals between each measurement can be selected from 5, 10, 20 and 60 minutes by utilizing the SUMMARY ITEM key on the PRE-SET menu (refer to 6.3 (16.4)).

◆ For automatic recording of a summary report, you can use the periodic recording function (refer to 6.3 (10)).

(9) HEMODYNAMICS from FUNCTION push HEMODYNAMICS

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

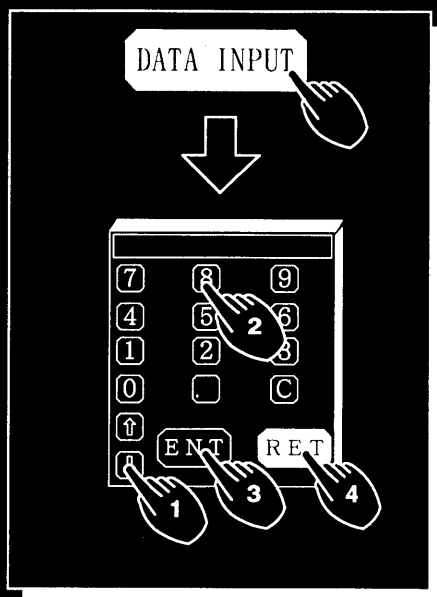
Enter data for the items in the left column and the resultant calculations are displayed in the right column.



1. Automatic data input.

◆ When the AUTO DATA INPUT key is pushed, the latest values for CARDIAC OUTPUT (CO AVERAGE)
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.



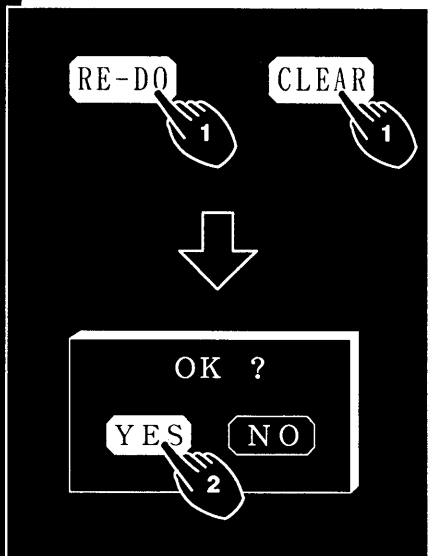
◆ When the (DATA INPUT) key is pushed, a ten key calculator is displayed. Select the item for data input with the (⇧) and (⇩) keys and enter the data with the numeric keys 0 – 9.
◆ Push the (ENT) key to input the data into the calculation formula. When all the data are input, or the (RET) key is pushed, 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.

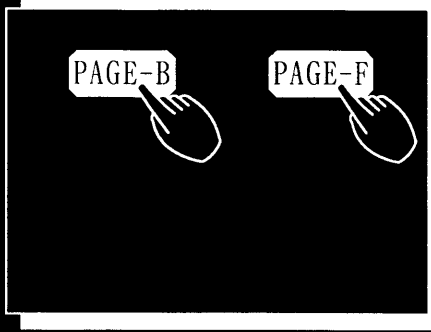
5. To clear all data in memory.



◆ 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.

◆ 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.



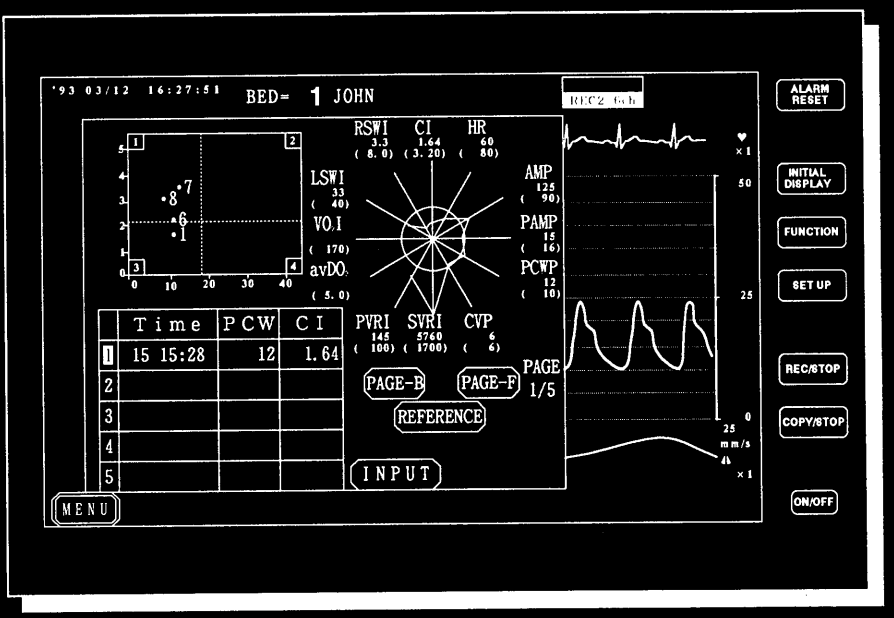
◆ Push the (PAGE-B) or the (PAGE-F) key to review previous data.
Data for five hemodynamic calculations are available for review.

(10) PROFILE

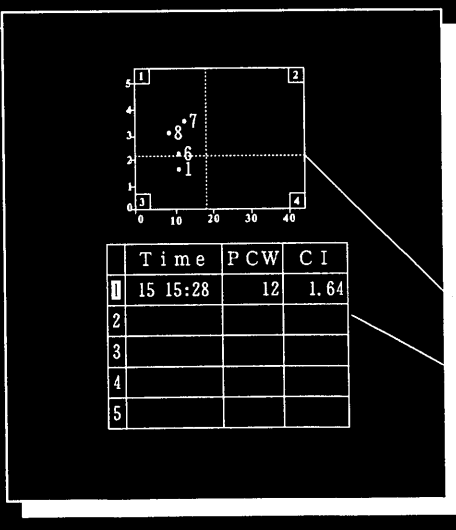
from [FUNCTION] push [PROFILE]

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.



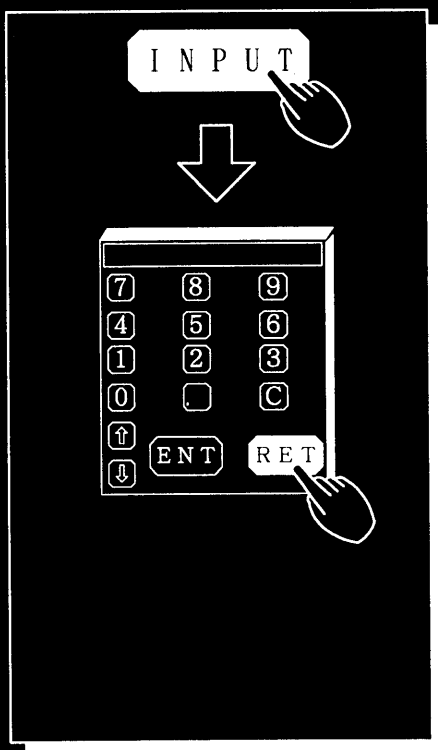
◆ A maximum of five calculations for PCWP and CI data which were entered through the hemodynamics calculation are displayed on a table with a graphic plot of PCW vs. CI.

Graphic plot of PCW vs. CI

PCW and CI data table

DS-3300 英文

2. Plot a graph by inputting PCW and CI (different from those stored in the memory).

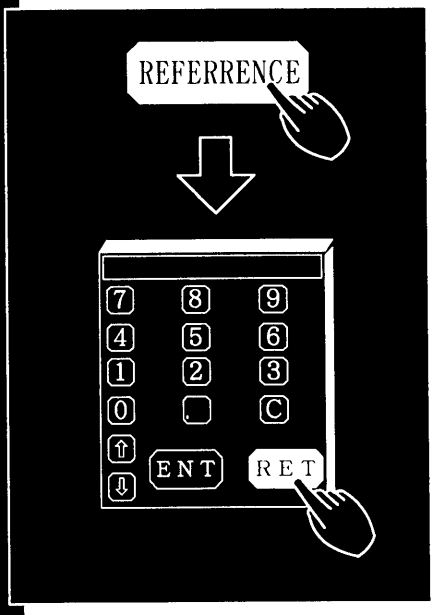


◆ Push the (INPUT) key. Numeric keys will appear. Then you can plot a graph of PCW vs. CI by inputting new PCW and CI with the numeric keys.

◆ Input a measured PCWP, then CI. These values will be on the graph. A number is assigned at cath point, starting from 6. It is possible to plot up to 10 data points on the same graph. The data input here cannot be stored.

Push the (RET) key. Numeric keys will disappear.

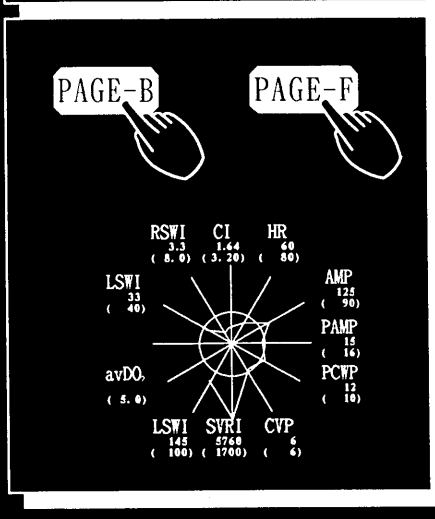
3. Change the reference value for the hemodynamics profile.



◆ Push the (REFERENCE) key. Numeric keys will appear, and a value to change will be highlighted thereby allowing you to change the reference value.

Push the (RET) key.
Numeric keys will disappear.

4. Hemodynamics data are based on the most recent data.
Past profiles of maximum five times can be displayed.

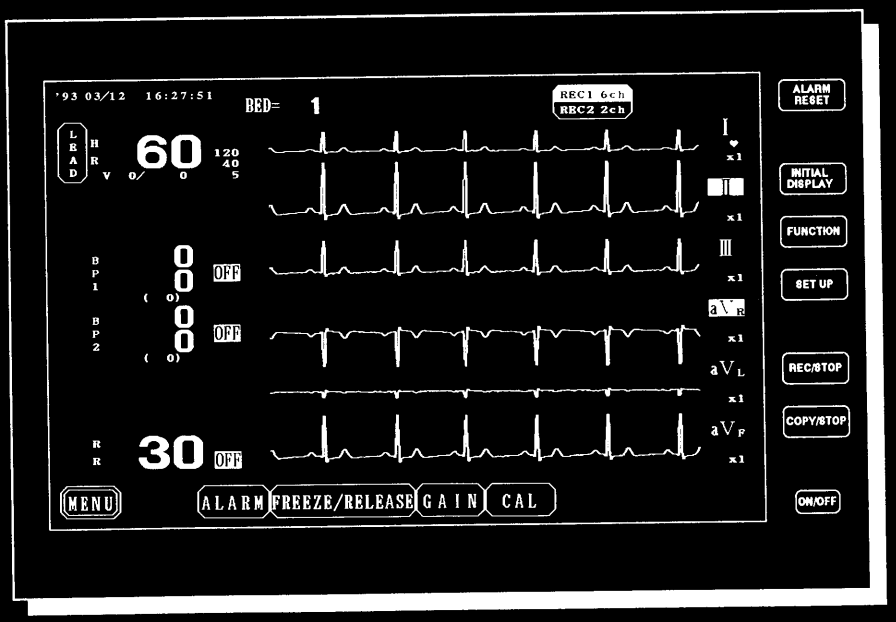


◆ (PAGE - B) and (PAGE - F) keys allow you to recall a past profile selected from five.

(11) 6- LEAD DISPLAY

from [FUNCTION] push [6 LEAD]

When the transmitter sends two ECG waveforms, push the [6 LEAD] key in the FUNCTION MENU. The display will be as shown below.



Note: Unless limb electrodes are placed on correct positions, proper lead waveforms are not displayed.

(12) CRG(CardioRespirogram) from FUNCTION push CRG

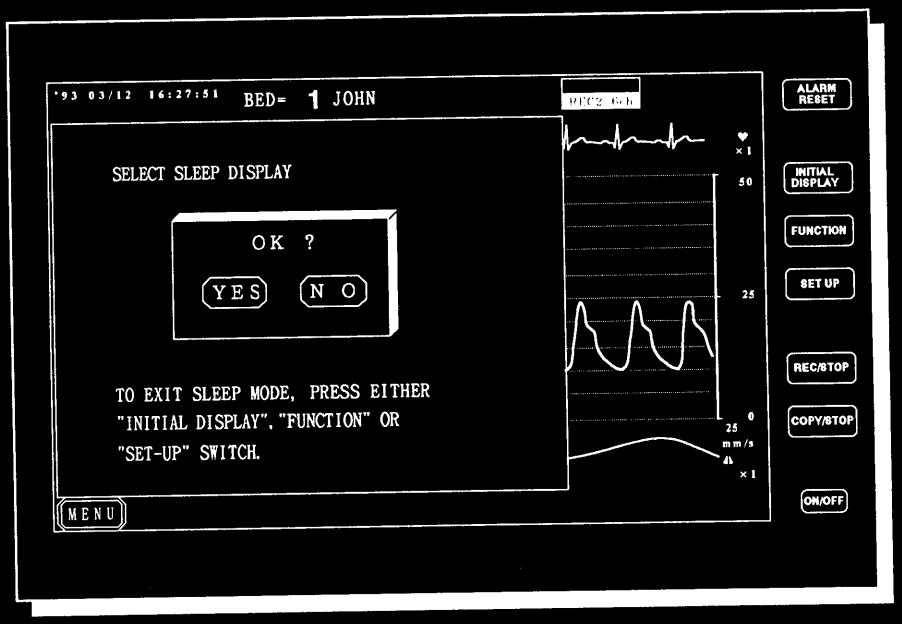
When the FUNCTION switch and the CRG keys are pushed, the following display is shown. The current ECG is displayed above a trendgram of the instantaneous heart rate for the last two minutes. The bottom trace is the respiration waveform displayed with a sweep speed of 1.25 millimeters per second for the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

The time length of heart rate trendgraph and respirationwaveform can be changed to 5 minutes by utilizing the SOFT SWITCH function (refer to 6.3 (16.17)).

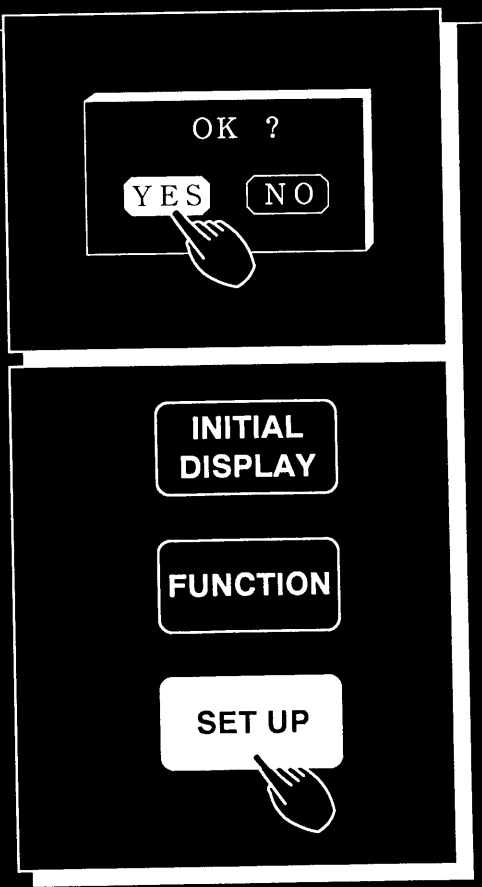
(13) SLEEP

from [FUNCTION] push [SLEEP]

When the [FUNCTION] switch and the [SLEEP] key are pushed, the following display is shown. The SLEEP mode turns off the display only on the DS-3300 bedside monitor. All alarm functions and data acquisition are still operating.



1. For patients who complain of brightness from the screen, the display can be turned off while the monitor still acquires data and maintains alarm status. All data are still monitored at the Central Station.



◆ When the [FUNCTION] switch and the [SLEEP] key are selected, a confirmation message is displayed. Push the [YES] key to mask the display except for date and time.

◆ To return to the normal display, push the [INITIAL DISPLAY], [FUNCTION] or [SET UP] switches.

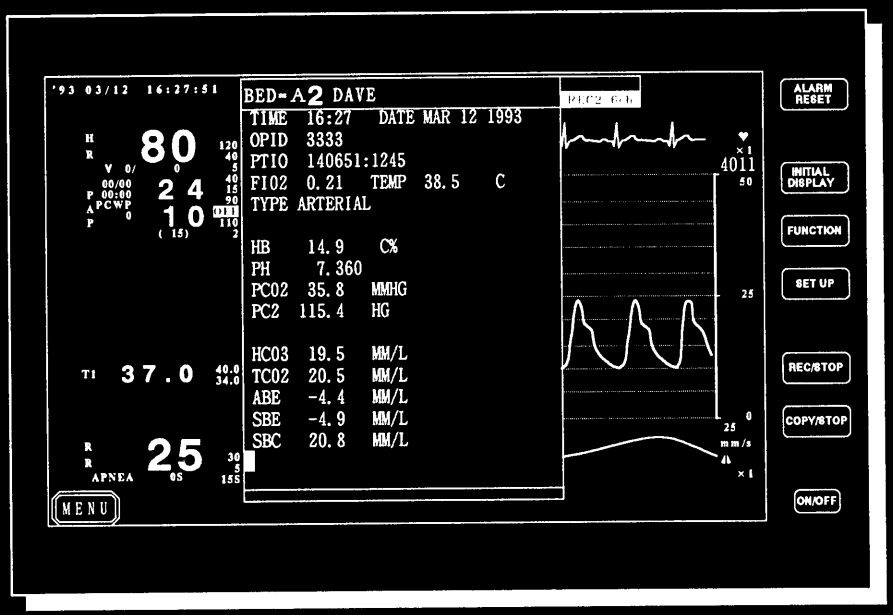
(14) CHARACTER DISPLAY

from FUNCTION
push CHAR. DISP

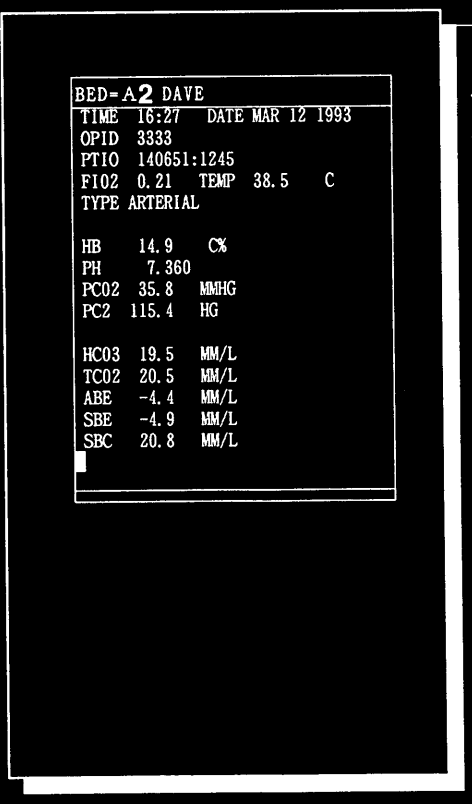
When the FUNCTION switch and the CHAR. DISP keys are pushed, the following display is shown.

Alphanumeric data received through the RS-232C port will be displayed. This function is available by setting the RS-232C to CHAR. DISP.

Refer to setting RS-232C on the PRE-SET menu.



1. Alphanumeric data display



◆ Alphanumeric data received through the RS-232C are displayed in 36 characters by 18 lines.

◆ Each line is fed when it reaches 36 characters.

◆ When 18 lines are reached, the display is automatically scrolled up, line by line.

Character Codes (ASCII)

High - place 4 bits →

Low - place 4 bits →

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			S_P	0	@	P		p				ー	タ	ミ		
1			!	1	A	Q	a	q			。	ア	チ	ム		
2			"	2	B	R	b	r			「	イ	ツ	メ		
3			#	3	C	S	c	s			」	ウ	テ	モ		
4			$	4	D	T	d	t			、	エ	ト	ヤ		
5			%	5	E	U	e	u			・	オ	ナ	ユ		
6			&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
7	B_L		'	7	G	W	g	w			ァ	キ	ヌ	ラ		
8	B_S		(	8	H	X	h	x			ィ	ク	ネ	リ		
9	H_T		)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
A	L_F		*	:	J	Z	j	z			ェ	コ	ハ	レ		
B	H_M		+	;	K	[	k	{			ォ	サ	ヒ	ロ		
C	C_L		,	<	L	¥	l	¦			ャ	シ	フ	ワ		
D	C_R		−	=	M	]	m	}			ュ	ス	ヘ	ン		
E			.	>	N	^	n	~			ョ	セ	ホ	゛		
F			/	?	O	_	o				ッ	ソ	マ	゜		

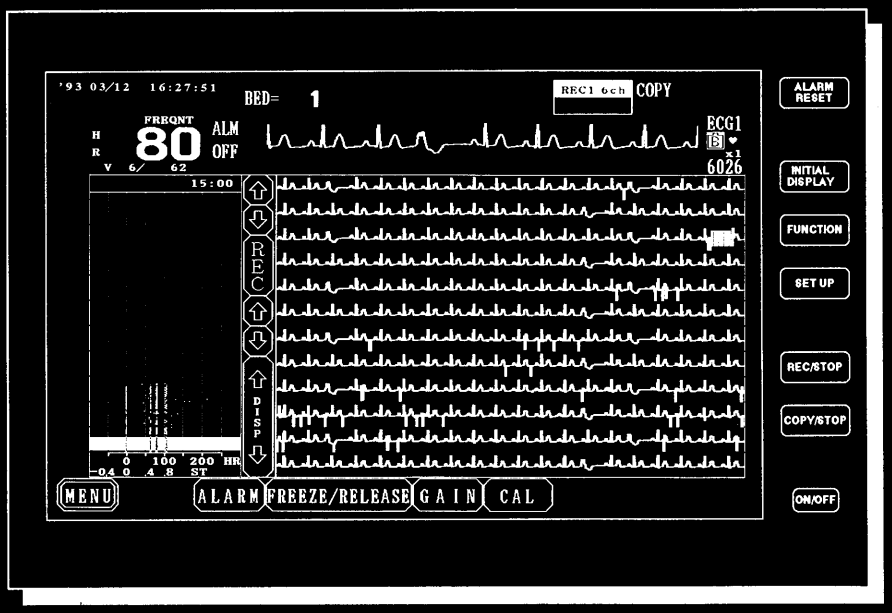
For blank codes on the above table, a question mark "?" is put on the character display.

(15) CONTINUOUS WAVEFORM

from [FUNCTION]
push [CONT. WAVE]

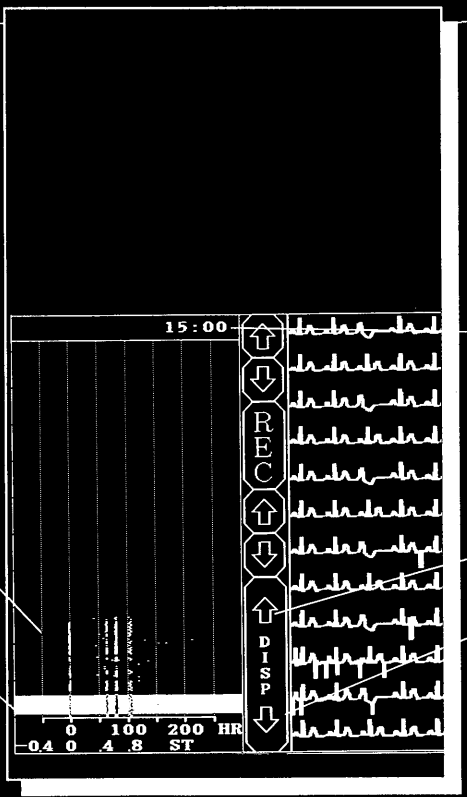
When the [FUNCTION] switch and the [CONT. WAVE] keys are pushed, the following display is shown. A 3- minute compressed ECG waveform will appear. You can scroll the display to choose advised 3 - minute waveform from a maximum 24- hour waveform and record.

This function is available by setting the IC memory card to the extension waveform memory. Refer to the IC MEMORY CARD INITIALIZATION (6.3 (16.5)).



1. Compressed ECG display (Σ display)

The time length of one line is 15 seconds and a 3- minute waveform is displayed on one page.



The time of waveform displayed at the top.

Indicates that there is no data on this area.

Indicates that the waveform on the display corresponds to this area of trendgraphs.

Display area moving keys

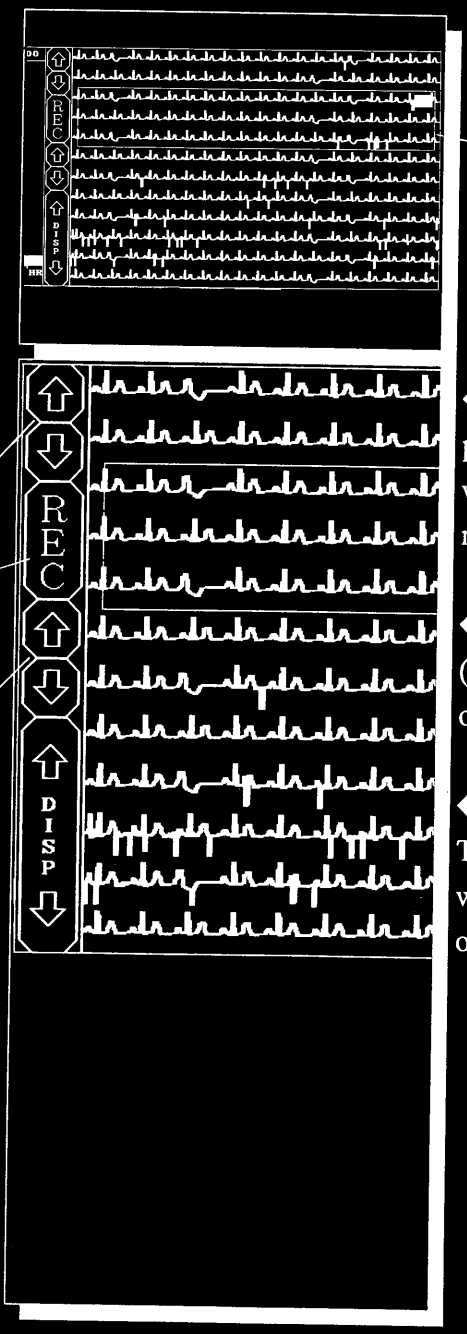
↑ key to move upward (to display older waveform)

↓ key to move downward (to display newer waveform)

◆ Using the [DISPLAY] key, move the cursor on the ST level and HR trendgraphs. The waveform at that trendgraph area will be displayed.

CONTINUOUS WAVEFORM

2. Waveform recording (12.5mm/sec)



◆ Push the record start or end point up/down key, the frame which indicates a recording range will appear.

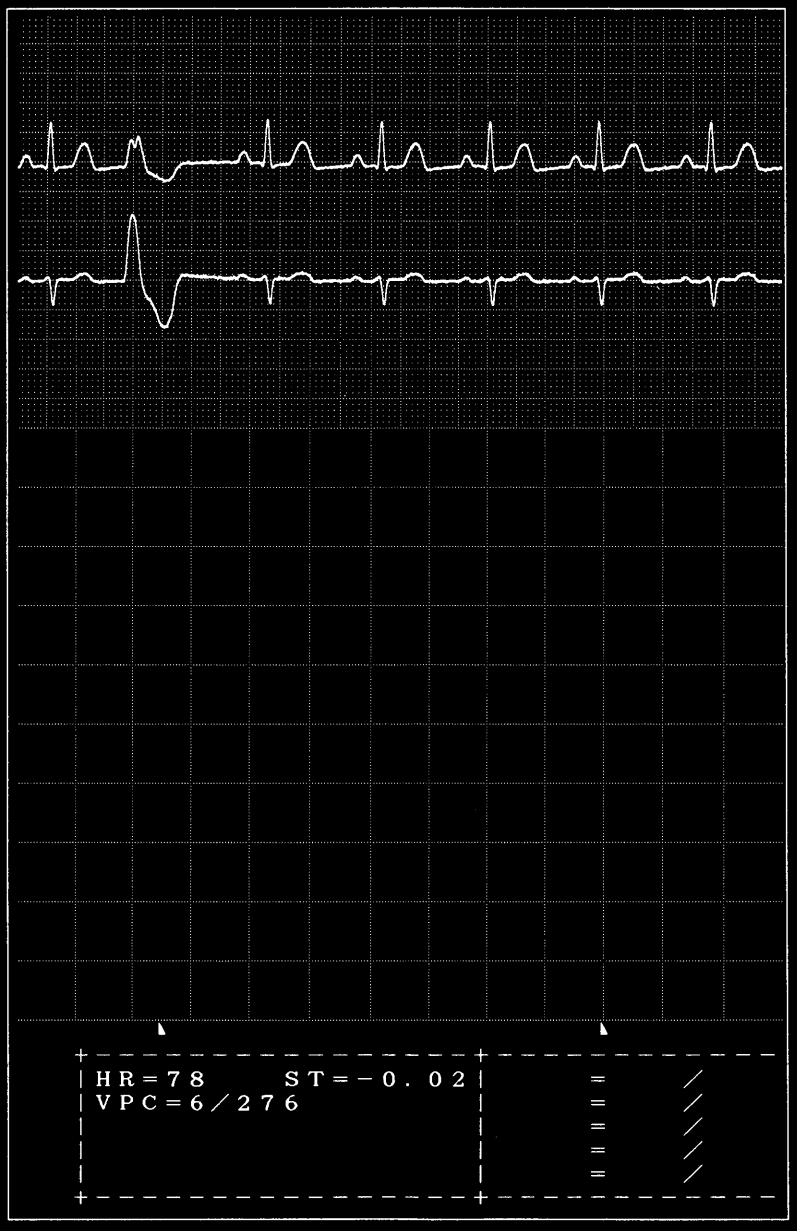
◆ Set a desired recording range. (Setting is possible in a unit of one line, 15 seconds per line.

◆ Push the **RECORD** key. The waveform in the set range will be recorded at a paper speed of 12.5mm/sec.

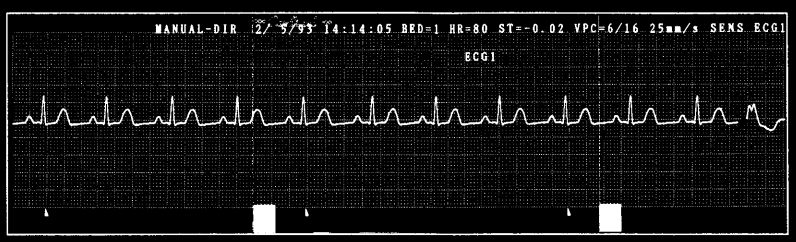
IC Memory Card Capacity	Waveform Memory Time
256KB	15 min.
512KB	30 min.
1MB	1 hour

Recording Examples

AU – 3320



AU – 3310



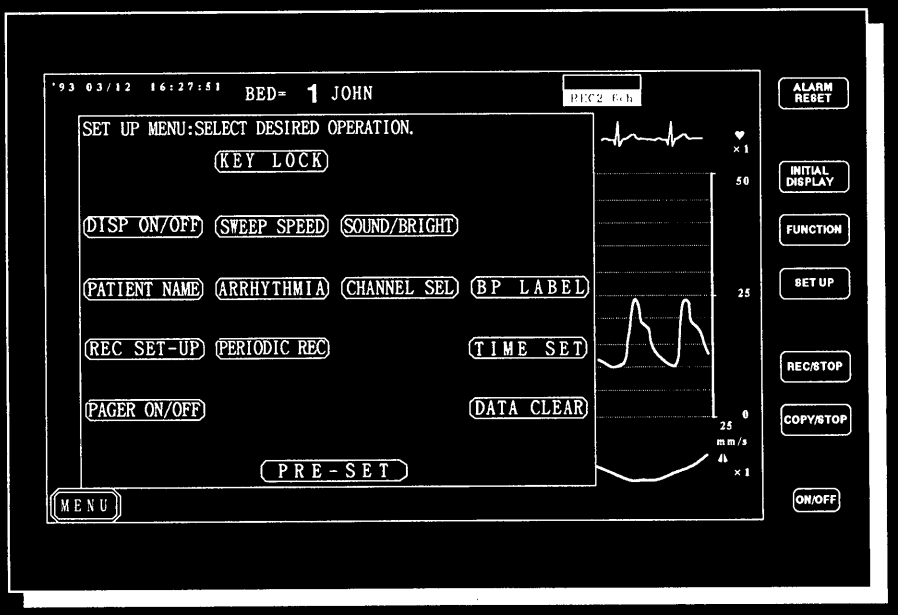
82

6.3 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.

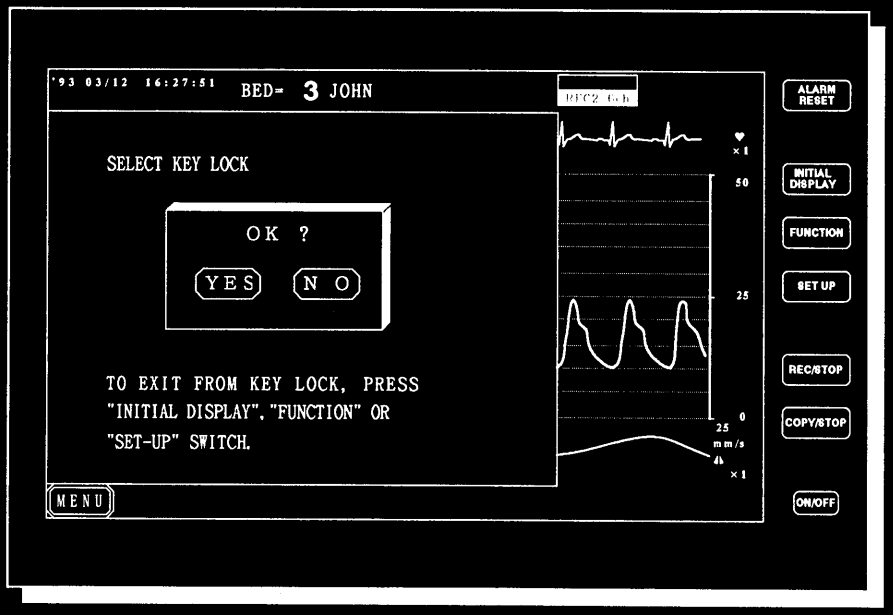


Some of the fuction keys are enclosed by a bold line. This means that those function keys work as same as the Bedside Monitor.

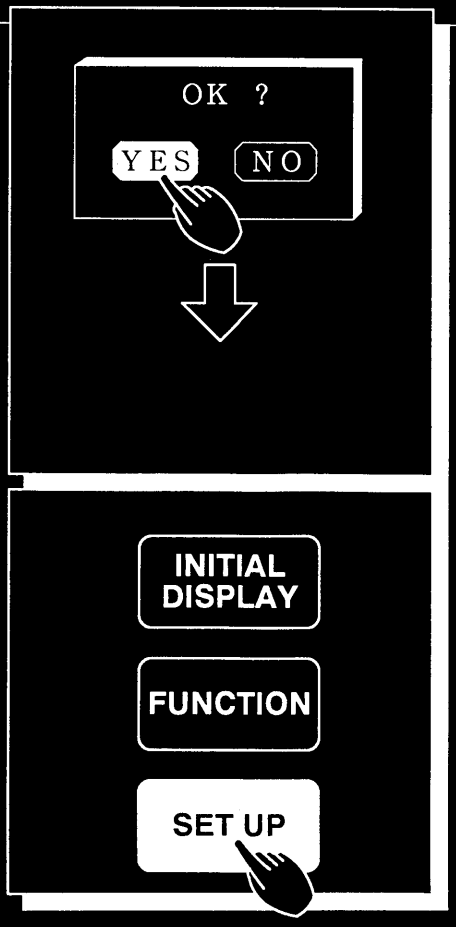
(1) KEY LOCK

from [SET UP] push [KEY LOCK]

When the [SET UP] switch and the [KEY LOCK] key is pushed, the following display is shown. When [YES] for key lock is selected, the functions of the touch keys on 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.

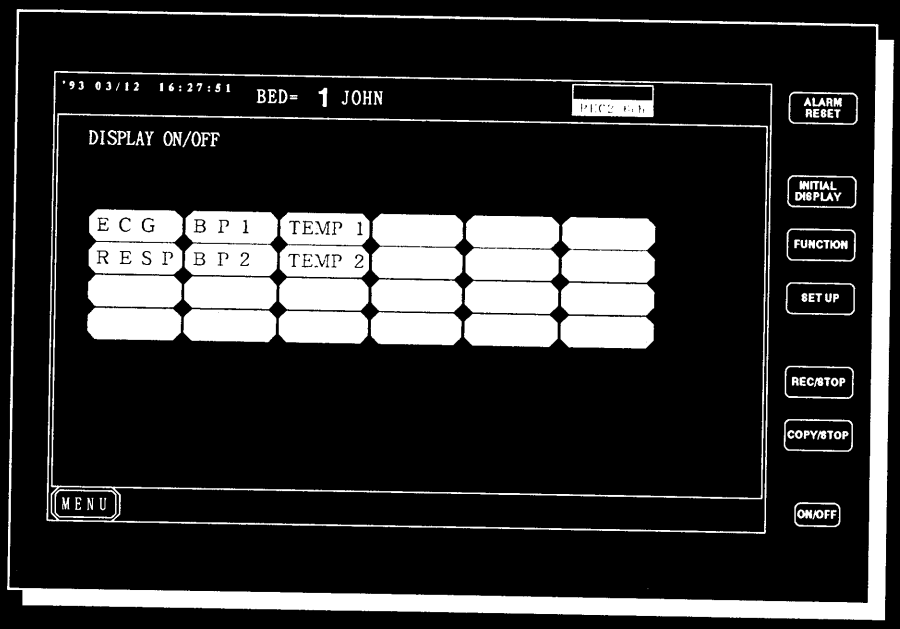
◆ To return to normal operation, push the [INITIAL DISPLAY], [FUNCTION] or [SET UP] switch.

(2) DISPLAY ON/OFF

from [SET UP] push [DISP ON/OFF]

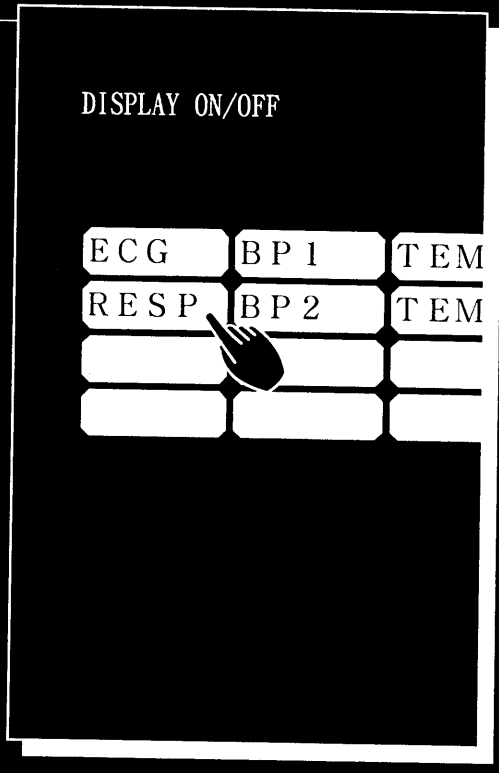
When the [SET UP] switch and the [DISP ON/OFF] key is pushed, the following display is shown.

Monitoring waveforms and measurements can be selected for display.



Select waveforms and measurements to be displayed.

Receivable parameters are displayed. Select the parameters which are measured by the transmitter.



◆ Reverse-lit parameters are displayed and parameters in normal contrast are not displayed.

◆ Push a key and the parameter is reverse-lit. Press it once more and it will be displayed in normal contrast.

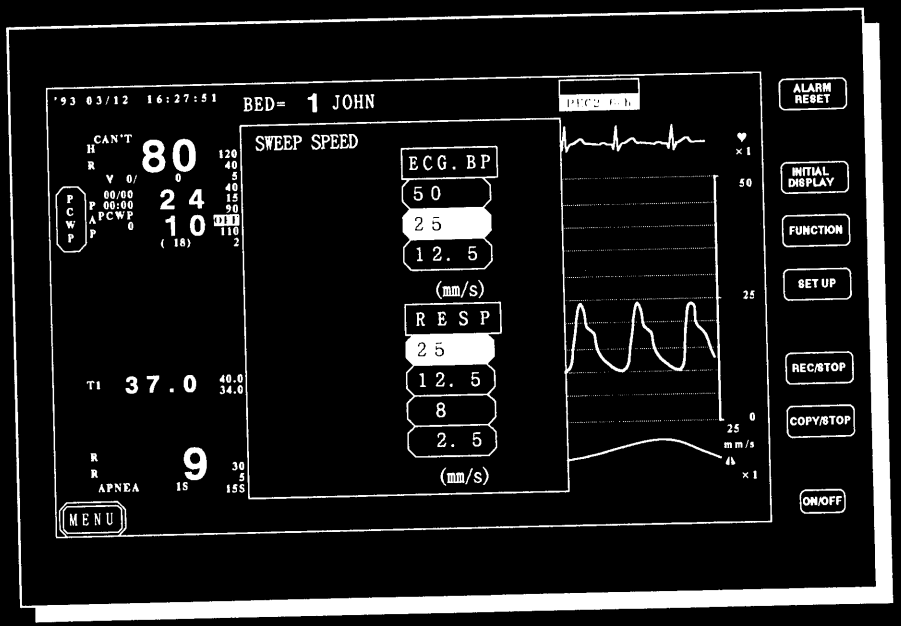
◆ Set so that the parameters which are not measured by the transmitter are not to be displayed. If not, the display may be unstable.

(3) SWEEP SPEED

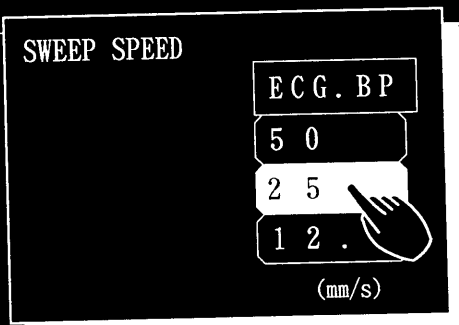
from [SET UP] push [SWEEP SPEED]

When the [SET UP] switch and the [SWEEP SPEED] key is pushed, the following display is shown below.

Sweep speed for the ECG/Blood Pressure and Respiration can be selected.

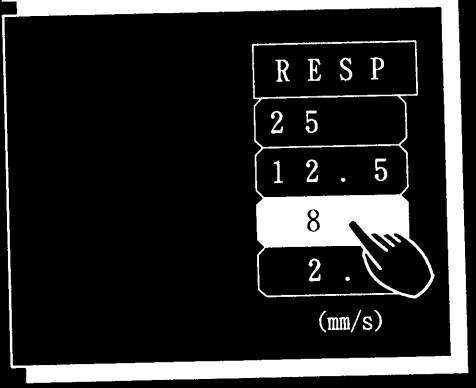


1. Sweep speed for ECG/Blood Pressure waveforms.



◆ Push [50], [25] or [12.5] key to select a desired sweep speed for ECG/BP waveforms.

2. Sweep speed for Respiration waveforms.



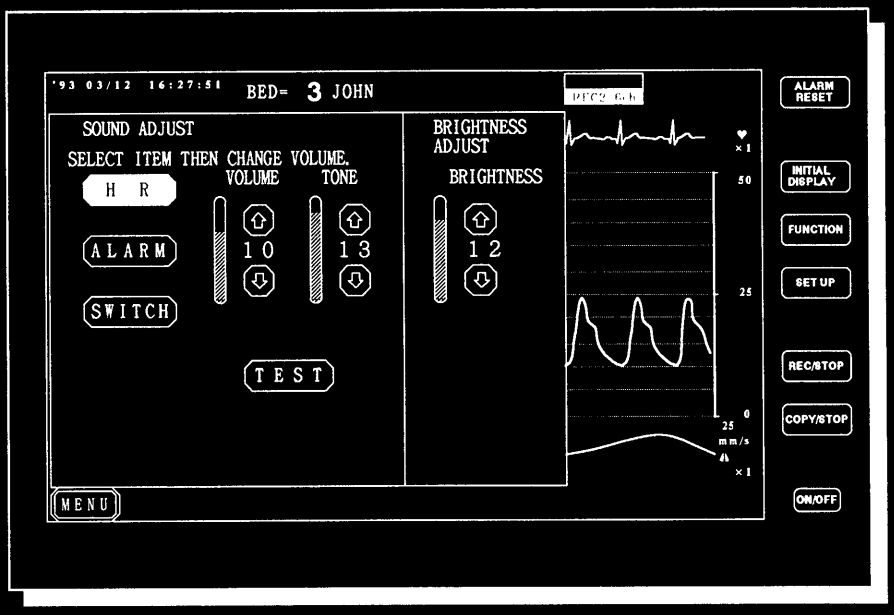
◆ Push [25], [12.5], [8] or [2.5] key to select a desired sweep speed for Respiration waveforms.

(4) SOUND/BRIGHTNESS

from [SET UP]
push [SOUND/BRIGHT]

When the [SET UP] switch and the [SOUND/BRIGHT] key is pushed, the following display is shown.

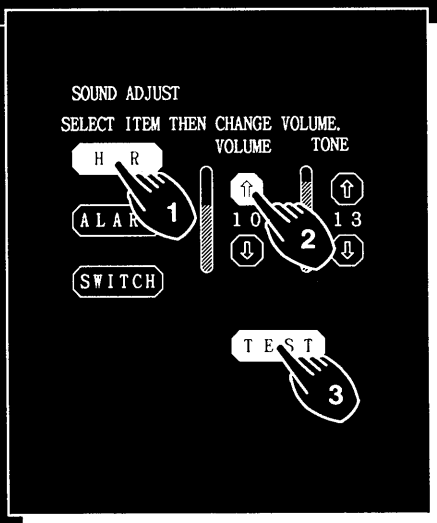
The sound level and tone for the alarm sound, heart rate sync sound and touch key tone as well as the brightness level of the monitor can be adjusted.

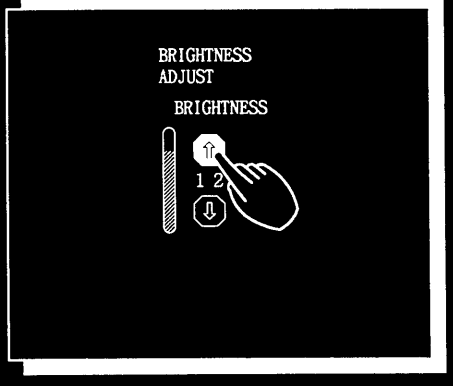


1. Select the item for sound adjustment.

2. Adjustment of volume and tone.

3. Adjustment of brightness.





◆ Push arrow keys [⇧] or [⇩] to adjust the volume and tone. To check the resultant sound, push the [TEST] key.

◆ The volume of nurse call sound is the same as that of the alarm sound.

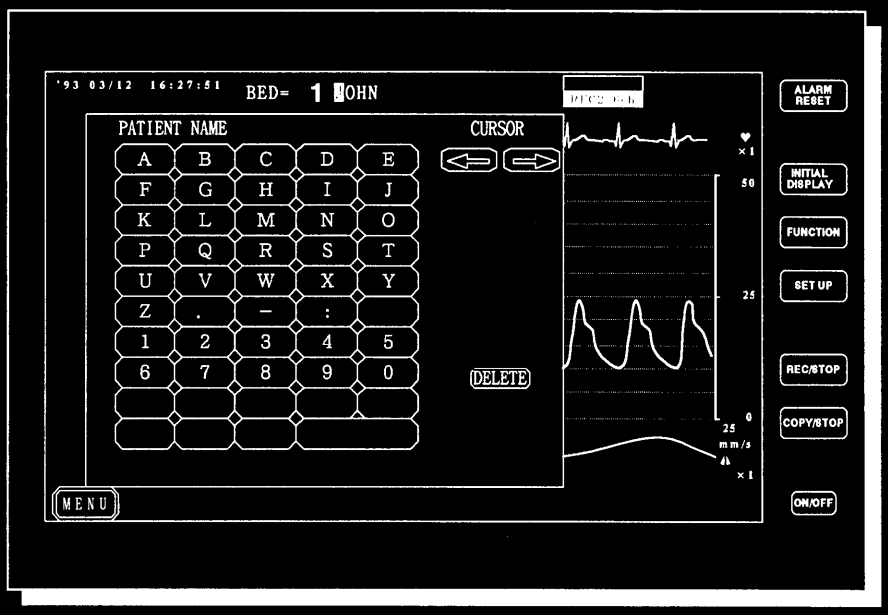
◆ Adjust the screen brightness using arrow keys [⇧] or [⇩].

(5) PATIENT NAME

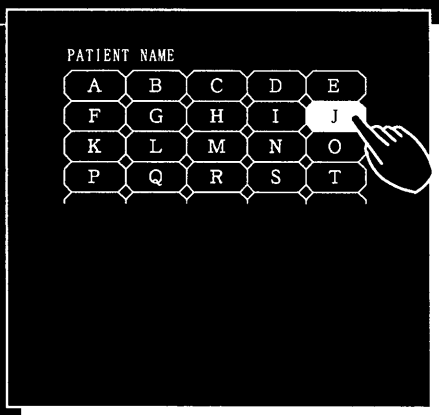
from [SET UP] push [PATIENT NAME]

When the [SET UP] switch and the [PATIENT NAME] key is pushed, the following display is shown for the bed selected.

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



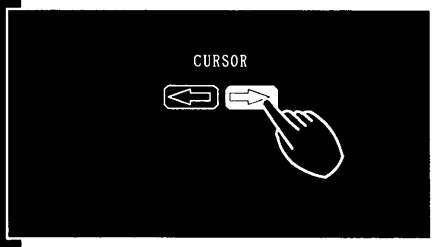
1. Name Input



◆ Select the characters for the patient's name.
Push the [SPACE] key (blank) to place a space between first and last names.

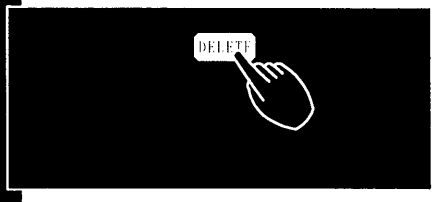
Any character of the alphabet or numbers from 0 - 9 can be used.

2. Character correction.



◆ Using the cursor key [⇦] or [⇨], move the cursor to the character you want to correct. Then input a correct character.

3. Character deletion.



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

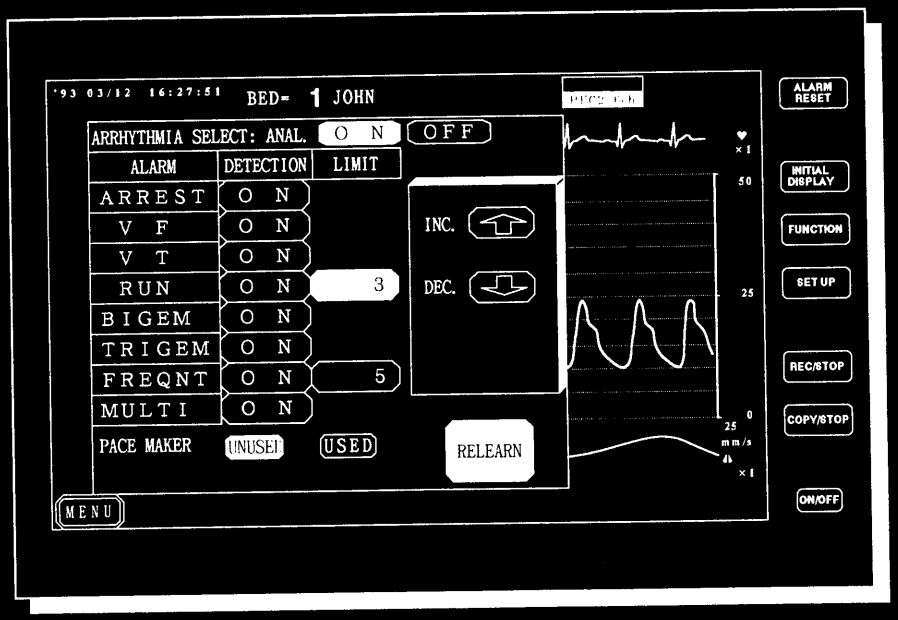
This will delete the last character input.

(6) ARRHYTHMIA SELECTION

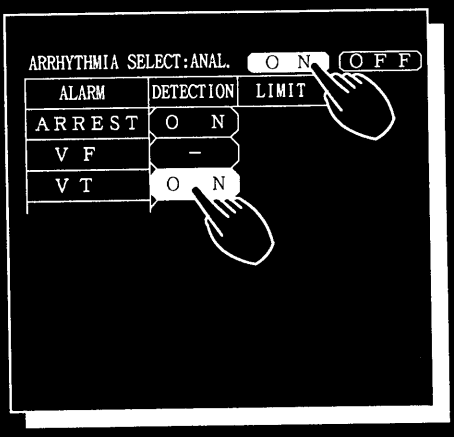
from (SET UP) push (ARRHYTHMIA)

When the (SET UP) switch and the (ARRHYTHMIA) key is pushed, the following display is shown below.

This display allows arrhythmia analysis ON/OFF, detection ON/OFF for each individual arrhythmia and limit setting for RUN and FREQNT.



1. Arrhythmia detection ON/OFF



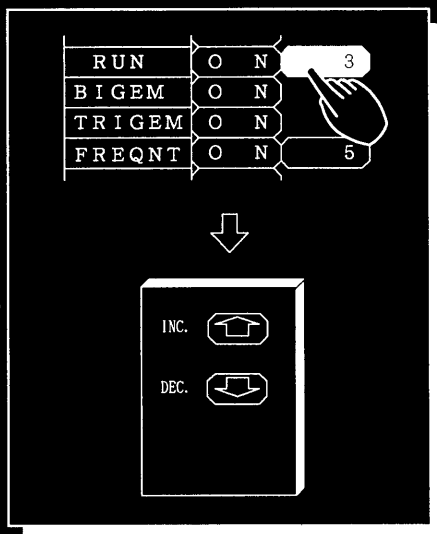
Push the (ON) or (OFF) key.

◆ If set to OFF, alarms and trendings related to arrhythmias are not available.

Each push of the DETECTION key for an arrhythmia changes the key label to (ON) and (—) alternately.

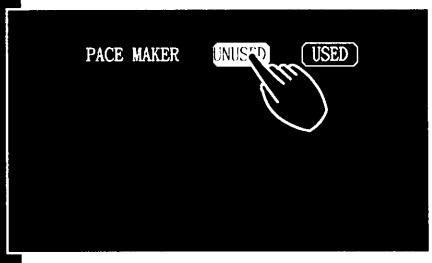
2. Selection of Individual events.

3. Set a limit of RUN or FREQNT for detection.



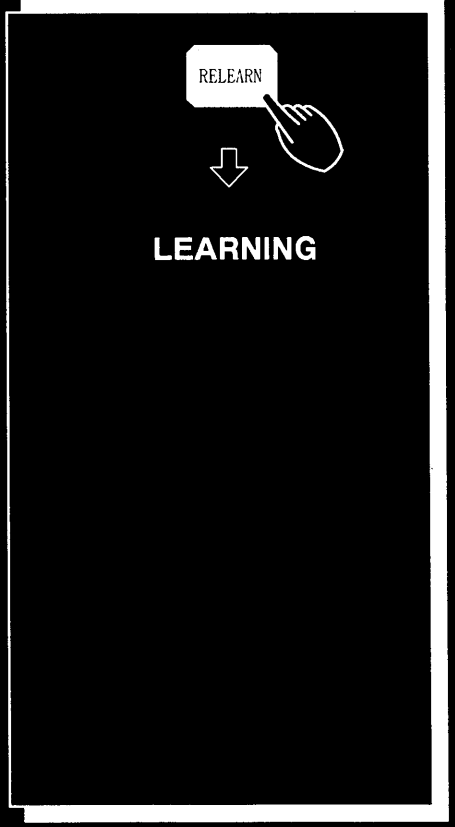
◆ A push of the LIMIT key for RUN or FREQNT displays the ⇧ and ⇩ keys. These keys allow you to increment or decrement the limit.
A selected limit is labelled on the LIMIT key.
◆ Default limits are 3 for RUN and 5 for FREQNT.

4. Pacemaker Identification



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

5. RELEARN



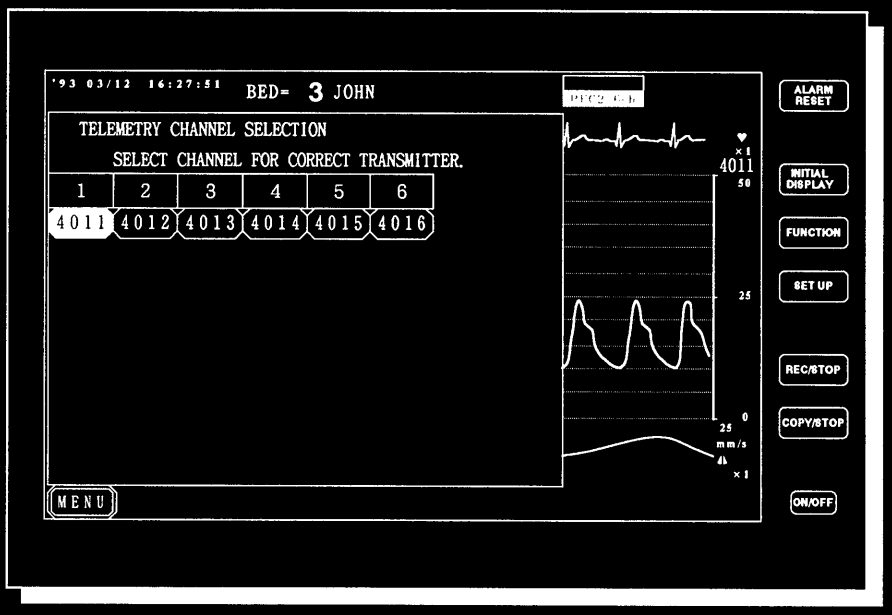
◆ To tell the monitor to RELEARN the normal QRS characteristics, push the RELEARN key.
The message "LEARNING" will be displayed for 30 - 60 seconds.
During this time, the arrhythmia detection will be stopped.
When the LEARNING message disappears the monitor will return to normal arrhythmia monitoring.
Use this process when there are false or inaccurate alarm messages or when the shape of the patient's QRS has changed.

(7) CHANNEL SELECTION

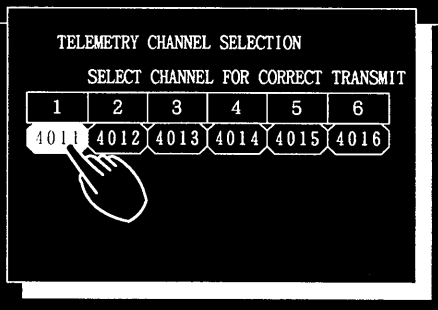
from SET UP
push CHANNEL SEL

When the SET UP switch and the CHANNEL SEL key is pushed, the following display is shown below.

The TELEMETRY CHANNEL SELECTION display will be initiated. A telemetry channel can be selected from six available channels.



Select a receiving channel.



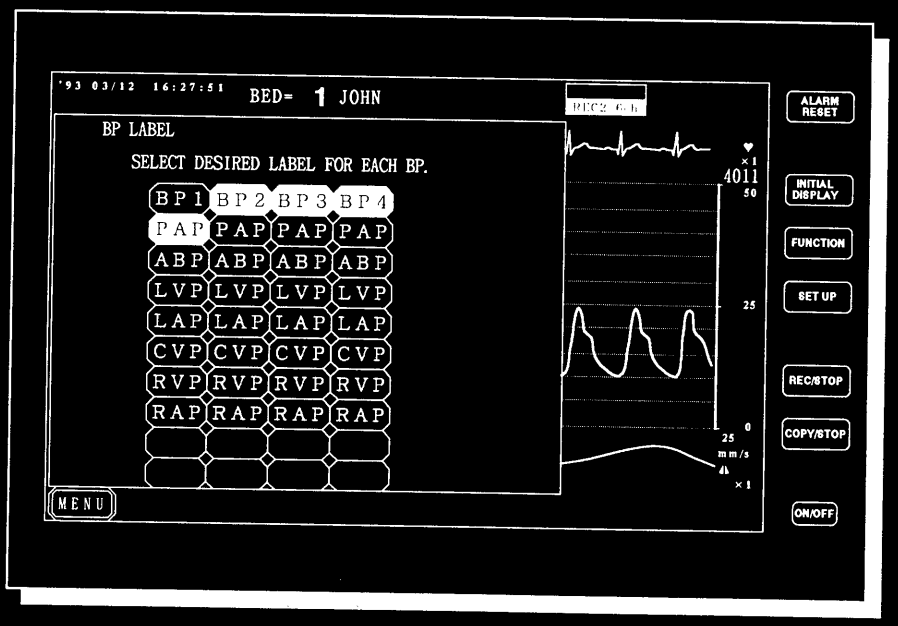
◆ Push the key of the receiving channel that corresponds to the telemetry transmitter.

◆ For telemetry channel assignment, refer to "6.3 (16.7)."

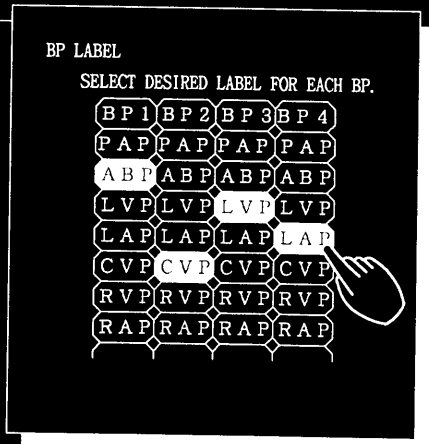
(8) BLOOD PRESSURE Labeling

from SET UP
push BP LABEL

When the SET UP switch and the BP LABEL key is pushed, the following display is shown. This allows you to label each of the blood pressure sites for display on the monitor.

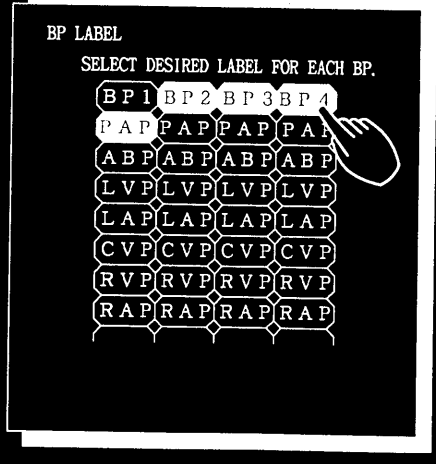


1. BP label.



◆ Select the desired name for each of the four blood pressure sites.

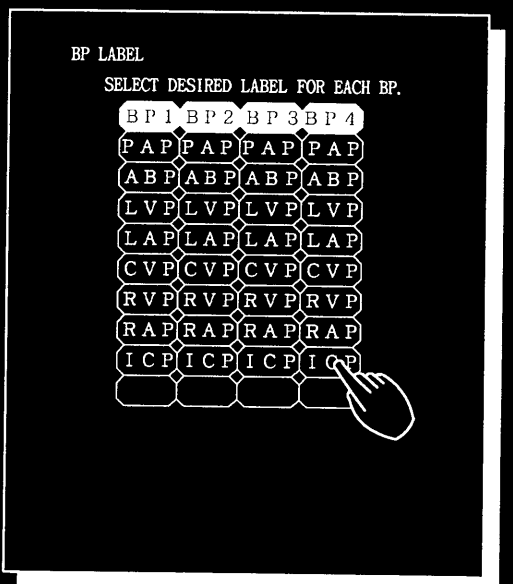
2. If labels are not required.



◆ Push BP1, BP2, BP3 or BP4 for generic indications without labels.

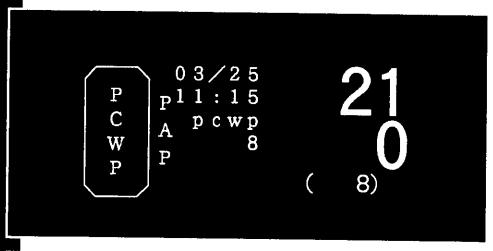
BLOOD PRESSURE Labeling

4. If PAP, CVP or an additional label is entered.

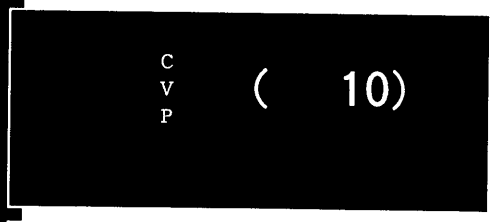


Additional BP labels

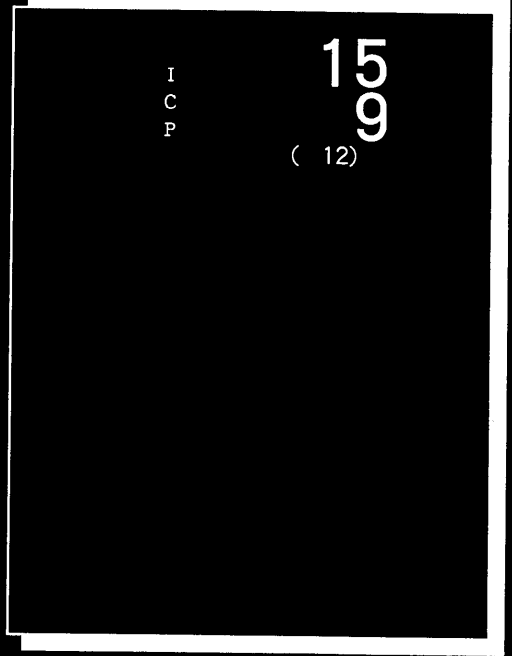
PAP



CVP



Additional BP label



◆ If PAP is selected, the **PCWP** key will appear on the INITIAL DISPLAY and a press of the key will store the mean value for PCWP in memory.

◆ If CVP is selected, only a mean pressure will be displayed on the INITIAL DISPLAY.

◆ If an additional label with the last character other than "P" is entered, only a mean value will be displayed on the INITIAL DISPLAY.

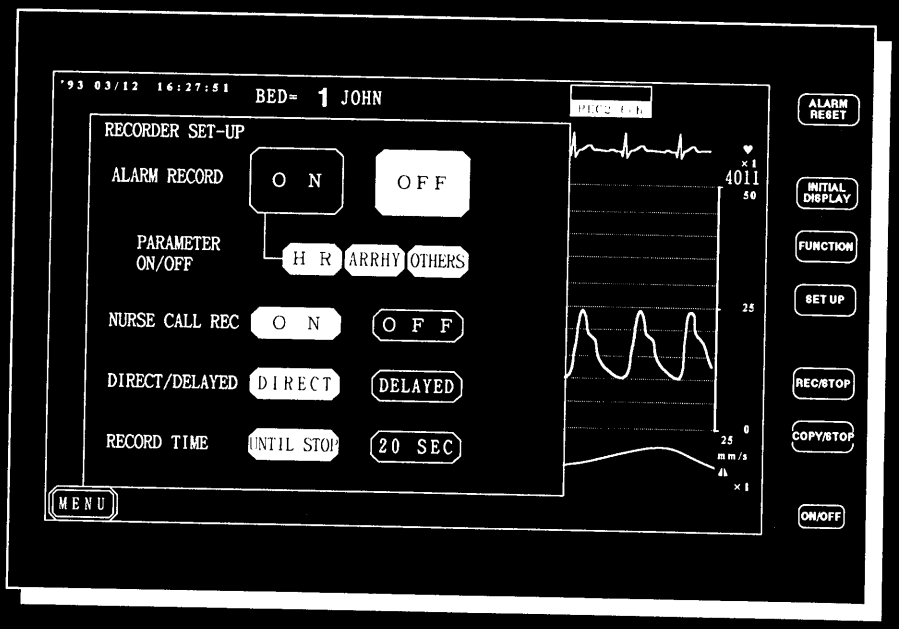
For entering of an additional BP label, refer to "6.3 (16.9)."

(9) RECORDER SET UP

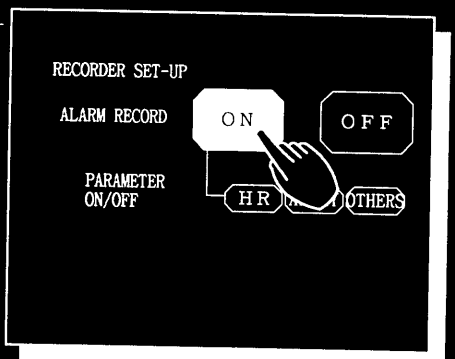
from [SET UP] push [REC SET-UP]

When the [SET UP] switch and the [REC SET-UP] key is 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.

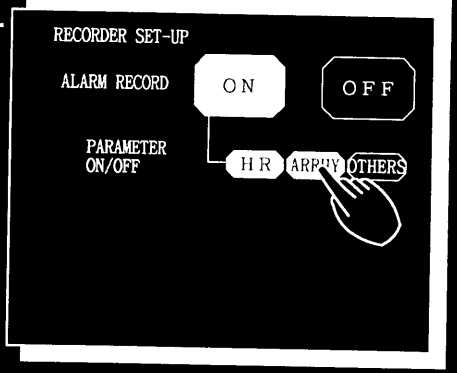


1. Alarm-initiated recording



◆ Select whether or not an alarm initiates the recorder to automatically record waveforms.

2. Selection of alarm-initiating factors.



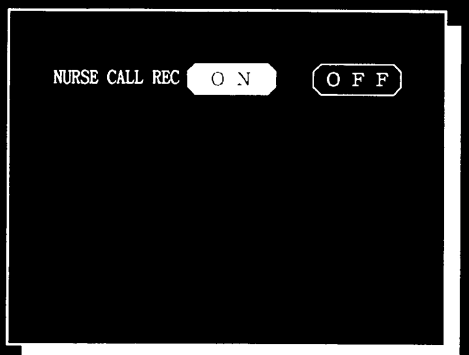
◆ Select alarm-initiating factors HR, ARRHY and/or OTHERS.

DS-3300 #X

RECORDER SET UP

3. Nurse call recording

Select whether or not a nurse call initiates the recorder to automatically record waveforms.



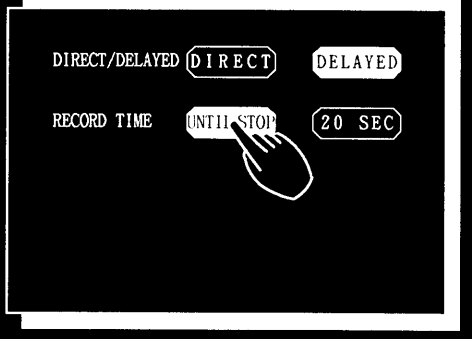
4. Direct/delayed waveform

Select a real-time DIRECT or DELAYED waveform for recording.

◆ If the (DELAYED) key is pushed, a 16-second delayed waveform is recorded.
(A delay time of 16 seconds can be switched to 8 seconds by utilizing the SOFT SWITCH function.)

5. Recording time

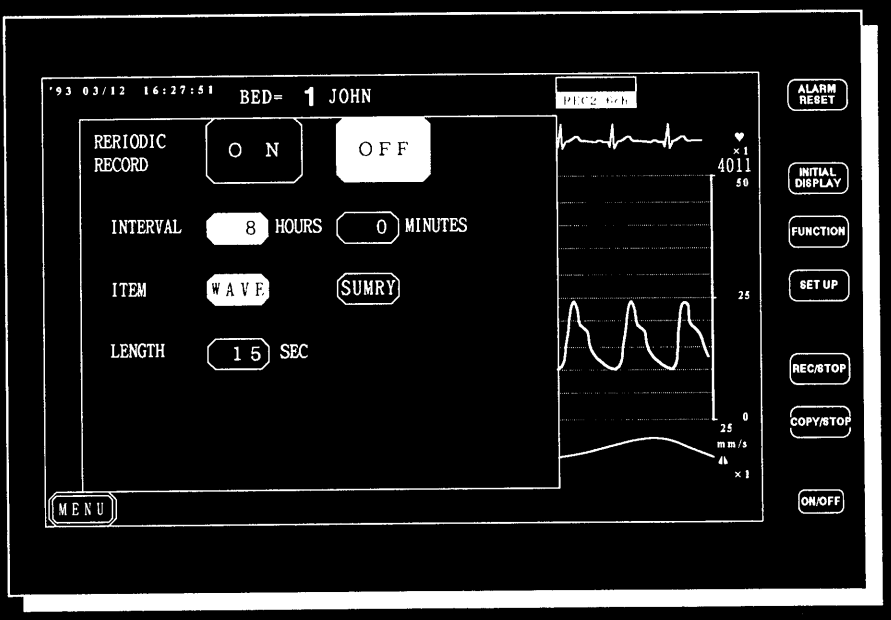
Select the (UNTIL STOP) or the (20 SEC).



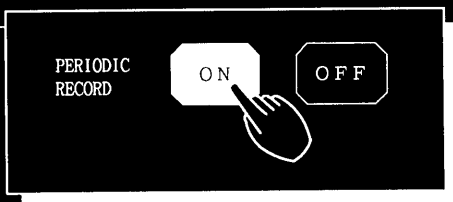
◆ The length of alarm-initiated recording is 20 seconds irrespective of the recording time setting here.

(10) PERIODIC RECORDING from [SET UP] push [PERIODIC REC]

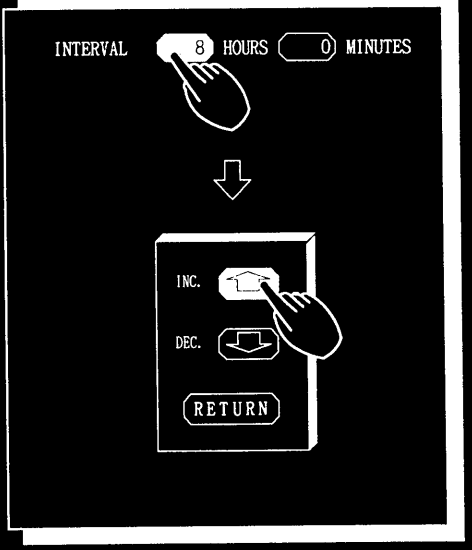
When the [SET UP] switch and the [PERIODIC REC] key is pushed, the following display will be shown for the bed selected. An interval for automatic recording can be selected. The recorder will automatically start and run a strip for the specified length.



1. Select Periodic Recording ON or OFF.



2. Selecting the interval.

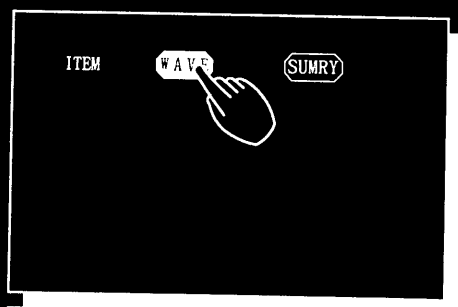


◆ The interval can be selected up to 24 hours.

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

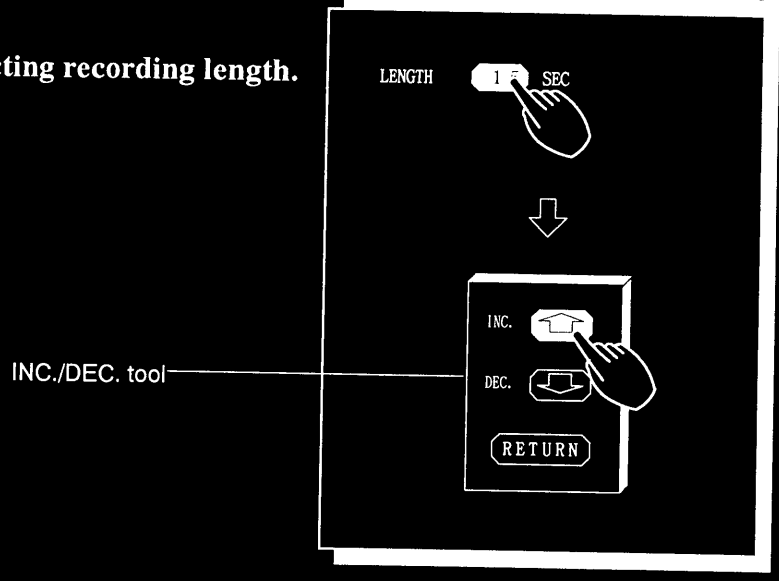
Use the ⇧ or ⇩ keys to increase or decrease the time interval.

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.

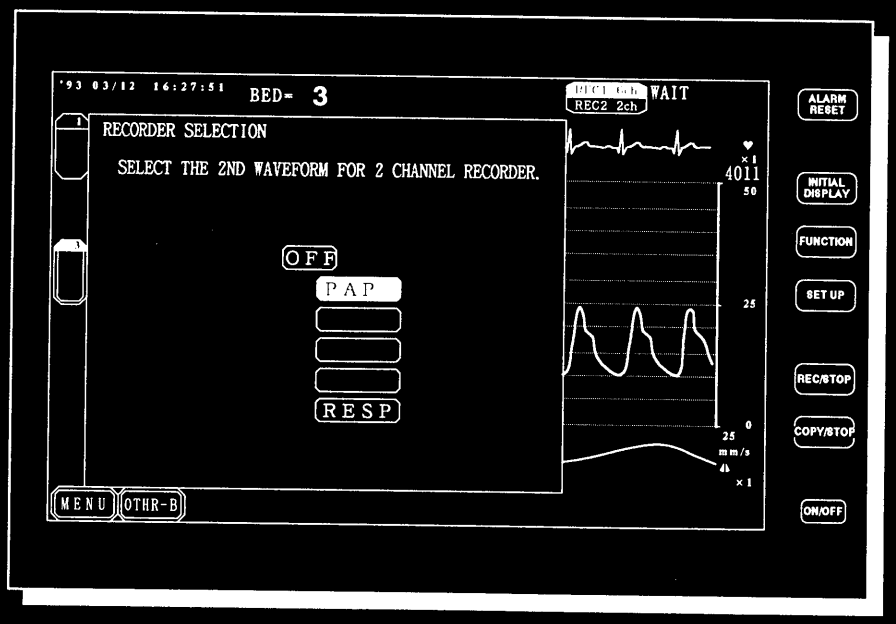


◆ The length of the strip can be selected up to 99 seconds.
When this key is pushed, an increment/decrement tool will appear.
Use the (⇧) or (⇩) keys to increase or decrease the length.
Push the (RETURN) key on the tool to return to the normal display.

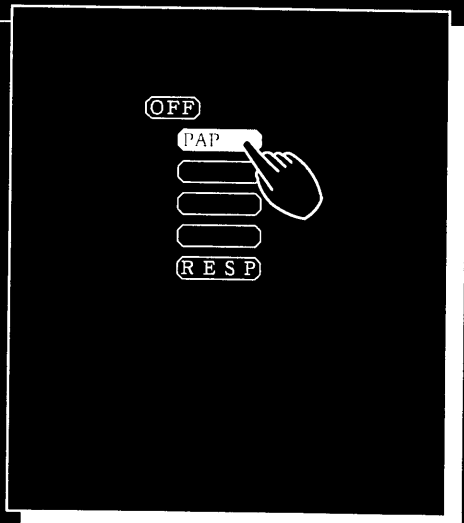
(11) RECORDER SELECTION

from SET UP
push RECORDER SEL

When the SET UP switch and the RECORDER SEL key is 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.



◆ 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.

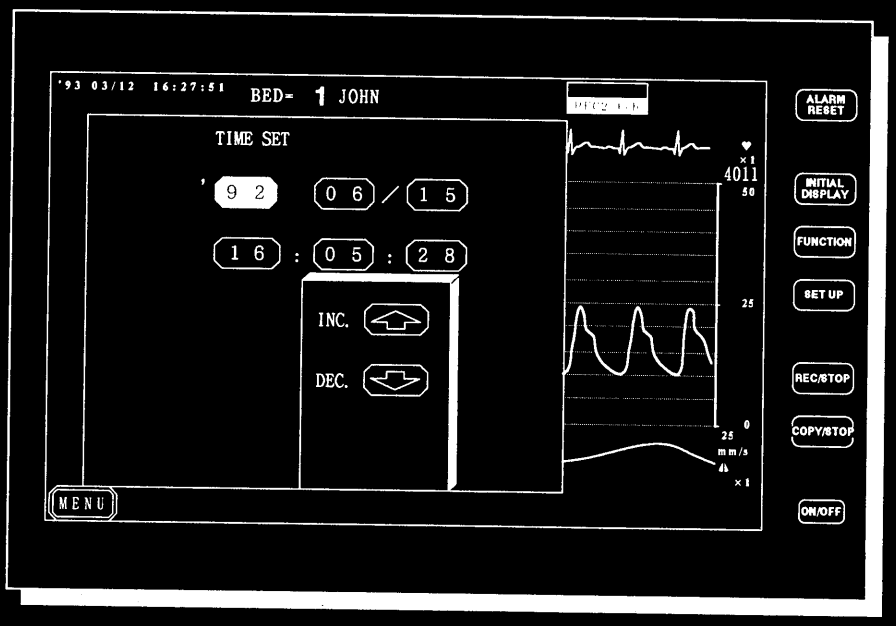
◆ When the OFF key is pushed, no waveform is recorded on channel 2.

(12) TIME SETTING

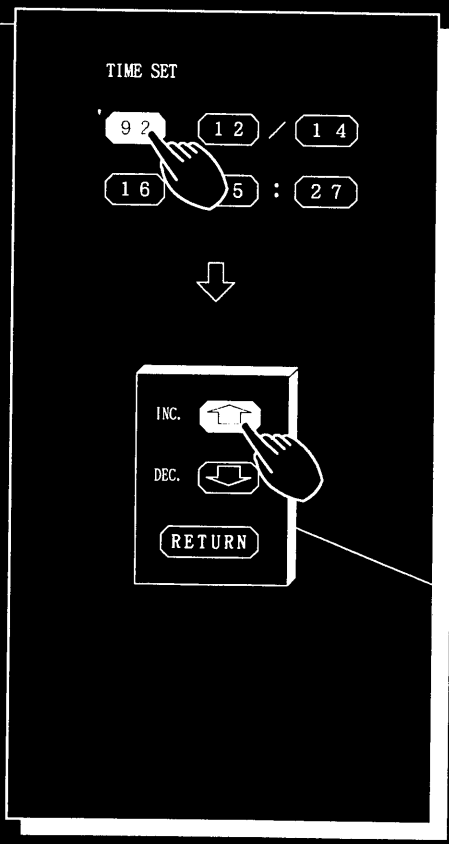
from [SET UP] push [TIME SET]

When the [SET UP] switch and the [TIME SET] key is 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 a desired setting item. Then using ⇧ ⇩, set it for the correct value.

◆ Push the (second) key. Seconds will be set at 00.

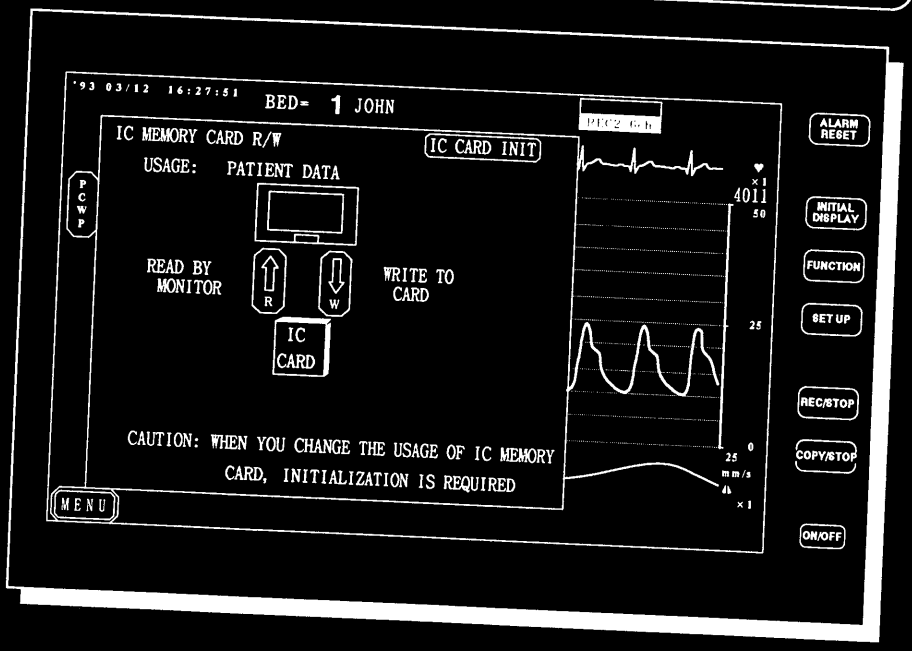
◆ The ⇧ key increments the number and the ⇩ key decrements the number.

(13) 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 is 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.



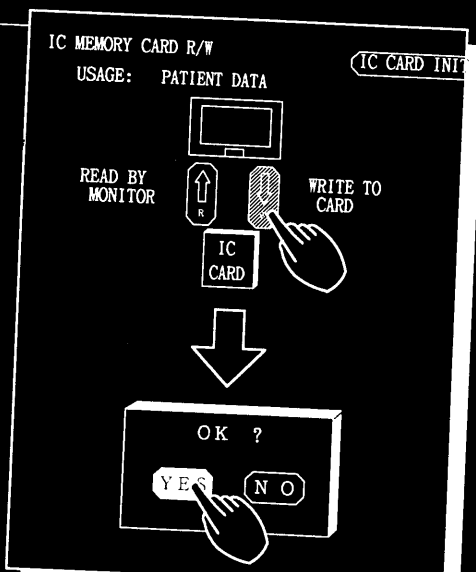
1. A purpose for usage

◆ Usage for the Bedside Monitor is

Patient data
Preset(Configuration)
ADD on memory
Continuous Waveform

only.

2. Data storage and data transferring.

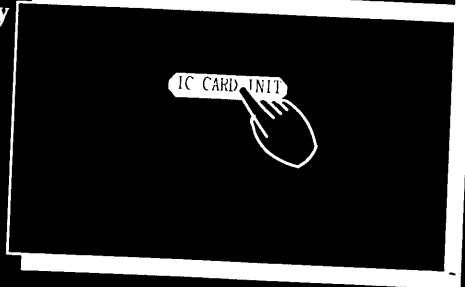


◆ Push ⇧ key to transfer data into the monitor, push ⇩ to store data in the card.

YES/NO keys will appear for confirmation. Push the (YES) key to effect the selection.

3. Initialization of IC memory card.

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



◆ Push the (IC CARD INIT) key.

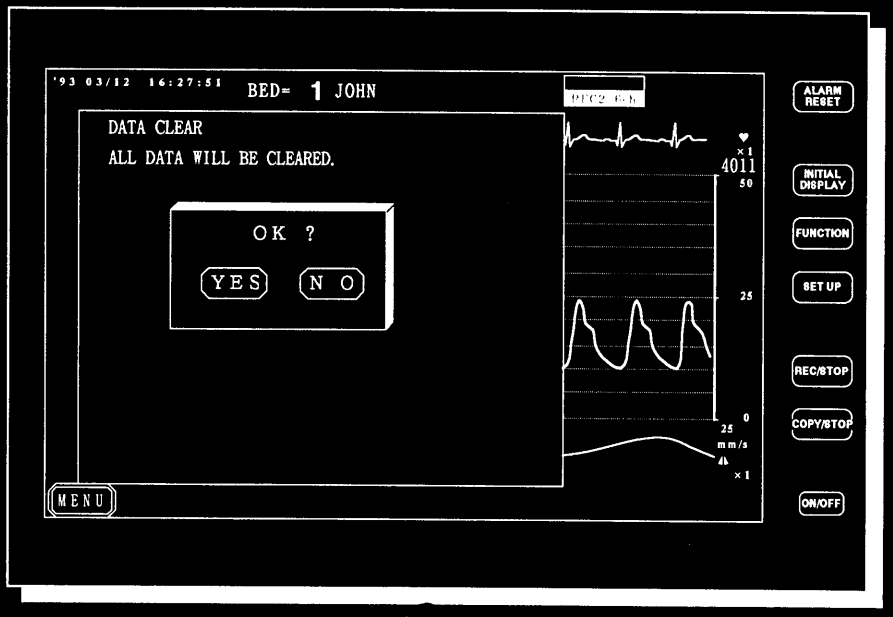
(See section IC MEMORY CARD INITIALIZATION)

(14) DATA CLEAR

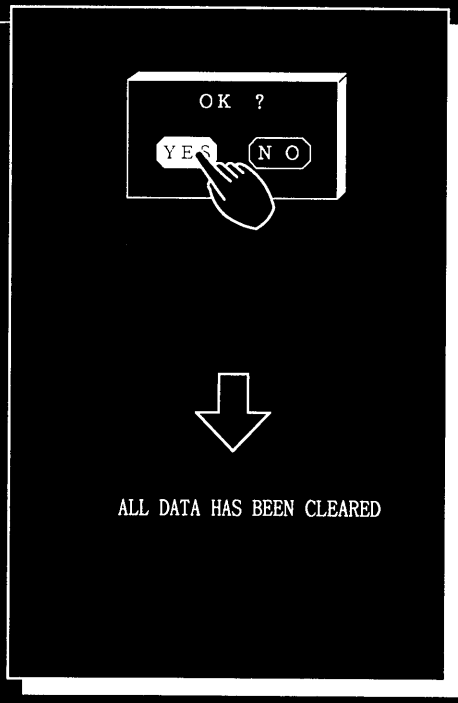
from [SET UP] push [DATA CLEAR]

When the [SET UP] switch and the [DATA CLEAR] key is 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.

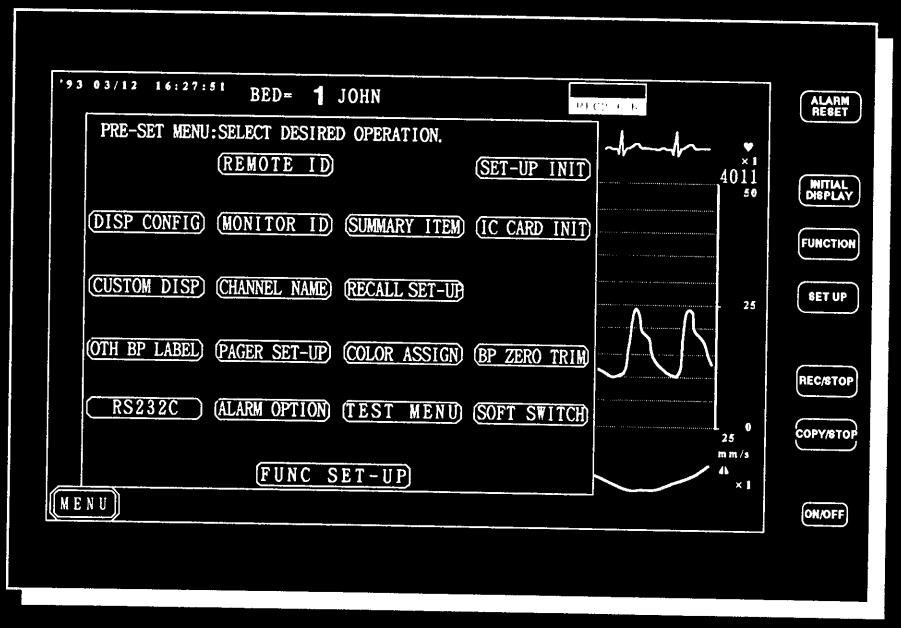
◆ When the data has been erased, this message will appear.

(16) PRE-SET

from [SET UP] push [PRE-SET]

When the [SET UP] switch and the [PRE-SET] key is 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.



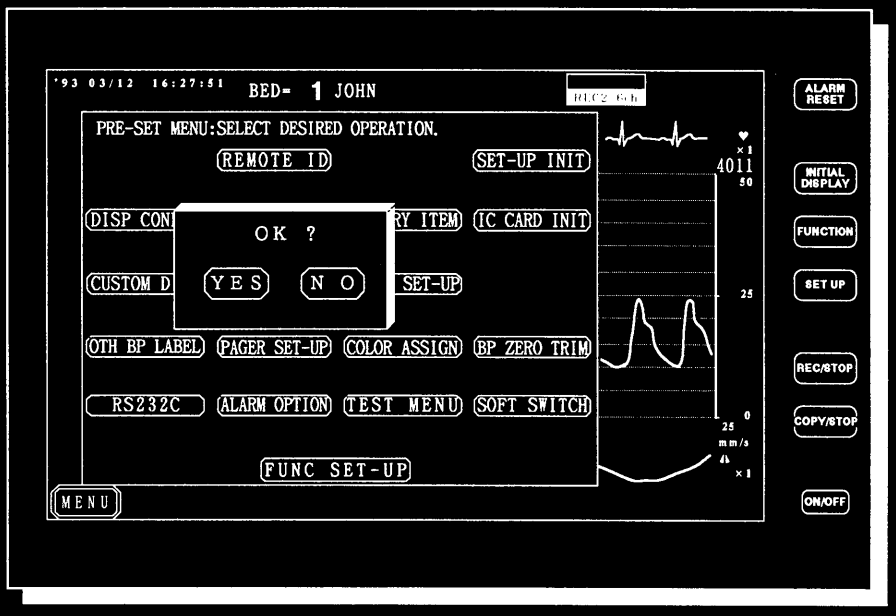
Since items on the PRE-SET MENU are rarely used, they are summarized separately from the SET UP MENU.

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

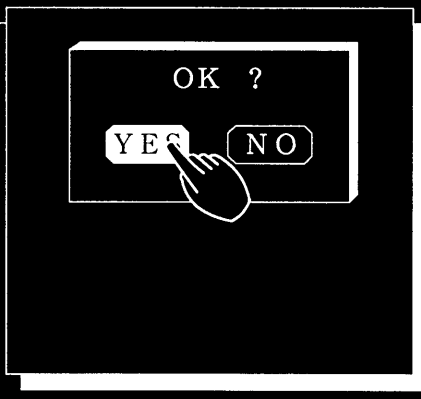
(16.1) SET-UP INIT

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

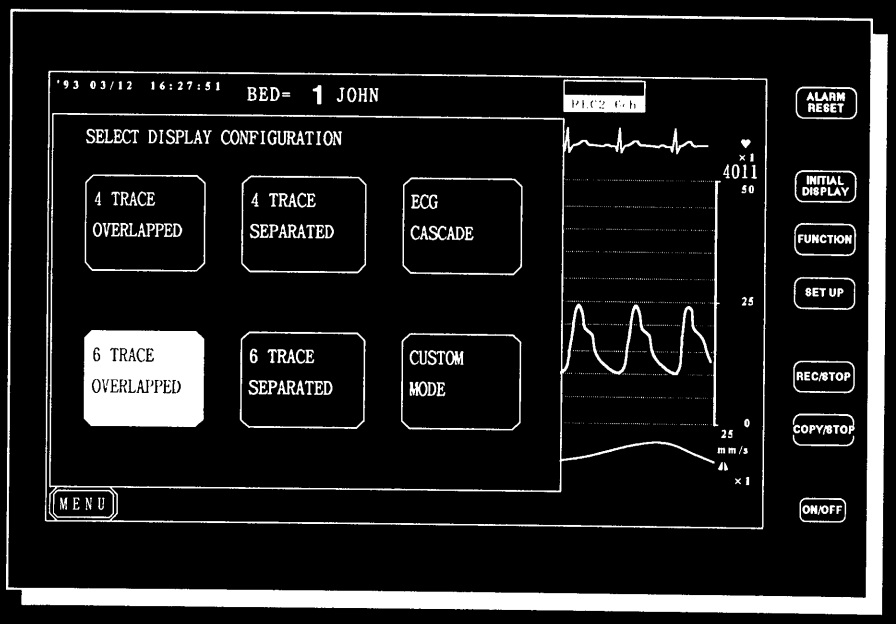


◆ When YES key is pushed, the data will be initialized.
All monitor settings will be initialized to the factory settings.

(16.2) DISPLAY CONFIGURATION

push [PRE-SET], [DISP CONFIG] from [SET UP]

When the [SET UP] switch, the [PRE-SET] and [DISP CONFIG] keys are pushed, the following display is shown. Select the desired display configuration from those shown.

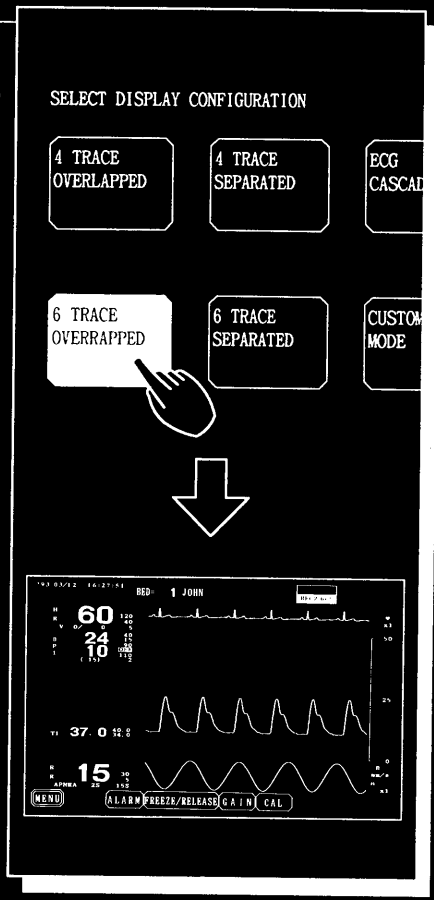


1. Select Display Configuration.

4 TRACE OVERLAPPED:
Waveforms and measurements of four parameters are displayed with blood pressure waveforms overlapped on the same scale.

4 TRACE SEPARATED:
Waveforms and measurements of four parameters are displayed with blood pressure waveforms on dedicated scales.

ECG CASCADE:
ECG waveform is displayed in cascade mode.



6 TRACE OVERLAPPED:
Waveforms and measurements of six parameters are displayed with blood pressure waveforms overlapped on the same scale.

6 TRACE SEPARATED:
Waveforms and measurements of six parameters are displayed with blood pressure waveforms on dedicated scales.

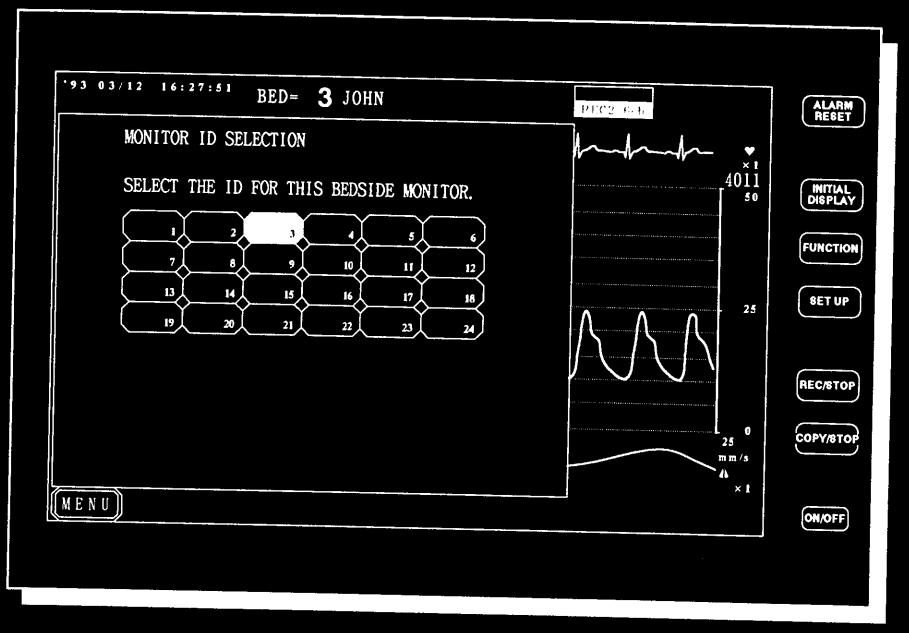
CUSTOM MODE:
A customized display configuration is selected (refer to "6.3 (16.6) CUSTOM DISPLAY CONFIGURATION."

(16.3) MONITOR ID

from [SET UP]
push [PRE-SET], [MONITOR ID]

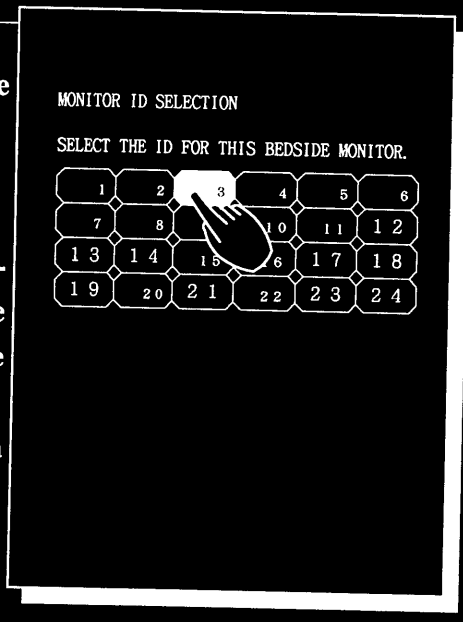
When the [SET UP] switch, the [PRE-SET] and [MONITOR ID] keys are pushed, the following display is shown.

This display allows selection of a monitor ID number.



Select an ID number for the bedside monitor.

The numbers which are already used for other bedside monitors in the network are labelled in a large size.
Select a number labelled in a small size.



◆ Up to 24 units of bedside monitors can be connected via the LAN system. Assign a proper ID number for each bedside monitor.

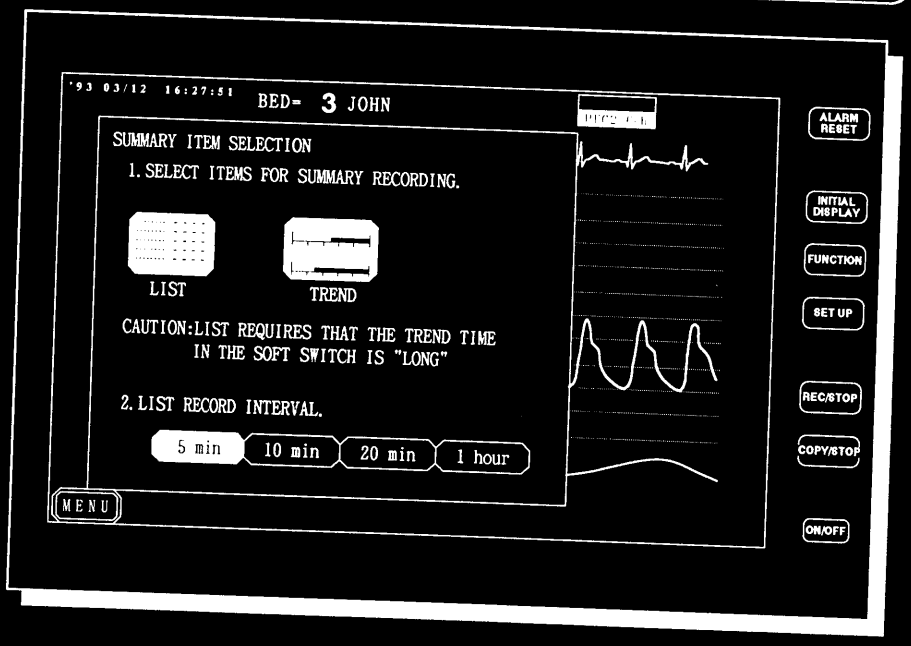
The display provides ID numbers from [1] to [24]. Push a proper key to assign the number to the bedside monitor.

(16.4) SUMMARY ITEM

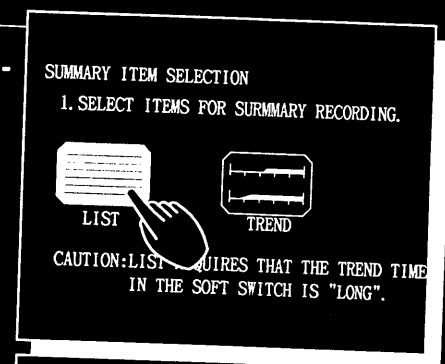
from SET UP
push PRE-SET , SUMMARY ITEM

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.

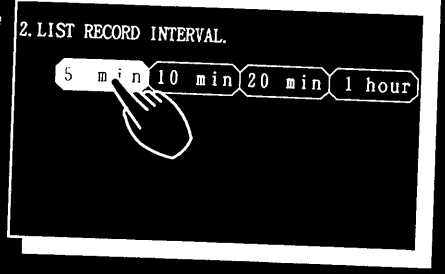


1. Selection of the items for summary recording.



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

2. Selection of the interval of measured parameters.



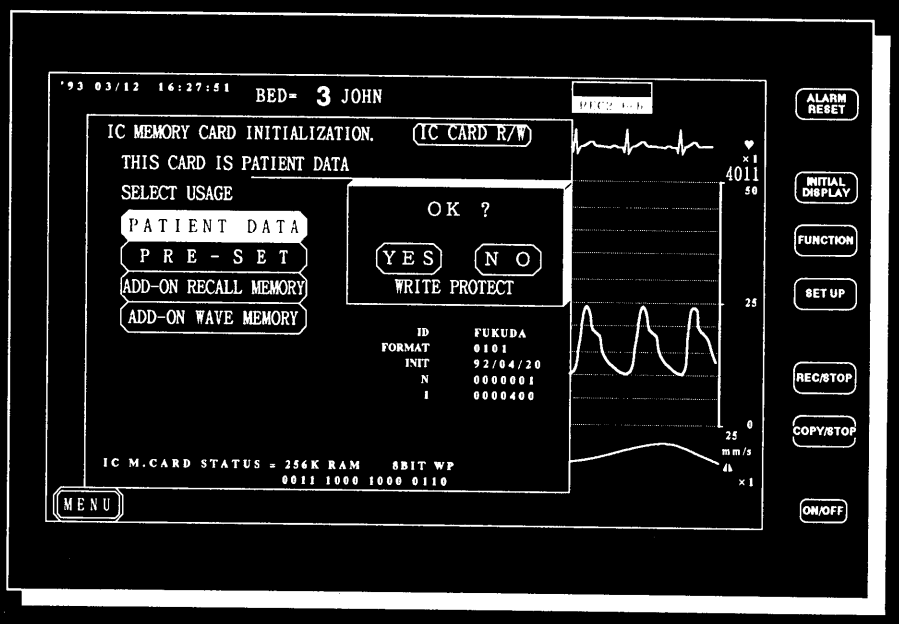
◆ Two hours to 24 hours data can be recorded by selecting "5 min" to "1hour" interval.

(16.5) IC MEMORY CARD INITIALIZATION

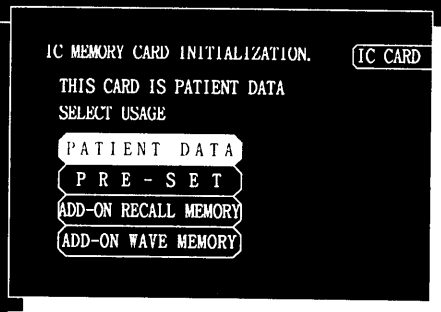
from [SET UP]
push [PRE-SET], [IC CARD INIT]

When an 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.

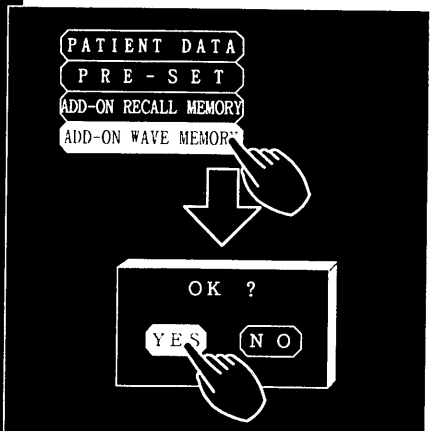


1. The display indicating whether the IC memory card has been initialized or not is shown. If it has been initialized, the purpose for usage will be shown.



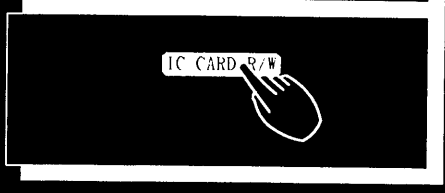
◆ When the [IC CARD INIT] key is pushed also in the IC MEMORY CARD display, the display at left will be shown.

2. Selection of the purpose for usage.



◆ Push the key you desire, and push the [YES] key to initialize the IC memory card.

3. Data storage or data transferring.

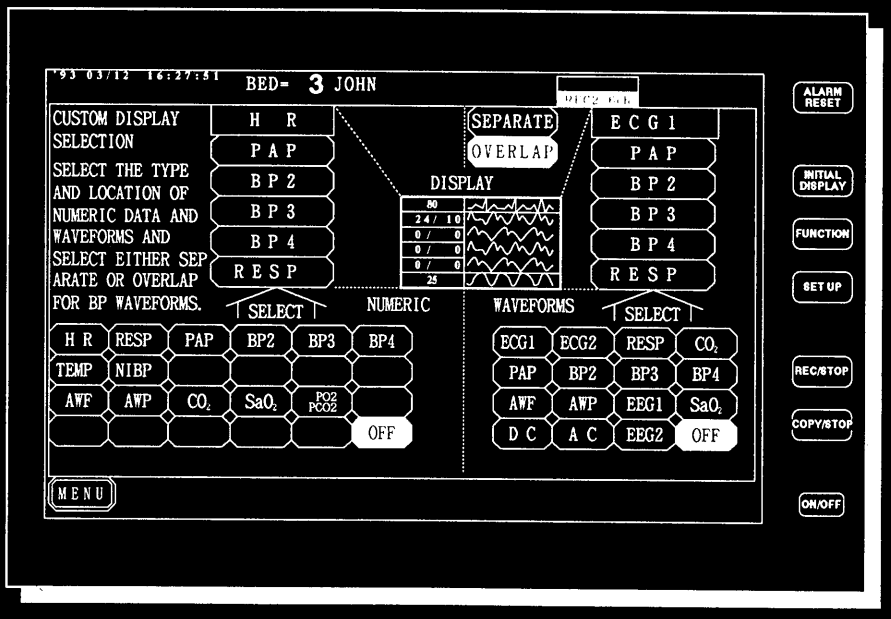


◆ Push the [IC CARD R/W] key.
(See section IC CARD R/W.)

(16.6) CUSTOM DISPLAY SELECTION

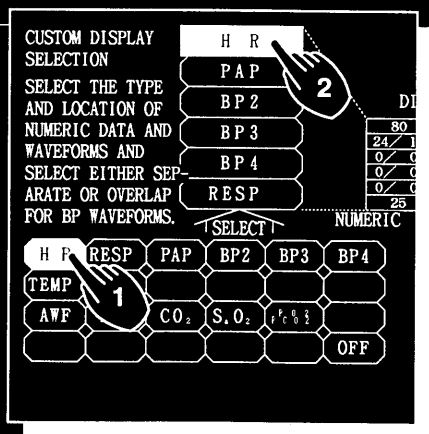
from [SET UP]
push [PRE-SET], [CUSTOM DISP]

When the [SET UP] switch, the [PRE-SET] and [CUSTOM DISP] keys are pushed, the following display is shown. This display allows you to create a desired display configuration. The display configuration made here can be selected as the INITIAL DISPLAY configuration by pushing the CUSTOM MODE key on the DISPLAY CONFIGURATION menu.



1. Select a display location for a numeric parameter.

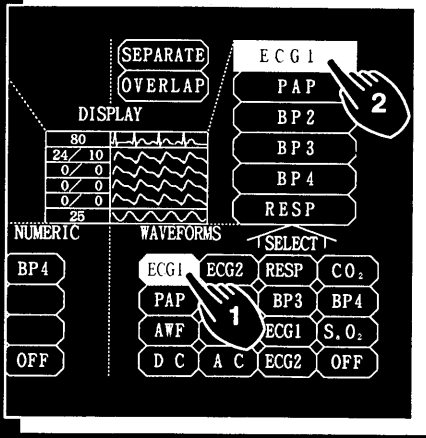
On this display, you can define a location for the waveform and measurement of each parameter. An illustration of display is shown at the center in a bold line.



◆ For a numeric parameter, push the parameter key selected from [HR] to [OFF] at the lower left. Then push a desired location key above the numeric parameter keys.

The parameter will be assigned to that location.

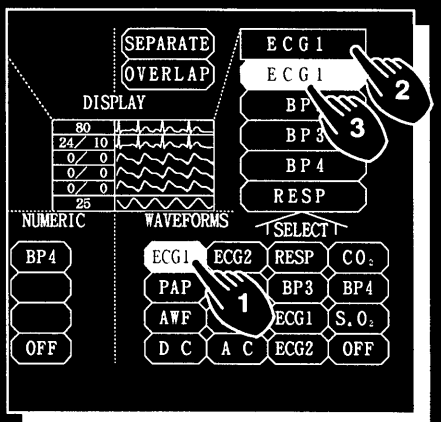
2. Select a display location for a waveform.



◆ For a waveform, push the parameter key selected from [ECG1] to [OFF] at the lower right. Then push a desired location key selected above the waveform parameter keys. The waveform will be assigned to the location.

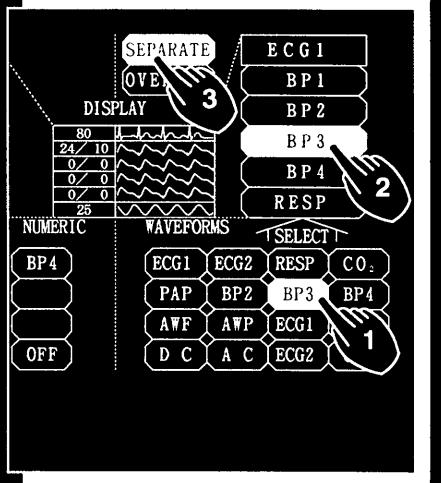
CUSTOM DISPLAY SELECTION

3. For cascade display of ECG waveform.



◆ For cascade display of ECG waveform, select the same waveforms and assign two continuous frames to them.

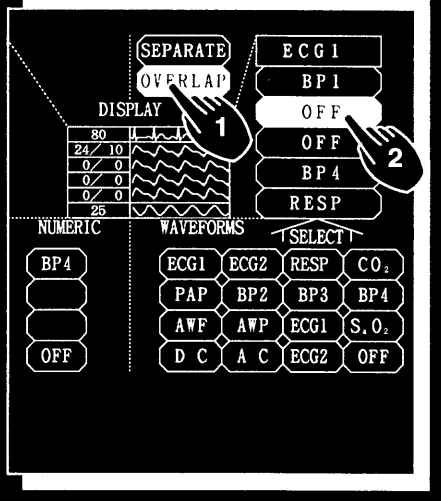
4. Select blood pressure display mode.



◆ For blood pressure waveforms, if BP1, BP2 and BP3 are assigned to three continuous frames and the (SEPARATE) key is pushed, each blood pressure waveform will be displayed in a dedicated scale.

If the (OVERLAP) key is pushed, these blood pressure waveforms will be overlapped on the same scale.

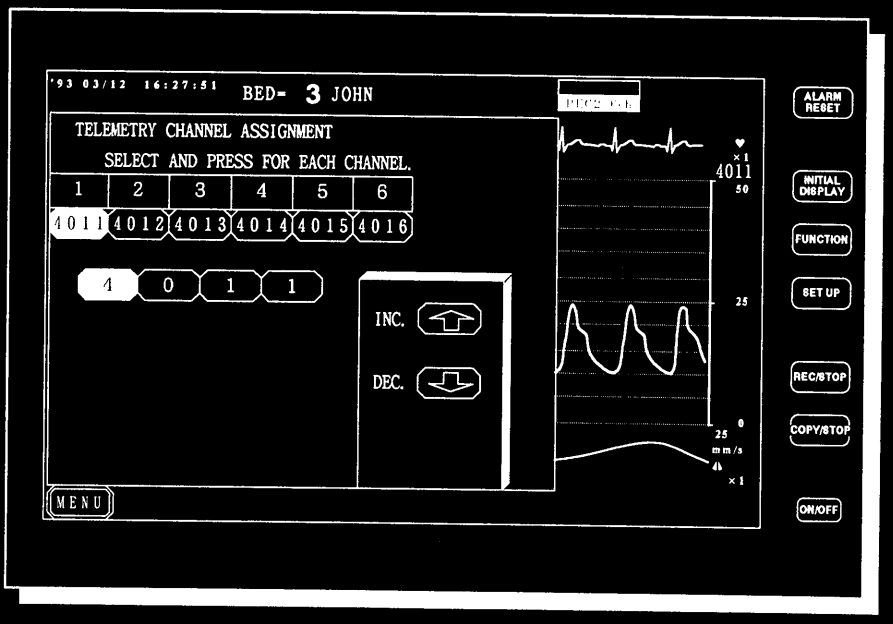
Also, if OFF is assigned to a frame between selected blood pressure frames after the (OVERLAP) key is pushed, blood pressure waveforms will be displayed using BP and OFF frames, thereby allowing you to monitor blood pressure waveforms on an extended scale.



(16.7) CHANNEL NAME

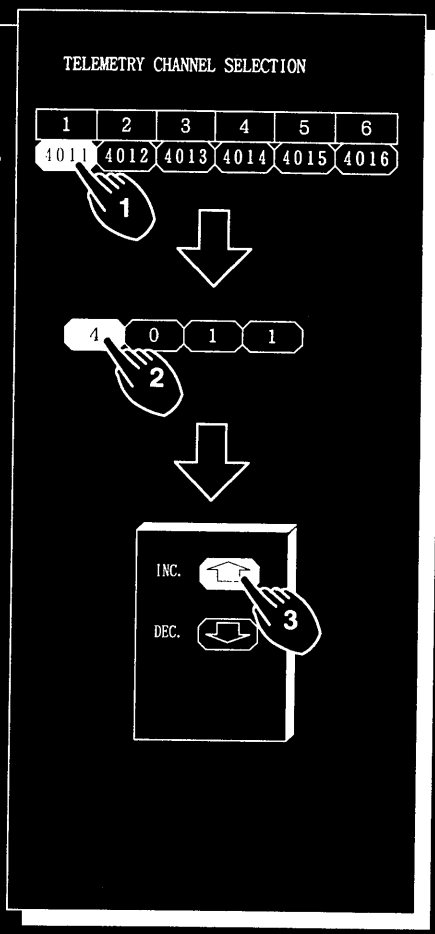
from SET UP
push PRE-SET , CHANNEL NAME

When the SET UP switch, PRE-SET and the CHANNEL NAME keys are pushed, the following display is shown. The monitor provides six telemetry receiving channels and this display allows you to set a channel name for the receiving channel (4 digits).



Set a channel name.

Note: For the channel used, contact your Fukuda representative.



◆ Push the channel key for which you want to name. The prevailing channel name will be displayed at the center in large-sized four digits which will serve for keys.
Push one of the keys. It will be reverse-lit and INC./DEC. keys will appear.

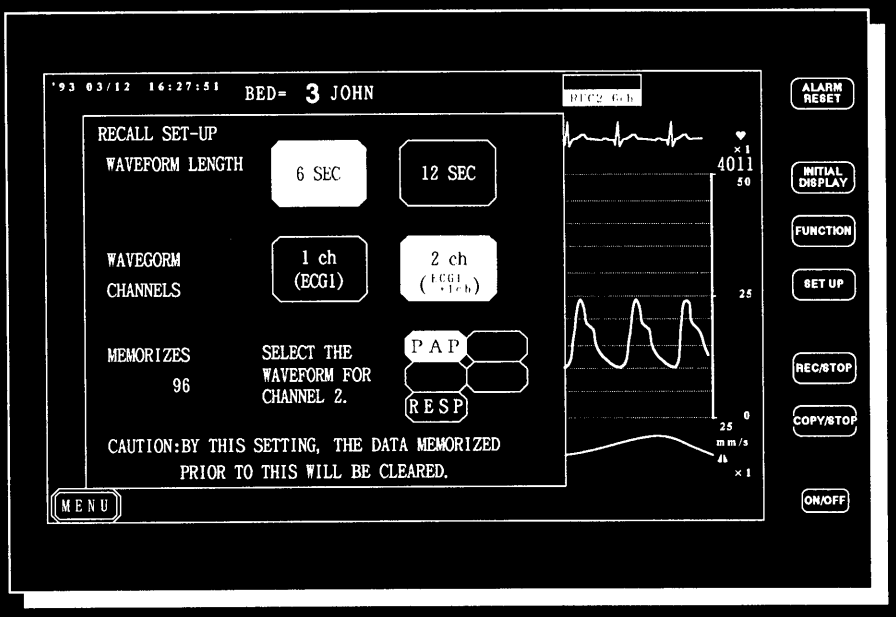
◆ Push the ⇧ key to increment the number.
Push the ⇩ key to decrement the number.
A setting range is from 0 to 9 and A to Z.

(16.8) RECALL SET UP

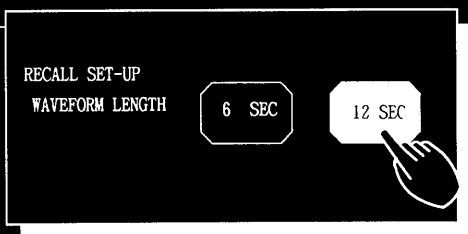
from [SET UP]
push [PRE-SET], [RECALL SET-UP]

When the [SET UP] switch, [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.

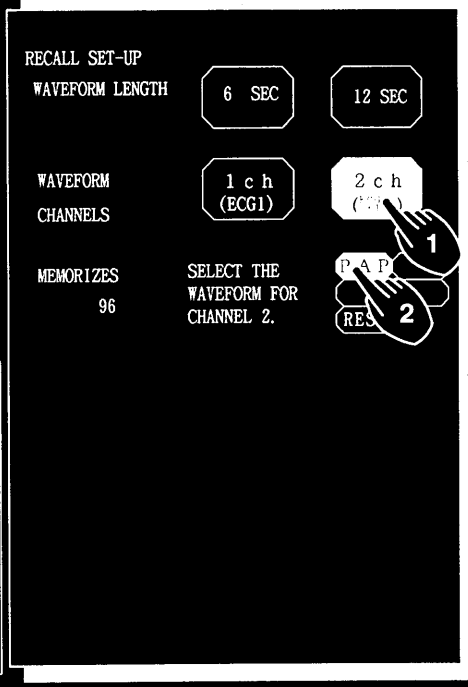


1. Waveform length.



◆ Selection of [12 SEC] reduces the number of stored waveforms to one half the number available with [6 SEC] .

2. Select 1 or 2



◆ Selection of [2 ch] reduces the number of stored waveforms to one half the number available with [1 ch] .

◆ The number of alarm-initiated stored waveforms is 192 standard with 6 seconds and 1 channel. It can be extended to 704 by using the IC memory card.

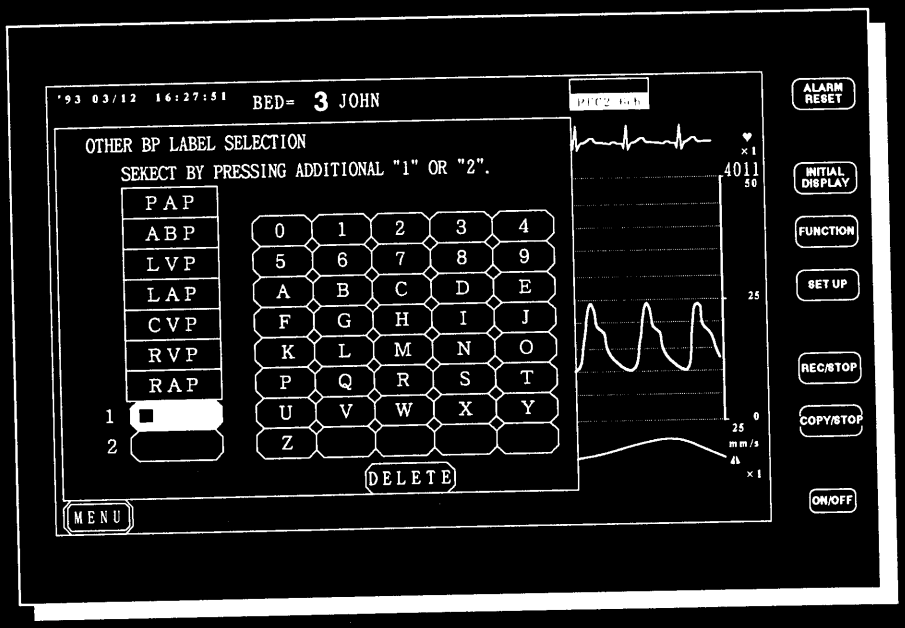
◆ If the [2 ch] (ECG+1ch) is pushed, a prompt is displayed to select a waveform of the 2nd channel. Push a desired waveform key to select.

Caution:
All recall waveforms which have been stored are cleared from the memory when any setting on the RECALL SET-UP display is changed.

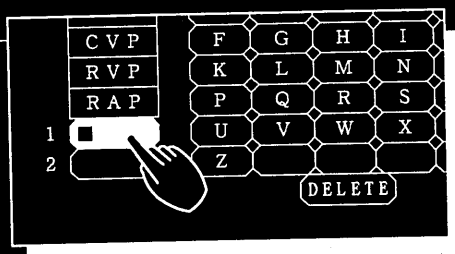
(16.9) OTHER BP LABEL SELECTION

from [SET UP]
push [PRE-SET] , [OTH BP LABEL]

When the [SET UP] switch, the [PRE-SET] and [OTH BP LABEL] keys are pushed, the following display is shown. You can use a three character identification name for additional blood pressure names for display on the monitor.



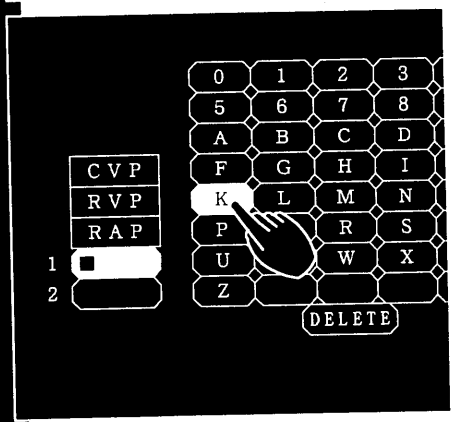
1. Adding BP Labels.



◆ Push either (1) or (2).
The key will be displayed in reverse contrast.

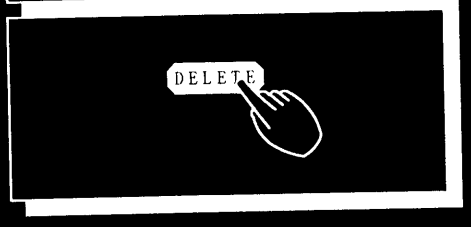
2. Input pressure name.

Note: If the input label has a letter other than "P" at the end, only a mean pressure will be displayed on the INITIAL DISPLAY.



◆ Select the three characters desired for the pressure name. These will be displayed in the (1) or (2) area selected.

3. Character deletion.



◆ When the [DELETE] key is pushed, all characters inputted will be deleted.

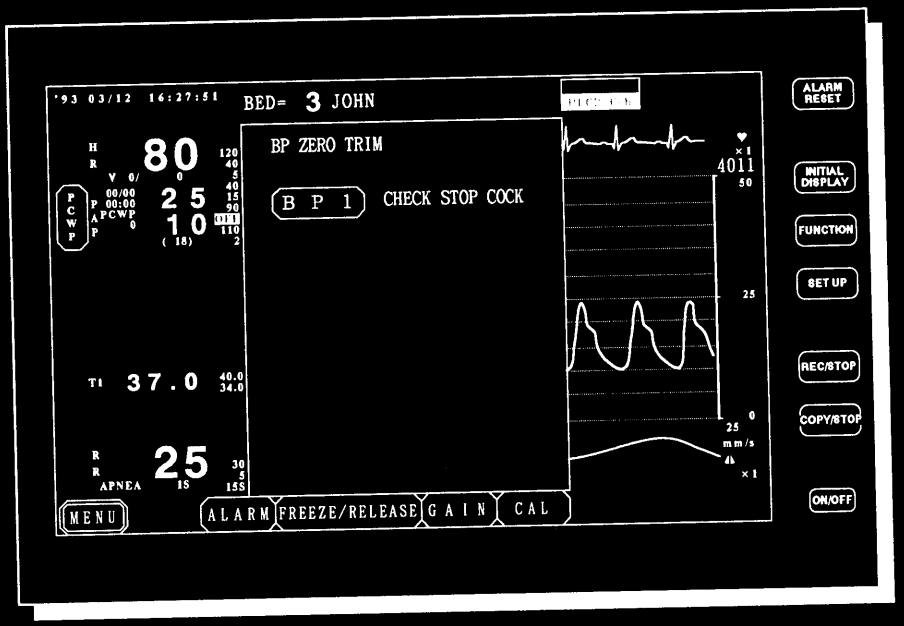
(16.10)

(16.11) BLOOD PRESSURE ZERO ADJ

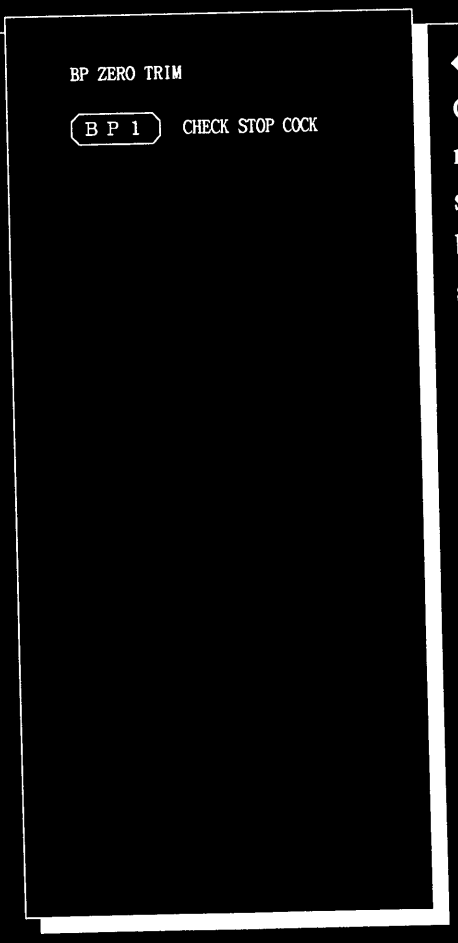
from [SET UP]
push [PRE-SET] , [BP ZERO TRIM]

When the [SET UP] switch, the [PRE-SET] and [BP ZERO TRIM] keys are pushed, the following display is shown.

This display allows you to trim the zero balance for each blood pressure at the receiver.



Check the status which permits zero balancing for blood pressures.



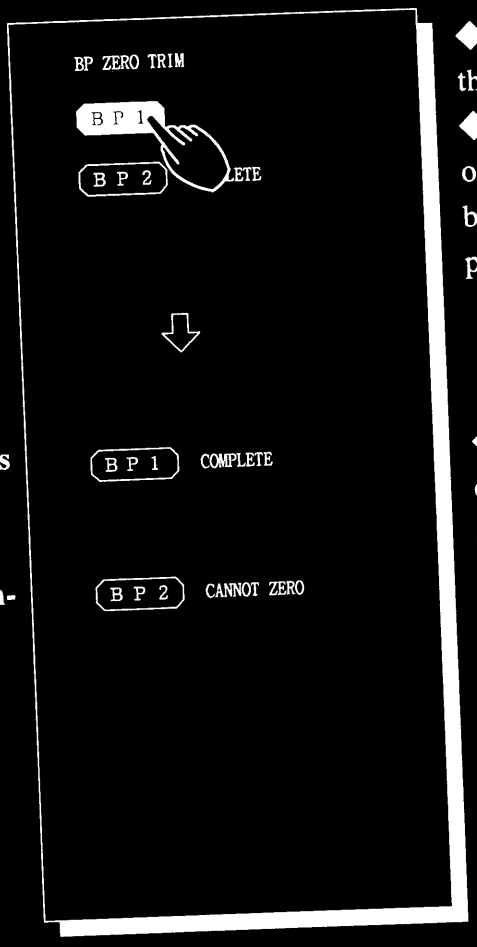
◆ Message "CHECK STOP COCK" is displayed for the measuring channel of blood pressure which has a waveform, there by making zero balancing impossible.

If the message is displayed, open the 3-way cock of the transducer to the atmosphere.

Then make sure the message disappears.

BLOOD PRESSURE ZERO ADJ

Take zero balance of the receiver for each blood pressure.



◆ First open the 3-way clock of the transducer to the atmosphere.

◆ Push the zero balance button on the transmitter to take zero balance at the transmitter. Then push the **BP1** or **BP2** key.

When fine zero balancing is complete.

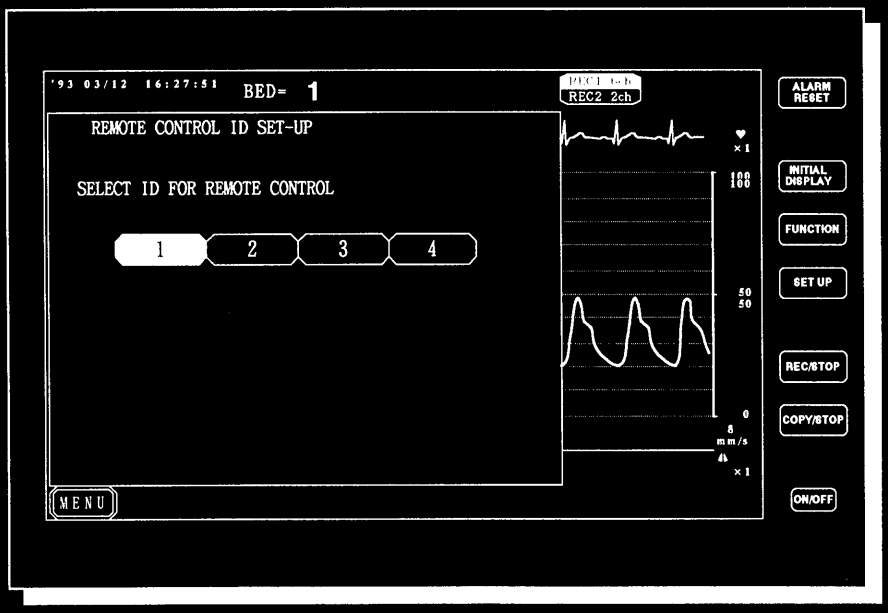
◆ If zero balancing is complete on the transmitter but is not taken at the monitor, push the BP key on the monitor.

When fine zero balancing cannot be made.

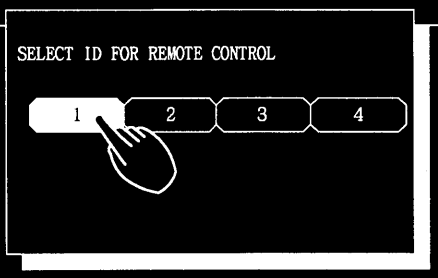
(16.12) REMOTE CONT. ID

from [SET UP]
push [PRE-SET], [REMOTE ID]

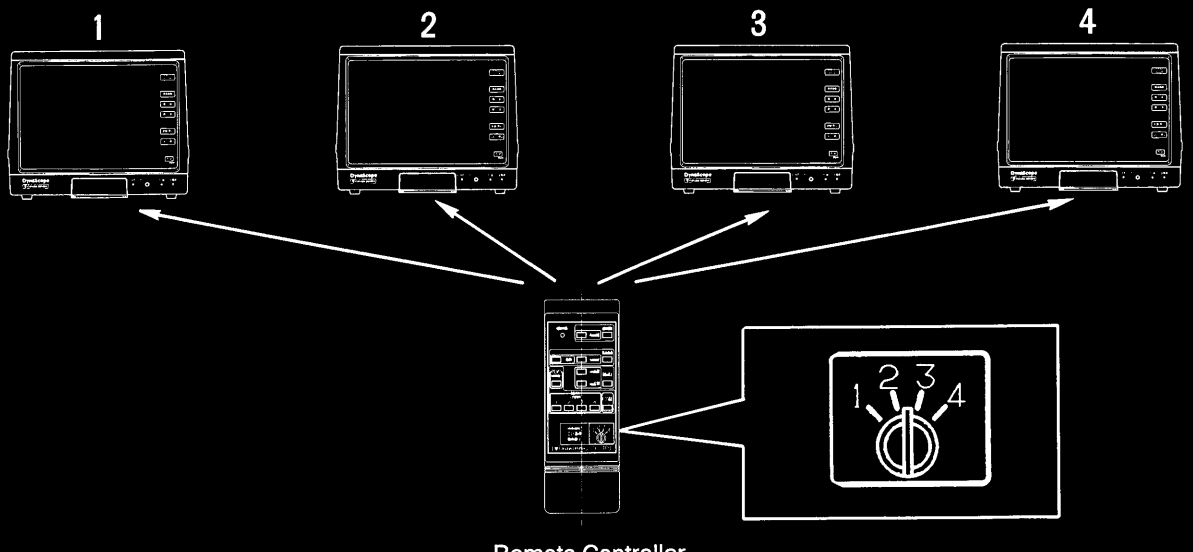
When the [SET UP] switch, the [PRE-SET] and [REMOTE ID] keys are pushed, the following display is shown. This display allows selection of an ID number which allows the remote control to identify the monitor.



1. Select an ID number which allows the remote control to identify the monitor.



◆ One remote control can cover four DS-3300 bedside monitors. Assign a different ID number to each individual bedside monitor.

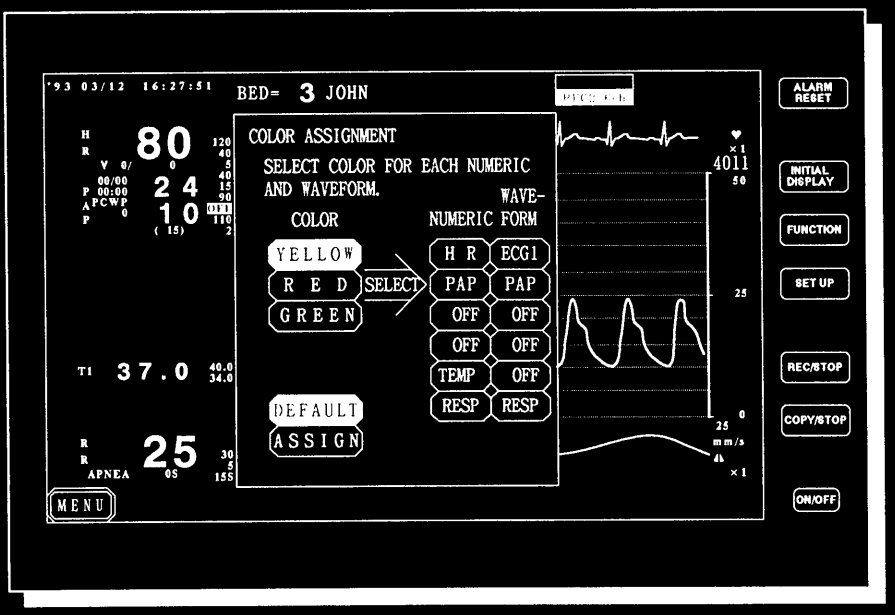


Remote Controller

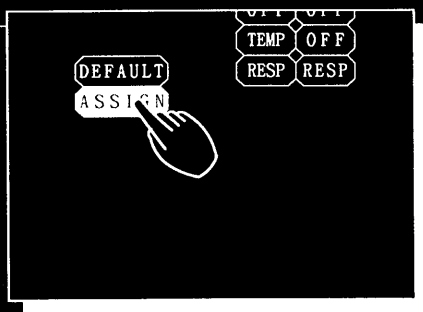
(16.13) COLOR ASSIGN

from [SET UP]
push [PRE-SET], [COLOR ASSIGN]

When the [SET UP] switch, the [PRE-SET] and [COLOR ASSIGN] keys are pushed, the following display is shown. This display allows selection of red, yellow or green for each waveform/measurement displayed on the color slave monitor.

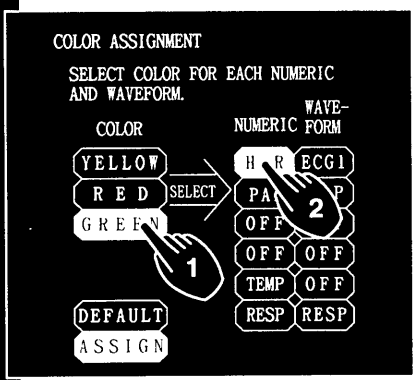


1. Push the [DEFAULT] or [ASSIGN] key.

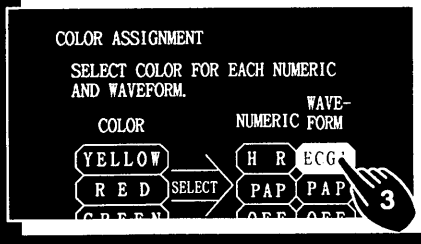


◆ Default colors are;
HR, ECG: Yellow
BP2: Red
BP3: Green
Others: Yellow

2. If the [ASSIGN] key is pushed, select colors for waveforms/measurements.



◆ First push the [RED], [YELLOW] or [GREEN] key. Then push the numeric parameter to which the color is to be assigned.

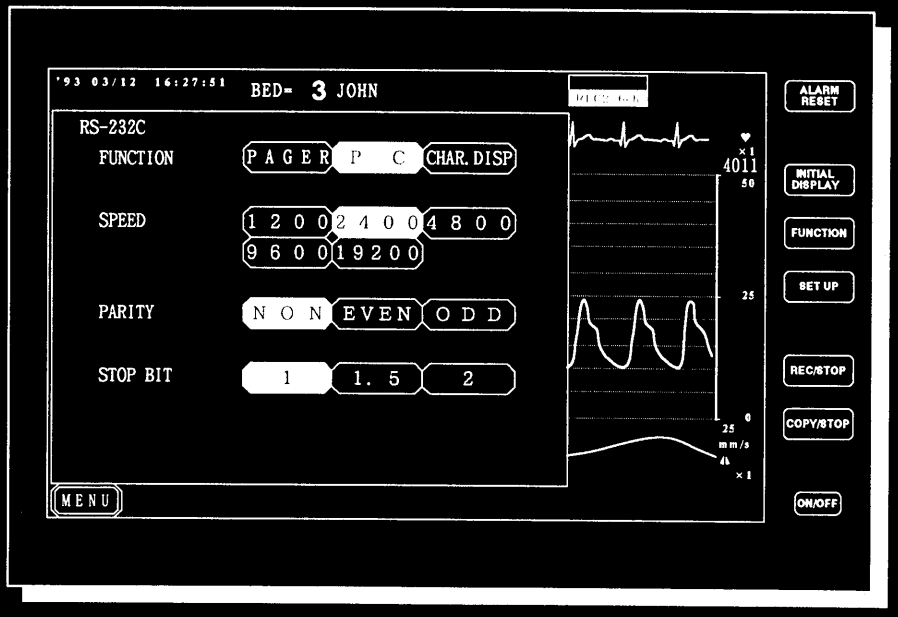


Then push the waveform parameter to which the color is to be assigned.

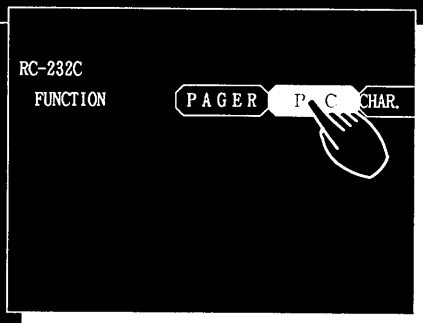
(16.14) RS-232C

from [SET UP]
push [PRE-SET] then [RS-232C]

When the [SET UP] switch, the [PRE-SET] and [RS-232C] keys are pushed, the following display is shown. This display allows selection of the RS-232C function, baud rate, etc.

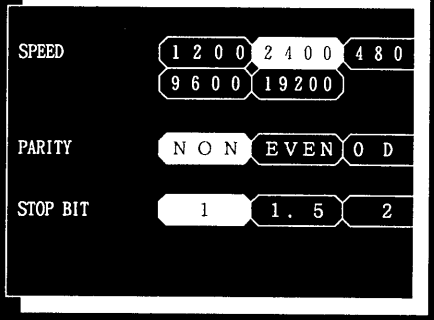


1. Select the RS-232C function.



◆ PAGER: Allows use of the pager system.
PC: Allows communication with the personal computer.
CHAR. DISP: Allows use of the character display function.

2. Select a baud rate, parity and stop bit if PC or CHAR. DISP is selected as the function.



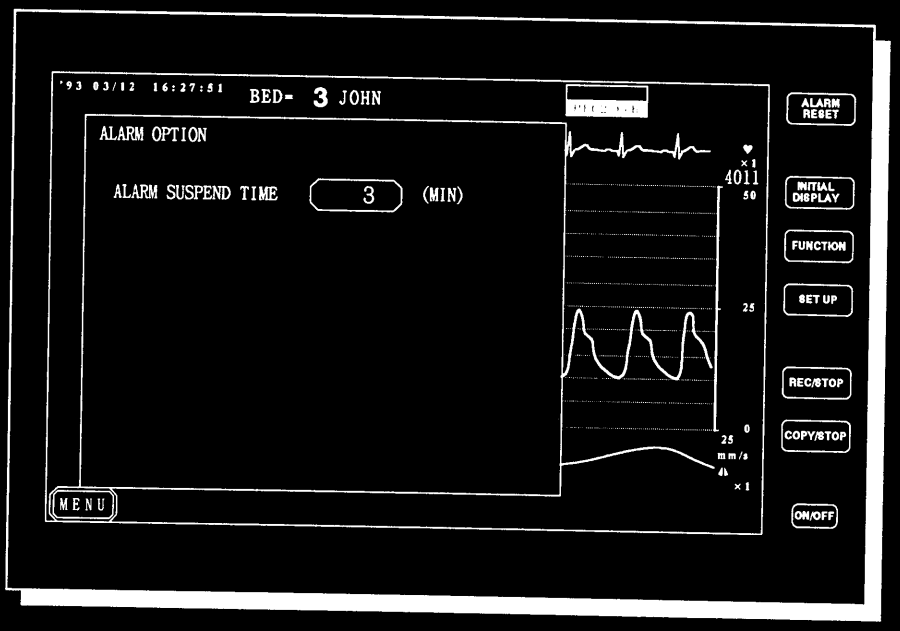
◆ Set these communications parameters for those of the subject device.
◆ For PC function, contact your Fukuda representative.

(16.15) ALARM OPTION

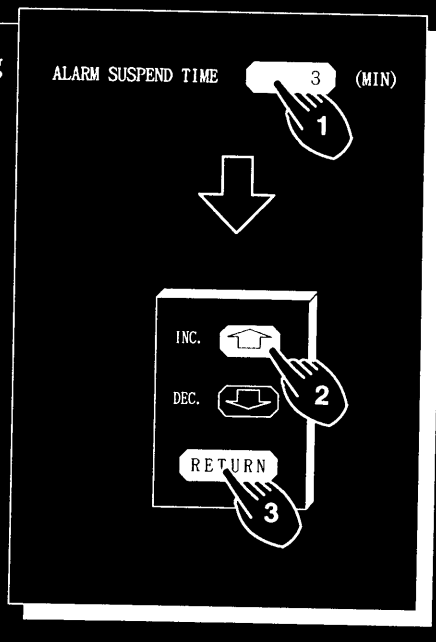
from [SET UP]
push [PRE-SET], [ALARM OPTION]

When the [SET UP] switch, the [PRE-SET] and [ALARM OPTION] keys are pushed, the following display is shown.

This display allows selection of an alarm suspending time.



Select an alarm suspending time.



◆ Push the ALARM SUSPEND TIME key which is initially label "3".

◆ INC. [⇧]/DEC. [⇩] keys will appear. Select a desired alarm suspend time in a range of 0 to 10 minutes.

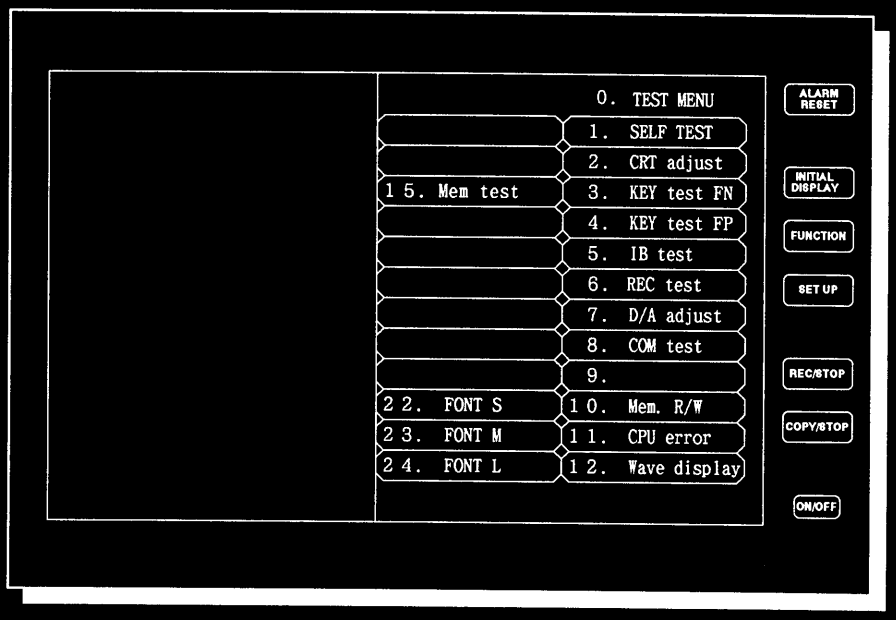
◆ Press the [RETURN] key to complete.

(16.16) 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 is shown.

The displayed menu is for servicing purpose only. Leave its operation to an authorized agent.

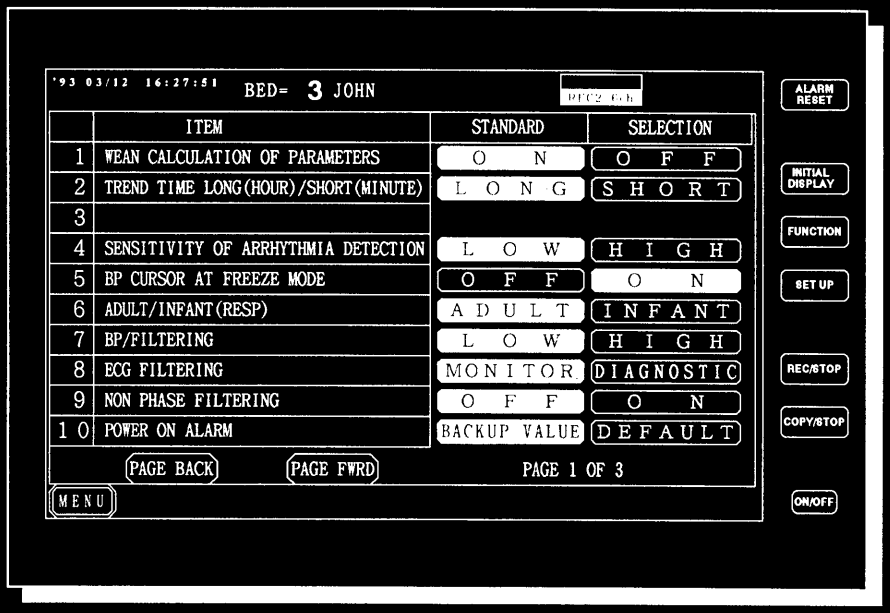


(16.17) SOFT SWITCH

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.



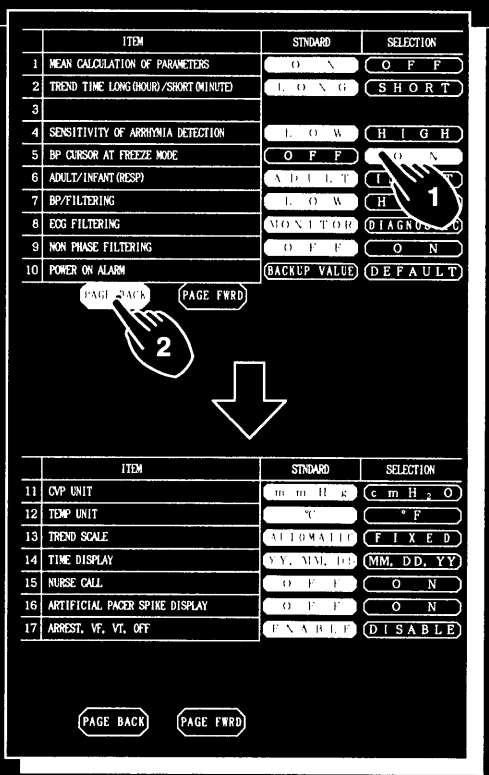
	ITEM	STANDARD	SELECTION
1	WEAN CALCULATION OF PARAMETERS	O N	O F F
2	TREND TIME LONG(HOUR)/SHORT(MINUTE)	L O N G	S H O R T
3			
4	SENSITIVITY OF ARRHYTHMIA DETECTION	L O W	H I G H
5	BP CURSOR AT FREEZE MODE	O F F	O N
6	ADULT/INFANT(RESP)	A D U L T	I N F A N T
7	BP/FILTERING	L O W	H I G H
8	ECG FILTERING	MONITOR	DIAGNOSTIC
9	NON PHASE FILTERING	O F F	O N
10	POWER ON ALARM	BACKUP VALUE	D E F A U L T

PAGE BACK PAGE FWRD PAGE 1 OF 3

MENU

1. Selecting a function.

2. Call the next or previous page.



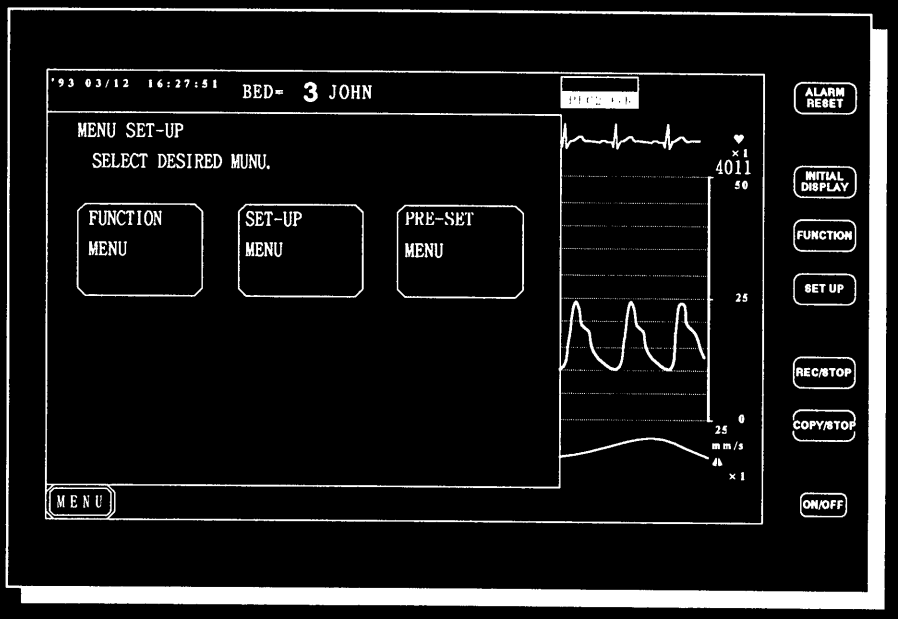
◆ The STANDARD settings for the monitor (as set at the factory) are listed on the left. To change a function, push the desired key under the SELECTION column.

Push the [PAGE FWRD] or [PAGE BACK] for more function selections.

(16.18) FUNCTION MENU SET-UP

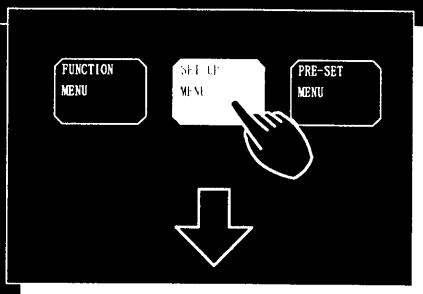
from [SET-UP]
push [PRE-SET], [FUNC SET-UP]

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.



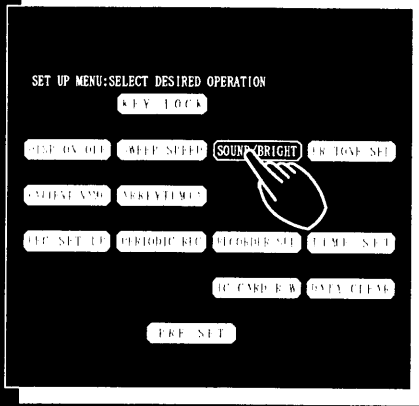
MENU

1. Select the menu.



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

2. Select the items to turn ON or OFF.

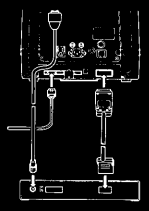
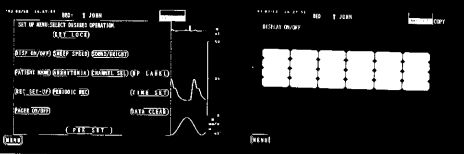
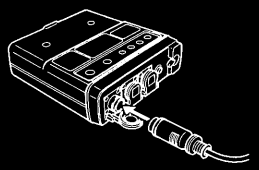
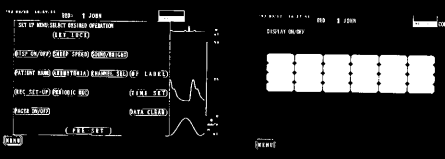
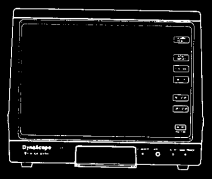
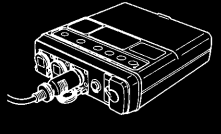


◆ To eliminate a function from the menu selection, push the desired key.
The key will be in normal contrast and the function will be disabled.
To restore the function, push the key again.

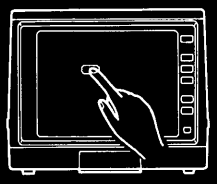
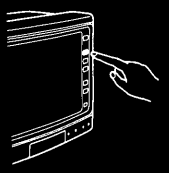
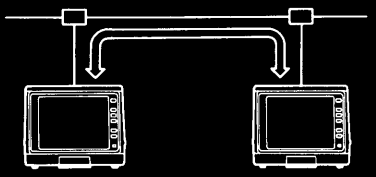
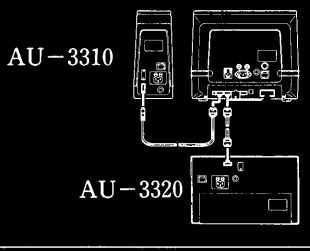
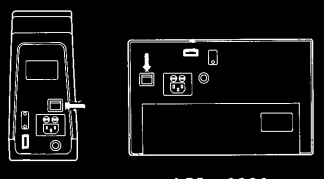
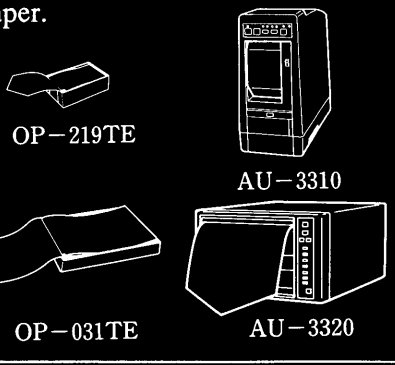
7. Troubleshooting

Problem	Check items	Treatment
Frequent interruption of waveforms.	Transmitter out of range from antenna cover area.	Use in the range. Use wide area antenna if necessary.
	Metal obstacle between transmitter and antenna.	Use in areas free from metal walls, other obstacles.
Noise, Abrupt change in waveform.	Is there interference from other transmitters?	Avoid using the same channel of transmitter in the same area.
Telemetry signals are not received. No ECG is displayed.	The transmitter battery is used up.	Replace the battery.
	The transmitter battery is loaded in reverse polarity.	Load the battery, polarity to polarity.
	Channel names of transmitter and receiver do not match.	Push the SET UP switch, and the CHANNEL SEL key to select the correct transmitter for the receiver.
	The plug and jack of the AC adaptor are not connected firmly.	Connect the plug and jack securely.
	The ECG lead cable is not connected.	Be sure to connect the ECG lead cable. It serves as the antenna.
	The connection cable is disconnected.	Connect the connection cable securely.
	Electrode is detached.	Check electrodes. If any of them is detached, replace it.

Troubleshooting

Problem	Check items	Treatment
No display except heart rate.	Connection cable between the monitor and the receiver.	 Make sure the cable is connected securely.
	Selection of DISPLAY ON/OFF mode.	Push the SET UP switch, DISPLAY ON/OFF and turn the item ON. 
No B.P. value displayed.	Connection of BP cable.	Connect or replace BP cable. 
	Selection of DISPLAY ON/OFF mode.	Push the **SET UP** switch, **DISPLAY ON/OFF** and turn the item ON. 
Pressure value and waveforms do not seem correct.	B.P. ZERO	Perform BP ZERO function. 
Electrode off mark is displayed and no ECG is shown.	Attachment of the electrodes to the patient.	Clean the electrode site and attach new electrodes. 
	Connection of ECG lead wires or electrodes.	Insure connection of the lead wires to the electrodes and make sure the receiver is securely inserted. 

Troubleshooting

Problem	Check items	Treatment
AC Noise, unstable ECG.	Connection of lead wires.	Replace lead wires if necessary.
	Electrode condition.	If electrode is dry, replace with a new one.
	Electric blanket is in use.	Do not use. Use other method.
 The screen touch key does not work.	The display is in " KEY LOCK " mode.	Try to push [INITIAL DISPLAY] switch again. 
 Other bed waveform does not show.	Necessary Bedside Monitor is connected to LAN.	Connect Bedside Monitor to LAN with LAN interface cable. 
 Record and Copy do not work.	Recorder is not connected.	Connect AU-3310, AU-3320. 
	Recorder is not turned ON.	Turn power switch of the recorder ON.  AU−3310 AU−3320
	Paper is improperly loaded, or paper is empty.	Load paper. 

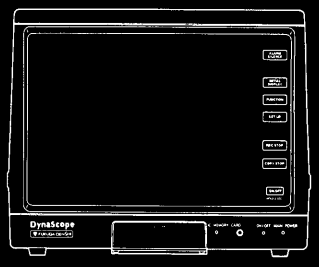
8. STORAGE AND MAINTENANCE

STORAGE

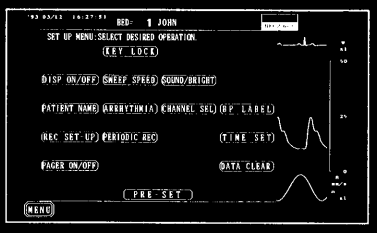
1. Install or store the instrument away from moisture, splashing water or chemicals.
2. Make sure the operating location has adequate ventilation and the unit is not in direct sunlight.
3. Avoid excess vibration and shock during transportation and operation.
4. Do not store near chemicals or where gasses 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

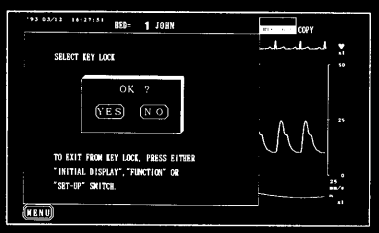
1. To clean the screen with power turned ON, lock the keys to prevent abnormal operation of the touch screen.



Push the SET UP switch

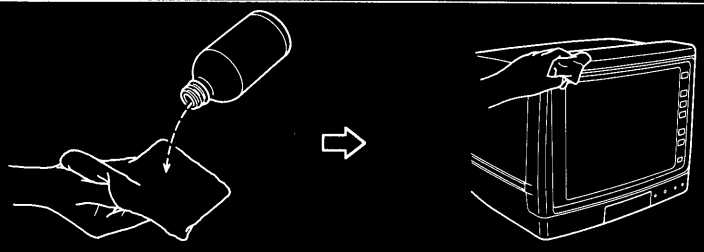


Push the KEY LOCK key



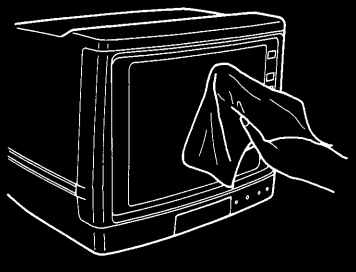
Push YES

2. Sterilization



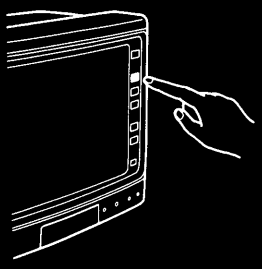
Wipe the monitor with guaze dampened with alcohol.

3. Cleaning



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

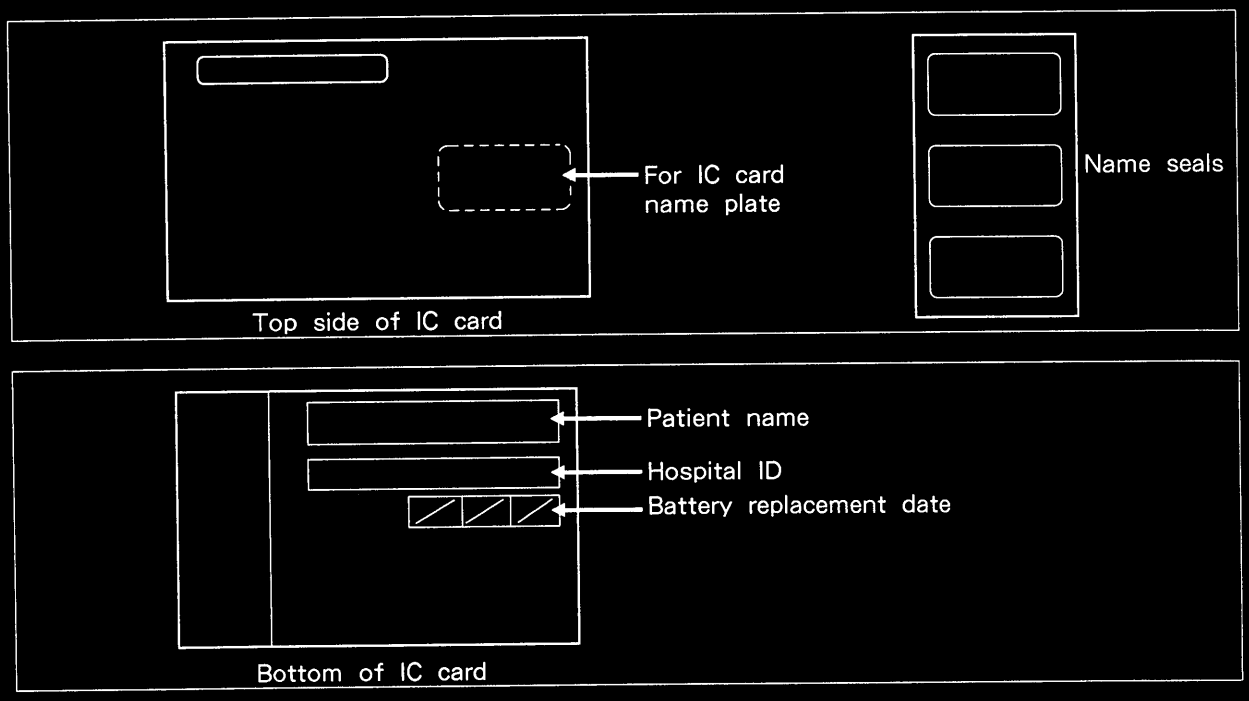
4. Release the KEY LOCK mode.



Push the INITIAL DISPLAY switch.

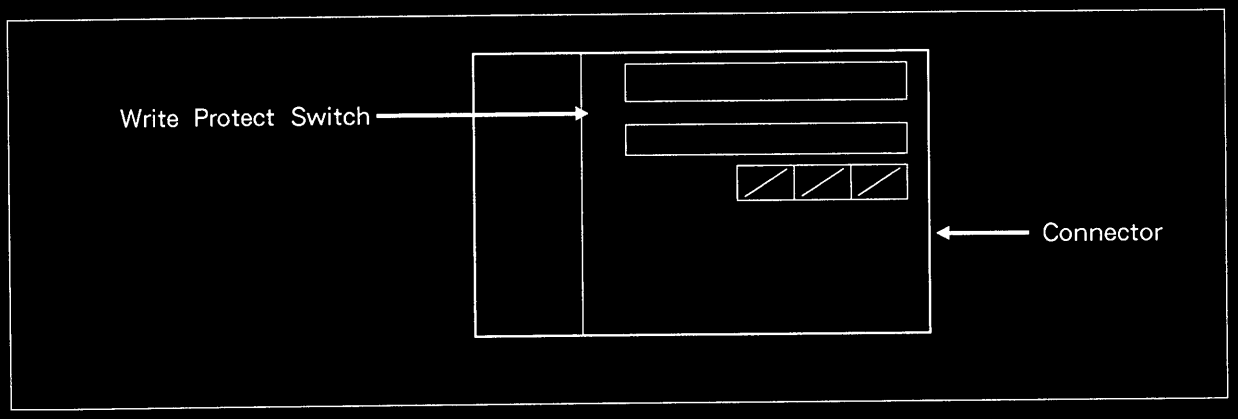
9. USE OF THE IC MEMORY CARD

9.1 IC CARD IDENTIFICATION



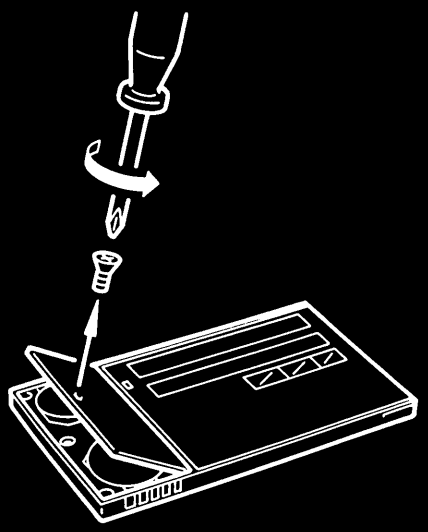
9.2 CAUTIONS:

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 one half years. See next page for Battery Replacement.

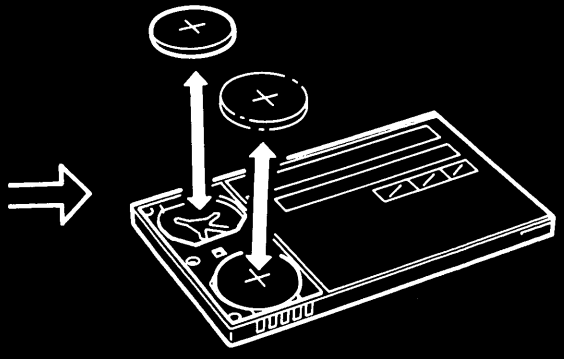


9.3 BATTERY REPLACEMENT

Battery replacement procedure



Bottom of IC card



Note : Do not remove both batteries at the same time. Replace batteries one at a time.

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 one 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.

9.4 Types of IC Memory Cards

There are three types of IC memory cards which provide different memory capacities.

Model	Memory Capacity	Parts Number	Battery Life
FML-256PG-C	256KB	1E8012	Approx. 5 years
FML-512PG-C	512KB	1E8017	Approx. 3 years
FML-1024PG-C	1MB	1E8003	Approx. 1.5 years

Any type of the above IC memory cards can be used for the PRE-SET program and PATIENT DATA.

The number of recall waveforms or the time length of a continuous waveform, which can be stored in an IC memory card designated as an extension memory, differs with the capacity as follows.

Memory Capacity	Number of Recall Waveforms (6 seconds/waveform, with one channel)		Time Length of Continuous Waveform
	For BMW or BMT	For Telemetry Central (per bed)	All Models (for a selected bed)
256KB	192	32	15 minutes
512KB	352	58	30 minutes
1MB	704	117	1 hour

10. SPECIFICATIONS

DISPLAY

CRT Screen:	12- inch, electromagnetic deflection
Display color:	Amber
Waveform Display Mode:	Non- fade moving trace
Number of Waveforms:	6 maximum
Waveform Length:	6 seconds (with a sweep speed of 25mm/sec)
Sweep Speeds:	ECG, BP: 12.5, 25, 50mm/sec
	Respiration: 2.5, 8, 12.5, 25mm/sec
Freezing:	All waveforms can be frozen simultaneously.
Frequency Response:	DC to 50Hz
Brightness Adjustment:	Available in SET UP mode

CONTROLS: 7 panel switches and touch- sensitive screen keys

SIGNAL INPUT

Input System:	Telemetry system
Measuring Parameters:	ECG, respiration, blood pressures and body temperatures
Receivable Parameters:	6 maximum

INPUT/OUTPUT CONNECTORS

Receiver Input:	Connects to the receiver.
LAN Connector:	Connects to Omninet II LAN branch cable.
Slave Monitor Output:	Connects to Fukuda recommended slave monitor.
Recorder Output 1:	Connects to AU- 3310 or AU- 3320 recorder.
Recorder Output 2:	Connects to AU- 3310 or AU- 3320 recorder.
RS- 232C Port:	Connects to the pager system, etc.
Alarm Pole Output:	Connects to AP- 300 alarm pole.

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

SPECIFICATIONS

SAFETY (with a system including the transmitter and receiver)

Electric Shock Protection:	Class I, type CF
Patient Leakage Current:	10 μ A maximum
Ground Leakage Current:	100 μ A maximum
Withstand Voltage:	1500V AC for one minute

POWER REQUIREMENTS

Input Power Supply:	115V AC ± 10%, 50/60Hz or 230V AC ± 10%, 50/60Hz
Power Consumption:	180VA maximum

PHYSICAL DATA

Dimensions:	31.8(W) × 34.1(D) × 26.2(H) cm
Weight:	Approx. 12kg

ENVIRONMENTAL CONDITIONS

Operating Temperature Range:	10 to 40℃
Operating Humidity Range:	30 to 80% RH (no dew condensing)
Operating Atmospheric Pressure Range:	70 to 106 kPa (700 to 1060 mbar)
Storage Temperature Range:	- 10 to +60℃
Storage Humidity Range:	10 to 95% RH
Storage Atmospheric Pressure Range:	70 to 106 kPa (700 to 1060 mbar)

SPECIFICATIONS

HEART RATE: Displayed together with ECG waveform. Renewed every 3 seconds. 6-second average or instantaneous

Measuring Range: 12 to 300 bpm

TRENDGRAPHS

Parameters: Heart rate, ST level, VPC, blood pressure, respiration rate, body temperature, Δ T

Trending Time: 1, 2, 4, 8, 24 hours (switchable to 1, 3, 6, 12, 24 hours or 1, 5, 10, 30, 60 minutes)

ECG

Time Constant: 0.5 seconds (switchable to 3 seconds)

ECG Filter: 25Hz in monitor mode, 100Hz in diagnosis mode

AC Filter: 50/60Hz

RESPIRATION

Measuring Range: 5 Ω equivalent signals

Frequency Response: 0.1 to 1Hz (adult), 0.1 to 2Hz (infant)

BLOOD PRESSURE

Measuring Range: - 50 to +300mmHg

Frequency Response: DC to 12Hz

BODY TEMPERATURE

Measuring Range: - 50 to +50 ℃

ALARMS

Parameter	Limit Setting
Heart Rate:	20 to 300 bpm
ARREST	
VF	
VT	
RUN:	2 to 6 VPCs
BIGEM	
TRIGEM	
FREQNT:	1 to 20 VPCs
MULTI	
Respiration Rate:	5 to 150 breaths/minute
Apnea Time:	1 to 40 seconds
Blood Pressure:	0 to 300mmHg
Body Temperature:	20 to 45 ℃

SPECIFICATIONS

RECORDING

Recording Modes: Manual recording (ordinary waveform recording. 20 seconds if operated through the transmitter)
Σ recording* (long- term compressed ECG waveform recording with HR and ST level trendgraphs)
Summary recording* (HR and ST level measurements every 5, 10, 20 or 60 minutes in a list plus trendgraphs)
Recall waveform recording
Frozen waveform recording
Trendgraph recording (all trendgraphs are recorded)
Periodic recording (automatic recording in preset intervals)
Alarm- initiated recording (20 seconds)
Nurse call- initiated recording (20 seconds)
Copy* (hardcopy of screen image)
* Σ recording, summary recording and copy are available only with the AU- 3320.

Maximum Number of Waveforms: 2 (AU- 3310), 6 (AU- 3320)

Periodic Recording: Interval: Selectable in a range of 1 minute to 24 hours 59 minutes
Recording item: Waveforms or summary (list and trendgraphs)
Waveform length: 5 to 250 seconds

Delay Time: 16 or 8 seconds (selectable by the SOFT SWITCH)

TEST FUNCTIONS: ROM version, IC memory card status, CRT adjustment, key test, receiver status, recorder status, communications status, etc.

SPECIFICATIONS

ETTING & STATUS INDICATIONS

Date/Time: Year/month/day and hour:minute

Gain: 1/4, 1/2, 1, 2 or 4

Alarm Limits: HR: High/low limits, VPC: FREQNT & RUN,
ST level: High/low limits

Waveform-related Messages: CAN/T, LEARN

QRS-synchronized Mark: Heart mark (♥) blinks in synchronization with R wave.

Lead-off Mark: 

Nurse Call Mark:  mark is displayed while at the same time the buzzer sounds and the recorder is initiated to record.

Low Battery Mark: 

Alarm Suspension: 1 to 20 minutes

Out-of-range Indication: Train of square pulses

Telemetry Channel: Receiving channel is indicated.

Pacemaker Pulse: Superimposed on ECG waveform in negative direction (when the function is set to ON by the SOFT SWITCH)

OPERATIONS AVAILABLE THROUGH TRANSMITTER

Recording
Alarm suspension
Nurse call
Event mark

NON-PHASE FILTER: fo: 0.8Hz, -12dB/oct, delay 0.6 seconds

IC MEMORY CARD: Read/write of preset data or patient data. May be used as an extended memory for recall waveforms or a continuous waveform

ECEIVER

Receiving Frequency: 174 to 192MHz

Number of Channels: 6

Receiving System: Crystal-controlled double superheterodyne

Dimensions: 31(W) × 34(D) × 56(H) cm

Weight: Approx. 4.5kg

Operating Temperature Range: 10 to 40 ℃

11. ACCESSORIES

To Main Monitor, Receiver & Recorder

To ensure the system performs to specifications, use the accessories specified by Fukuda Denshi. When ordering spares, indicate the model numbers together with the names.

Main Monitor DS-3300

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

Multi-Parameter Telemetry Receiver LW-3311

No.	Item	Model	Q'ty	Remarks
⑨	Connection Cable	CJ-281-B	1	
⑩	Antenna Base	OA275	1	With tightening screw
⑪	UHF/VHF Antenna	HW420MP	1	

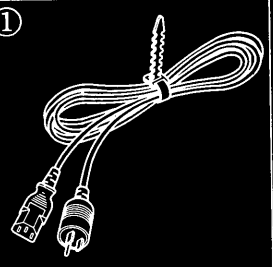
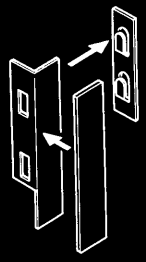
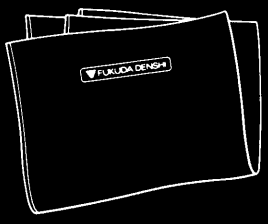
Recorder AU-3310 (2 channel)/AU-3320 (6 channel)

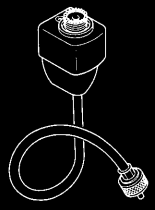
No.	Item	Model	Q'ty	Remarks
⑬	Power cable	CS-18 or	1	230V standard
		CS-24	1	USA, 115V standard
⑭	Grounding cable	CE-01A	1	
⑮	Power fuses	218-002 (2A)	2	For AU-3310
		218-004(4A)	2	For AU-3320
⑯	Connection Cable	TOCP200Q-60CB	1	
⑰	Dust proof cover	5H5751	1	For AU-3310
		5H5751	1	For AU-3320
⑱	Chart Paper	OP-219TE	1	For AU-3310, Z-fold paper
		OP-031TE	1	For AU-3320, Z-fold paper
⑲	Paper Shaft	OA-59	1	For AU-3310, 63mm wide paper
⑳	Mounting Adaptor	OA-70	1	For AU-3310
㉑	Operation Manual		1	For AU-3310
			1	For AU-3320

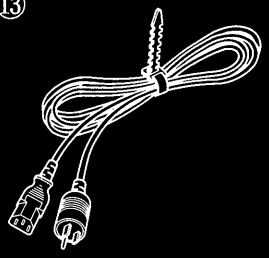
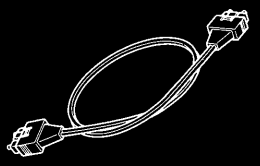
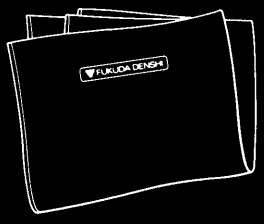
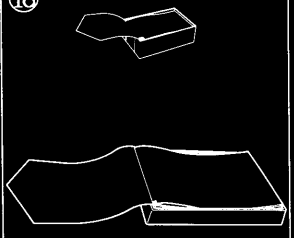
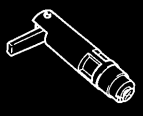
Note : Accessories are subject to change without prior notice.

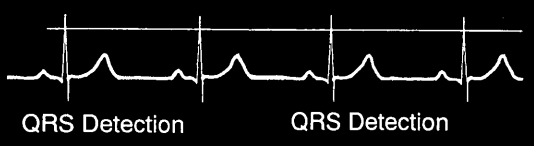
ACCESSORIES

To Main Monitor, Receiver & Recorder

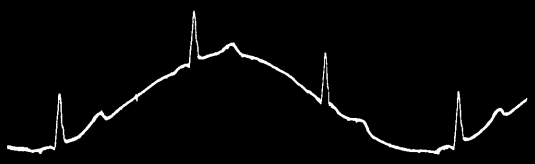
① 	② 	③ 	④ 
⑤ 	⑥ 	⑦	⑧

⑨ 	⑩ 	⑪	⑫

⑬ 	⑭ 	⑮ 	⑯ 
⑰ 	⑱ 	⑲ 	⑳ 
㉑	㉒	㉓	㉔

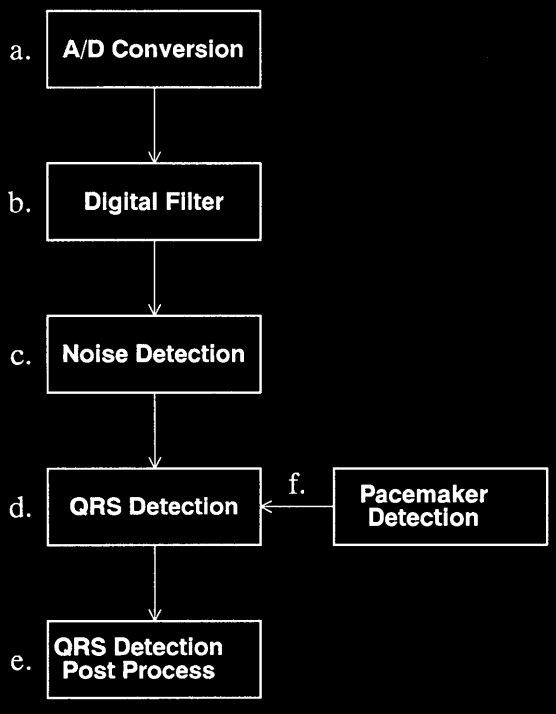


QRS Signal is small, but the Twave is large.



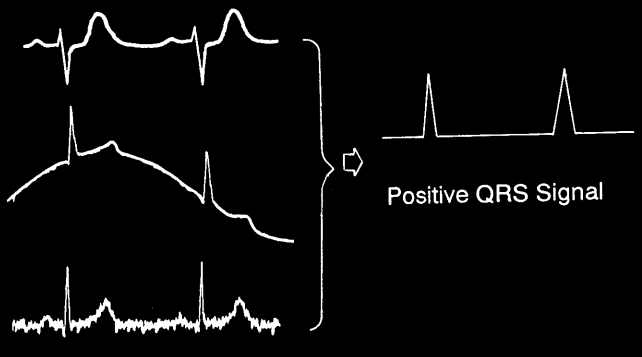
ECG with base line drift.

The following process is applied to the QRS algorithm for detection of QRS waveforms under various conditions. In principle, a threshold is determined that allows for detection of the R wave peak. However, an actual ECG signal varies due to electrode position, base line drift, artifact and individual patients.



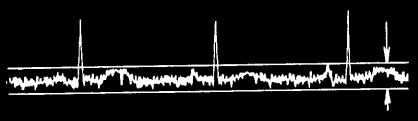
a. Analog ECG converted to Digital signal.

b. QRS signal in the ECG is enhanced. T wave and P wave as well as base line drift and artifact which causes noise are inhibited.

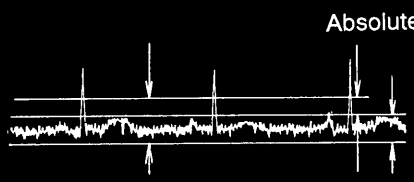


At the same time, negative QRS is converted to a positive signal.

137



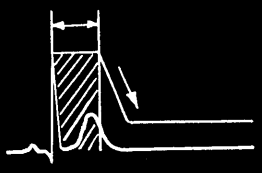
Noise Signal level



Absolute Threshold + Noise signal level

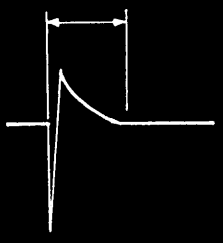
c. Even if all the noise is not inhibited in the digital filter, the noise level is detected.

d. From the QRS signal level and noise level, a threshold is determined. Any ECG signal that exceeds this threshold is judged as QRS.



T Wave Inhibit
QRS Post Processing

e. After QRS Detection, a period is established in which detection is inhibited to avoid counting tall T waves as QRS. After that time period, the detection threshold is gradually reduced to a lower level.

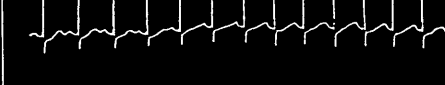


Pacemaker Detection

f. When a pacemaker pulse is detected, the QRS detection is inhibited for a certain period so the pacemaker pulse is not counted as QRS.

ARRHYTHMIA ANALYSIS

1. Arrhythmia detected and detection standard

Arrhythmia	Detection Standard	Waveform Example
ARREST	When QRS is not detected for 5 seconds.	
VF	When VF is detected by arrhythmia algorithm.	
VT	Continuous 9 beats of VPC with R-R interval less than 500 milliseconds.	
RUN	When 3 (selectable) or more continuous beats of VPC occur.	
BIGEM	Two consecutive patterns of a normal beat followed by a VPC (N-V-N-V-N)	
TRIGEM	Three consecutive patterns of two normal beats followed by a VPC (N-N-V-N-N-V-N-N-V)	
FRQN	When 5 (selectable) VPC occur within one minute.	
TACHY	When heart rate is 120 bpm (selectable) or more for 5 seconds or more.	
BRADY	When heart rate is 40 bpm (selectable) or less for 5 seconds or more.	

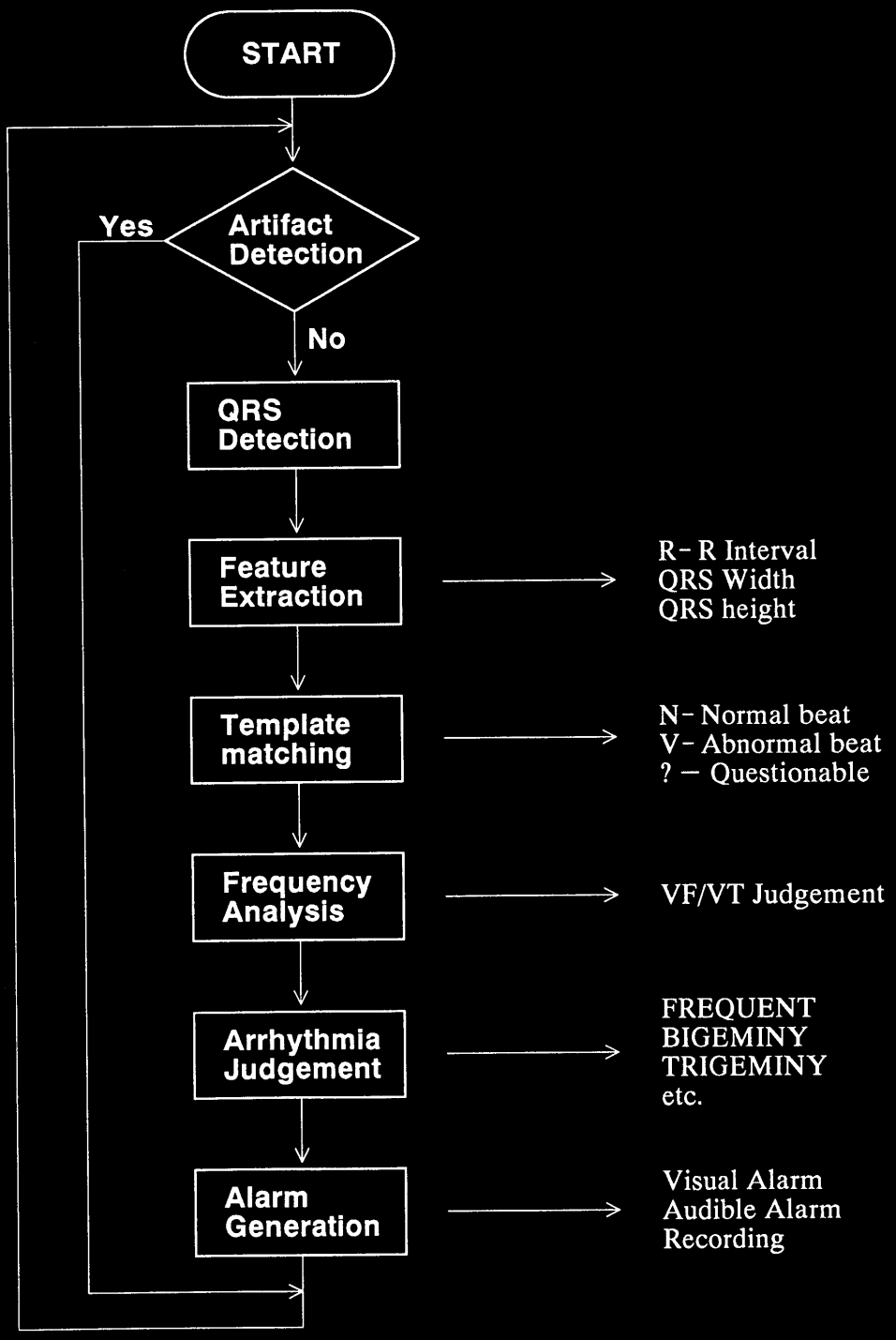
2. Waveform Quality Indication

Waveform Condition	Indication
Large, Odd Waveform	CAN'T
No QRS Waveform	NO-SIG
Preparation for Analysis	LEARN

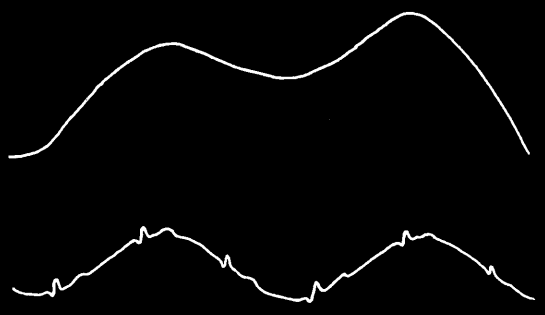
3. Outline of Arrhythimia Processing

The following flow chart shows the process used for acquiring ECG to arrhythmia judgement. The method employed is a combination of feature extraction and template matching.

Furthermore, the ECG signal is processed through frequency analysis for further determination of ventricular fibrillation (VF) or ventricular tachycardia (VT).



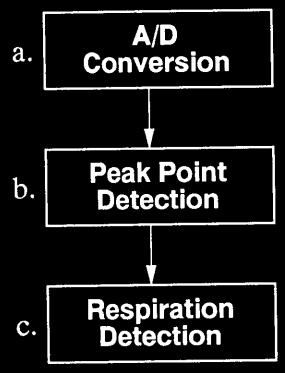
RESPIRATION DETECTION



Heart Activity Superimposed on Signel

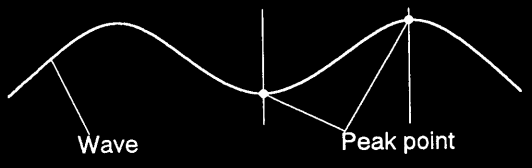
In certain cases, there may be base line drift caused by body motion or artifact caused by heart activity superimposed onto the respiration signal.

The following algorithm is used to process respiration detection.

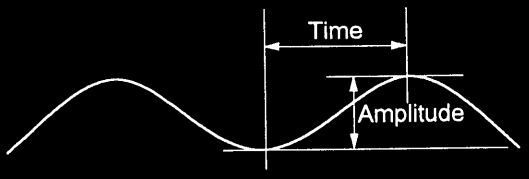


Respiration Detection Algorithm

a. Respiration signal is converted to a digital signal.



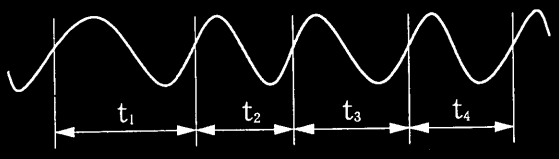
b. Average level of Respiration signal is determined.



c. A threshold is determined by adding an absolute value to the average level, when the signal is regarded as a respiration waveform.

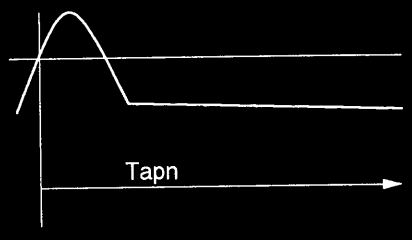
Respiration Rate Calculation

Respiration rate is calculated based on mean value of breath intervals for a six sec. window.



Apnea Determination

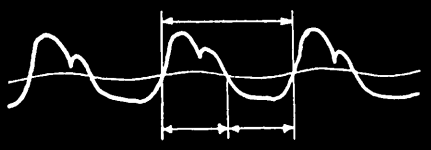
Apnea is determined when the respiration waveform is not detected for longer than the APNEA ALARM time setting.



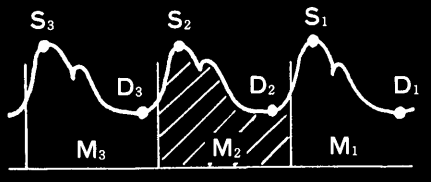
BLOOD PRESSURE CALCULATION

Computations are made for Systolic, Diastolic and Mean pressure value with each cardiac cycle.

Noise Signal level

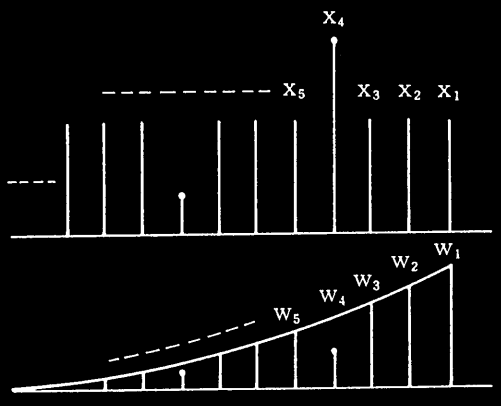


First, the average pressure value is measured. When the pressure is greater than the average, it is considered the systolic period. When the pressure is less than the average, it is considered the diastolic period.



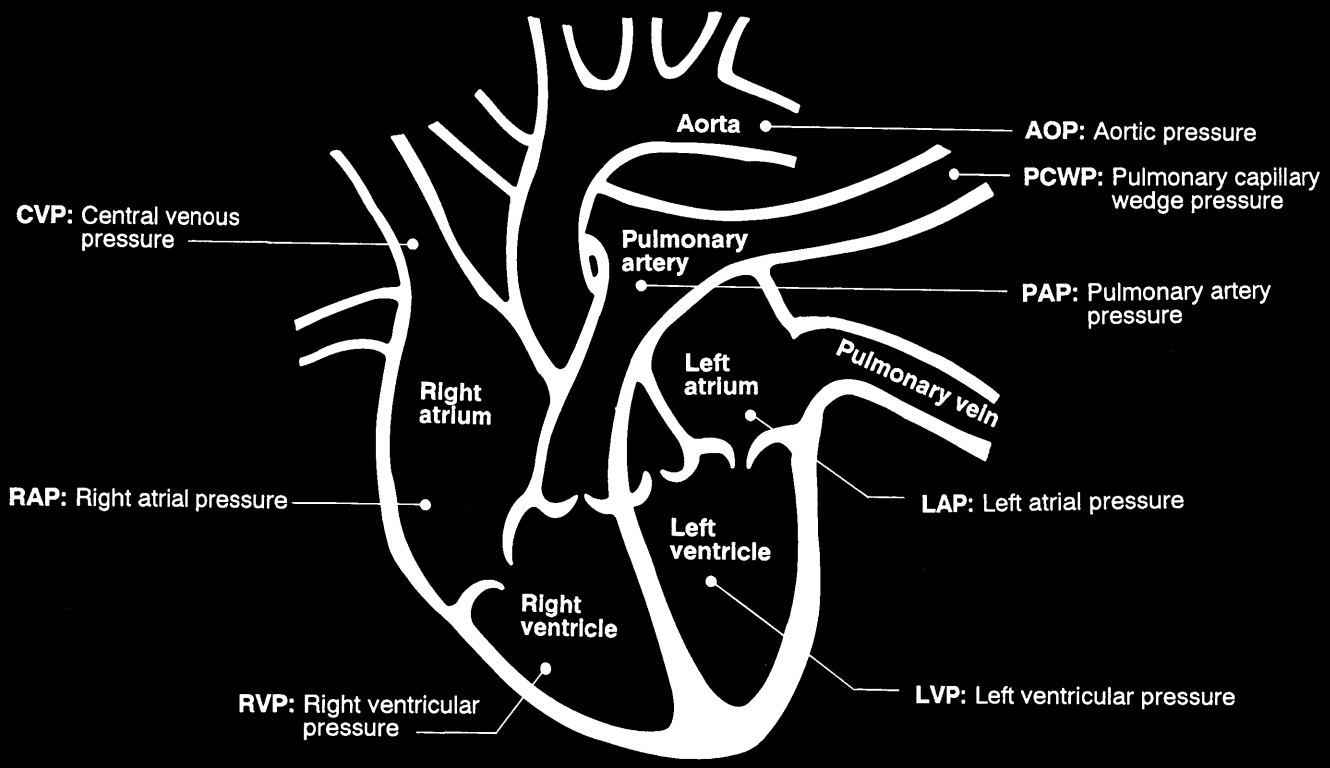
The blood pressure value for display is processed as a mean weighted calculation in order to suppress artifact or changes caused by respiration or arrhythmias.

The equation of this processing is the same for systolic, diastolic and mean pressures and the values are calculated individually. The larger the difference of the value to the average, the smaller the weight becomes.

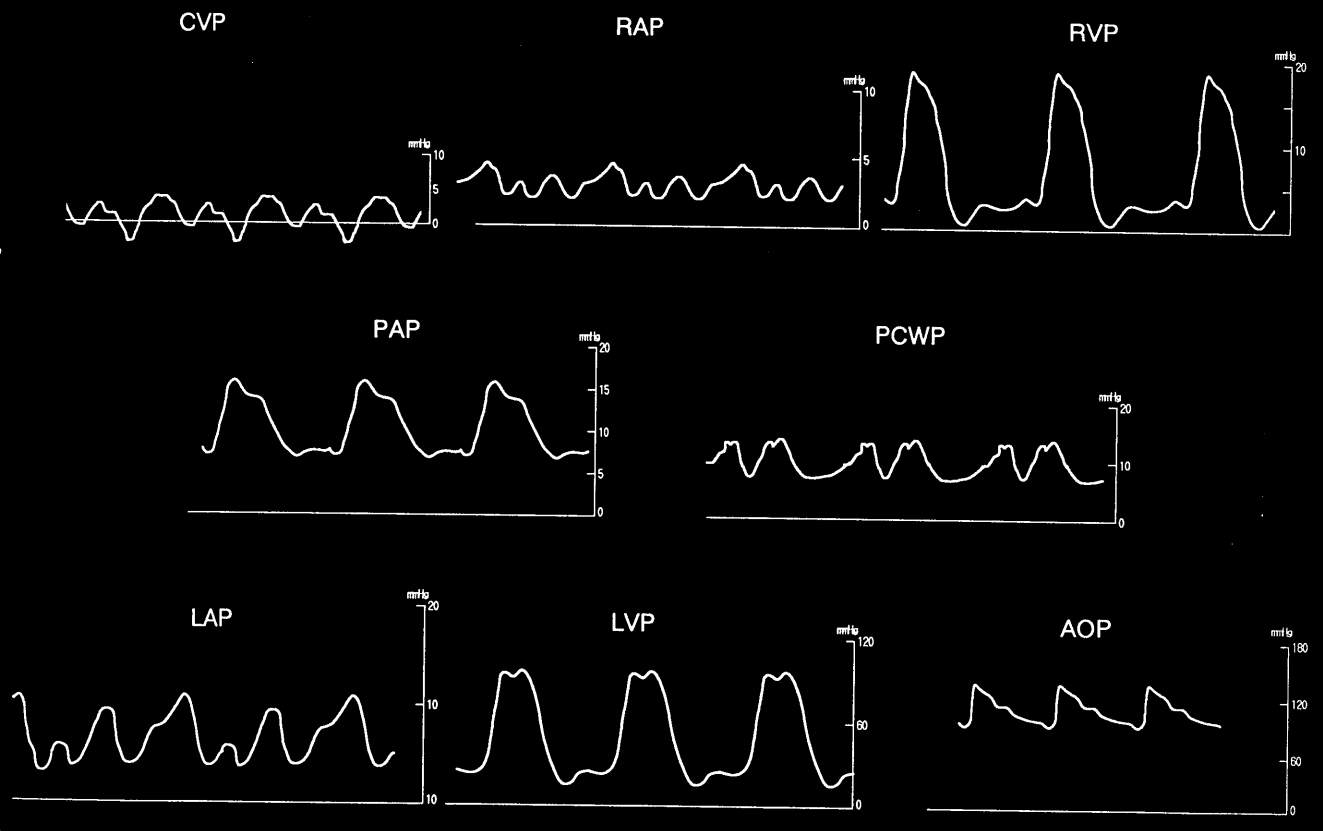


$$\text{Pressure}=\frac{W1\times1+W2\times2+W3\times3\cdots\cdot}{W1+W2+W3\cdots\cdot}$$

BLOOD PRESSURE NAME and BLOOD PRESSURE CHANGE



TYPICAL WAVEFORM EXAMPLES



HEMODYNAMIC CALCULATION FORMULA

Parameter (unit)	Acronym	Formula
body surface area (m^2)	BSA	$h^{0.725} \times w^{0.425} \times 71.84 \times 10^{-4}$ (Dubois)
cardiac index (ℓ /min/m^2)	CI	$\frac{CO}{BSA}$
stroke volume index (m ℓ /beat./m^2)	SVI	$\frac{SV}{BSA}=\frac{CO/HR}{BSA}$
systemic vascular resistance index (dynes·sec·cm^{-5}·m^2)	SVRI	$SVR \times BSA=\frac{(AMP-CVP)\times 79.92}{CO}\times BSA$
pulmonary vessel resistance index (dynes·sec·cm^{-5}·m^2)	PVRI	$PVR \times BSA=\frac{(PAMP-PCWP)\times 79.92}{CO}\times BSA$
left ventricular cardiac work index (g·m/m^2)	LCWI	$\frac{LCW}{BSA}=\frac{CO\times(AMP-PCWP)\times 0.0136}{BSA}$
left ventricular stroke work index (g·m/m^2)	LVSWI	$\frac{LVSW}{BSA}=\frac{SV\times(AMP-PCWP)\times 0.0136}{BSA}$
right ventricular cardiac work index (g·m/m^2)	RCWI	$\frac{RCW}{BSA}=\frac{CO\times(PAMP-CVP)\times 0.0136}{BSA}$
right ventricular stroke work index (g·m/m^2)	RVSWI	$\frac{RVSW}{BSA}=\frac{SV\times(PAMP-CVP)\times 0.0136}{BSA}$
arterial O_2 saturation (%)	SaO_2	$\frac{100}{(1+7070/PaO_2'^{2.7})}$ $PaO_2'=\frac{PaO_2}{10^{\{0.024\times(TEMP-37)+0.48\times(7.4-aPH)+0.013\times BE\}}}$
arterial O_2 contents (m ℓ /d ℓ)	CaO_2	$\frac{(Hb\times 1.34)\times SaO_2}{100}+(PaO_2\times 0.0031)$
venous O_2 saturation (%)	SvO_2	$\frac{100}{(1+7070/PvO_2'^{2.7})}$ $PvO_2=\frac{PaO_2}{10^{\{0.024\times(TEMP-37)+0.48\times(7.4-aPH)+0.013\times BE\}}}$

HEMODYNAMIC CALCULATION FORMULA

Parameter (unit)	Acronym	Formula
venous O_2 contents (m ℓ /d ℓ)	CvO_2	$\frac{(Hb\times1.34)\times SvO_2}{100}+(PvO_2\times0.0031)$
arterial venous O_2 contents difference (m ℓ /d ℓ)	$aVDO_2$	$CaO_2 - CvO_2$
O_2 consumption volume index (m ℓ /min/ m^2)	VO_2I	$CI \times aVDO_2 \times 10$
O_2 supply volume index (m ℓ /min/ m^2)	O_2AVI	$CI \times CaO_2 \times 10$
estimated O_2 intake ratio	O_2ER	$\frac{aVDO_2}{CaO_2}$
shunt ratio	Qs/Q_T	$\frac{CcO_2-CaO_2}{CcO_2-CvO_2}$
		$CcO_2=\frac{Hb\times1.34\times ScO_2}{100}+(P_AO_2\times0.0031)$
		$ScO_2=\frac{100}{(1+7070/PA^{2.7})}$
		$PA=P_AO_2/10^{\{0.024\times(TEMP-37)+0.48\times(7.4-QPH)+0.013\times BE\}}$
		$P_AO_2=(PB-47)\times FiO_2-\frac{PaCO_2}{R}+\frac{1-R}{R}\times$
		$PaCO_2 \times FiO_2$
		$PB \fallingdotseq 760mmHg,\ FiO_2 \leqq 1$
		$R=\dot{V}\,co_2 / \dot{V}\,O_2=0.83$
heavy carbon trioxide ion density (mmo ℓ / ℓ)	HCO^3	$10^{\{PH-6.1+\log(0.03\times PaCO2)\}}$
base excess (mmo ℓ / ℓ)	BE	$[HCO_3] - 24 - 31 \times (7.4 - aPH)$

Switch	Key	Description	Page
SET-UP	KEY LOCK	Locking of operation of touch keys.	6-48
	DISP ON/OFF	ON/OFF of display items.	6-49
	SWEEP SPEED	Selection of sweep speed.	6-50
	SOUND/BRIGHT	Adjustment of tone of sound and brightness.	6-51
	H.R. TONE SEL	Selection of the bed to generate H.R. sound.	
	PATIENT NAME	Registration of a patient's name/ID number.	6-52
	ARRHYTHMIA	ON/OFF of arrhythmia detection Setting of a threshold.	6-53
	CHANNEL SEL	To display characters input through the RS-232C port.	6-55
	BP LABEL	Labeling or naming of blood pressure sites.	6-56
	REC SET-UP	Setting of recording function.	6-58
	PERIODIC REC	Setting of periodic recording.	6-60
	RECORDER SEL	Selection of second waveform for 2 ch recorder.	6-62
	TIME SET	Date, time set.	6-63
	PAGER ON/OFF	To set the pager which will be called at an alarm.	
	IC CARD R/W	Loading or saving of data for IC memory card.	6-64
	DATA CLEAR	Erasure of all of patient data.	6-65
	PRE-SET	Display of preset menu.	6-67

Switch	Key	Description	Page
SET-UP + PRE-SET	SET-UP INIT	Initialization to factory settings.	6-68
	DISP CONFIG	Selection of display configuration.	6-69
	MONITOR ID	Number assignment to the monitor.	6-70
	SUMMARY ITEM	Selection of items for summary report.	6-71
	IC CARD INIT	Initialization of IC card.	6-73
	CUSTOM DISP	To make a customized display configuration.	6-74
	CHANNEL NAME	To select a receiving channel number.	6-76
	RECALL SET-UP	Selection of recall length, channel, and parameter for 2nd channel.	6-77
	OTH BP LABEL	Selection of BP name.	6-78
	BP ZERO TRIM	To take zero balance at the receiver.	6-80
	REMOTE ID	To assign a monitor number which can be identified by the remote control.	6-82
	COLOR ASSIGN	To assign colors to waveforms and measurements for the color slave monitor.	6-83
	RS-232C	To select the RS-232C function.	6-84
	ALARM OPTION	To set an alarm suspend time.	6-85
	TEST MENU	Menu display for servicing.	6-86
	SOFT SWITCH	Selection of monitoring condition ON/OFF	6-87
	FUNC SET-UP	ON/OFF operation of item in each menu.	6-88

Installation

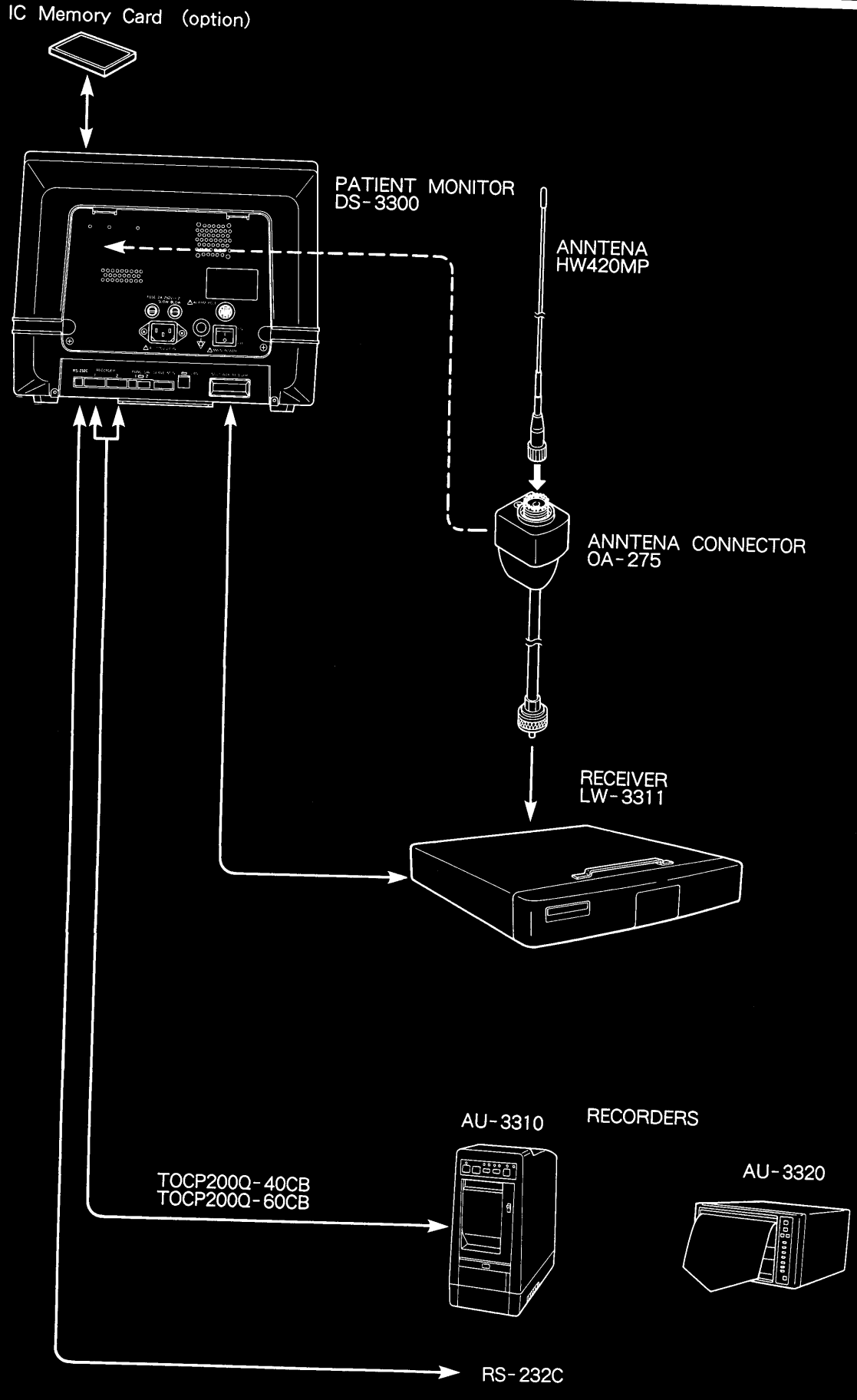
Telemetry Bedside Monitor 4L2275

Installation

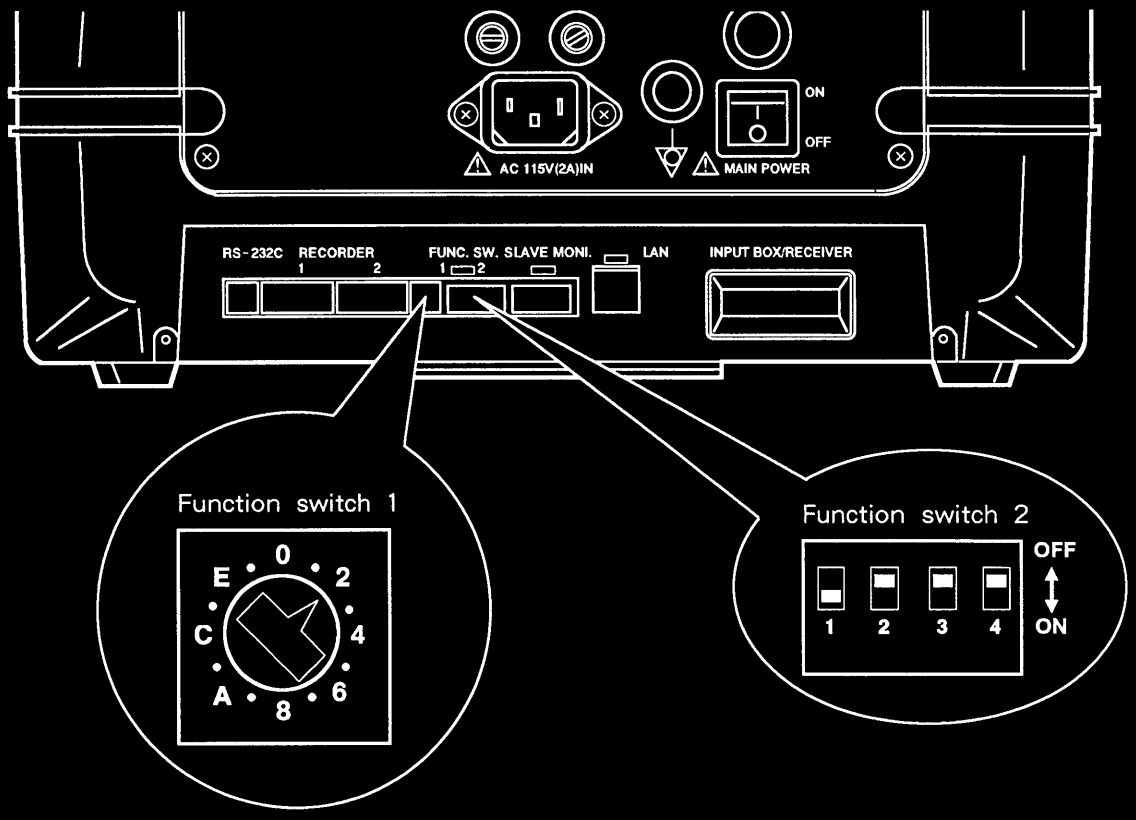
0S-3300 英文

CONTENTS

SYSTEM CONFIGURATION



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) BMT(Telemetry 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

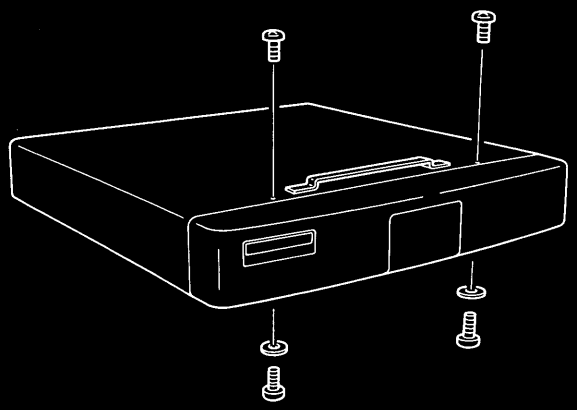
No.	ON	OFF
1	English	Japanese
2	NA	
3	Display Freeze	Normal
4	Test mode	Normal

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

Receiving Channel

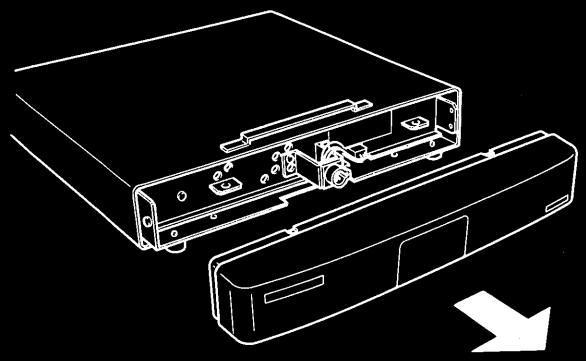
If the channel of the receiver is different from that of the transmitter, you need to replace the receiver module or the crystal which is attached to the transmitter as an accessory.

When replacement is complete, put the channel label on the surface of the receiver module and the rear panel of the receiver.

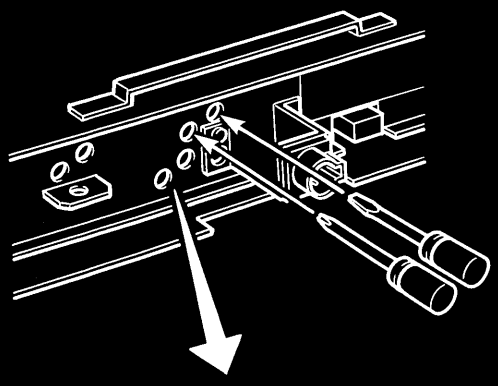


Zero Balancing and Gain Adjustment for Blood Pressure Amplifier

If the BP ZERO TRIM key on the PRE- SET MENU does not effect fine zero adjustment, conduct the following to adjust the receiver.

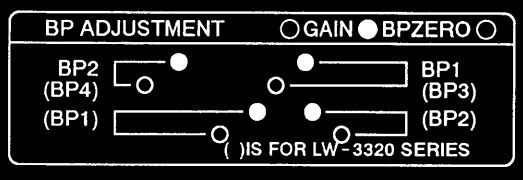


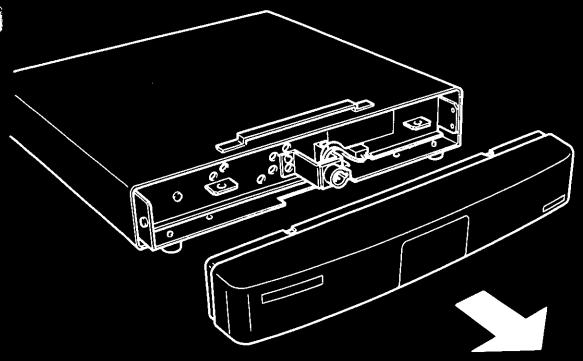
Loosen four screws which attach the front cover to the mainframe.



Pull the front cover toward you. Trimmers will be accessible as shown at the left.

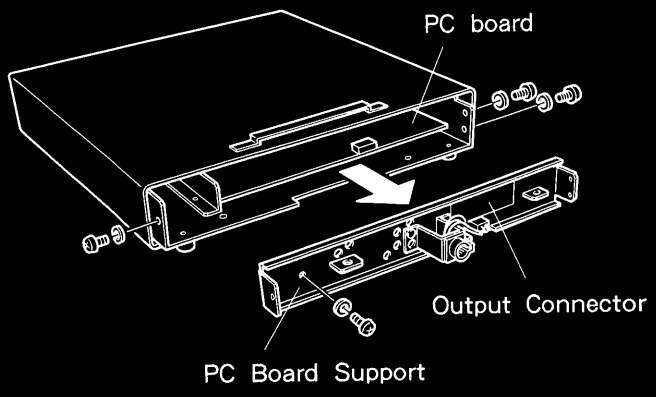
Adjust zero balance trimmers and gain trimmers for BP1 and BP2.





Adjusting AC Filter and Time Constant

Loosen the four screws which attach the front cover to the mainframe. Then pull the front cover toward you.



Remove the wiring connection of the ECG output connector at the center.

Loosen the three screws which attach the PC board support to the mainframe at the left and right and one screw on the front of the PC board support. Then remove the PC board support.

Holding both sides of the receiver board, pull it out toward you.

AC Filter

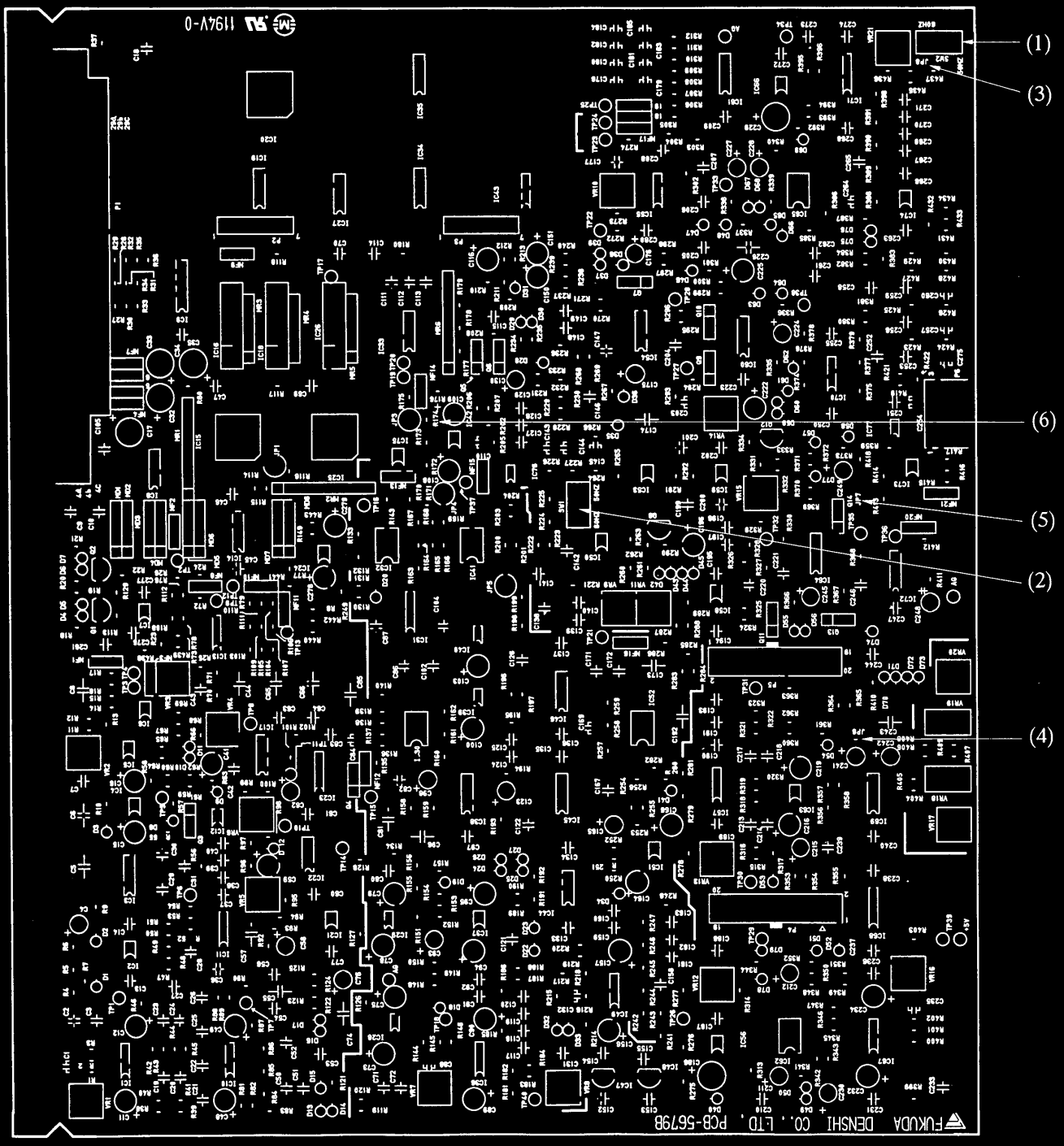
The AC filter operates in the MONITOR mode and not in the DIAGNOSTIC mode.

To switch the filter to 50 or 60Hz, use SW1 (AC filter switch for ECG2) and SW2 (AC filter switch for ECG1). These switches have been set to 50Hz when delivered from the factory.

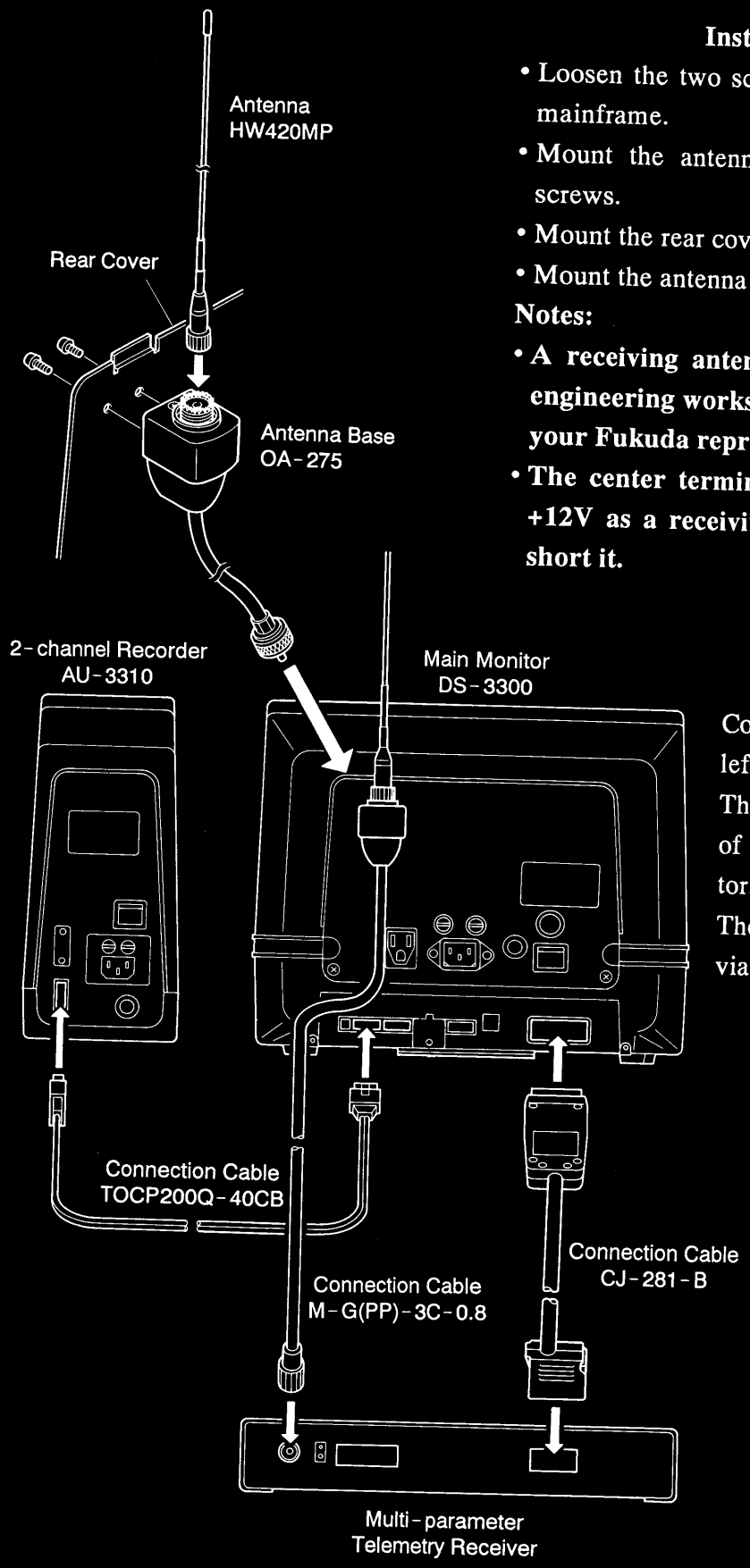
Time Constant

The time constant has been set at 0.5 seconds when delivered from the factory. Change the setting as required for each individual application. The time constant in the DIAGNOSTIC mode can be changed to 3 seconds by making open JP8 and JP6 on the PC board.

Parameter	ECG 1		ECG 2	
Jumper	JP8		JP6	
Setting	As connected	Cut	As connected	Cut
Monitor	0.5 sec.	0.5 sec.	0.5 sec.	0.5 sec.
Diagnosis	0.5 sec.	3.0 sec.	0.5 sec.	3.0 sec.



Location of Switches and Jumpers
(1) AC filter 50/60Hz switch for ECG1
(2) AC filter 50/60Hz switch for ECG2
(3) Jumper JP8 for ECG1 time constant
(4) Jumper JP6 for ECG2 time constant
(5) Jumper JP7 for selection of ECG1 analog output sensitivity – 1V/mV or 0.5V/mV
(6) Jumper JP3 for selection of ECG2 analog output sensitivity – 1V/mV or 0.5V/mV



Installing the Antenna Base

- Loosen the two screws which attach the rear cover to the mainframe.
- Mount the antenna base onto the rear cover with two screws.
- Mount the rear cover to the mainframe.
- Mount the antenna to the antenna base.

Notes:

- **A receiving antenna system for a wide area requires engineering works for each medical institution. Consult your Fukuda representative.**
- **The center terminal of the antenna connector outputs +12V as a receiving booster power. Take care not to short it.**

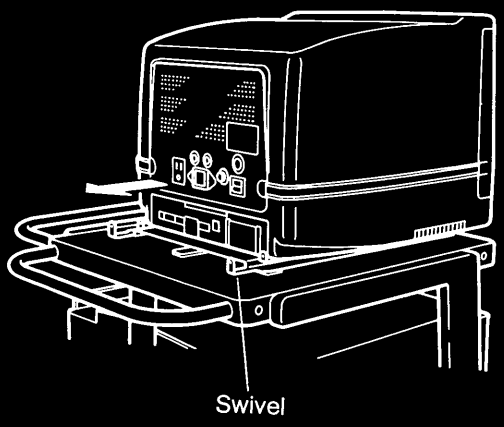
Connection of Component Units

Connect component units as shown at the left.

The recorder may be connected to either of two recorder connectors on the monitor.

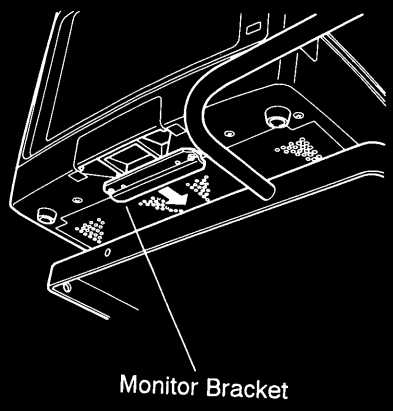
The receiver will be supplied with power via the connection cable CJ-281-B.

Mounting the Monitor to a Trolley

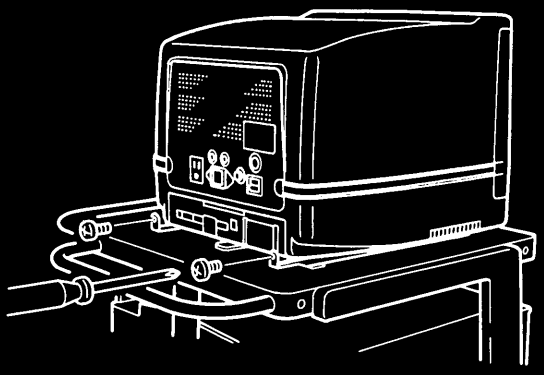


Note: The trolley is not applied as an approval product by CSA. VDE or TUV, NEMKO or SEMKO.

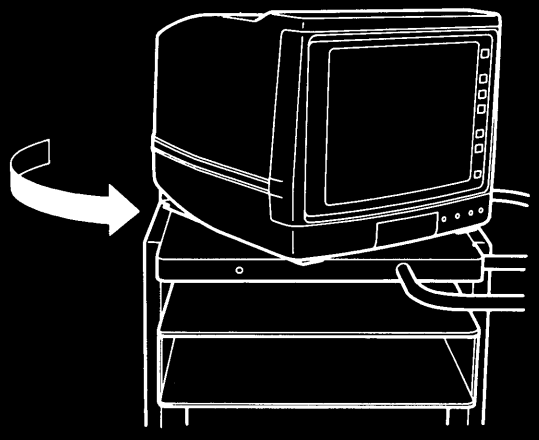
Place the monitor on the swivel on the top of the trolley and push it toward the rear.



Make sure the monitor bracket on the bottom of the monitor is engaged with the swivel plate.

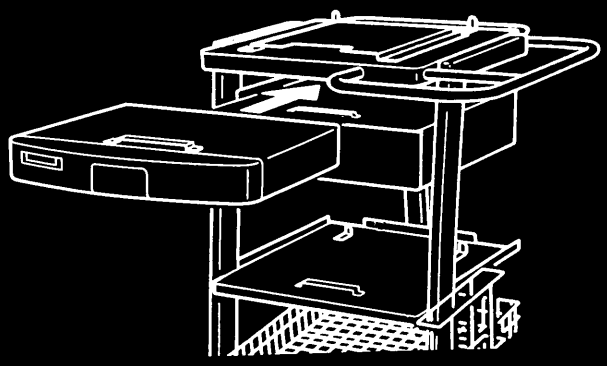


Secure the monitor to the swivel plate with two mounting screws.

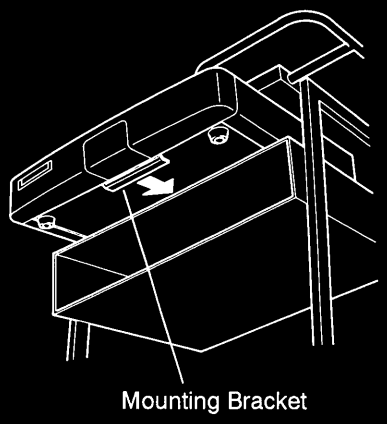


The monitor can be rotated for the best viewing angle.

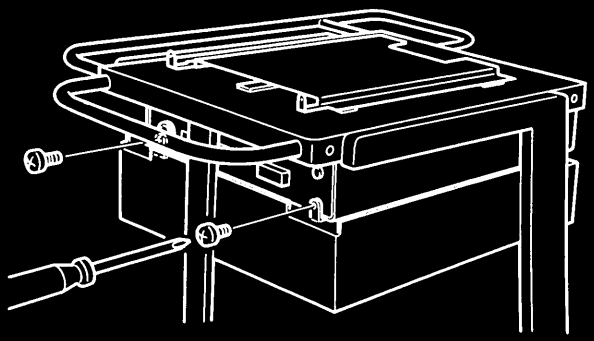
The following two trolleys are available:
OT- 83: Standard
OT- 84: Deluxe



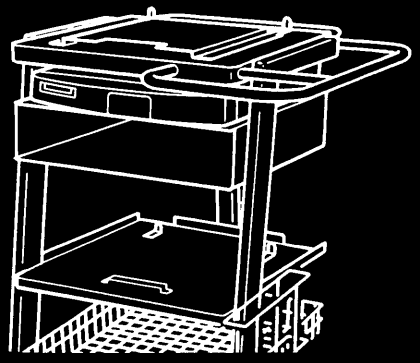
Slide the receiver LW-3100 onto the trolley.



Slide the receiver so the mounting bracket under the receiver hooks the metal fixture of the trolley.

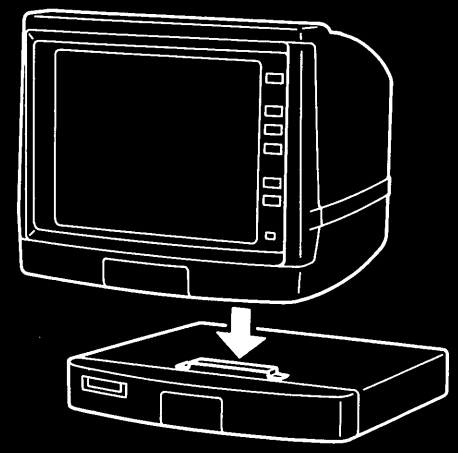


Secure with screws on the back.

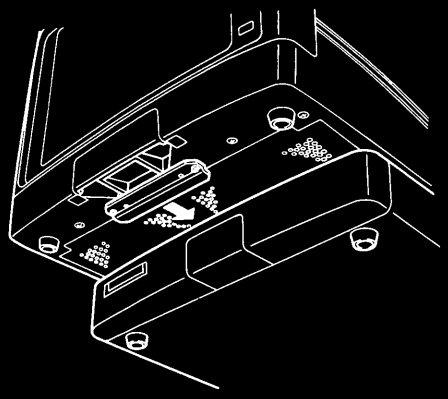


Mounting the receiver to the trolley is completed.

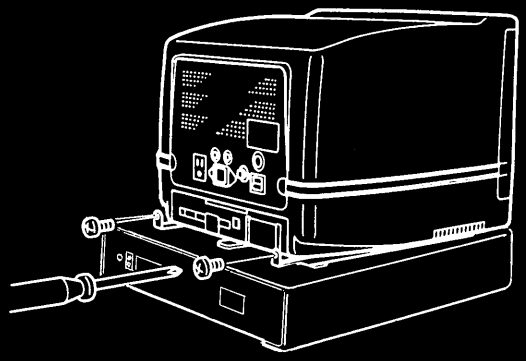
Mounting the Receiver to the Monitor



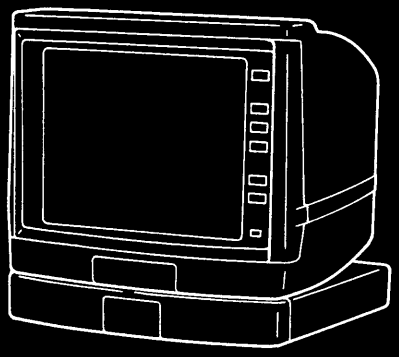
Place the monitor on the receiver such that the monitor mounting bracket is in front of the bracket on the receiver.



Slide the monitor so the fixtures engage.

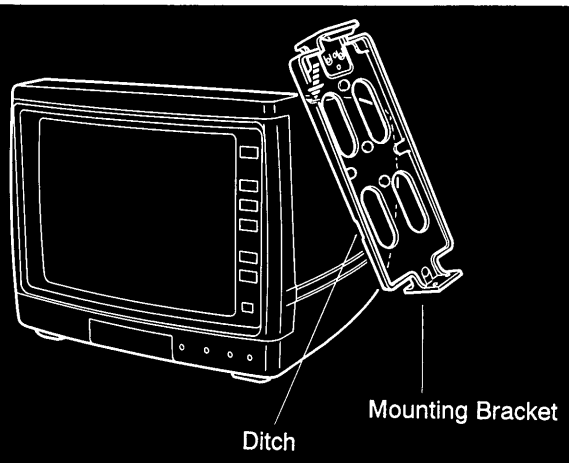


Secure together with screws on the back.

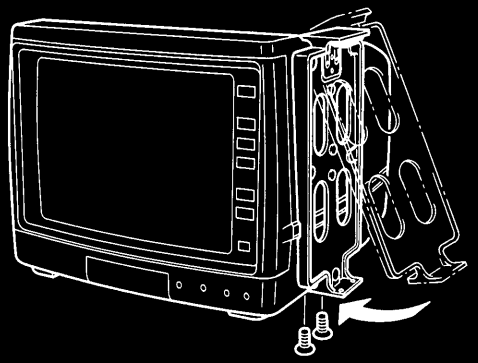


Monitor and receiver are connected.

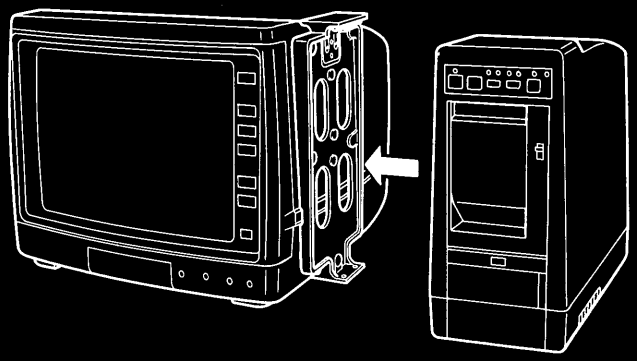
Mounting the AU – 3310 to the monitor



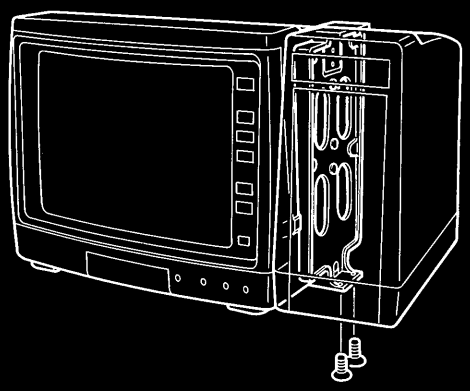
Attach the mounting bracket to the side of the monitor by locating the top of the mounting bracket into the concave area on the top of the monitor.



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

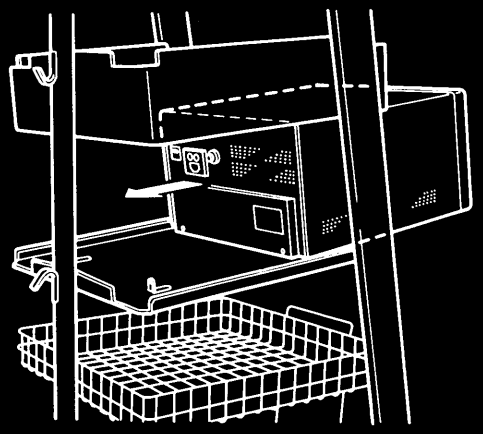


Using the same procedure, mount the AU - 3310 into the mounting bracket by locating the top of the bracket into the concave area on the top of the recorder.

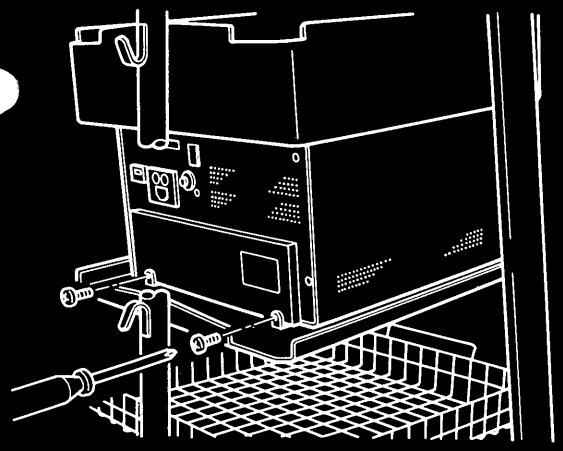


Move the bottom of the recorder to the bottom of the bracket and secure it with two mounting screws.

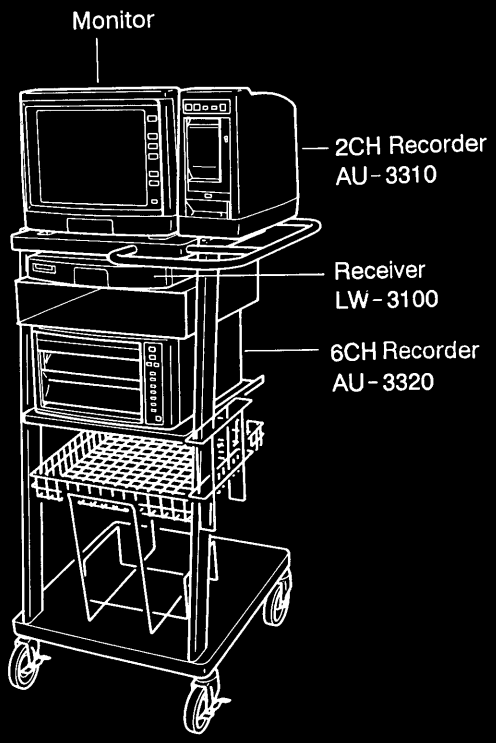
Mounting the AU-3320 to the monitor



Set the AU-3320 on the shelf of the trolley.

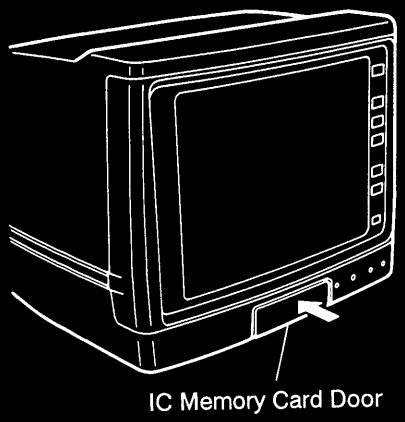


Secure the recorder with two screws into the rear panel.

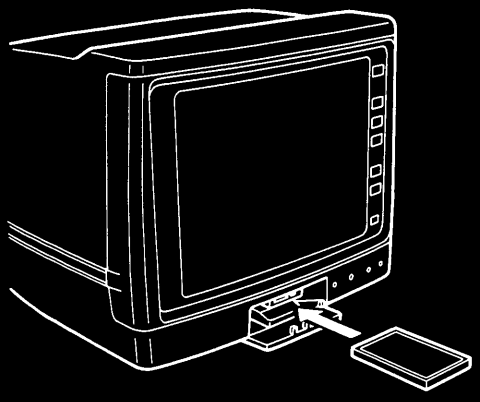


The figure at the left shows the correct installation location for the LW-3100, AU-3310 and AU-3320.

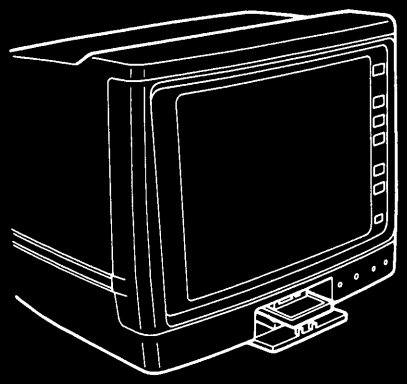
159



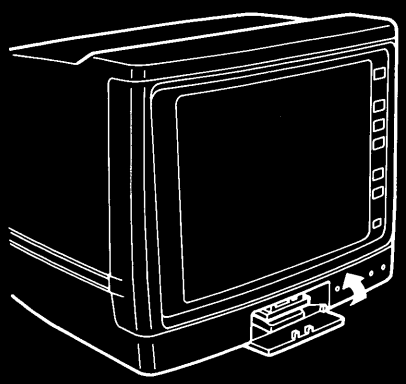
Push and open the door for the IC memory card.



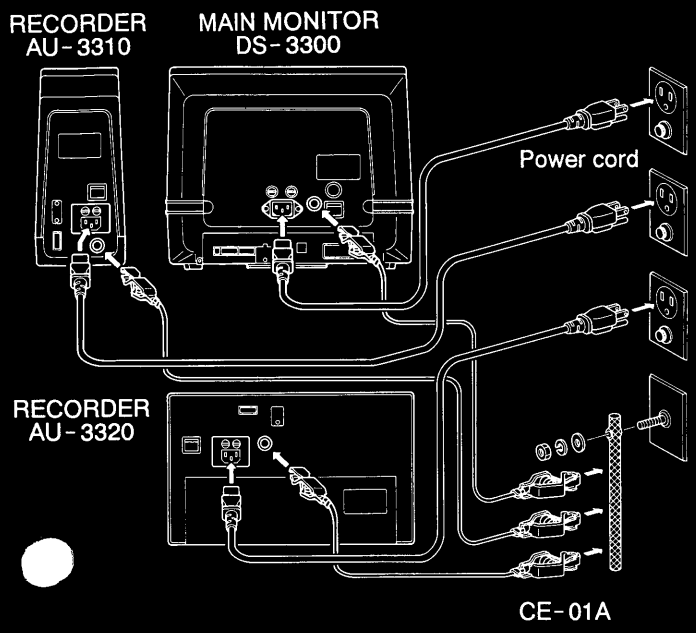
Insert the IC memory card into the slot.



The figure at the left shows the condition when 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.

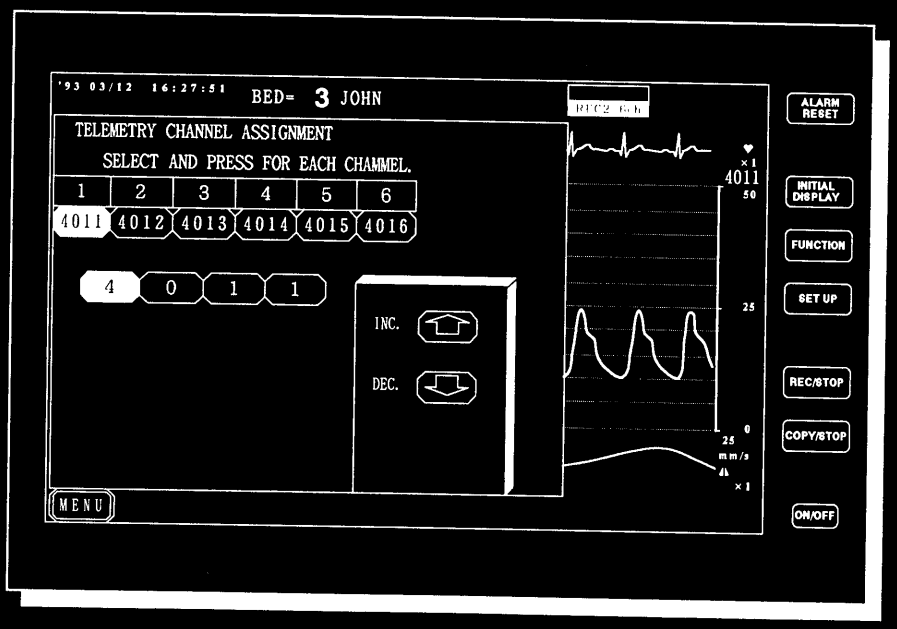
Recorder Connection

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

from (SET UP) push (PRE-SET)
then (CHANNEL NAME)

Push the (SET UP) switch. The SET UP MENU will appear. Push the (PRE-SET) key on the SET UP MENU. The PRE-SET MENU will appear.

Push the (CHANNEL NAME) key on the PRE-SET MENU. The TELEMETRY CHANNEL ASSIGNMENT display will be initiated. The monitor provides six receiving channels. Assign a name to the channel in four digits.



Assigning a Name to the Channel

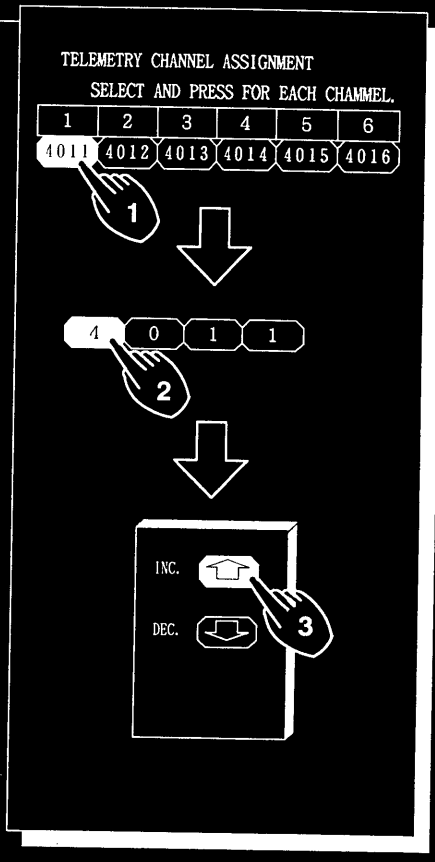
Note: For the channel used, contact your Fukuda representative.

◆ A channel name can be input using alphanumerics in a range of 0 to 9 and A to Z.

Push the arrow key ⇧ to increment.

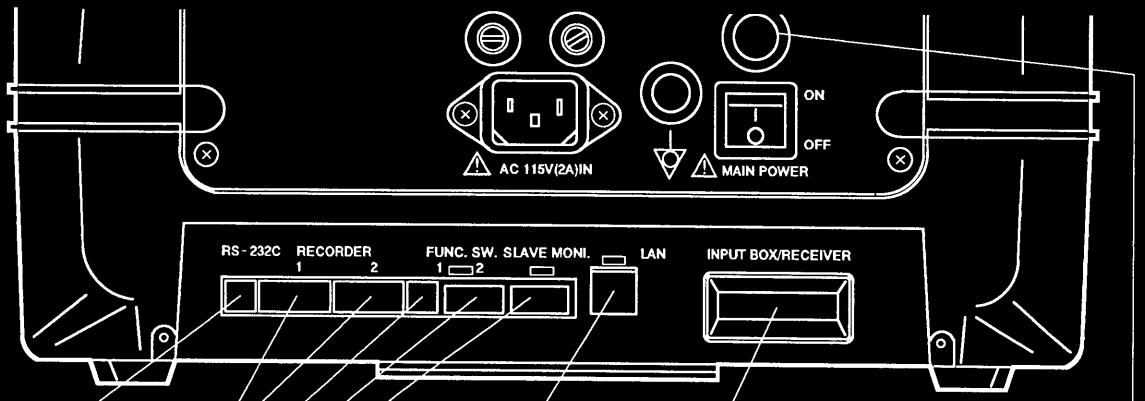
Push the arrow key ⇩ to decrement.

When alphanumerics are input for all four digits, push the RETURN key. The channel name will be entered and the arrow keys will disappear.

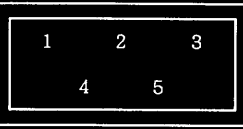


◆ Push the channel key to set. The name of the channel will be displayed at the center in a large size. Push any of the four digits. The key will be reverse-lit and INC. (⇧) / DEC. (⇩) keys will appear. Assign a channel name to the monitor according to the table on the rear panel of the receiver.

PIN ASSIGNMENT AND SIGNAL I/O

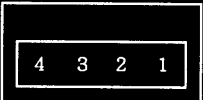


RS – 232C



1. RECEIVING DATA (RD)
2. GND
3. SENDING DATA (SD)
4. + 5V OUT
5. + 5V OUT

LAN

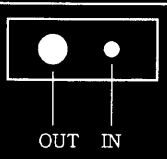


1. DIFF A I/O
2. DIFF B I/O
3. NC
4. NC

ALARM POLE

1. QRS SYNC.	11. OUT OF RANGE
2. PLUSE SYNC.	12. NURSE CALL
3. RESPIRATION SYNC.	13. BATTERY USED UP
4. BLOOD PRESSURE SYNC.	14. NC
5. PACEMAKER SYNC.	15. ALARM FOR AP-300
6. NC	16. QRS SYNC. for AP-300
7. ELECTRODE OFF	17. LOW (ID)
8. OUT OF RANGE	18. HIGH (ID)
9. +5V OUT	19. GND
10. +5V OUT	20. GND

RECORDER



SLAVE MONITOR

1. H. SYNC OUT	8. AG
2. V. SYNC OUT	9. AB
3. VIDEO OUT	10. GND
4. CLOCK OUT	11. GND
5. DATA OUT	12. GND
6. B. CONT OUT	13. GND
7. AR	14. GND

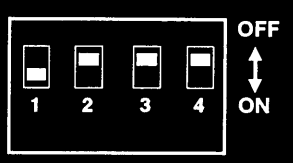
INPUT BOX/RECEIVER

1. NC	17. + 15V OUT
2. NC	18. + 15V OUT
3. NC	19. + 15V OUT
4. NC	20. + 15V OUT
5. + 5V OUT	21. + 15V OUT
6. GND	22. + 15V OUT
7. DATA IN	23. PG
8. DATA OUT	24. PG
9. NC	25. PG
10. NC	26. PG
11. NC	27. PG
12. NC	28. PG
13. NC	29. SHIELD
14. NC	30. SHIELD
15. NC	31. SHIELD
16. NC	32. SHIELD

FUNCTION SETTING 1

No.	MONITOR
0	CENTRAL
1	ECG TELEMETRY
2	BEDSIDE
3 ~ E	NC
F	SYSTEM INITIALIZATION

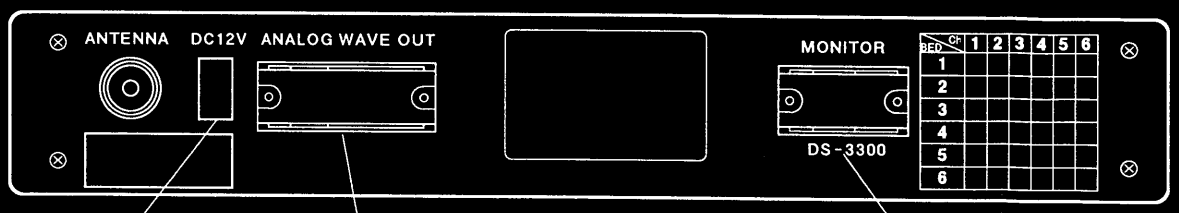
FUNCTION SETTING 2



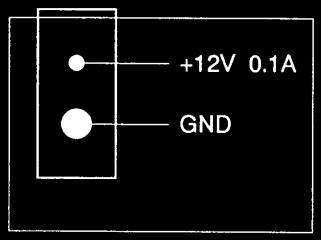
KEEP No. 2 ~ 4 THE SWITCHS TURNED OFF No.1 SWITCH TURNED ON .

INSTALLATION Pin assignments and input/output signal (LW-3311)

Rear Panel



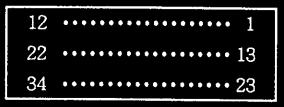
DC 12V



MONITOR

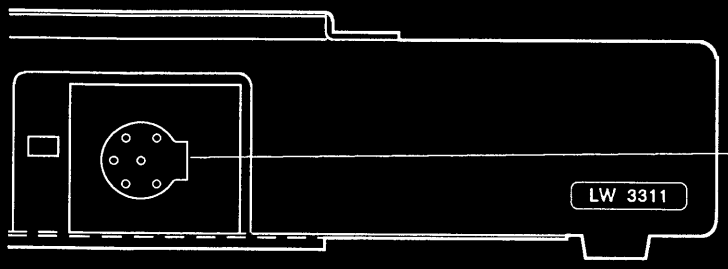
1. GND	8. + 15V	14. Shield
2. TXD	9. + 15V	15. PG.
3. RXD	10. + 15V	16. PG.
4. Unused	11. + 15V	17. PG.
5. Unused	12. + 15V	18. PG.
6. Unused	13. + 15V	19. PG.
7. Unused		20. PG.

ANALOG WAVE OUT

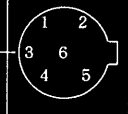


1. ECG 1 WAVEFORM	13.	23. Electrode OFF
2. NC	14.	24. NC
3. QRS SYNCHRONIZATION	15. NC	25. Battery used up
4. OUT OF RANGE	16. RESPIRATION OFF	26. NC
5. ECG 2 WAVEFORM	17.	27. Analog GND
6. NC	18. NC	28. Analog GND
7. RESPIRATION WAVEFORM	19.	29. Digital GND
8. RESPIRATION SYNCHRONIZATION	20. NC	30. Digital GND
9. NC	21. BLOOD PRESSURE 1 OFF	31. NC
10. BLOOD PRESSURE 2 WAVEFORM	22. BLOOD PRESSURE 2 OFF	32. NC
11. NC		33. + 5V
12. BLOOD PRESSURE 1 WAVEFORM		34. + 5V

Front Panel



ECG OUT



1. Analog GND
2. Digital GND
3. QRS SYNCHRONIZATION (TTL + 5V) 4. NC
5. ECG 1 WAVEFORM (1V/mV)
6. QRS SYNCHRONIZATION (TTL + 5V)