CE 0086

CARDIMAX

FX-7542

ELECTROCARDIOGRAPH

Ver. 04

OPERATION MANUAL



- Before using this device, read this operation manual.
- Store this manual in a safe location near the unit for future reference.

FUKUDA DENSHI

CE 0086

This device bears a CE label in accordance with the provisions of Medical Device Directive 93/42/EEC.

THE PERSONS RESPONSIBLE FOR PLACING DEVICES ON THE EC MARKET UNDER MDD 93/42/EEC

EC REP

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Note:
Only qualified physicians or persons under instructions from physicians are allowed to use the FX-7542.

Printed in Japan

Introduction

Thank you for purchasing our new electrocardiograph.

This operation manual is intended as a guide to proper operation of the CardiMax FX-7542.

Be sure to read and understand this manual thoroughly before using the CardiMax FX-7542. We recommend you to keep the operation manual near at hand while operating the equipment.

If you have any questions or opinions on the product or the manual, contact your local Fukuda Denshi sales or service representative.

This operation manual is for the FX-7542 Version 04.

Notes to Users

Labeling on the Equipment

The labels attached to the equipment provide important information for using the equipment safely and properly.

If these labels are damaged or removed, the safety of the operator or the patient may not be ensured because of missing information. Be careful not to damage the labels.

Reminders to Use the Equipment Safely

Be sure to use the equipment according to the operation and periodic inspection procedures given in this manual.

Be sure to read carefully and understand the contents of the manual before using the equipment.

Safety Precautions

The following safety symbols are used throughout this manual.
Each symbol has different meanings as shown below.
Be sure to read the contents provided with these symbols to use the equipment safely and properly.

⚠ **DANGER**	Failure to follow these instructions could cause death, serious injury, or imminent danger of fire.
⚠ **WARNING**	Failure to follow these instructions could cause death, serious injury, or fire.
⚠ **CAUTION**	Failure to follow these instructions could cause injury or damage to the equipment.

⚠	This mark is attached to the main unit to protect the equipment from being damaged. The manual provides detailed information on items to which you have to pay attention.

NOTE	A note provides information about the proper use and operating methods to prevent incorrect operations and trouble with the equipment.

Safety Icons


Indicates actions that are prohibited. Detailed instructions are provided next to the icon.


Provides instructions on how to cope with dangers, warnings, and cautions. Detailed instructions are provided next to the icon.


Indicates actions that must be performed. Detailed instructions are provided next to the icon.

Notes from Fukuda Denshi

We have a responsibility to assure your safety in using the equipment as a manufacturer of electronic devices for medical applications. To that purpose, maintenance, repair, or modification of the equipment should be performed by us or our authorized dealers. Failed parts, if any, will be replaced with specified parts.
Note that we are not responsible for failures caused by improper use of the equipment. Do not use the equipment for purposes not described in this operation manual.

Safety

Design Specifications

The Cardimax FX-7542 falls under the following equipment classifications.

1. **Protection against electric shock**
   Class I, Internally powered

2. **Type against electric shock**
   Type CF

3. **Protection against liquids entering the equipment**
   Not provided with protection against entry of water (IPX0)

4. **Operating safety in the presence of air-inflammable anesthetic gases or oxygen/nitrous oxide-anesthetic gases**
   The equipment is intended for use in an environment free from flammable anesthetic gases or flammable substances.

5. **Running mode**
   Continuous running mode

Preventive Maintenance

The purpose of preventive maintenance is to assure that the equipment is in safe operating conditions at all times and prevent potential future problems.

Perform preventive maintenance at least once a year.

Preventive maintenance is a thorough inspection to find external damage to the equipment main unit as well as all the connectors and cords.

Perform maintenance if one of the following should occur.

- When the equipment receives strong impact by being dropped and other causes
- When liquid spills on or inside the equipment
- When the equipment does not function properly
- When the external case is found cracked, broken, or damaged
- When the power cord, patient cables, and other cables show performance degradation

Danger of Explosion

⚠ DANGER

- **Do not operate the FX-7542 in an atmosphere of flammable anesthetic gas or oxygen in high concentration.**
  Explosion or fire may result.
- **Do not operate the FX-7542 within a hyperbaric oxygenation tank.**
  Explosion or fire may result.
- **Do not operate the FX-7542 in a place where flammable liquids or gases such as anesthetics, oxygen, and hydrogen are used.**
  Explosion or fire may result.
- **Do not use the gas pipe for grounding.**
  Explosion or fire may result.

Combination with Magnetic Resonance Imaging (MRI) Apparatus

⚠ WARNING

- **Before performing MRI scans, disconnect the electrodes and transducers connected to the patient.**
  Local heating due to induced electromotive force may cause burns to the patient. See the operation manual of the MRI apparatus for details.

Combination with Defibrillation Equipment

⚠ WARNING

- **Be sure to use the supplied patient cable (CP-104J, CP-104T, CP-104L) when operating the equipment along with defibrillation equipment.**

Optional Accessories

⚠ WARNING

- **Be sure to use cords and cables specified by us.**
  The use of cords and cables other than those specified may increase emission or decrease immunity.

High-frequency Surgery

⚠ WARNING

- **Attach the return electrode properly when using the FX-7542 along with a high-frequency surgery device such as an electric cautery.**
  Improper attachment may cause burns to the area to which the electrode is attached.

Disposing of the FX-7542 and Accessories

⚠ WARNING

- **Entrust disposal of the FX-7542 and its accessories to specialized industrial waste disposal services.**

Use of the FX-7542 and Supplied Cords

⚠ WARNING

- **Do not disassemble or modify the FX-7542.**
  Electric shock may result.
- **Do not touch the FX-7542 while defibrillation is in progress.**
  Electric shock may result.

- **Be sure to use the supplied patient cable (CP-104J, CP-104T, CP-104L).**
  The use of a patient cable other than those supplied with the equipment may damage the equipment or impair safety when the equipment is used along with a defibrillator.
- **Be sure to connect the power cord to a receptacle for medical use.**
  Use a battery if such receptacle is not available.
  Use a receptacle capable of supplying power to be consumed by the FX-7542.
- **Contact us before connecting the FX-7542 to other devices.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.

Connecting the Power Cord

⚠ WARNING

- **Be sure to connect the power cord to a receptacle for medical use.**
  Use a battery if such receptacle is not available.

Leakage Current

⚠ CAUTION

- **If the power cords from multiple devices are connected to the same receptacle, the patient may be exposed to danger due to increase of leakage current from those devices.**
- **If a cardiac pacemaker or other electrical stimulator is connected to the patient, the risk of a potential hazard to the patient may increase.**
  Pay particular attention to assure safety when taking ECG record in such conditions. Appropriate measures should be taken to assure that the leakage current falls within the permissible range. Follow the instructions of the operation manual of the cardiac pacemaker and other electrical stimulating devices.
- **When using the FX-7542 along with other devices, make potential equalization connection to prevent potential difference from occurring between the devices.**
  If there is potential difference between the devices, the patient or the operator may be exposed to danger.
- **Do not touch the electrodes of the FX-7542 or conductive part of the connectors to avoid danger to the patient.**

Application to Cardiac Systems

⚠ CAUTION

- **The FX-7542 is a type CF equipment, but not intended for direct applications to patients' heart.**

Transportation

⚠ CAUTION

- **Pack the FX-7542 with specified packing materials for transportation.**

⚠ CAUTION

- **Do not use or store the FX-7542 in a place subject to splash of water.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Do not subject the FX-7542 to a strong impact or vibration. Be careful not to drop it.**
  Electric shock or fire may result.
  Contact Fukuda Denshi's sales or service representative if you unintentionally drop the FX-7542.
- **Do not subject the liquid crystal display to a strong impact.**
  The display may be damaged.
- **Make sure that the patient does not come in contact with the FX-7542, other electric appliances, or metallic parts.**
  The leakage current may increase, thus exposing the patient to dangerous situations.
- **Do not insert the PC card or CF card in a wrong direction or with too much force.**
  Both the FX-7542 and the PC card or the CF card may be damaged.
- **When you unplug a cord, be sure to hold the plug and not the cord. Do not plug/unplug the cord with wet hands.**
  Electric shock, short circuit, or injury may result.
- **Operate the touch panel display with your finger.**
  If you tap the touch-panel display with a tool instead of your finger, the surface of the panel may be damaged or a failure may result.
- **Wipe off dirt on the surface of the touch-panel display with a soft cloth moistened with ethanol or with silicon cloth supplied with the equipment.**
- **When not using the FX-7542, place the supplied cover on it to prevent liquid from entering the liquid crystal display.**

[When using a battery pack]

- **Be sure to use a specified battery pack (T8HR4/3FAUC-5887).**
  Liquid leakage, heating, or explosion may result.

[Checks]

- **Perform daily checks to assure the safety of the FX-7542.**
- **Perform periodic checks (1) once every 3 to 4 months to assure the safety of the FX-7542.**
- **Perform periodic checks (2) by a specialist once every 12 months to assure the safety of the FX-7542.**

Also see individual precautions listed on each page.

⚠ CAUTION

[PC card and CF card]

- **Be sure to turn off the power before inserting/removing the PC/CF card.**
  If the PC/CF card is inserted or removed during operation, an error may result. If it is unavoidable to insert or remove the PC/FC card with the power kept on, be sure to check that the PC/CF card status display by the icon has changed, and then restart operating the equipment.
- **Do not remove the PC/CF card while ECG data is being stored in the PC/CF card.**
  Not only the data being stored but also previous data already stored may not be retrieved.

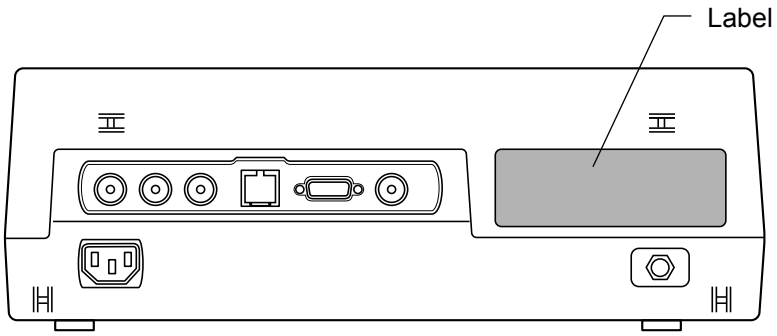
Also see individual precautions listed on each page.

⚠ CAUTION

Install the optional ECG Interpretation Software (FP-1001), and ECG examination can be carried out.
The interpretations and the Minnesota codes given by the FX-7542 do not demonstrate the type or the degree of development of cardiac diseases. Consequently, the 4-stage ranking in comprehensive judgment is made based only on electrocardiographic point of view. There may be a case where abnormality in ECG does not necessarily indicate that the patient has a cardiac disease (the abnormality in ECG may be occurring due to other causes) although the possibility that the patient has an organic heart disease is high. On the other hand, there may be a case where preclinical coronary atherosclerosis may be hidden although no abnormality is found in the ECG interpretation.
Make comprehensive judgment clinically with the ECG and other interpretations taken into consideration.

Label for Assuring Safety

A label is attached to the FX-7542 in an easy-to-see place to assure safety. The following figure shows the position where the label is attached.



Equipment Symbols

The following symbols are printed on the FX-7542.

 ..... Attention: Descriptions are given in the Operation Manual.

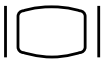
 ..... Type CF equipment, defibrillator

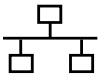
 ..... Potential equalization terminal

 ..... AC power supply

 ..... Serial port

 ..... External signal input/output

 ..... External CRT terminal

 ..... LAN port

If You Have a Trouble

If a trouble should occur, find the cause and take appropriate measures to make stable ECG recording.

■ AC interference

When the cause is in the patient

- Clean the patient's skin with alcohol or soap solution, and apply keratin cream.

When the cause is in the electrode

- Clean the electrode with alcohol or soap solution. If the dirt cannot be removed, polish the electrode with sandpaper.
- If the electrode is attached loosely, fasten it securely to the extent the patient does not feel pain.

When the cause is in the environment

- If there is interference of an X-ray imaging machine, diagnostic ultrasound imaging equipment, and other electrical appliances, turn off the power of those devices, or select a different inspection site.
- Ground the bed made of metal.

Others

- Check the grounding status of the equipment for a break of the grounding cord.
- Replace the patient cable that is about to break.

■ The base line of the ECG vibrates irregularly.

When the cause is in the patient

- If the patient seems nervous, make him/her feel relaxed by explaining that electrocardiography is a simple procedure that does not cause harm to the patient.
- Tell the patient to stop moving or talking if he/she is.

When the cause is in the electrode

- If the electrode is attached too tight, loosen it, paying attention that it does not come off.

When the cause is in the environment

- Perform the inspection in a place where the patient feels the room temperature comfortable.
- Provide a bed wide enough for the patient to feel comfortable.

■ The ECG waveform is unstable.

When the cause is in the patient

- Clean the patient's skin with alcohol or soap solution, and apply keratin cream.
- If the patient seems nervous, make him/her feel relaxed by explaining that electrocardiography is a simple procedure that does not cause harm to the patient.
- Tell the patient to stop moving or talking if he/she is. Ask him/her to stop breathing for some time while ECG recording is being made.

When the cause is in the electrode

- Clean the electrode with alcohol or soap solution. If the dirt cannot be removed, polish the electrode with sandpaper.
- If the electrode is attached loosely, fasten it securely to the extent the patient does not feel pain.
- Do not use old electrodes and new ones together.

When the cause is in the environment

- Avoid selecting a place where the temperature is high enough to make the patient perspire.

■ Measures to ensure Electromagnetic Compatibility (EMC)

The FX-7542 complies with the safety standards IEC60601-2-25 (1999) and IEC60601-1-2 (2001). However, if strong electromagnetic waves exceeding the allowable limit exist nearby, malfunction may result. Take appropriate measures in such cases.

Effect of electromagnetic emission

- Use of a mobile phone terminal may cause malfunction to the equipment.
  Tell everyone in the facilities where medical electric equipment is installed to turn off the power of their mobile phones and small radio devices.

Effect of burst and conducted electromagnetic waves

- High-frequency noise may be transmitted from other devices through a power receptacle. Identify the source of the noise, and turn off the source device if possible. If not, place a noise eliminator or take other necessary measures.

Effect of static electricity

- In dry indoor conditions in winter, static electricity discharge may cause malfunction of the equipment. Humidify the room, or discharge the static electricity from the operator and the patient before using the equipment.

Effect of surge (lightning)

- If lightning occurs nearby, excessive voltage may be induced to the equipment. If danger is suspected, remove the power plug from the AC receptacle, and use the embedded battery power (option), or use a UPS, if provided.

If an error message is displayed, see "Error Messages and Remedies" on page 17 and subsequent pages.

Guidance for Electromagnetic Compatibility (EMC)

Details on the electromagnetic compatibility (EMC) of the FX-7542 are given below. Read and understand the following information before using the FX-7542.

■ Compliance with electromagnetic emissions

The FX-7542 is intended for use in **the electromagnetic environment** specified by the following table. Before using the FX-7542, check the environment of the site where it is used.

Emission test	Compliance	Electromagnetic environment/guidance
RF emissions CISPR 11	Group 1	The FX-7542 uses RF energy for its internal functions only. Therefore, its RF emissions are very low and are not likely to cause any interference with the electronic equipment installed nearby.
RF emissions CISPR 11	Class B	The FX-7542 is intended for use in all types of buildings including private houses. The equipment can be connected directly to the commercial low-voltage power supply in buildings used for domestic purposes.

■ Compliance with electromagnetic immunity (1)

The FX-7542 is intended for use in **the electromagnetic environment** specified by the following table.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment/guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV Contact ±8kV Air	±6kV Contact ±8kV Air	It is desirable that the floor material be wood, concrete, or ceramic tile. If the floor is covered with a synthetic material, relative humidity should be 30% or higher.
Electrically fast transition/burst IEC 61000-4-4	±2kV Power supply lines ±1kV Input/output lines	±2kV Power supply lines ±1kV Input/output lines	It is desirable that the quality of the power supply be equivalent to that of a standard commercial or hospital environment.
Surge IEC 61000-4-5	±1kV: Differential mode ±2kV: Common mode	±1kV: Differential mode ±2kV: Common mode	It is desirable that the quality of the power supply be equivalent to that of a standard commercial or hospital environment.
Voltage drops, dips, and fluctuations of input power supply line IEC 61000-4-11	<5% U_T (>95% drop in U_T) for 0.5 cycles 40% U_T (60% drop in U_T) for 5 cycles 70% U_T (30% drop in U_T) for 25 cycles <5% U_T (>95% drop in U_T) for 5 seconds	<5% U_T (>95% drop in U_T) for 0.5 cycles 40% U_T (60% drop in U_T) for 5 cycles 70% U_T (30% drop in U_T) for 25 cycles <5% U_T (>95% drop in U_T) for 5 seconds	It is desirable that the quality of the power supply be equivalent to that of a standard commercial or hospital environment. If the FX-7542 user requires continuous operation even during a power failure, it is recommended to use an uninterruptible power supply or a battery (option).
Magnetic field of commercial frequency (50/60 Hz) IEC 61000-4-8	3 A/m	3 A/m	It is desirable that the power frequency magnetic field have the same characteristics as those of general locations in a standard commercial or hospital environment.

NOTE: U_T puts priority on the AC power supply voltage over the applied test level.

■ Compliance with electromagnetic immunity (2)

The FX-7542 is intended for use in **the electromagnetic environment** specified by the following table.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment/guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2.5 GHz	3 Vrms 3 V/m	Do not use portable or mobile RF communications equipment in a place closer to any part of the FX-7542 (including cables) than the recommended separation distance calculated with the formula applicable to the transmitter frequency ranges shown below. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 80 MHz to 2.5 GHz where, P is the maximum output power rating of the transmitter in watts (W) according the transmitter manufacturer, and d is the recommended separation distance in meters (m). The field strength from fixed RF transmitters (determined based on the result of electromagnetic survey[a]) must be lower than the compliance level in each frequency range[b]. Interference may occur in the vicinity of the equipment marked with the following symbol. 

NOTE 1: The separation distance for higher frequency range applies to 80 MHz and 800 MHz respectively.

NOTE 2: These guidelines may not apply to all situations. Electromagnetic propagation is affected by reflection and absorption from buildings, objects, and people.

a: The field strength of fixed transmitters such as base stations for radio (cellular/cordless) phones and land mobile radios, amateur radio, AM/FM radio broadcast and TV broadcast base stations cannot be predicted theoretically with accuracy. To assess the electromagnetic environment produced by fixed RF transmitters properly, perform electromagnetic survey at site. If the measured field strength at site where the FX-7542 is used exceeds the applicable RF compliance level shown above, the equipment should be monitored to assure normal operation. If an abnormality is found, additional measures such as re-orienting or relocating the FX-7542 may be required.

b: It is desirable that the field strength be 3 V/m or less for the frequencies that do not fall within the 150 KHz to 80 MHz range.

■ Recommended separation distance between portable/mobile RF communications equipment and the FX-7542

The FX-7542 is intended for use in **an electromagnetic environment** where RF emission interference is controlled. **The electromagnetic interference** can be prevented during operation by maintaining the minimum distance between the portable/mobile RF communications equipment (transmitters) and the FX-7542 shown below (recommended values based on the maximum output power of the transmitter).

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	26 MHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at the maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the formula applicable to the frequency of the transmitter. P in the formula is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: The separation distance for higher frequency range applies to 80 MHz and 800 MHz respectively.
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection and absorption from buildings, objects, and people.

■ Interference by electric cautery

The FX-7542 is protected against the operation failure caused by the use in combination with the electric cautery specified below.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment/guidance
Incision mode	Output power: 300 W	Output power: 300 W	When the electric cautery is generating RF energy, the noise level of the waveform displayed/recorded in the FX7542 increases. The original level is restored in 10 seconds after the generation of RF energy is stopped. If waveforms during the period including generation of RF energy are analyzed, effective examination result may not be obtained.
Coagulation mode	Output power: 100 W	Output power: 100 W	

Error Messages and Remedies

This section describes the types of error messages displayed on the screen and remedies.

B

Message	Cause	Remedy
Battery error. Power has been turned off automatically.	Battery error occurred.	Connect the power cord to switch to AC operation. If operation is not switched to AC operation even after a certain period of time elapses, the power is automatically turned off.
Battery power is insufficient. Charge the battery.	Since battery charge became low during battery operation, the power was automatically turned off.	Connect the power cord to allow AC operation, or charge the battery before resuming operation.
Battery voltage is low. Recording cannot be made.	Recording was not started because of low battery charge during battery operation.	Connect the power cord to allow AC operation, or charge the battery before resuming operation.
Battery voltage is low. Recording was suspended.	Recording was suspended because of low battery charge during battery operation.	Connect the power cord to allow AC operation, or charge the battery before resuming operation.

C

Message	Cause	Remedy
CF card cannot be used.	A CF card of different format type has been inserted.	Insert the CF card formatted for the equipment.
CF card is full. Replace the card.	The maximum number of data that can be stored in the CF card has been reached.	The data before this message appeared has been stored. Replace the inserted CF card with a new one.
Charge the battery before using it.	The battery charge connected to the device is low.	Charge the battery before operating the equipment with the battery.
Check serial port setting.	Serial port setting is not correct.	Check the contents of the setting.
Check the connection of the ID reader.	The ID reader is not connected properly.	Check the state of the ID reader and the connection status. Also check the setting on the connection of ID reader.
Check the connection with the load device.	The connection with the load device such as master rack is not correct.	Check the status of each load device and the connection with it. Also check the setting on the connection with the load devices.
Check the ECG amplifier on side A.	The amplifier set on side A differs from the setting.	Check the amplifier set on side A and its setting.
Check the ECG amplifier on side B.	The amplifier set on side B differs from the setting.	Check the amplifier set on side B and its setting.
Check the setting of the ID reader.	The setting of the ID reader function is not correct.	Check the connection of the ID reader and the ID reader format setting.

Message	Cause	Remedy
Copying failed.	Copying of data failed.	Check that the medium to which the data is to be copied is available.

D

Message	Cause	Remedy
Daily report data has been initialized.	The daily report data was initialized when the power was turned on.	If the message appears every time the power is turned on, the memory backup battery may be dying. Replace the battery in such cases.
Data cannot be sent to the host.	Transmission to DMS failed.	The data attempted to be sent when this message appeared has not been transmitted. Contact us, informing of the error cord that appeared at the end of the message.
Data cannot be written.	The data cannot be written with this equipment.	The error may occur when the data stored with another device is to be copied. Check the data.
Data cannot be written because of capacity shortage of the CF card.	Writing failed because the maximum number of data to be stored in the CF card has been reached.	The data attempted to be stored when the message appeared has not been stored. Replace the CF card with a new one, and write the data again.
Data cannot be written because of capacity shortage of the PC card.	Writing failed because the maximum number of data to be stored in the PC card has been reached.	The data attempted to be stored when the message appeared has not been stored. Replace the PC card with a new one, and write the data again.
Daily report data is full.	Automatic recording has been made exceeding the number that can be controlled as a daily report in a day.	Record the daily report as required, and then initialize the daily report data.
Data was not read properly with the ID reader.	Read the data again.	If the data cannot be read even if reading is attempted many times, the magnetic card may be faulty.
Deletion failed.	Deletion of ECG data failed.	The PC card or the CF card may be faulty. Contact us.

F

Message	Cause	Remedy
Folder in which the data is to be copied is full. Select another folder.	The number of data stored in the folder of the PC card or the CF card in which the data is to be copied has reached 300.	Select another folder.
Formatting of the CF card failed.	Formatting of the CF card failed.	The inserted CF card may be faulty. Contact us.
Formatting of the PC card failed.	Formatting of the PC card failed.	The PC card set may be faulty. Contact us.

I

Message	Cause	Remedy
Insert a CF card.	A CF card is not inserted.	Insert the CF card.

M

Message	Cause	Remedy
Master ID processing failed.	Master ID request to DMS was not made.	Check the connection with the DMS.

N

Message	Cause	Remedy
No applicable data exists.	Data requested for DMS was not found.	Check the contents of the DMS request.
No applicable data was found by the search. Check the details of the search.	No applicable data was found when search was attempted with file/network utilities or recording of daily report was attempted with daily utilities.	Check the search conditions.
No data exists in this folder.	Data to be retrieved was not found in a folder of the PC card or the CF card.	Replace the medium with the one to which ECG data is stored.
No recording paper	Recording paper is not set.	Set recording paper properly.

P

Message	Cause	Remedy
Paper magazine is open.	The paper magazine is open.	Close the paper magazine.
Patient’s data has not been entered.	An attempt was made to start the inspection with either one of the age or the sex of the patient not entered.	Enter the age and the sex before starting the inspection. Even if this message appears, the inspection is started.
Patient data has not been updated.	An attempt was made to start the inspection without updating the patient data.	Update the patient data before starting the inspection. Even when this message appears, the inspection is stared.
PC card cannot be used.	A PC card of different format type has been inserted.	Insert the PC card formatted for the equipment.
PC card is full. Replace the card.	The maximum number of data that can be stored in the PC card was reached.	The data before this message appeared has been stored. Replace the inserted PC card with a new one.

Message	Cause	Remedy
Power is automatically turned off to prevent battery consumption.	If operation is not made within the set period of time under battery operation, the power is automatically turned off.	Turn on the power again.

R

Message	Cause	Remedy
R wave cannot be detected. Check the cable.	Examination/measurement of waves failed.	Check the state of the electrodes and record the data again.
Recording time	It is 10 seconds before the start of interval recording after exercise.	Check the recording status.
Recording was suspended because the thermal array head overheated. Turn off the power.	The thermal array head for recording is abnormally overheated.	Turn off the power, wait for some time, and then record the data again. If overheating occurs frequently, the device may be faulty. Contact us in such cases.
Recovery failed.	Recovery of ECG data failed.	The CF card or the PC card may be faulty. Contact us.
Removal failed.	Removal of ECG data failed.	The PC card or the CF card may be faulty. Contact us
Replace the CF card for examination data.	Storage of ECG data in CF card for storing function setting was attempted.	Replace the CF card with the one for storing examination data. Format the CF card if it is to be used for the first time.
Replace the CF card with the one for setting backup.	An attempt was made to write the function setting in the CF card for storing ECG data.	Replace the CF card with the one for setting backup. Format the CF card that is to be used for the first time.
Retrieval failed.	Retrieval of ECG data failed.	The PC card or the CF card may be faulty. Contact us.

S

Message	Cause	Remedy
Serial port data storage failed.	Storage of serial port measurement data failed.	Check the connection of the serial port and the device connected.
Set the PC card.	The PC card is not set.	Set the PC card.
Storage in DMS cannot be made because master ID processing is in progress.	An attempt was made to store the data in DMS while master ID processing was in progress.	The data attempted to be stored when this message appeared has not been stored. Store the data after master ID processing is completed.
Storage of data in the CF card failed.	Storage of data in the CF card failed.	The inserted CF card may be faulty. Contact us.
Storage of data in the PC card failed.	Storage of data in the PC card failed.	The PC card inserted may be faulty. Contact us.

T

Message	Cause	Remedy
Target number of the test has not been set.	The target number of the Master's test has not been entered.	Enter age, sex, weight, and the amount of exercise for the target number to be automatically calculated, or enter the target number using the ten keys.
There is no data to be retrieved.	No data to be retrieved was found in the PC card, CF card, or DMS.	Replace the medium with the one containing ECG data.
There was no ID:ZZZ (*) information.	When the patient data acquisition function was used, no corresponding patient data was found.	Check whether the entered ID is correct or the ID is registered in DMS.
Transfer failed.	Data transfer between PC card or CF card folders failed.	The PC card or the CF card may be faulty. Contact us.

(* The entered ID number appears for ZZZ.)

U

Message	Cause	Remedy
Under battery operation. Switch to AC power.	Continuous inspection such as stress inspection was attempted during battery operation.	Since the inspection may have to be suspended because of insufficient battery charge, connect the power cord to switch to AC operation.
Use a different folder.	The number of data transferred between PC or CF card folders and stored in the folder has reached 300.	Use a different folder for storage.

W

Message	Cause	Remedy
Writing in the CF card is not allowed.	Writing in the CF card is prohibited.	Check that the data can be written, and insert the CF card formatted for the equipment.
Writing in the PC card is not allowed.	Writing in the PC card is prohibited.	Check that the data can be written, and insert the PC card formatted for the equipment.

Z

Message	Cause	Remedy
Z-fold paper has been selected.	Roll paper is used while Z-fold paper has been selected.	Select roll paper in the setting to use roll paper. If the setting is not to be changed, replace the roll paper with Z-fold paper.

Maintenance and Inspection

About Maintenance and Inspection

This section describes the items of maintenance and inspection to be performed for The CardiMax FX-7542.

To use the equipment safely and maintain its reliability on functions and performance, be sure to perform daily inspections before use and periodic inspections.

Note that we are not responsible for the accidents caused by not performing maintenance and inspection.

⚠ CAUTION

⚠
- **Do not open the enclosure of the FX-7542.**
- **Pay attention not to let liquid such as alcohol enter the FX-7542.**

Daily Inspection

Perform daily inspections every day according to the daily inspection record table.

If any one of the judgment items on the daily inspection record table is marked as "NG," overall judgment is "NG." Take appropriate measures to eliminate the defect.

Do not use the FX-7542 until all the items are marked as "Good."

Periodic Inspection

To prevent failures or accidents and maintain safety and effectiveness of electronic devices for medical use, periodic inspection is essential. Yakuhatsu No. 495 defines maintenance and inspection as follows: "Maintenance and inspection are activities to provide an environment where a device can operate properly or improve unfavorable conditions to maintain the performance, reliability, and safety of the device at a high level, thus fulfilling the performance of the device effectively and safely. Periodic inspections are part of this process."

Each medical organization should perform periodic inspections by itself. Or the inspections can be consigned to Fukuda Denshi's dealers and sales offices or third parties by concluding a "maintenance/inspection contract." Contact Fukuda Denshi's dealers or sales offices nearest to you for details.

If any one of the judgment items on the periodic inspection record table is marked as "NG," overall judgment is "NG." Take appropriate measures to eliminate the defect.

Do not use the FX-7542 until all the items are marked as "Good."

Cleaning and Sterilizing Electrodes and Patient Cables

Wipe the electrodes and patient cables to be reused with cotton or a cloth moistened with alcohol solution to sterilize them. Then wipe off moisture with soft lint cloth.

⚠ WARNING

- **Infections may occur via electrodes. To prevent infections, keep the electrodes clean and sterilized at all times.**

⚠ CAUTION

- **Do not perform heat sterilization with water, steam, or air.**
- **Do not use cleaning liquid other than the one specified.**

Cleaning and Sterilizing the Main Unit

Clean and sterilize the exterior of the FX-7542, following the procedure shown below.

- **Cleaning**
  Wipe the main unit with a cloth moistened with cleaning liquid for household use diluted with water. Do not use ether or benzene to prevent damage to the housing.
- **Sterilization**
  Spray alcohol solution, and then wipe off moisture with a soft lint cloth.

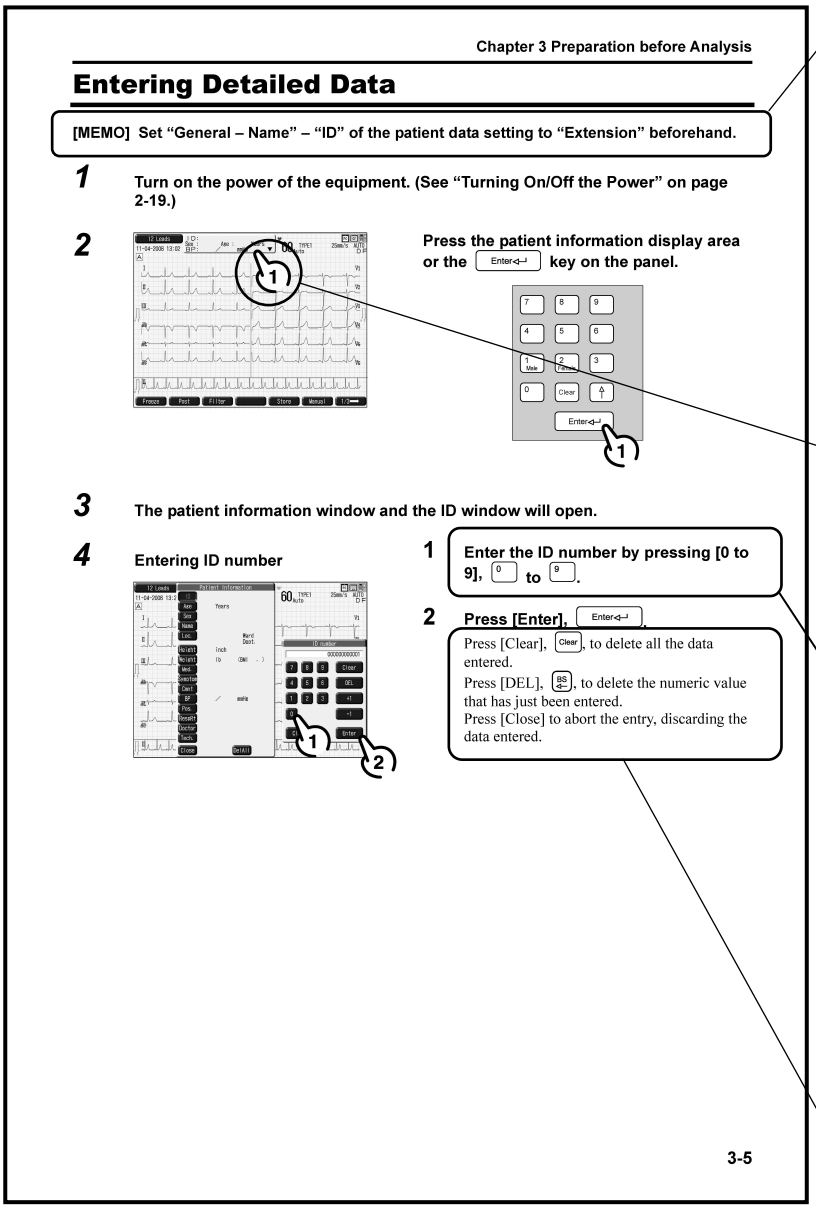
Cleaning the Thermal Array Head

If foreign matter generated by printing is attached to the thermal array head, the printing quality deteriorates. In such cases, wipe the thermal array head using the cleaning kit specified by us or a cotton swab moistened with alcohol.

Do not use sandpaper to prevent damage to the electric heating element.

How to Read This Manual

This manual uses the following symbols to demonstrate the degree of importance of information.



The marks indicate the following.

[NOTE]: Provides information required to use the equipment properly. Be sure to read the contents.

[MEMO]: Provides detailed explanation on operation and related information.

The following icons indicate the order of pressing the screen.



Indicates the operating procedure.

Follow the instructions provided here.

- **The function keys displayed on the screen are enclosed in square brackets [ ]. Example: [AUTO], [MENU]**
- **The keys on the operation panel are enclosed in rectangles ☐. Example: Enter, Clear**

Supplementary explanations on operating procedure
Provides detailed procedure and supplementary information on operation.

FP-1001

The function is enabled only when the optional ECG Interpretation Software (FP-1001) is installed.

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Chapter 1

Introduction

This chapter describes basics of the CardiMax FX-7542 such as characteristics and names of each part.

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- **Useful Functions 1-3**

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Features of the FX-7542

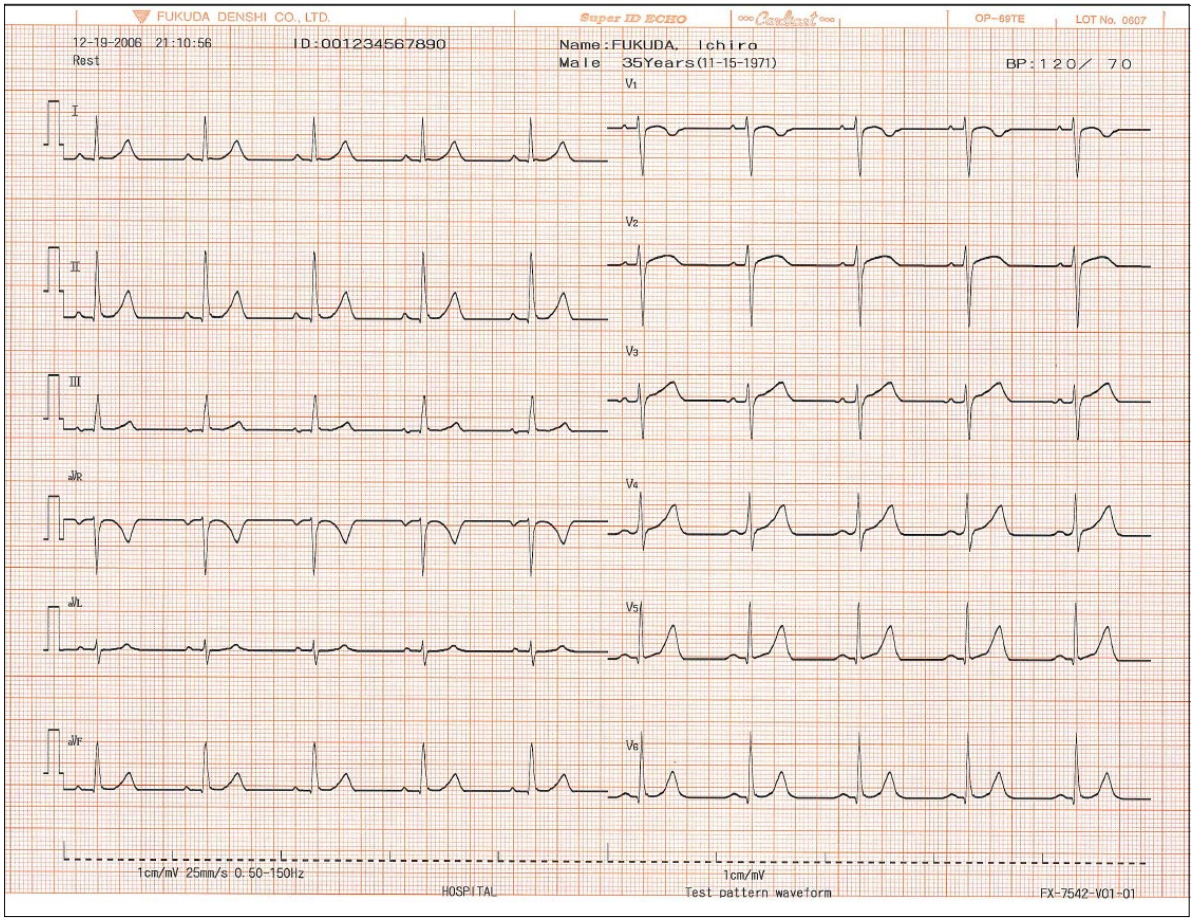
The CardiMax FX-7542 measures a standard 12-lead electrocardiogram (ECG) with high accuracy and performs examination for disease classification. The result of the examination and the ECG waveforms can be recorded and printed. The ECG data can be stored in a PC card and a CF card.

Examinations That Can Be Carried Out with the FX-7542

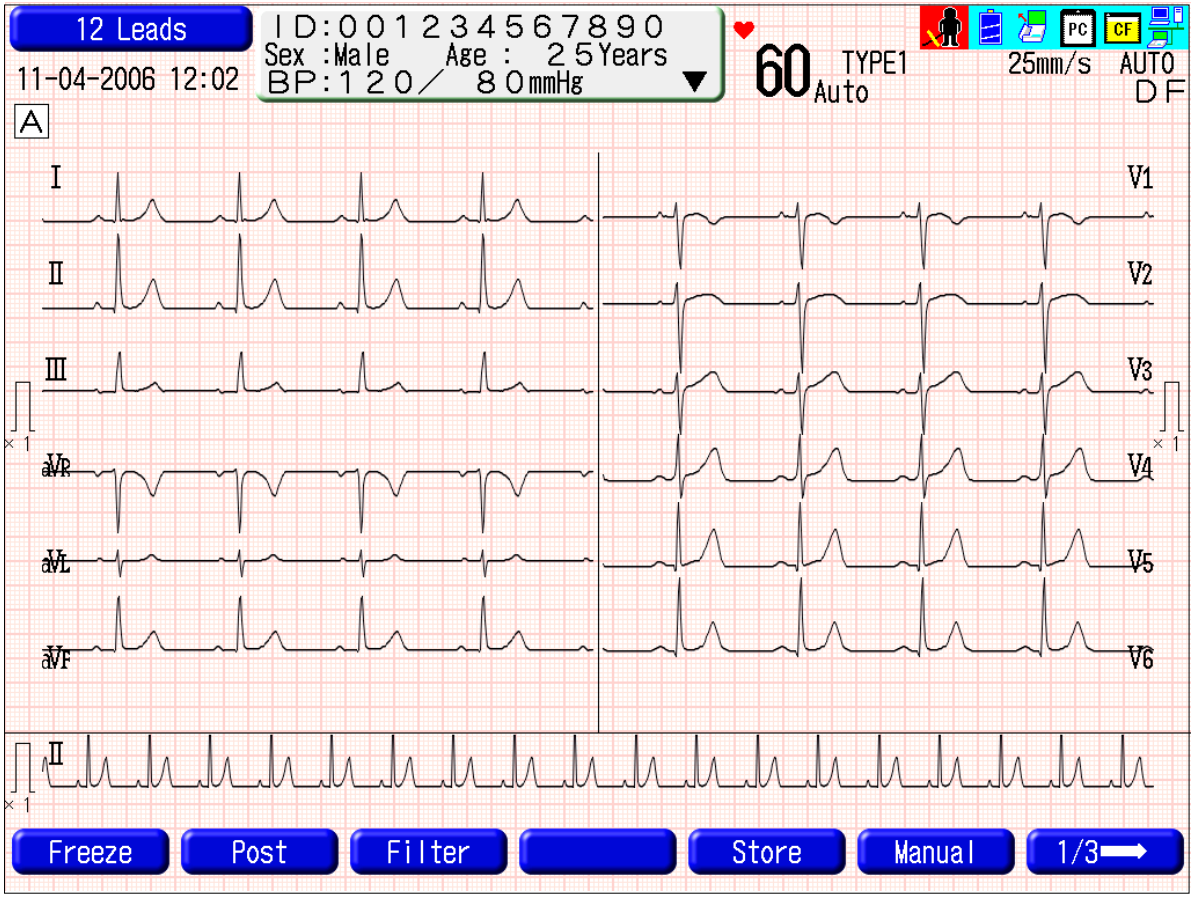
- **Standard 12-lead examination**
  Standard 12-lead ECG examination as well as stress judgment by 12-lead examination after exercise can be carried out.
- **Long-term arrhythmia examination**
  Three-lead long-term arrhythmia examination and 1-lead R-R measurement can be carried out.
- **Master's test**
  An exercise test can be carried out by Master's 2-step method. Stress judgment by 12-lead examination can also be carried out in the post-exercise state.
- **15-lead examination**
  By mounting the ECG amp module (EE-21) to the option slot, 15-lead examination can be carried out.
- **DC input examination**
  Biological signals coming from external devices connected to the FX-7542 can be fetched, and their waveforms can be displayed and printed.

Useful Functions

- **Information for interpreting ECG is provided.**
  Install the optional ECG Interpretation Software (FP-1001) in the FX-7542, and the 12-lead ECG examination function is enabled. The examination program makes Minnesota code classification, interpretation classification, and the classification by age and sex based on clinically improved diagnostic standard, thus improving the accuracy of examinations. The FX-7542 is also provided with examination programs for screening and the Law of Health and Medical Services for the Aged. The result of examinations is recorded in a new report format useful for multilateral ECG diagnoses.
- **Detailed interpretations on the result of ECG examination can be displayed.**
  For the interpretations displayed as the result of examination, the judgment criteria used for selecting the interpretation (guide) as well as detailed information on the interpretation (commentary) can be displayed. (See Chapter 6 “Commentary Function.”) Detailed information of an interpretation can be checked based on the name of the interpretation even long after the examination is performed.
- **Various ECG can be recorded.**
  Not only resting ECG recording but also interval recording and various other measurements for exercise tests can be carried out by controlling the master unit. The recording channel and report format of these ECG recordings can be changed according to applications.
- **Important examination data can be stored in a PC card or a CF card.**
  The FX-7542 is equipped with a PC card slot and a CF card slot in which the ECG data can be stored.
- **Examination data can be printed clearly on recording paper.**
  Adoption of high-density thermal printing method allows clear ECG to be recorded on a 210-mm wide recording paper. Furthermore, the patient data as well as ECG examination record can be recorded at the same time.



- **ECG waveforms can be checked on a large color LCD.**
  The large color LCD displays ECG waveforms clearly. The conditions of the patient such as heart rate as well as the status of devices such as electrodes and the recorder can also be checked on the screen. By connecting an external display unit, the ECG waveforms can be checked in a place away from the patient.



- **Switching can be made between 2 patients.**
  Mount the ECG amp module (EE-20, EE-21) to the option slot, and switching can be made between 2 patients connected to the equipment at the same time. If EE-21 is mounted, 15-lead examination can also be carried out.
- **The laptop equipment is easy to operate.**
  The FX-7542 is laptop-type equipment consisting of a color LED provided at the top and an operation panel provided underneath the LED. The touch panel system adopted for the color LCD allows you to perform most of the operations by just pressing the buttons displayed on the screen. The color of the pressed button changes, allowing you to check if the button is pressed properly. (Use of the key button on the operation panel further facilitates operations.)

[NOTE] Be sure to press the keys on the color LCD and the operation panel with your finger.

- **Use of the options allows you to transfer the FX-7542.**
  A handle and a built-in battery are optionally available for you to use the FX-7542 anywhere you want. Transfer of the equipment and long-term battery operation are thus allowed. ECG examination can be carried out even if a power receptacle is not available.
- **An electric cautery can be used with the FX-7542.**
  The FX-7542 operates properly without being affected by high-frequency current generated from an electric cautery.

Names and Functions of Parts

This section describes the names and functions of each part.

⚠ WARNING

- **Contact your local Fukuda Denshi sales or service representative before connecting other instruments to the FX-7542.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Be sure to use the supplied patient cable (CP-104J, CP-104T, CP-104L).**
  If a patient cable not provided with protective function against defibrillation is used, the equipment may be damaged or safety may not ensured.

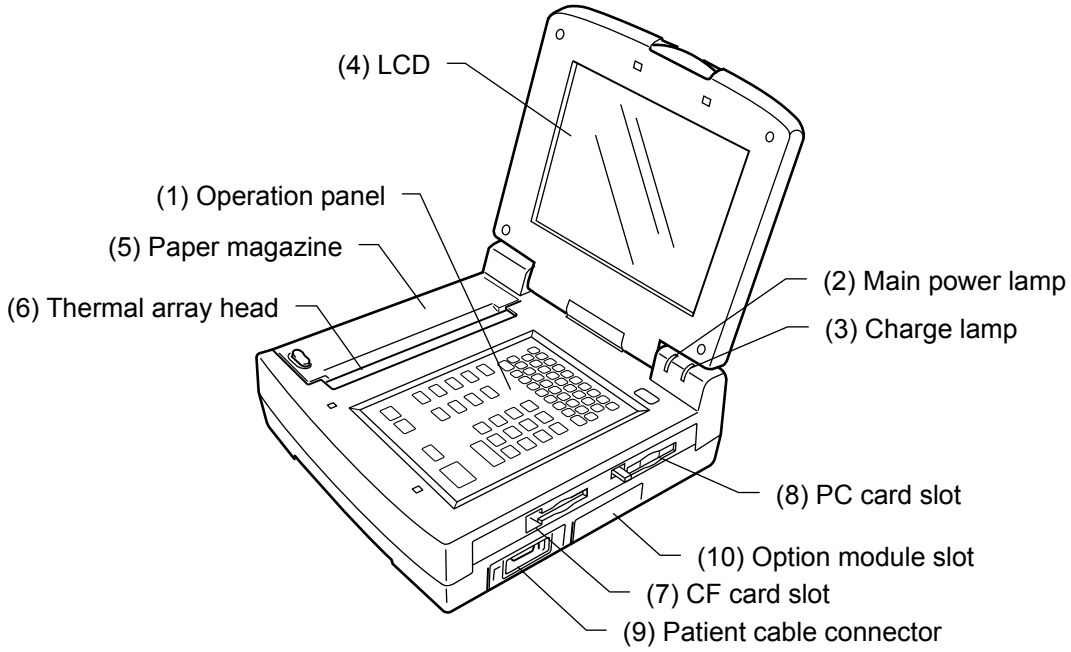
⚠ CAUTION

- **Be careful not to bend, drop, or have impact on the PC card and the CF card.**
- **Be careful not to have impact on the equipment while data is being stored in the PC card and the CF card.**
  Otherwise the recorded data may be lost or the card may be damaged.
- **Do not touch the terminal of the PC card and the CF card with your hand or a metallic object.**

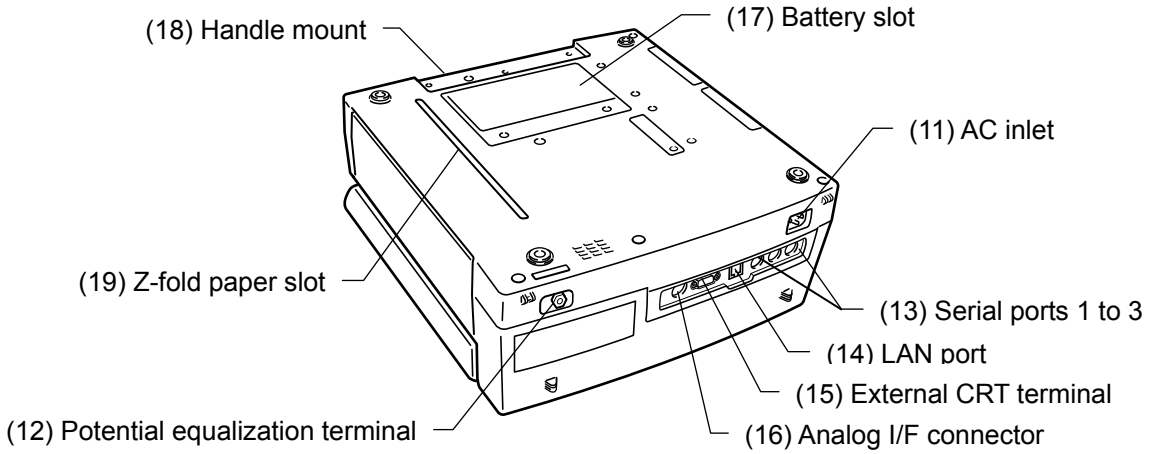
Notes on the danger/warning labels attached to the equipment

- **These danger/warning labels provide important information for using the equipment safely and properly.**
- **Do not damage the danger/warning labels attached to the equipment or erase the characters on the labels.**

<Front view>



<Rear view>



The function of each part is as follows.

(1) Operation panel

Consists of key switches for operations. ECG recording can be started and patient data can be entered using these key switches.
See “Types and Functions of Operation Panel Keys” on page 1-9 for the functions of each key.

(2) Main power lamp (Green)

Stays on when the equipment is connected to the AC receptacle.

(3) Charge lamp (Green/orange)

Keeps flashing in green while the battery is being charged, and goes off when charging is completed. If a failure should occur while charging is in progress, the lamp comes on in orange. (See “Charging the Battery” on page 2-7.)

(4) LCD

Displays ECG waveforms and patient information. (See "How to Read the LCD" on page 1-12.)

[NOTE] Advanced technologies are used to manufacture the color LCD. However, there may be some dots that are kept on or off at all times on the screen. Characteristically, the LCD may produce some inconsistency due to temperature fluctuations, which is not a fault.

[NOTE] Remove the dust or dirt attached on the surface of the LCD carefully using the supplied silicon cloth. To remove stubborn dirt, immerse cloth in alcohol such as ethanol, squeeze the cloth firmly, and wipe the dirt with it.

(5) Paper magazine

Set the recording paper in the magazine.

(6) Thermal array head

Prints ECG waveforms and measurement values on the recording paper.

(7) CF card slot

Insert the CF card (option) into the slot to save or retrieve the ECG data.

(8) PC card slot

Insert the PC card (option) into the slot to save or retrieve the ECG data.

[NOTE] Do not remove the PC card or CF card or turn off the power of the equipment while the data is being saved in the PC card or the CF card.

(9) Patient cable connector

Connect the patient cable (CP-104J, CP-104T, CP-104L) into the connector. (See "Connecting the Cords" on page 2-11.)

(10) Option module slot

Mount the option module into the slot.

(11) AC inlet

Connect the power cord here. (See "Connecting the Cords" on page2-11.)

(12) Potential equalization terminal

Connect the grounding cord here. (See "Connecting the Cords" on page 2-11.)

(13) Serial ports 1 to 3

Connect optional external devices (Master' step, ID reader) here. (See Chapter 16 "Connecting Other Devices.")

(14) LAN port

The equipment is connected to the Network file server (EFS-200) via the LAN. (See Chapter 16 “Connecting Other Devices.”)

(15) External CRT terminal

Connect a video monitor here (See Chapter 16 “Connecting Other Devices.”)

(16) Analog I/F connector

Connect the optional analog I/O box (CI-701) here. External devices such as those capable of outputting DC power can be connected to the analog I/O box. (See Chapter 16 “Connecting Other Devices.”)

(17) Battery slot

Insert the optional battery (FX-7542 battery) here. (See “Mounting the Battery (Option)” on page 2-5.)

(18) Handle mount

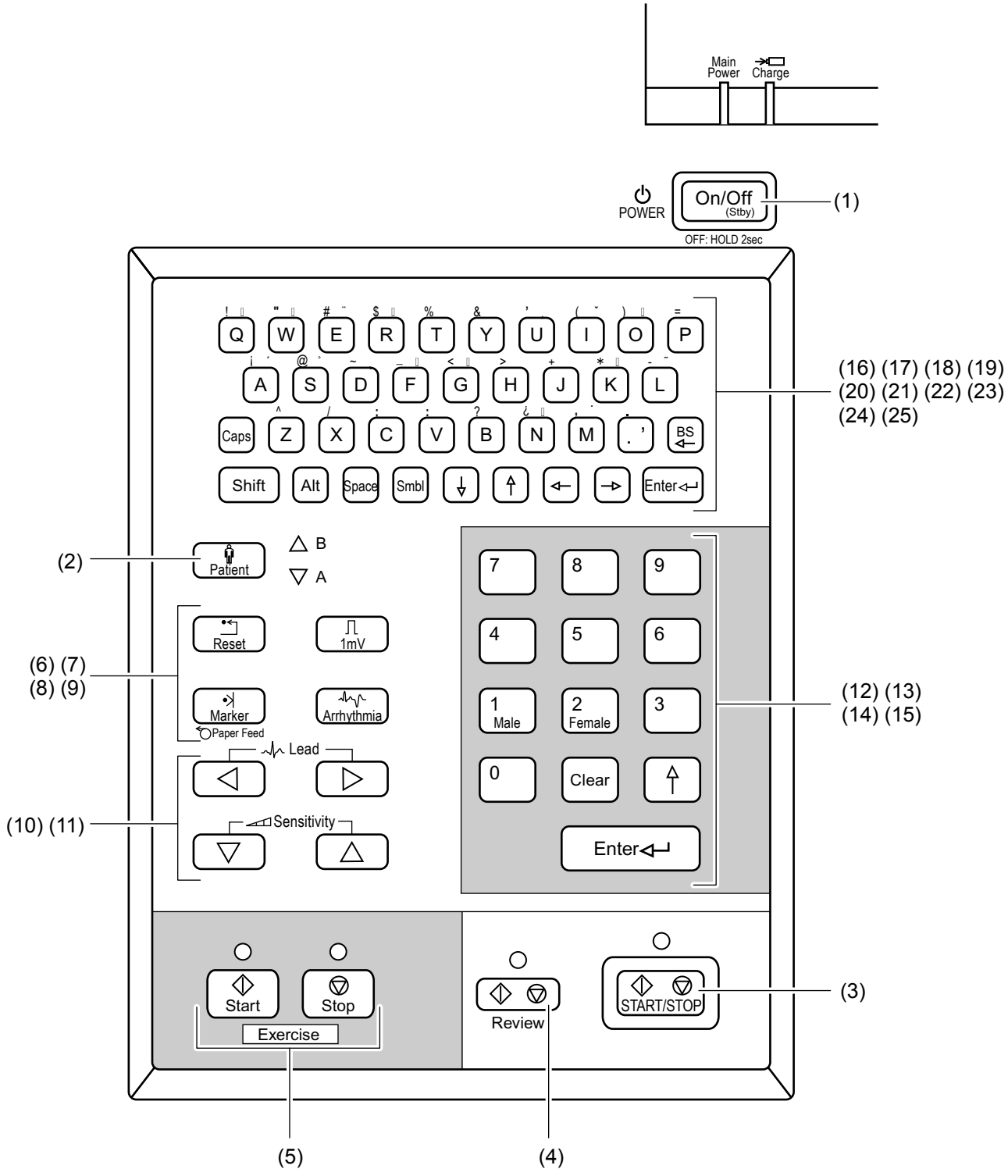
Mount the optional handle (OA-301) here. (See “Mounting the Handle (Option)” on page 2-4.)

(19) Z-fold paper slot

Insert the Z-fold paper here when using the equipment mounted on the trolley.

Types and Functions of Operation Panel Keys

The operation panel consists of the key switches for operations. The function of each key on the operation panel is as follows.



(1) 

key
Turns on/off the power.

(2) 

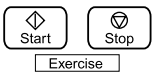
key
Switches between patients A and B.

(3) 

key
Starts/stops ECG recording.

(4) 

key
Records the ECG data collected before the key is pressed.

(5) 

key
Starts/stops ECG during or after an exercise test.

(6) 

key
Outputs calibrated waveforms.

(7) 

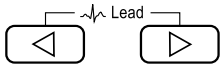
key
Input waveforms are reset while the key is pressed.

(8) 

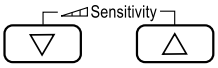
key (Paper feed key)
Performs mark printing. Feeds the recording paper during suspension.

(9) 

key
Extends recording of arrhythmia.

(10) 

key
Changes the lead to be recorded.

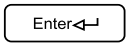
(11) 

key
Switches the sensitivity.

(12) 

to 

key
Enters numeric values.

(13) 

key
Shifts the patient information item to be entered and displays the entry window.

(14) [Clear] key
Deletes the entered contents.

(15) [↑] key
Returns to the previous item.

(16) [A] to [Z] key
Used to enter English, Roman, and Kana characters as well as symbols.

(17) [Space] key
Enters space.

(18) [Enter] key
Confirms the entry.

(19) [BS] key
Deletes a character of entered contents.

(20) [Shift] key
Switches between uppercase and lowercase characters.

(21) [↓] key
Displays the next candidate for Kanji character conversion.

(22) [↑] key
Display the previous candidate for Kanji character conversion.

(23) [←] [→] key
Moves the cursor horizontally.

(24) [. '] key (Dot key)
Enters a dot.

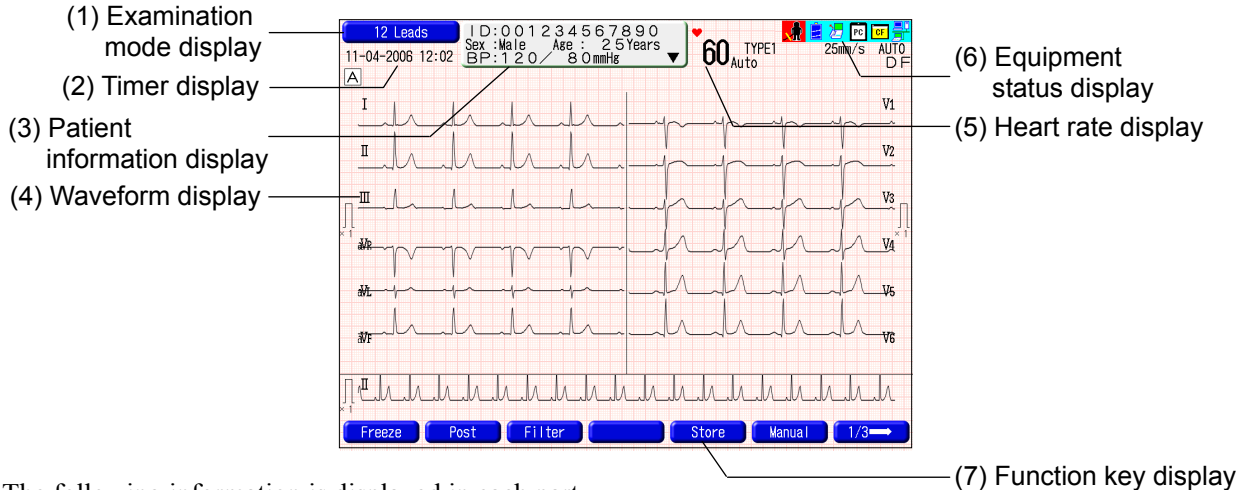
(25) [Alt] key
Switches characters.

(26) [Smbl] key
Switches to symbol entry.

(27) [Caps] key
Fixes to upper or lower-case character entry.

How to Read the LCD

The LCD displays the status of examination, ECG waveforms, patient information, equipment status, etc.



The following information is displayed in each part.

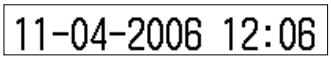
(1) Examination mode display

Displays the examination mode currently selected.



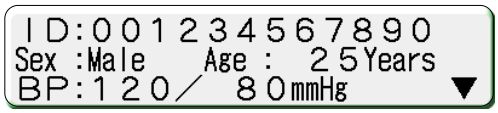
(2) Timer display

Displays the current time in normal status. Functions as a timer, displaying remaining or elapsed time, while an exercise test is being conducted.



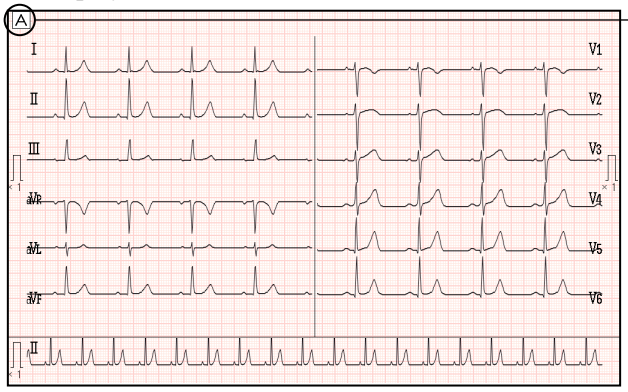
(3) Patient information display

Displays patient information such as ID number, sex, and age.



(4) Waveform display

Displays ECG waveforms



If an ECG amp module (EE-20, EE-21) is mounted to the option module slot, the patient currently selected (A or B) is displayed.

(5) Heart rate display

Displays the heart rate within the range from 20 to 300.



(6) Equipment status display

1) Icon

You can check the current status of the equipment with the icons.
Press each icon button to see details.
The icons change as follows depending on the status of the equipment.

- **Electrode ocondition**

Electrode is disengaged.



High impedance, But usable.



- **Battery status**

Remaining battery power high



Remaining battery power medium



Remaining battery power low



No remaining battery power



[MEMO] The icons are not displayed in AC operation.

- **Recorder status**

Magazine up



No recording paper



Recording paper error



- **PC card status**

Use of PC card allowed



Use of PC card allowed (20%)



Use of PC card allowed (50%)



Use of PC card allowed (80%)



Use of PC card not allowed (No free space)



PC card error



- **CF card status**

Use of CF card allowed



Use of CF card allowed (20%)



Use of CF card allowed (50%)



Use of CF card allowed (80%)



Use of CF card not allowed (No free space)



CF card error



[MEMO] Icons are not displayed if the PC card or the CF card is not specified as a storage medium, or inserted into the equipment.

- **LAN connection status**

Online



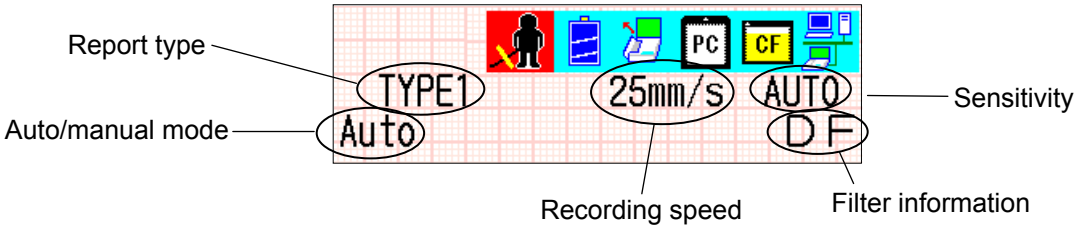
Offline or LAN error



[MEMO] The icons are not displayed if the Data Management System (DMS) connected via the LAN is not specified as a storage medium.

2) Character display

The filter type, mode selection, recording speed, and sensitivity currently made effective are displayed.



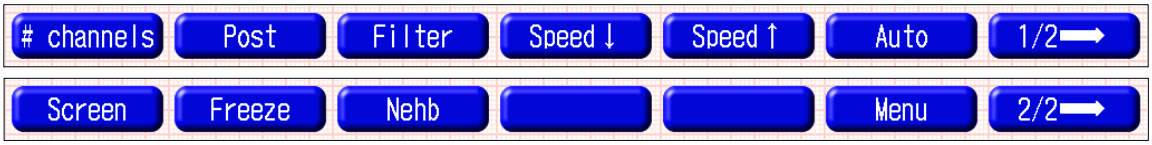
[MEMO] If the setting for each item is changed by function key operation, the display on the screen is changed at the same time.

Types and Functions of Function Keys

Function Key Layout

- **Standard 12-lead examination**

  (1) Manual mode



  (2) Auto mode

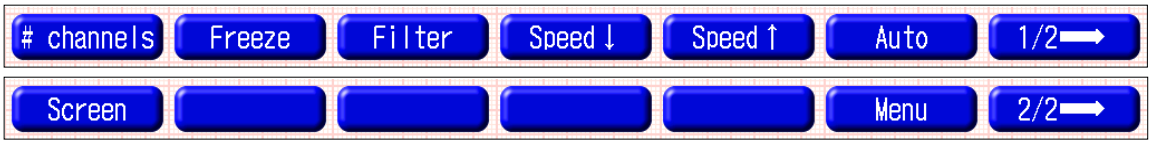


- **Long-term arrhythmia examination**

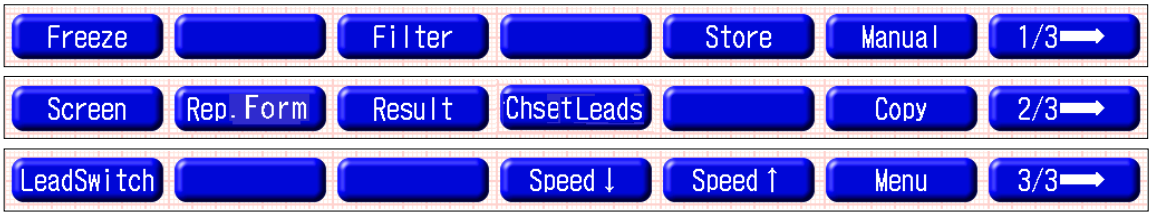


- **Master's test**

  (1) Manual mode



  (2) Auto mode



- **DC input examination**



The following function keys are displayed on the function key display.

Name of the key	Function of the key
Freeze	Freezes the waveform displayed on the screen, and edits and displays the past waveform for 10 minutes at the maximum. (See “Freezing Waveforms on the Screen for Checking” on page 5-2.)
Post	Makes interval recording and periodic recording after exercise.
Exam time	Exam time can be selected.
Exam lead	The type of lead to be printed can be selected.
Lead	Reference lead can be selected.
Filter	Switches between ON/OFF of the filter. (See “Setting Filters” on page 3-24.)
Copy	Copies and prints the data collected previously by auto or review recording.
Store	Stores the ECG data in a medium specified as the place of saving.
Auto	Displayed only in the manual mode. Switches the recording mode to Auto.
Manual	Displayed only in the auto mode. Switches from the auto mode to the manual mode.
1/3→, 2/3→, 3/3→ 1/2→, 2/2→	Switches function key display.
Screen	The screen format to be displayed can be switched.
Rep. form	The form of reports can be switched.
Result	Displays the data examination result.
Menu	Used to make the setting of the equipment, output daily report, display commentaries, and perform maintenance.
Speed↓ Speed↑	Switches the recording speed.
End	Exits the ECG recording after exercise, and enters the static ECG recording mode.
# channels	Displayed only in the manual mode (when recording is suspended). Switches the number of channels of 12-lead manual recording.
ChestLeads	Chest lead can be selected.
Nehb	Displayed only in the manual mode. Switches the lead mode to Nehb lead.
12 lead	Displayed only in the manual mode. Switches the lead mode to 12 lead.

Chapter 2

Installing the FX-7542

This chapter describes installation procedure of the FX-7542, recording paper replacement procedure, cord connection procedure, etc.

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Mounting the Handle (Option).....2-4

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- **Notes on the Use of the Battery 2-6**
- **Charging the Battery.....2-7**
- **Operating the Equipment with the Battery.....2-8**
- **Checking the Remaining Battery Power.....2-8**
- **Refreshing the Battery.....2-9**

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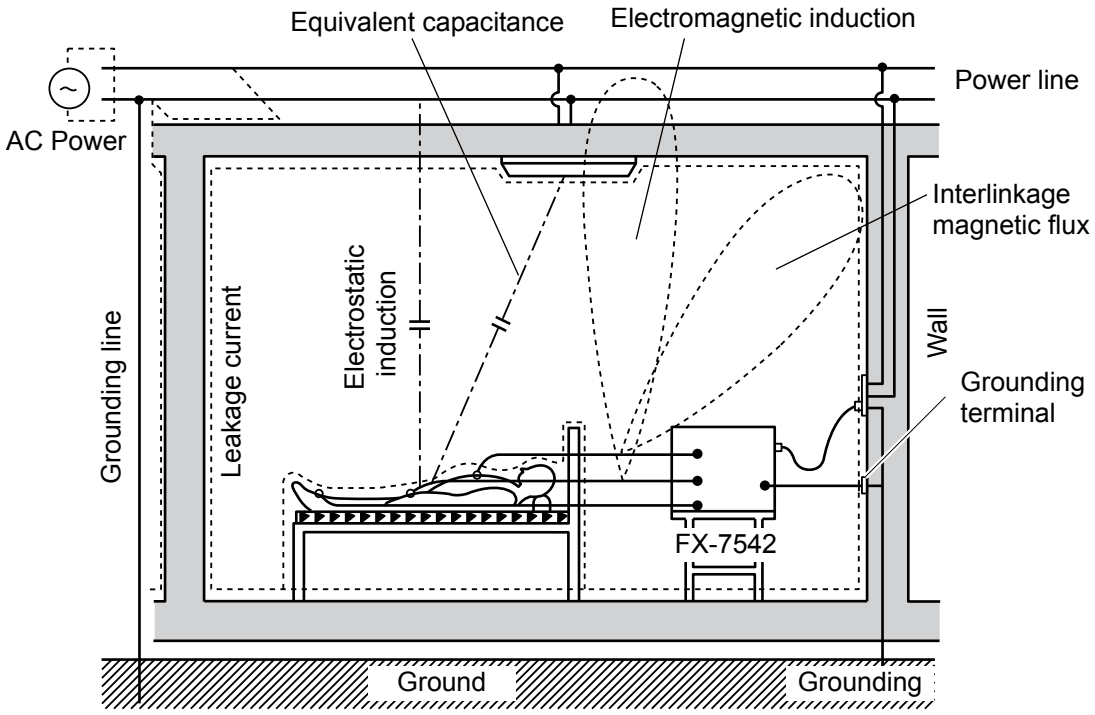
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Turning On/Off the Power.....2-19
- **Turning On the Power 2-19**
- **Turning Off the Power.....2-20**

Notes on Installation Site

Pay attention to the following when selecting an installation site.

- **If strong radiant waves exist in the surroundings, interference occurs. (Leakage current, electrostatic induction, electromagnetic induction, etc. come in through the routes shown by the following figure.)**
  Select a place where high-voltage lines or power lines having large loads are not laid near the patient's bed.
- **Do not install the FX-7542 near X-ray units, ultrasonic equipment, radios, table lamps, and fluorescent lamps to avoid interference.**
- **Use the FX-7542 in a place where the room temperature is maintained around 20°C to 25°C (68°F to 77°F).**
- **Select a place of low humidity.**

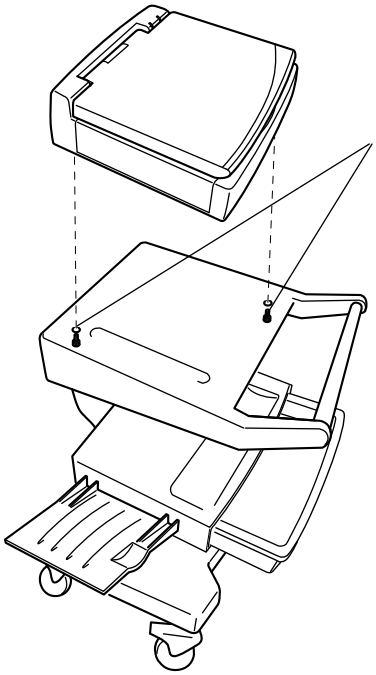


Mounting the FX-7542 on the Trolley (Option)

Mount the FX-7542 on the optional trolley (OTE-01) as shown by the following figure.

⚠ CAUTION

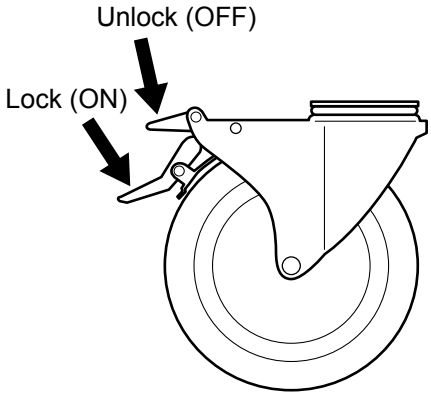
- **Place the FX-7542 on the trolley, and then fasten it to the trolley with the 2 setscrews provided at the back of the top panel.**
  Otherwise the equipment may fall off the trolley, thus causing injury or damage to the equipment.



Place the equipment in the orientation shown by the figure and fasten it with the 2 setscrews.

⚠ CAUTION

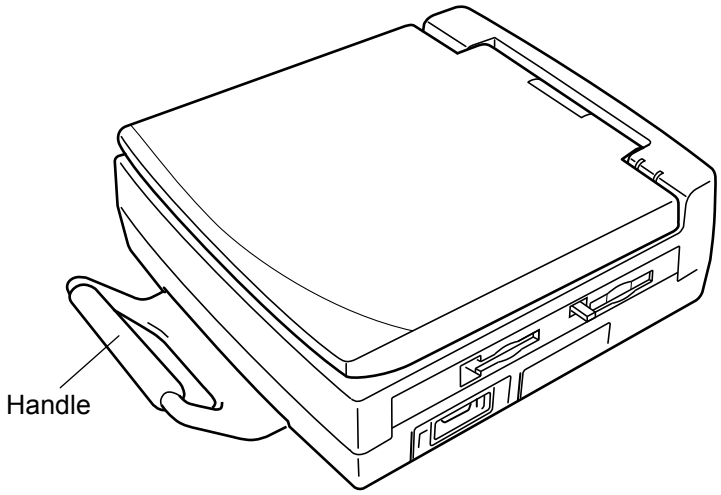
- **When using or storing the equipment, be sure to lock the 2 casters.**
  Otherwise the trolley may move or roll over, thus causing damage to the equipment.



Mounting the Handle (Option)

Mount the optional handle (OA-301) to facilitate transportation.
See the operation manual supplied with the handle for details of the mounting procedure.

[NOTE] Be sure to fasten the 3 bolts securely. If these bolts are loose, they may come off while the equipment is being used, causing great danger to the operator and the patient. If the bolts are found loose, refasten them securely.



Mounting the Battery (Option)

This section describes how to mount the optional battery (FX-7542 battery) and charging procedure.

⚠ WARNING

- **Contact Fukuda Denshi's service engineer before mounting or replacing the battery.**
  Improper handling may result in electric shock and other dangerous situations.
- **Be sure to remove the power cord before mounting or replacing the battery.**
  Electric shock may result.
- **Do not throw the battery in fire.**
  Explosion may result.
- **Do not charge the battery with devices other than the FX-7542.**
  Leakage, heating, or explosion may result.
- **Do not disassemble or modify the battery.**
  If the battery is damaged and the liquid in it attaches to your skin or clothes, immediately wash it off with water. If it splashes onto your eyes, wash them with clear water, and immediately seek medical attention.
- **Do not use the battery for other devices.**
  Leakage, heating, or explosion may result.
- **Do not short-circuit the terminal.**
  Leakage, heating, or explosion may result.
- **If charging is not completed even if the specified charging time elapses, stop charging the battery.**
  Leakage, heating, or explosion may result.
- **Be careful not to have strong impact on the battery or drop it.**
- **Consign the disposal of the battery to authorized disposal services.**

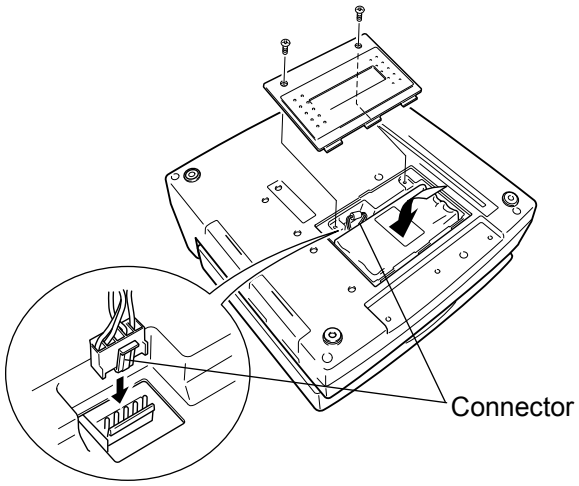
⚠ CAUTION

- **Be sure to use the specified battery (FX-7542 battery).**
  Use of batteries other than the specified one may result in leakage, heating, or explosion.

Mounting the Battery

1 **Remove the 2 screws provided at the bottom face of the battery cover, and then remove the battery cover.**

2



Insert the connector of the battery into the main unit, and insert the battery into the main unit.

[NOTE] Pay attention to the orientation of the connector.

[NOTE] Insert the battery with the bulging face down.

[NOTE] Be sure to remove the power cord before replacing the battery.

3 **Place the battery cover back in position, and fasten it with the screws.**

[NOTE] Be careful not to let the cables be caught with the cover.

Notes on the Use of the Battery

Pay attention to the following when using the battery.

- **Service life of the battery**

The expected service life of the battery is approximately 300 times of repetitive charging and discharging (use) operations. Note that the service life varies depending on the frequency of use and the charging/discharging pattern of the battery. If the battery power decreases in a short time even when it is charged fully, it is coming to the end of its service life. Replace it with a new one in such cases.

- **Storage**

If the equipment is not to be used for a long time, remove the battery before storing the equipment. Mount the battery to the equipment and charge it until it is fully charged once every 3 months. If the battery is left uncharged for a long time, self-discharge occurs and the battery power is thus discharged excessively to the extent where the battery cannot be used any more. Avoid storing the battery in a place where the temperature is lower than 0°C (32°F) or higher than 30°C (86°F).

- **Battery capacity**

If insufficient charging and discharging are repeated, intended capacity of the battery may not be obtained temporarily. The phenomenon ceases to occur if refreshing operation is performed once or twice. (See “Refreshing the Battery” on page 2-9.)
If repetition of insufficient charging and discharging is inevitable because of the usage of the equipment, perform battery refreshing operation once a moth.

- **Grid print recording**

To perform grid printing with “Roll plain” or “Folded plain” selected as recording paper, large amount of battery power is required. Consequently, the voltage drops and the time when recording can be carried out becomes much shorter than the remaining battery power display. Use the AC power as far as possible if grid printing is to be performed.

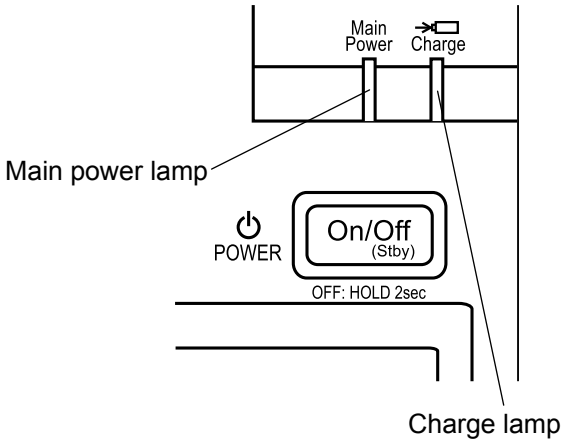
Charging the Battery

Set the battery in the FX-7542 to charge it.

1 **Turn off the power of the FX-7542. (See "Turning On/Off the Power" on page2-19.)**

[NOTE] The battery cannot be charged while the equipment is in operation.

2



Connect the power cord to the equipment main unit. (See "Connecting the Cords" on page 2-11.)

The main power lamp comes on and the charging lamp starts flashing, indicating that charging is in progress.
The charging lamp indication changes depending on the charging status.
Stays on in green when charging is in progress.
Goes off when charging is completed.
Stays on in orange if an error occurs during charging.

[NOTE] The reasons why the charge lamp comes on in orange during charging include the following.

- **The battery temperature has increased/decreased extremely high/low.**
- **Some kind of error has occurred to the equipment main unit or the battery.**

Remove the power cord, leave the equipment as it is for a while, and start charging again.

Contact us if the charging lamp comes on even if charging is repeated.

The empty battery can be charged fully in approximately 2 hours and 30 minutes. The charging time varies depending on the battery power remaining when the charging is started, ambient temperature, etc.
If the battery is in almost fully-charged state, charging is not started to prevent excessive charging.
We recommend you to charge the battery at around the room temperature (10°C to 30°C (50°F to 86°F)).

[MEMO] To keep the battery in ready state at all times, do not remove the power cord immediately after the AC power is turned off but keep performing charging until the charging lamp goes off.

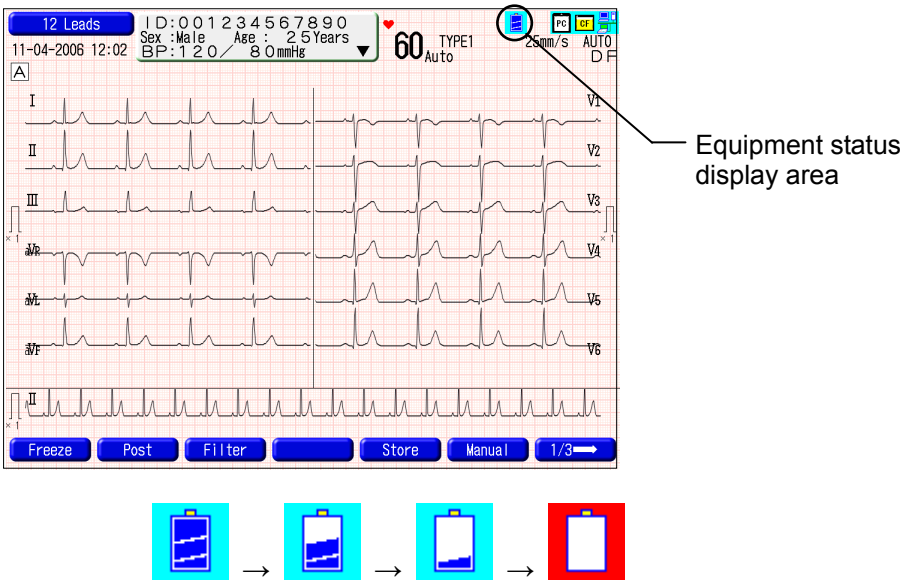
Operating the Equipment with the Battery

Remove the power cord and press the On/Off (Stby) button to turn on the power. (See "Turning On/Off the Power" on page 2-19.)

[MEMO] If the power cord comes off or power failure occurs while the equipment is operated with AC power, the operation is automatically switched to battery operation.

Checking the Remaining Battery Power

The battery can be used continuously for approximately 40 minutes from the fully charged state until it becomes empty (6ch recording at 20°C (68°F) according to JIS T1202 testing method).
Note that the time varies depending on the state of usage and storage.
While the equipment is operated with the battery, the remaining battery power is displayed with the icon in the equipment status display area on the screen.



With the decrease of the remaining battery power, the icon changes display from fully charged state at left to empty state at right as shown above.
Charge the battery when the icon becomes .
When the remaining battery power has decreased to a certain level, the following message may be displayed. Switch to AC power operation or charge the battery in such cases.
"Insufficient battery power. Charge the battery."
"Battery voltage low. Recording cannot be made."
"Battery voltage low. Recording has been stopped."

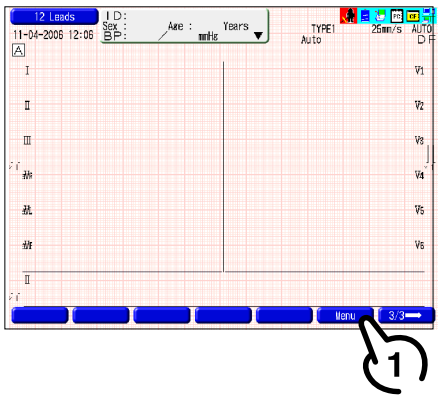
[NOTE] If the equipment is kept used even after the message indicating that the battery voltage is low appears, the power is automatically turned off. Since the battery power is low in this case, connect the power cord immediately and charge the battery. If the battery is left uncharged, the power is discharged excessively due to self-discharge and the equipment may become unusable.

[NOTE] Avoid using the equipment with the battery in a place where the room temperature is below 0°C (32°F) or higher than 40°C (104°F).

Refreshing the Battery

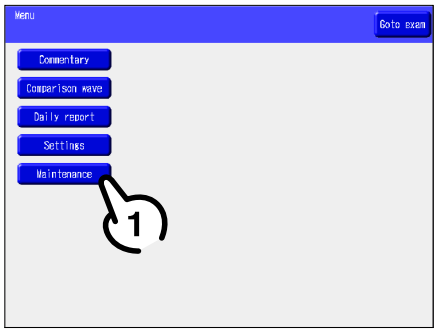
Refresh the battery as follows to restore battery power.

1



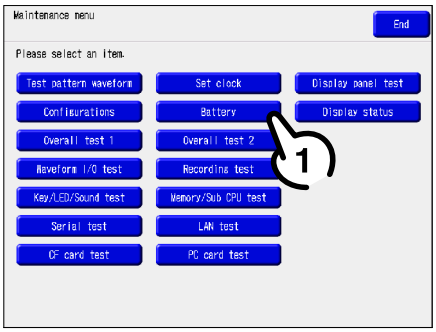
Start the equipment with the battery, press [1/3 →] [2/3 →], and then press [Menu].
If the equipment cannot be started because of insufficient remaining battery power, start the equipment with AC power.

2



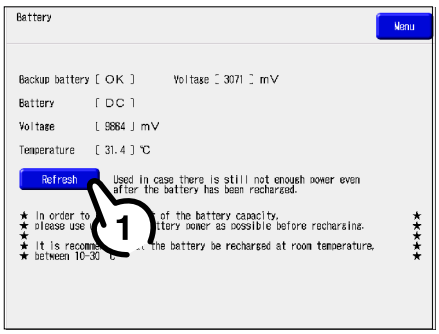
Press [Maintenance].

3



Press [Battery].

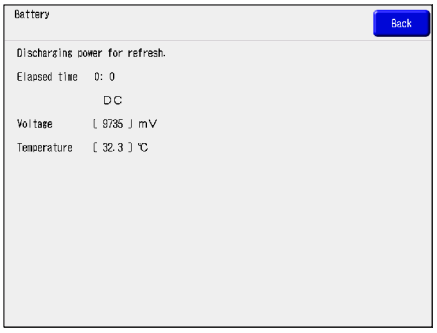
4



Press [Refresh].

If the equipment is started with AC power, remove the AC cord before pressing [Refresh]. If the power is turned off in this state, proceed to “6.”

5



Leave the equipment as it is until the battery power runs out.

When the battery power runs out, the power of the equipment is automatically turned off within 2 hours, though the time varies depending on the state of the battery.

6

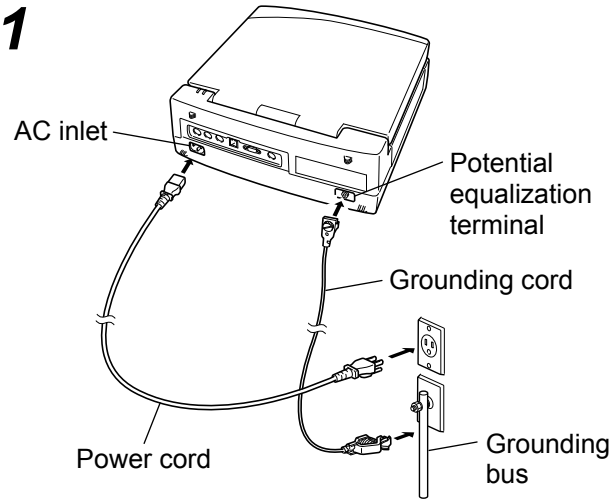
Insert the power cord into the main unit to charge the battery.

The charging is completed in approximately 2 hours and 30 minutes.

Connecting the Cords

This section describes how to connect the cords to the FX-7542.

1



Connect the supplied power cord provided with 3-pin plug to the AC inlet. Connect the plug on the opposite side to the receptacle for medical use.

When the power cord with 3-pin plug is connected to the receptacle for medical use (3-pin receptacle with grounding electrode), the equipment is automatically grounded. Be sure to use the supplied power cord. If a cord other than the one supplied with the equipment is used, the patient or the operator may be exposed to a risk of electric shock or other dangerous situations.

[NOTE] Contact us when connecting the equipment to an inverter for vehicles such as ambulances. The operation of the equipment may not be assured depending on the type of the inverter.

[NOTE] If grounding cannot or may not be made, use the equipment with the optional built-in battery (FX-7542 battery). If the equipment is used in an improperly grounded condition, the patient and the operator may be exposed to a risk of electric shock and other dangerous situations.

2

To make potential equalization grounding, connect the potential equalization terminal of the equipment to the grounding terminal on the wall with the optional grounding cord.

[NOTE] When using the equipment with other electrical devices for medical use, make potential equalization connection to prevent potential difference from occurring between the devices. Potential difference between the devices, if any, may expose the patient and the operator to a risk of electric shock and other dangerous situations.

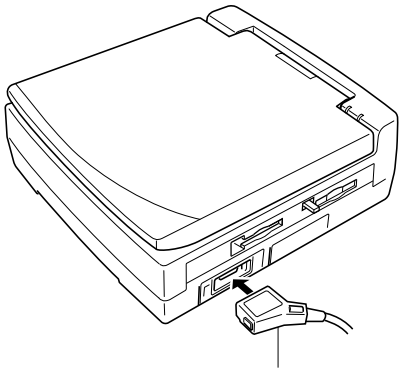
⚠ DANGER

- **Do not use a gas pipe for grounding.**
  Explosion or fire may result.

⚠ CAUTION

- **Check that the grounding cord is not loose or about to break.**
- **Clip the ground bus securely with the clip of the grounding cord.**
- **If ground bus is not available, bury a metal rod in the ground. Sprinkle water fully around the area to obtain sufficient effect.**
- **Do not connect the cords to ungrounded objects such as sash windows, vinyl water pipes, and the grounding terminal of other devices.**
- **Avoid using a water pipe as a grounding conductor because it may not be grounded securely.**

3



Patient cable (CP-104J)

Connect the supplied patient cable (CP-104J, CP-104T, CP-104L) to the lead connector.

⚠ WARNING

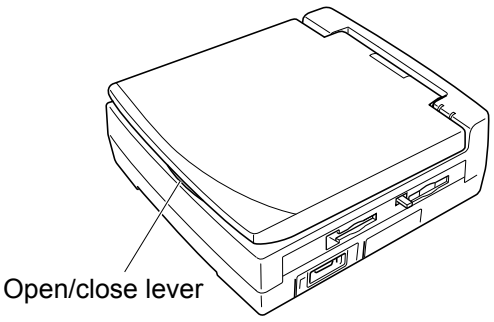
- **Be sure to use the patient cable supplied with the equipment (CP-104J, CP-104T, CP-104L).**
  If a patient cable not provided with protective function against defibrillation is used when the equipment is used along with a defibrillator, the equipment may be damaged or safety may not be ensured.

Opening/Closing the LCD

Opening the LCD

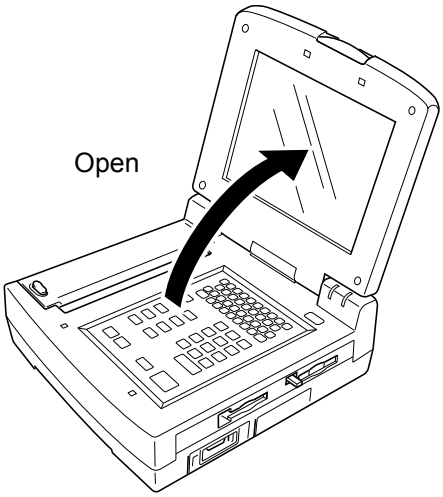
[MEMO] The LCD can be set at any desired angle larger than 90 degrees.

1



Lift the open/close lever upward.

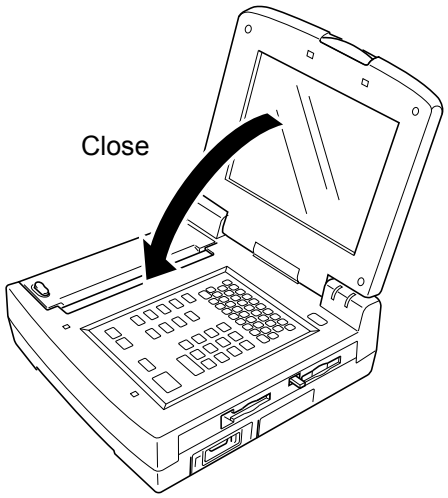
2



Lift and adjust the LCD to an easy-to-see angle.

Closing the LCD

1



Close the LCD securely, making sure that a clicking sound is heard.

Supplying Recording Paper

Recording paper is available in 2 types: roll paper and Z-fold paper.

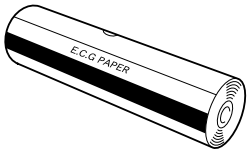
How to Store the Recording Paper

Pay attention to the following when storing the recording paper.

- **The recording paper develops color at 70°C (158°F). Be careful not to subject the paper to direct sunlight or leave it in a room high in temperature or humidity.**
- **Do not subject the recording paper to fluorescent light for a long time.**
- **Do not file the recording paper for storage using a PVC film.**
- **If the recording paper is stored with the surfaces on which ECG waveforms are printed are attached closely to each other, the waveforms may be transferred to attached surfaces.**

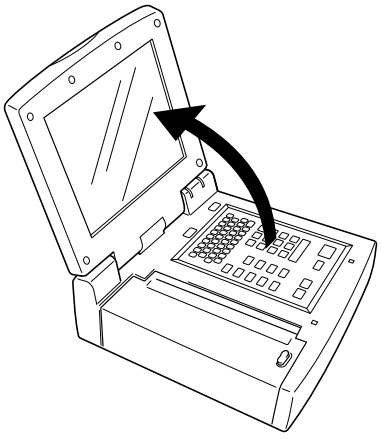
Replenishing Roll Paper

Replenish the roll paper, following the procedure shown below.



Roll paper (OP-69TE)

1 **Open the LCD.**

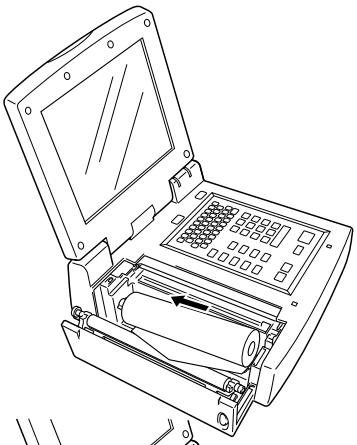


2



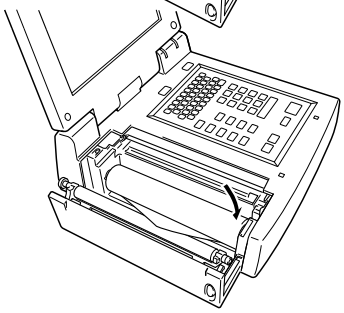
Press the button on the cover of the paper magazine to open the magazine.

3



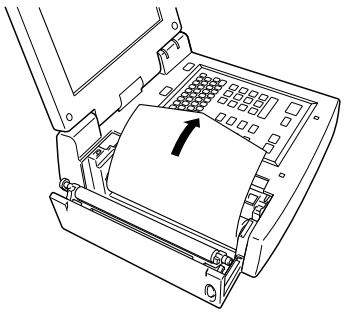
Insert the roll paper, aligning the shaft hole of the roll paper with the protrusion on the far side.

4



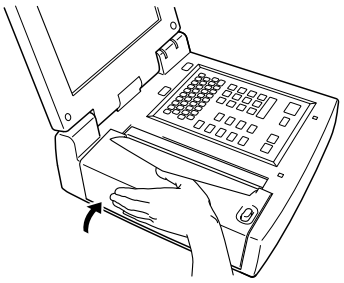
Insert the protrusion on your side into the shaft hole of the roll paper, while pressing down the protrusion on the far side.
Check that the protrusion is inserted into the shaft hole of the roll paper.

5



Holding the edges of the roll paper, pull it out by approximately 20 cm.
Pull it out uniformly, being careful not to let it sag.

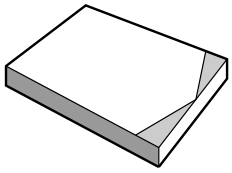
6



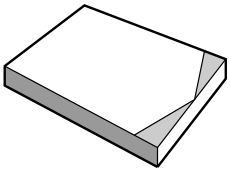
Close the paper magazine cover by pressing the side of the cover as shown by the figure at left.
Press the paper magazine cover until a clicking sound is heard.
Check that the roll paper is not caught in between.

Replenishing Z-fold Paper

Replenish the Z-fold paper, following the procedure shown below.



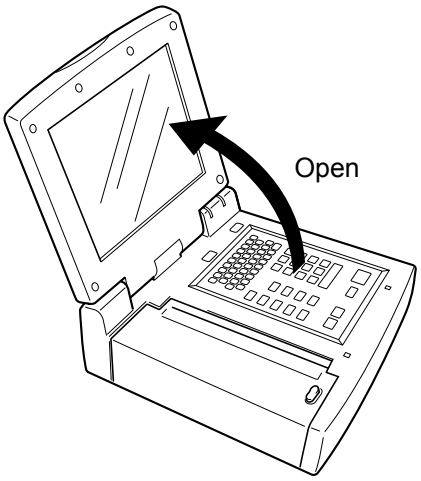
Z-fold paper (OP-621TE, With scale)



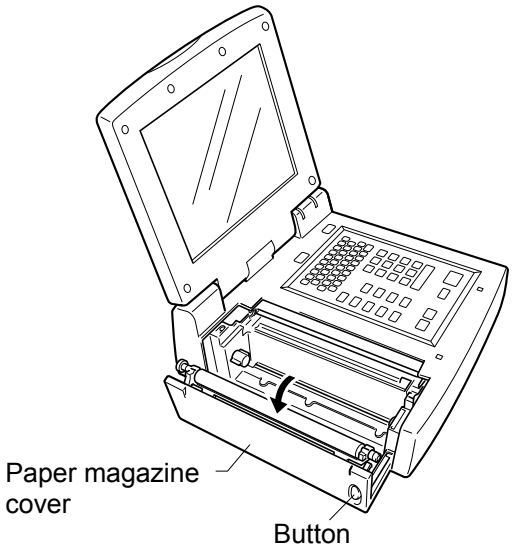
Z-fold paper (OP-622TE, Without scale)

[MEMO] Set "Lead/Record" – "Record" – "Recording paper" to "Folded cross-sectional" or "Folded plain" when using Z-fold paper. If "Folded plain" is selected, grid is also printed along with waveforms. (See "Lead/Record" on page 17-15.)

1 **Open the LCD.**

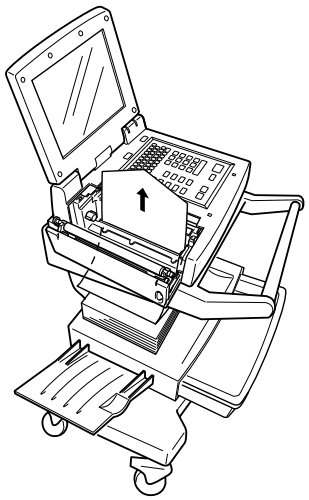


2 **Press the button on the paper magazine cover to open the magazine.**



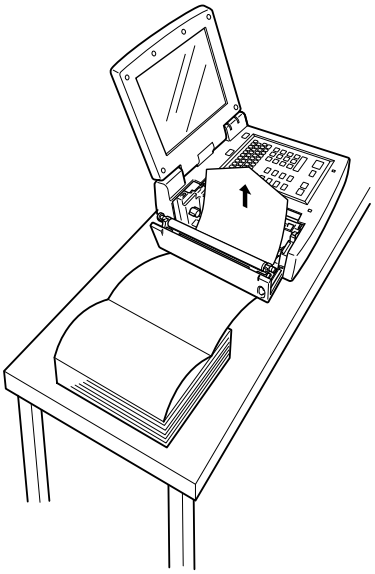
3 Set the Z-fold paper.

When optional trolley is used



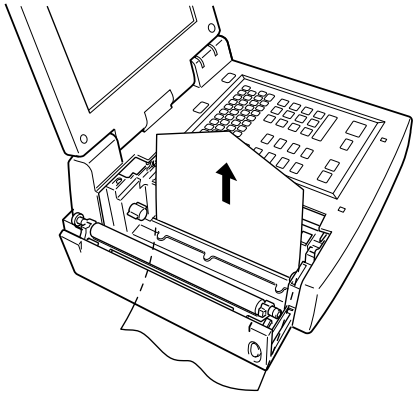
Insert the edge of the recording paper from the Z-fold paper slot at the bottom of the main unit, and pull it out upward.

When placing the equipment on a desk



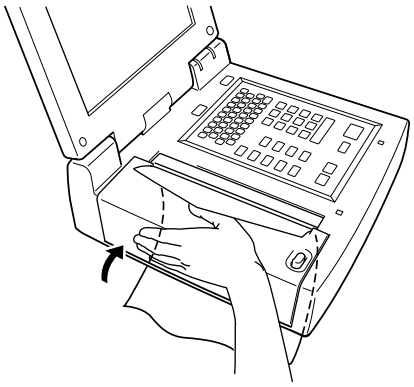
Place the recording paper at the left of the main unit, and insert the edge of the Z-fold paper into the slot at the bottom of the magazine cover. Holding the edge of the Z-fold paper, pull it directly in the upper right direction.

4



Holding the edge of the Z-fold paper, pull it out by approximately 20 cm.

5



Close the paper magazine by pressing the side of the cover as shown by the figure at left.

Press the paper magazine cover until a clicking sound is heard.

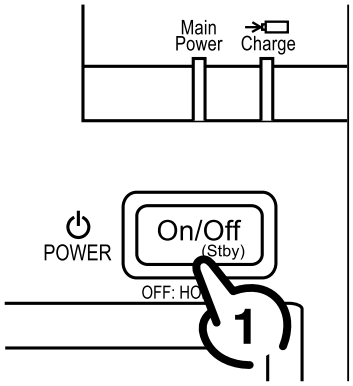
Turning On/Off the Power

Turning On the Power

[MEMO] If the battery is mounted, the operation is automatically switched to battery operation even if the main power is turned off due to unexpected power failure or coming off of the power cable.

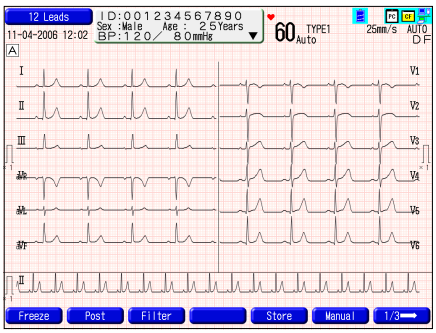
[MEMO] If key operation is not performed for a specified period of time during battery operation, the power is automatically turned off. However, this function is not carried out while recording or examination is being performed. The time until the power is turned off can be set arbitrarily. (See "General/PowerGeneral/power supply" in "Setting the ECG Controls" on page 17-14.)

1



Press the On/Off (Stby) button on the operation panel.

The equipment is started after a while, and the following screen appears.
The screen displayed varies depending on the setting.

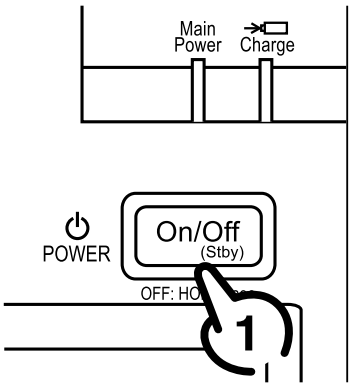


[MEMO] ( ) is kept displayed at the upper right-hand corner of the screen while the equipment is operated with the battery. When the battery power runs out, ( ) appears. Charge the battery in this case. (See "Charging the Battery" on page 2-7.)

[MEMO] If the battery is mounted, the "Charge battery" sign appears if the remaining battery power becomes low even when the equipment is operated with AC power.
If the sign appears, charge the battery when the equipment is not used. (See "Charging the BatteryCharging the battery" on page 2-7.)

Turning Off the Power

1



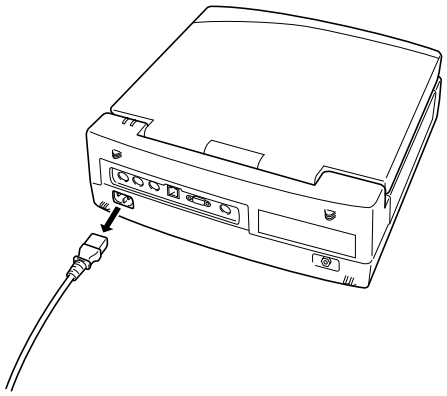
On completion of the operation, press down the On/Off (Stby) button on the operation panel for approximately 2 seconds.

[MEMO] If the power of the equipment is turned on when the battery pack is mounted but the battery is not fully charged, the charging lamp comes on and battery charging is started.

[MEMO] If the power is not turned off even if the On/Off (Stby) button is pressed down for 2 seconds, keep pressing it down. The power is turned off forcibly after approximately 9 seconds.

When the equipment is not used for a long time

1



Remove the power cable from the equipment.

[NOTE] If the equipment is operated with the battery and it is not to be operated for longer than 3 months, charge the battery and then remove the battery pack from the equipment and store it.

[NOTE] Contact Fukuda Denshi's service engineer when removing the built-in battery.

Chapter 3

Preparation before Examination

This chapter describes how to attach electrodes, enter patient information, and set filters.

Attaching Electrodes 3-2
- Cautions in Attaching the Electrodes 3-2
- Attaching the Electrodes 3-2
- Checking the Electrode Condition 3-4

Entering Patient Information 3-5
- Type of Data to Be Entered 3-5
- Entering Detailed Data 3-6
- New Patient Function 3-15

Using Patient Information Registered in the CF Card 3-16
- Registering Patient Information 3-16
- Reading Registered Patient Information with the ID number Used as a Key ID 3-17
- Specifying and Reading the Registered Patient Information 3-18
- Searching Patient Information 3-20
- Deleting Patient Information No Longer Required 3-22

Switching Patients 3-23

Setting Filters 3-24
- Types of Settable Filters 3-24
- How to Set Filters 3-24

Setting Sensitivity 3-26

Check Carefully 3-27

Attaching Electrodes

It is essential to attach the electrodes properly to make proper ECG records. Be sure to attach the electrodes properly to maintain proper electrical contact.

⚠ CAUTION

- **Be careful not to let the patient come in contact with the equipment, other electrical devices, and metallic objects.**

Cautions in Attaching the Electrodes

- **Attach the limb electrodes securely using keratin cream.**
  Since Wilson's central point is determined based on the limb electrodes, noise is also generated to the chest leads if noise such as hum interferes with the limb electrodes.

Attaching the Electrodes

1 **Wipe the part of the patient's body to which the electrodes are to be attached with alcohol to remove dirt and fat.**

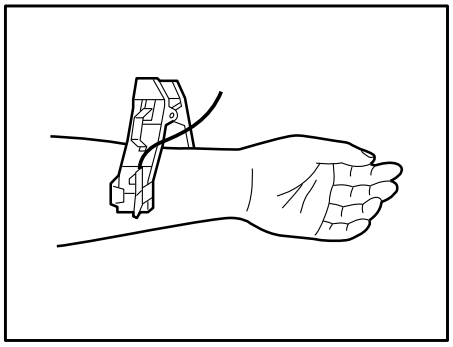
If the patient's skin or the electrode is not clean, the contact resistance increases, thus destabilizing recording.

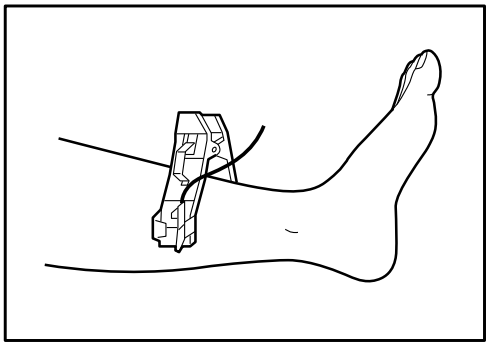
Apply keratin cream by rubbing it with your finger until the patient's skin turns slightly reddish.

[NOTE] Be careful not to let keratin cream that is applied to adjacent chest areas overlap.

2 **Attach the limb electrodes to the patient's arms and legs.**

Fasten the electrodes to the patient's arms and legs securely at several centimeters apart from his/her wrists and ankles.

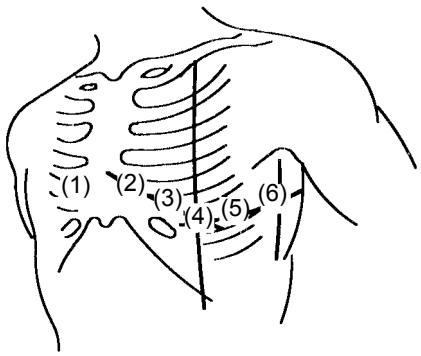




[NOTE] Make sure that the patient does not feel pain or feel uncomfortable.

3 Attach the chest electrodes.

Record the chest leads from V1 to V6. Attach the chest electrodes along with the limb electrodes. The standard positions of chest leads are shown below.



(1): Fourth intercostal space at right border of stemum
(2): Fourth intercostal space at left border of stemum
(3): Midway between locations (2) and (4)
(4): Fifth intercostal space on left midclavicular line
(5): Left anterior axillary line at the horizontal level of (4)
(6): Left midaxillary line at the horizontal level of (4)

[MEMO] The lead chips and the electrodes are color-coded and distinguished from each other with alphanumeric characters to clarify the attachment positions. Check them carefully before attaching them to the patient.

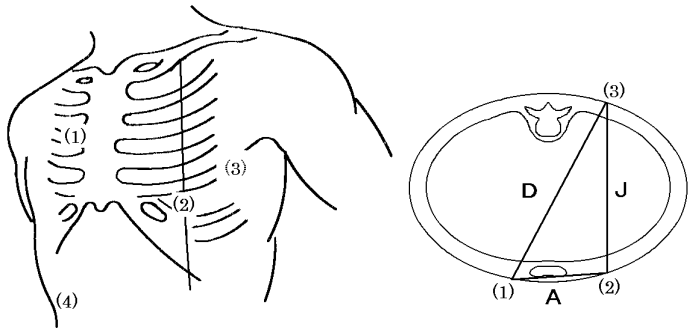
Patient Cable / Electrode position		Right hand	Left hand	Left leg	Right leg	(1)	(2)	(3)	(4)	(5)	(6)
CP-104T	Cable/ Tip color	Red/ Red	Yellow/ Yellow	Green/ Green	Black/ Black	White/ Red	White/ Yellow	White/ Green	White/ Brown	White/ Black	White/ Purple
	Symbol	R	L	F	N	C1	C2	C3	C4	C5	C6
CP-104J	Cable/ Tip color	Red/ Red	Yellow/ Yellow	Green/ Green	Black/ Black	White/ Red	White/ Yellow	White/ Green	White/ Brown	White/ Black	White/ Purple
	Symbol	R	L	F	N	C1	C2	C3	C4	C5	C6
CP-104L	Cable/ Tip color	White / White	Black/ Black	Red/ Red	Green/ Green	Brown/ Red	Brown/ Yellow	Brown/ Green	Brown/ Blue	Brown/ Orange	Brown/ Violet
	Symbol	RA	LA	LL	RL	V1	V2	V3	V4	V5	V6

[NOTE] If the FX-7542 is to be used along with a defibrillator using electrodes other than AgAgCl electrodes, longer time may be required until ECG waveforms are restored after defibrillation discharge. Use AgAgCl electrodes when the FX-7542 is to be used along with a defibrillator.

4 Nehb lead

Nehb lead is able to used only by manual recording of 12-lead examination mode.

Positions of Nehb lead are shown below.



(1) Nst: Second rib at right border of stemum
(2) Nap: Fifth intercostal space on left midclavicular line
(3) Nax: Back- left posterior axillary line on level with the bottom tip of the scapula
(4) N: Right front iliac spine, or bottom end of right arcus costalis

Symbols for connecting of leads and electrodes of Nehb lead

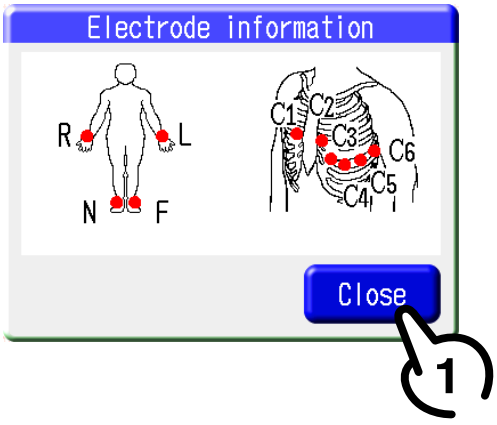
Lead chips are color coded and identified with alphanumerical characters as shown below. Check them before connecting the leads to the patient.

Electrode position / Patient Cable		Nst (1)	Nap (2)	Nax (3)	N (4)	-	-	-	-	-	-
CP-104T	Cable/ Tip color	Red/ Red	Yellow/ Yellow	Green/ Green	Black/ Black	White/ Red	White/ Yellow	White/ Green	White/ Brown	White/ Black	White/ Purple
	Symbol	R	L	F	N	-	-	-	-	-	-
CP-104J	Cable/ Tip color	Red/ Red	Yellow/ Yellow	Green/ Green	Black/ Black	White/ Red	White/ Yellow	White/ Green	White/ Brown	White/ Black	White/ Purple
	Symbol	R	L	F	N	-	-	-	-	-	-
CP-104L	Cable/ Tip color	White / White	Black/ Black	Red/ Red	Green/ Green	Brown/ Red	Brown/ Yellow	Brown/ Green	Brown/ Blue	Brown/ Orange	Brown/ Violet
	Symbol	RA	LA	LL	RL	-	-	-	-	-	-

Checking the Electrode Condition

【MEMO】 In advance, press [ECG controls] – [General/Power] – [<General>], and select [Electrode Condition] for [Display Lead off].

1



If the electrode condition is not stable, “Electrode information” window will be displayed at the upper left of the screen.

The status of each electrode will be indicated by flashing in one of the following colors.

Good : Blue
Fair : Yellow
NG : Red

Press “Close" to close the “Electrode information” window.

When the “Electrode information” window is closed, the following electrode information icon will be displayed.

Fair : Yellow 

NG : Red 

Entering Patient Information

Enter the patient information such as name, age, and sex.
The following 6 methods are available to enter the patient information.

- Entering name, height, weight, and information on medication in addition to age and sex (See "Entering Detailed Data" on page 3-6.)
- Reading the data registered in a CF card (See "Using Patient Information Registered in the CF Card" on page 3-16.)
- Using an ID reader such as magnetic card (See "Setting How to Read ID Card" on page 17-10.)

Select an appropriate entering method depending on situations.

Type of Data to Be Entered

The following data can be entered.

Display	Description	Setting range	Note
ID	Patient's ID number	3 to 20 digits	Three hyphen positions can be specified.
Age	Age	3 digits	Entry subdivided into year/month/week/day. Entry by birth date also allowed. Entry by age range also allowed.
Sex	Sex	Male/Female	
Name	Name	24 1-byte characters/ 12 2-byte characters	Selection can be made from alphanumeric characters, Katakana/Kana characters, and symbols.
Loc.	Information on location such as ward (location 1) and department (location 2)	One item for each location (locations 1 to 4), 4 items in total, can be entered.	A maximum of 200 items can be registered for all the locations from 1 to 4. The number of digits can be selected in the range from 4 to 8.
Height	Height	3 integer digits + 1 decimal digit	Unit: cm
Weight	Weight	3 integer digits + 1 decimal digit	Unit: kg
Med.	Medication code or information on medication	Two items can be entered.	A maximum of 10 cases can be registered.
Symptom	Subjective symptom	One item only can be entered.	A maximum of 10 cases can be registered.
Cmnt	Arbitrary comment		
BP	Systolic/diastolic blood pressure	3 digits for each	Unit: mmHg
Pos.	Body position	Lying/Sitting/Standing	
RespRt	Respiration rate	3-digit numeric value	Unit: Frequency/min.
Doctor	Name of doctor in charge		A maximum of 20 names can be registered.
Tech.	Name of technician in charge		A maximum of 20 names can be registered.

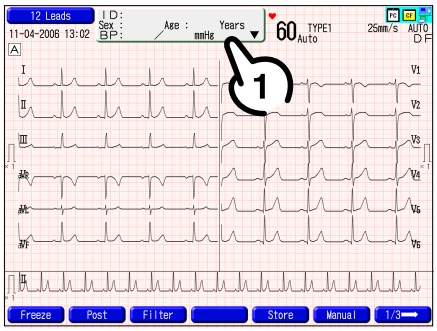
[MEMO] Settable items include whether the entered data should be displayed, entered data should be stored even after the power is turned off, number of digits of the ID number, and the position of hyphen (-) in the ID number Make these settings beforehand. (See "Setting Patient Information" on page 17-33.)

Entering Detailed Data

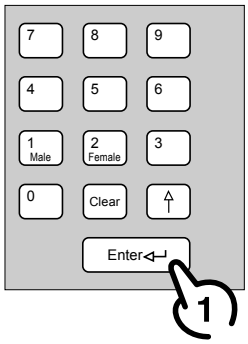
[MEMO] Set “General – Name” – “ID” of the patient data setting to “Extension” beforehand.

1 **Turn on the power of the equipment. (See “Turning On/Off the Power” on page 2-19.)**

2

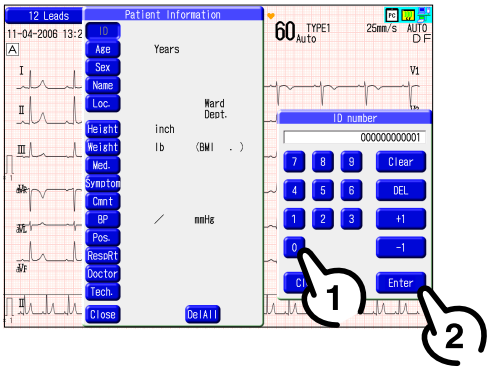


Press the patient information display area or the Enter↵ key on the panel.



3 **The patient information window and the ID window will open.**

4 **Entering ID number**

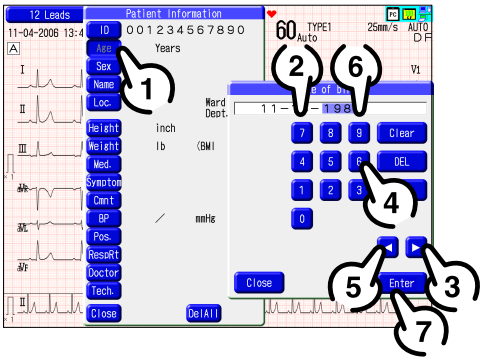


1 **Enter the ID number by pressing [0 to 9], 0 to 9.**

2 **Press [Enter], Enter↵.**

Press [Clear], Clear, to delete all the data entered.
Press [DEL], BS, to delete the numeric value that has just been entered.
Press [Close] to abort the entry, discarding the data entered.

5 Entering age (Birthday input method)



1 **Press [Age] on the patient information window to open the age entry window.**

2 **Enter the year of birth by pressing [0 to 9],** [0] **to** [9]**.**

3 **Press [▶]** [→]**.**
Or press [Enter], [Enter]**.**

4 **Enter month by pressing [0 to 9],** [0] **to** [9]**.**

5 **Press [▶]** [→]**.**

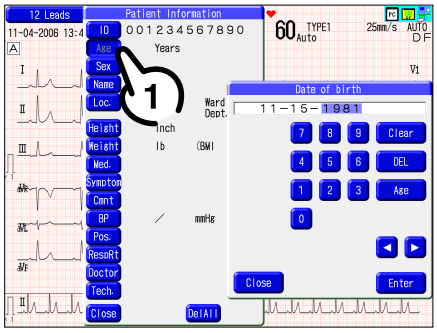
6 **Enter date by pressing [0 to 9],** [0] **to** [9]**.**

7 **Press [Enter],** [Enter]**.**
Press [Clear], [Clear], to delete all the entered data.
Press [DEL], [BS], to delete the numeric value that has just been entered.
Press [Close] to abort the entry, discarding the entered data.

8 **The current age of the patient is automatically calculated based on the entered date of birth.**

Entering age (Direct input method)

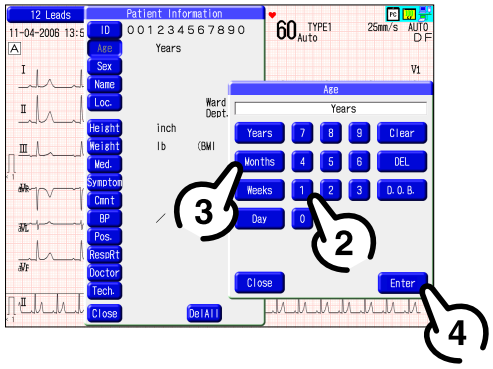
[MEMO] If [Age] is selected as the method of entering age, the age entry window appears first.



1 **Press [Age] in the age entry window (for date of birth entry) to switch to the age entry window.**

2 **Enter age by pressing [0 to 9], [0] to [9].**

3 **Press one from [Years], [Months], [Weeks], and [Day].**



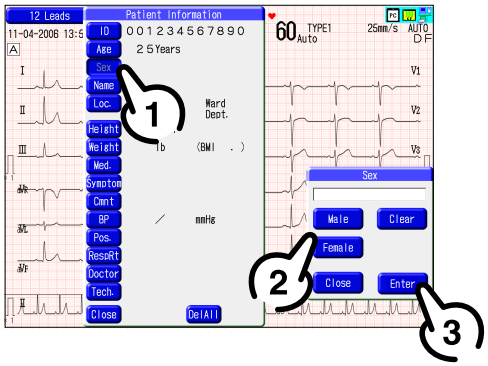
4 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [DEL], [BS], to delete the numeric value that has just been entered.

Press [Close] to abort the entry, discarding the entered data.

6 Entering sex



1 **Press [Sex] on the patient information window to display the sex entry window.**

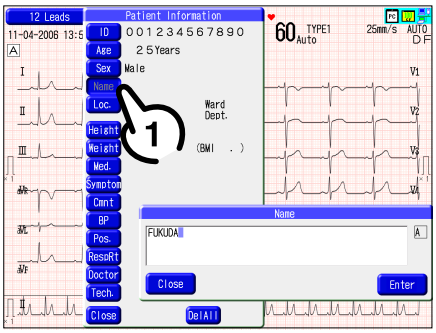
2 **Select sex by pressing [Male], [1 Male] or [Female], [2 Female].**

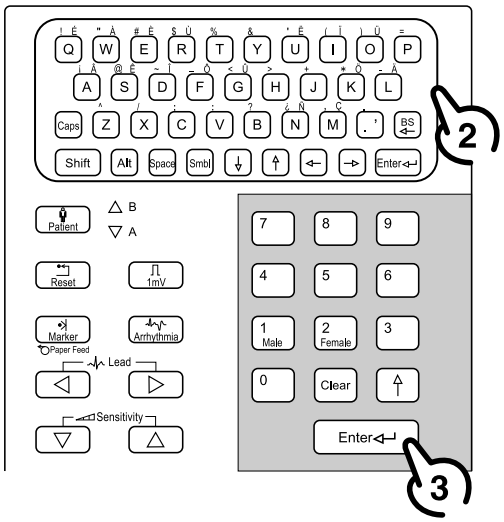
3 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [Close] to abort the entry, discarding the entered data.

7 Entering name





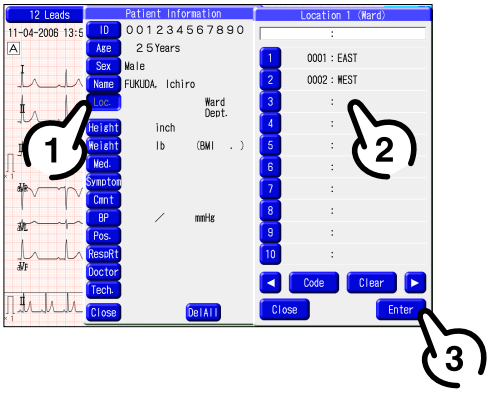
1 **Press [Name] in the patient information window to open the name entry window.**

2 **Enter the name of the patient using the full keys on the operation panel.**
See “Types and Functions of Operation Panel Keys” on page 1-9 for the functions of the full keys.
See “Entering Characters” on page 17-5 for character entry method.

3 **Press [Enter],** Enter↵.

[MEMO] Note that characters cannot be converted and entered exceeding the setting range.

8 Entering location



1 **Press [Loc.] in the patient information window to open the location entry window.**

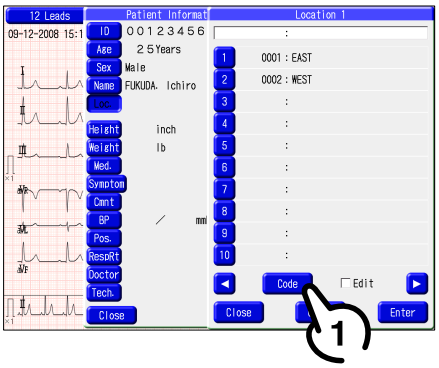
2 **Press the relevant location division.**

3 **Press [Enter],** Enter↵.
Press [Clear], Clear, to delete all the entered data.
Press [Close] to abort the entry, discarding the entered data.

Entering the location code directly

The code whose No. is known can be entered directly. Follow the procedure shown below to enter the location code.

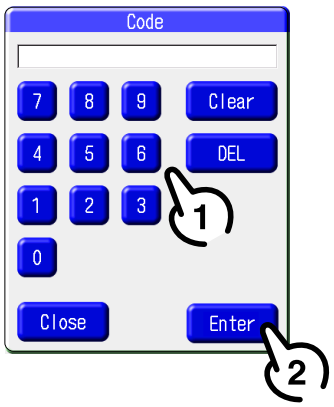
1



Press [Code].

[MEMO] Put a check mark inside ☐Edit and press any number to edit the code and location.

2



1 **Enter the code by pressing [0 to 9], [0] to [9].**

2 **Press [Enter], [Enter].**

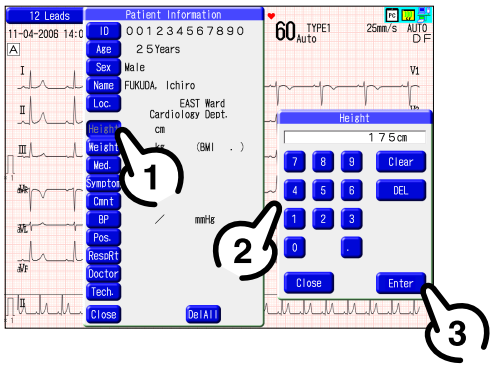
Press [Clear], [Clear], to delete all the entered data.

Press [DEL], [BS], to delete the numeric value that has just been entered.

Press [Close] to abort the entry, discarding the entered data.

9

Entering height



1 **Press [Height] in the patient information window to display the height entry window.**

2 **Enter the height by pressing [0 to 9], [0] to [9].**

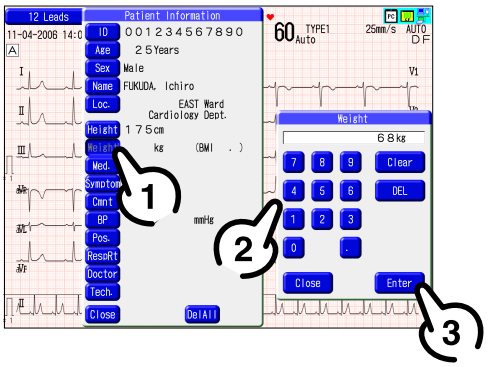
3 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [DEL], [BS], to delete the numeric value that has just been entered.

Press [Close] to abort the entry, discarding the entered data.

10 Entering weight



1 Press [Weight] in the patient information window to display the weight entry window.

2 Enter the weight by pressing [0 to 9], [0] to [9].

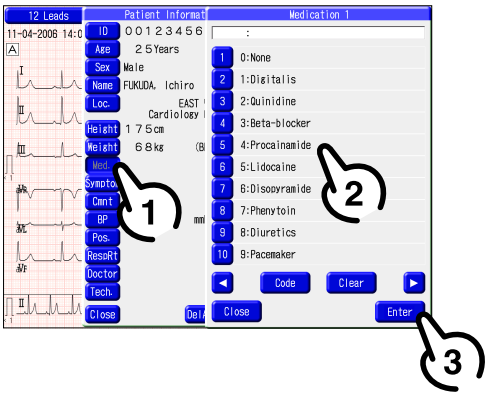
3 Press [Enter], [Enter].

Press [Clear], [Clear], to delete all the entered data.

Press [DEL], [BS], to delete the numeric value that has just been entered.

Press [Close] to abort the entry, discarding the entered data.

11 Entering medication data



1 Press [Med.] in the patient information window to display the medication data entry window.

2 Press the medicine the patient is currently taking to select it.

3 Press [Enter], [Enter].

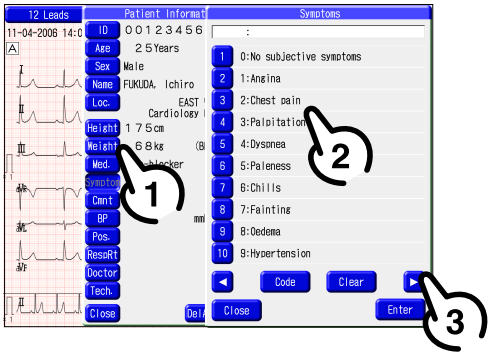
Press [Clear], [Clear], to delete all the entered data.

Press [Close] to abort the entry, discarding the entered data.

Entering medication code directly

Follow the procedure in “Entering the location code directly” on page 3-10.

12 Entering symptoms



1 Press [Symptom] in the patient information window to display the symptom entry window.

2 Press applicable symptom to select it.

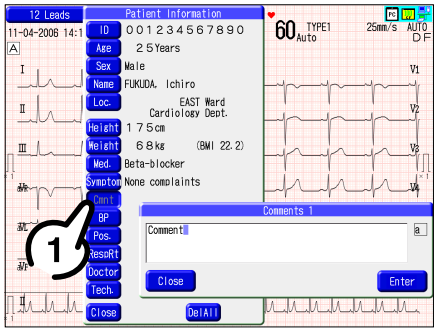
3 Press [Enter], Enter↵.

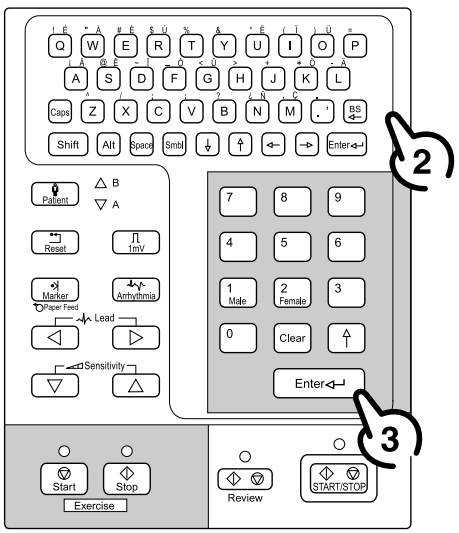
Press [Clear], Clear, to delete all the entered data.
Press [Close] to abort the entry, discarding the entered data.

Entering symptom code directly

Follow the procedure in "Entering the location code directly" on page 3-10.

13 Entering comments





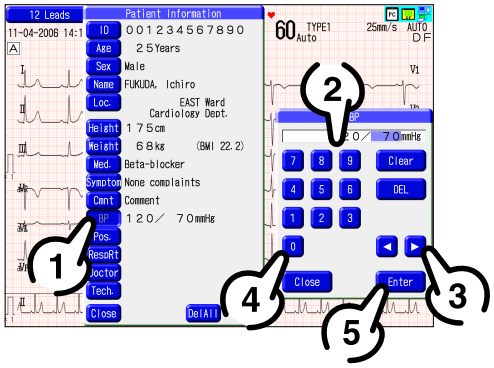
1 Press [Cmnt] in the patient information window to display the comment entry window.

2 Enter your comments using the full keys on the operation panel.
See "Types and Functions of Operation Panel Keys" on page 1-9.

3 Press [Enter], Enter↵.

The procedure is the same as that of entering the patient's name. (See "7 Entering name" on page 3-9.)
Press [Close] to abort the entry, discarding the entered data.

14 Entering blood pressure



1 Press [BP] in the patient information window to display the blood pressure entry window.

2 Enter systolic blood pressure by pressing [0 to 9], [0] **to** [9].

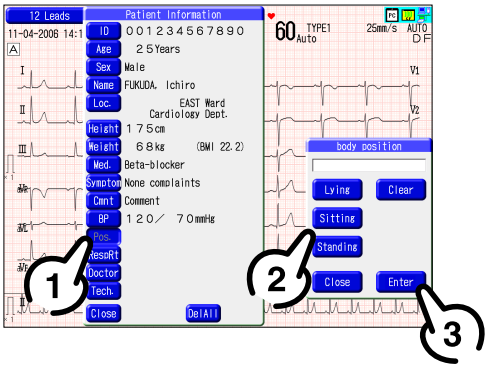
3 Move the cursor (place of entering characters) by pressing [▶] [→] **to the right of "/."**
You can also move the cursor by pressing [Enter] [Enter↵].

4 Enter diastolic blood pressure by pressing [0 to 9], [0] **to** [9].

5 Press [Enter], [Enter↵].

Press [◀] [←] or [▶] [→] to move the cursor (place of entering characters) to left or right.
Press [Clear], [Clear], to delete all the entered data.
Press [DEL], [BS], to delete the numeric value that has just been entered.
Press [Close] to abort the entry, discarding the entered data.

15 Entering body position



1 Press [Pos.] in the patient information window to display the body position entry window.

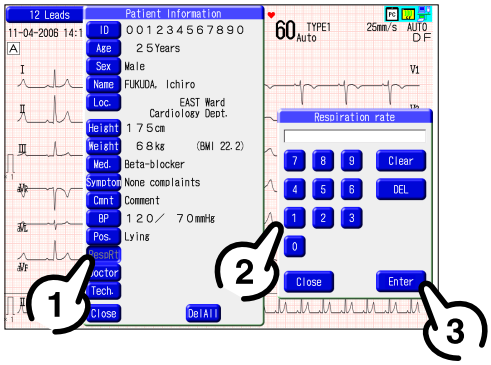
2 Press the applicable body position to select it.
The function keys for each body position on the screen correspond to the keys on the operation panel as follows.

[Lying] → [0]
[Sitting] → [1 Male]
[Standing] → [2 Female]

3 Press [Enter], [Enter↵].

Press [Clear], [Clear], to delete all the entered data.
Press [Close] to abort the entry, discarding the entered data.

16 Entering respiration rate



1 **Press [RespRt] in the patient information window to display the respiration rate entry window.**

2 **Enter the respiration rate by pressing [0 to 9], [0] to [9].**

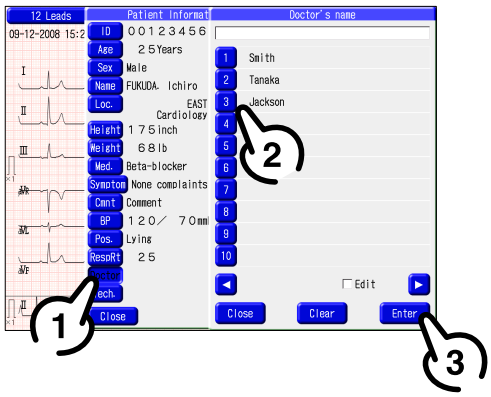
3 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [DEL] [BS] to delete the numeric value that has just been entered.

Press [Close] to abort the entry, discarding the entered data.

17 Entering the name of the doctor



1 **Press [Doctor] in the patient information window to display the doctor's name entry window.**

2 **Press the key that corresponds to the name of the doctor.**

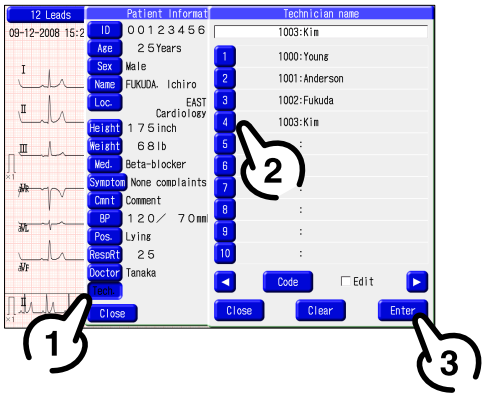
[MEMO] **Put a check mark inside ☐Edit and press any number to edit the code and doctor.**

3 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [Close] to abort the entry, discarding the entered data.

18 Entering the name of the technician



1 **Press [Tech.] in the patient information window to display the technician's name entry window.**

2 **Press the key that corresponds to the name of the technician.**

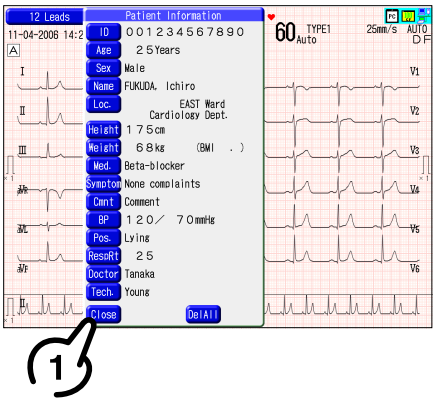
[MEMO] **Put a check mark inside ☐Edit and press any number to edit the code and technician.**

3 **Press [Enter], [Enter].**

Press [Clear], [Clear], to delete all the entered data.

Press [Close] to abort the entry, discarding the entered data.

19



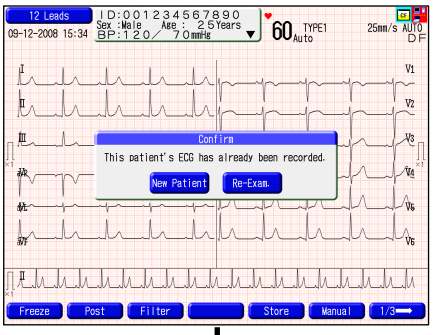
Press [Close].

The data of the patient has now been entered.

New Patient Function

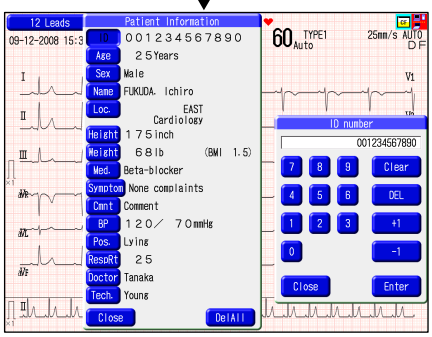
If starting a new examination with the same patient information of the previous examination, a message which prompts to input the patient information will be displayed.

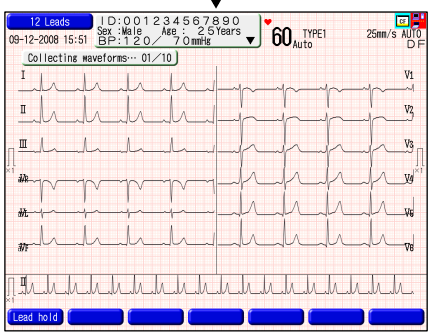
[MEMO] Perform the following setting in advance.
Press [menu] – [Settings] – [Patient data] – [Details settings], and select [Yes] for [Alert duplicated ID].



Select [New Patient] and display the patient information input screen.

Select [Re-Exam.] to start the examination with the previous patient information.





Using Patient Information Registered in the CF Card

The patient information entered prior to the examination can be registered in the CF card, and the data can be called up for the next examination.

[MEMO] When using the patient information register function, set “General” – “Patient Selection”to “Yes” of the patient data setting.

[MEMO] The patient information that can be registered are ID number, Name, date of birth, and, and sex. Age cannot be registered because it changes with time. Register the patient’s age by entering his/her date of birth. (See “Entering age” on page 3-7.)

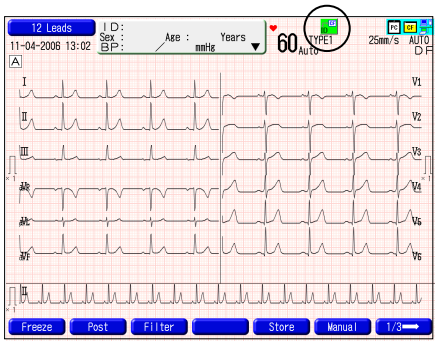
[MEMO] Insert the CF card into which the patient information is to be registered into the CF card slot, and format the card beforehand. (See “Preparation before Storing Data (Formatting)” on page 14-9.)

[MEMO] A maximum of 5000 patient information can be registered in a 16-MB CF card. If the CF card is used both for patient registration and ECG data storage, there may be a case where the number of data that can be registered is less than 5000, even if the capacity of the CF card is larger than 16 MB. Use a CF card having capacity of 16 MB or larger exclusively for patient information registration.

Registering Patient Information

Enter the patient information, perform examination, and register the patient information in the CF card.

1

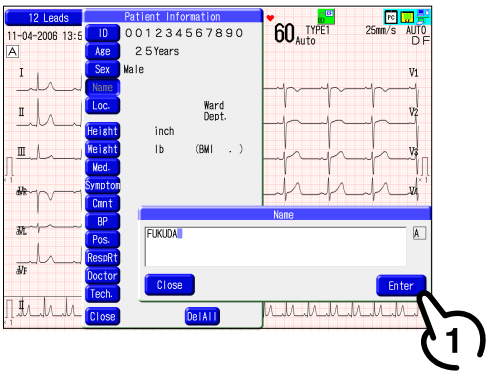


Set a formatted CF card into the CF card slot.

The green icon appears, indicating that the CF card for patient information registration has been set.

[MEMO] If a CF card for patient information registration is not inserted into the CF card slot or the CF card is to be used for patient information registration for the first time, the red icon for error indication appears. If the card is to be used for the first time, proceed to the next step. If not, check that the CF card for patient information registration has been inserted in the slot properly.

2



Enter the patient information and perform examination.

On completion of the examination, the patient information used for the examination is automatically registered in the CF card.

When the CF card is used for patient information registration for the first time, the "Creating environment for patient information registration" message appears.

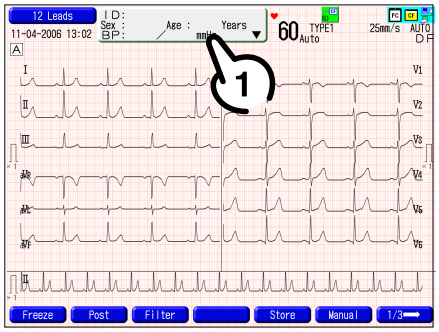
[NOTE] The patient information is registered in the CF card immediately after the examination is completed. If the CF card is removed or the power is turned off in this state, the CF card may be damaged.

[MEMO] The patient information registration is made when automatic recording, extended recording, and long-term arrhythmia examination are completed.

Reading Registered Patient Information with the ID number Used as a Key ID

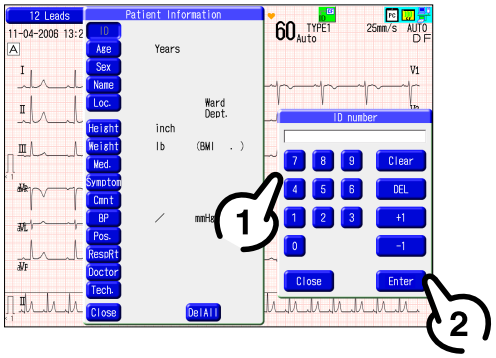
The patient information registered in a CF card can be read with the patient's ID number used as a key.

1



Press the patient information display area.

2



1 **Enter the patient's ID number by pressing [0 to 9], [0] to [9].**

2 **Press [Enter], [Enter].**

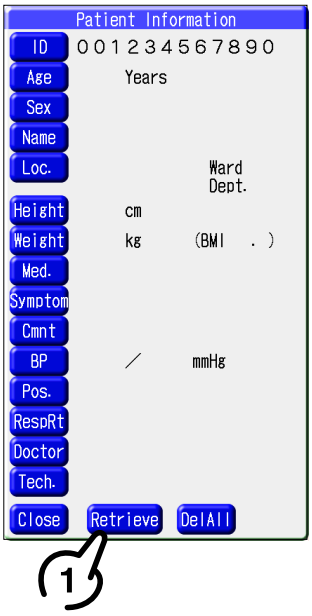
The patient information is read from the CF card with the entered ID number used as a key, and displayed on the screen.

Press [Clear], [Clear], to delete all the entered data.

Press [DEL], [BS], to delete the numeric value that has just been entered.

Press [+1] to increment the ID number, and press [-1] to decrement the ID number

When ID number is entered



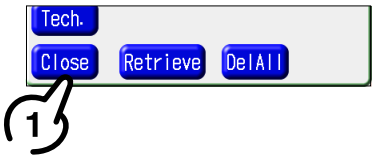
Press [Retrieve].

The patient information is read from the CF card with the entered ID number used as a key, and displayed on the screen.

[MEMO] If no patient information corresponding to the specified ID number is found, the "No data for ID: 99...9 found" message appears. (99...9: specified ID number)

[MEMO] The ID number can also be read from the ID reader. If the ID number is read from the ID reader, the patient information is automatically read from the CF card. (See "Setting How to Read ID Card" on page 17-10.)

3



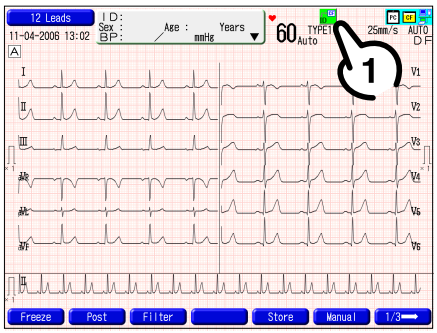
Press [Close].

[MEMO] If the data with the same ID number are registered, the one with smaller number is selected.

Specifying and Reading the Registered Patient Information

The patient information registered in the CF card is read and used for examination.

1

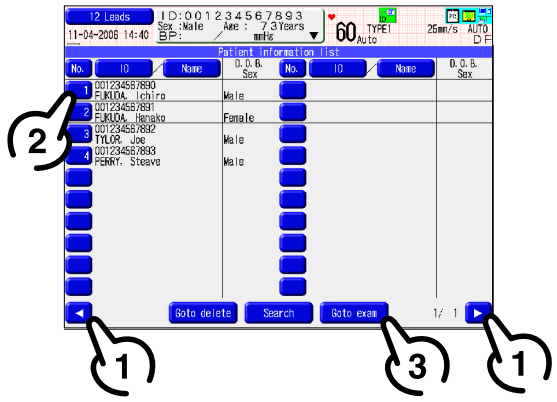


Press the patient information CF card icon 

.

The patient information list appears.

2



1 **If desired patient information is not displayed on the patient information list, press [◀] or [▶] to switch pages.**

Press the title button of the desired item to rearrange the list in ascending/descending order.

<No.> Rearranges the Nos. in ascending/descending order.
<ID> Rearranges the ID list in ascending/descending order.
<Name> Rearranges the list of names in alphabetically ascending/descending order.

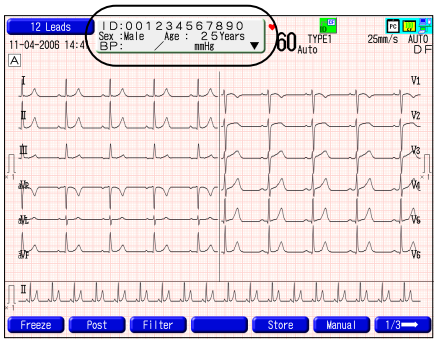
2 **Press a desired No.**

The patient information is selected.

3 **Press [Goto exam].**

The patient information list is closed.

3



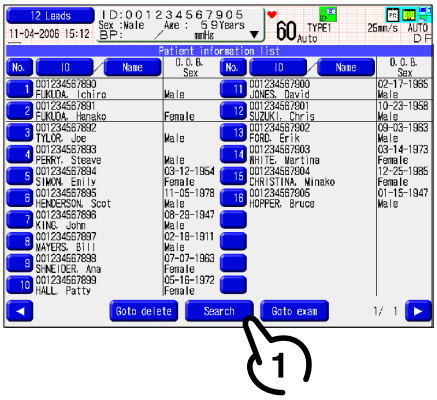
The specified patient information is displayed.

[MEMO] The patient information registered are ID number, name, date of birth, and sex only. Enter other patient information separately as required.

Searching Patient Information

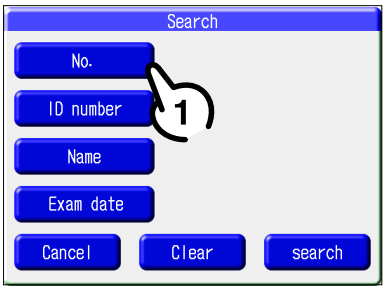
Search the patient information that satisfies the conditions from the registered patient information list.

1



Press [Search].
The patient search window appears.

2

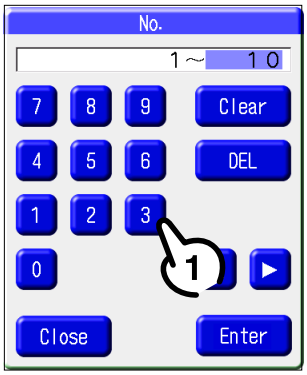


Select search criteria.

<No.>	Specify registration No.
<ID number>	Specify ID number
<Name>	Specify name.
<Exam date>	Specify the exam date

3

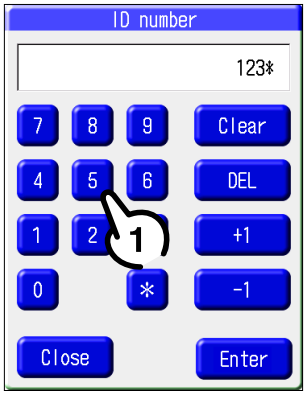
Enter the conditions as follows for each of the criteria in step 2 above.
<No.>



Enter the data No. of the target patient.
Specify the range of search by defining start No. and end No.

[MEMO] If the start No. is omitted, the target range of search for patient information is from the first No. to the end No. specified. If the end No. is omitted, the target range of search is from the start No. to the last No.

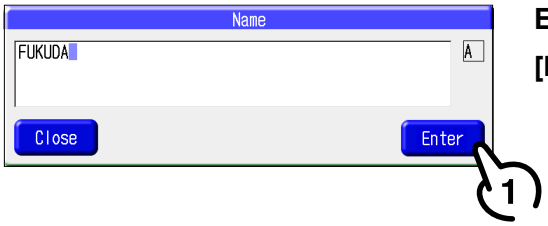
<ID number>



Enter the ID number of the target patient.

[MEMO] Wildcard matching can be performed. For example, "123*" is entered, "123," "12345," "1234567890" etc. are extracted.

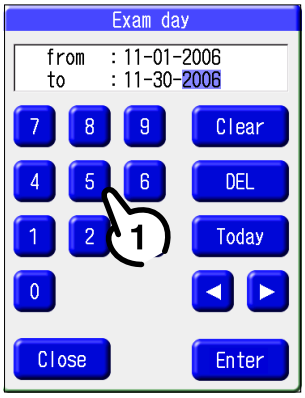
<Name>



Enter the name of the target patient.

[MEMO] The names that contain the entered character string are searched. For example, if "fuku" is entered, names such as "Fukuda," "Fukuyama," and "Kofuku" are extracted.

<Exam day>

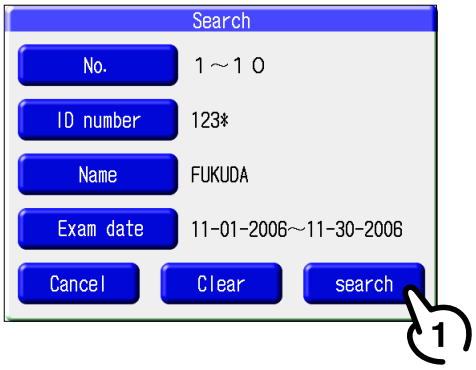


Enter the exam day when the target patient information was registered.

Specify the start date and the end date of the search range.

[MEMO] If the start date is omitted, the target range of search for patient information is from the first date to the end date entered. If the end date is omitted, the target range of search is from the start date to the last date.

4



Press [search].

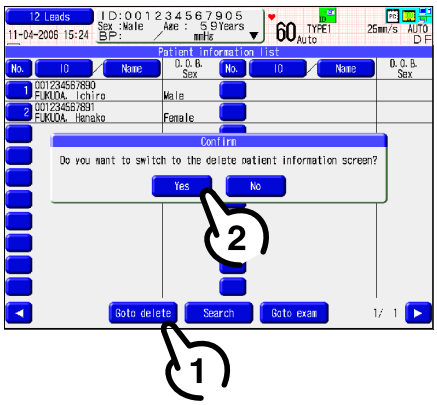
The patient information that satisfies all the specified conditions are extracted and displayed.

Deleting Patient Information No Longer Required

Delete the patient information that is no longer required from the CF card as follows.

[MEMO] The deleted patient information cannot be restored.

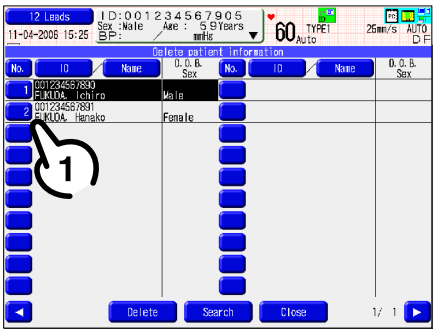
1



1 **Press [Goto delete].**
A confirmation message window appears.

2 **Press [Yes].**
The delete patient information screen appears.

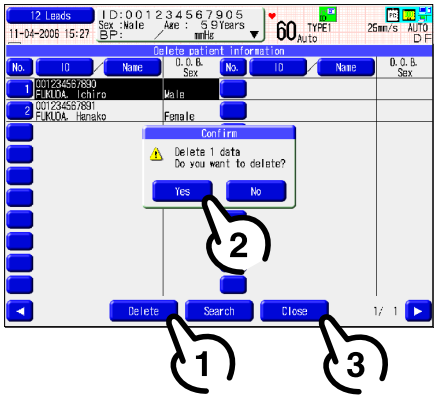
2



Press the No. of the patient information to be deleted.
The selected patient information is highlighted.

[MEMO] Multiple patient information to be deleted can be specified.

3



1 **Press [Delete].**
The confirmation window appears.

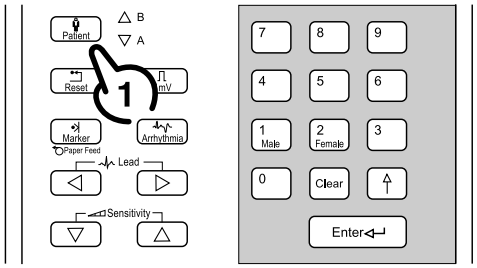
2 **Press [Yes].**
The specified patient information is deleted from the CF card.

3 **Press [Close].**
The patient information list display appears again.

Switching Patients

If 2 patients are connected to the FX-7542, various displays and waveforms of the patients can be switched as follows. This function is available only when ECG amp module (EE-20, EE-21) is inserted into the option slot.

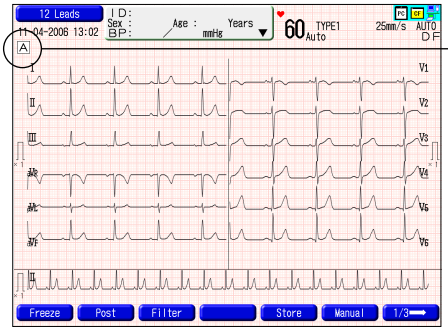
1



Press Patient on the operation panel.

Every time the key is pressed, the patient from whom ECG data is to be collected is switched between A and B.

[MEMO] In 15-lead examination, switching is automatically made from patient A to patient B. Switching from patient B to patient A is not allowed.



The patient display is switched between A and B.

Setting Filters

Noise that affects the ECG waveforms can be eliminated using filters.

Types of Settable Filters

The following filters can be set to ON (effective) or OFF (ineffective).

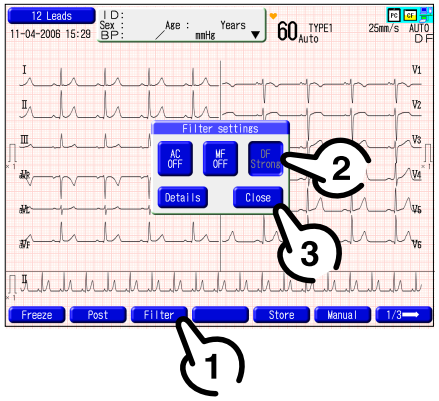
- **AC filter (Hum filter, displayed as “AC” on the screen)**
  Set to ON when cyclic waves are added to the waveform due to the noise generated from a power supply.
- **Drift filter (Displayed as “DF” on the screen)**
  Set to ON when the top/bottom position of the base line is not stable.
- **Muscle filter (Displayed as “MF” on the screen)**
  Set the filter to ON when noise is generated as a result of movement of muscles of the patient.

How to Set Filters

1 **Turn on the power of the equipment. (See “Turning On/Off the Power” on page 2-19.)**
Attach the electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)

2 **Check the waveforms displayed on the screen for the effect of noise.**
If noise is found, perform the following.

3



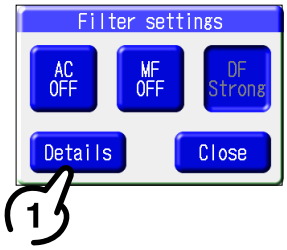
1 **Press [Filter].**
The filter setting screen appears.

2 **Press the filter button corresponding to the noise found.**
The filter of the button pressed is set to ON.

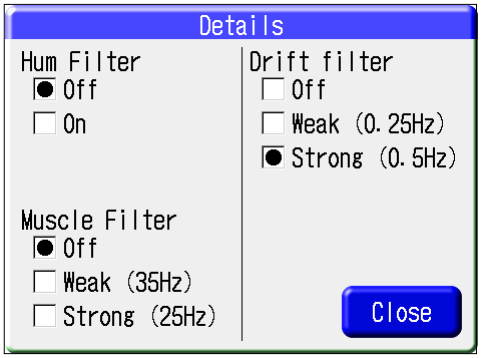
3 **Press [Close].**

4 **Repeat steps 2 and 3 until the noise is eliminated.**

When making detailed setting



1 **Press [Details].**
The detailed setting screen appears.



2 **Make the setting for hum filter, muscle filter, drift filter.**

- Hum Filter: ON/OFF of the filter
- Muscle Filter: Level of filtering characteristics and OFF
- Drift Filter: Level of filtering characteristics and OFF

[MEMO] The setting contents for "Filter" – "Filter 2" are added to the filters for exercise tests. (See "Setting the ECG Controls" on page 17-14.)

[MEMO] Be careful when reading the ECG data taken by using a 25-Hz muscle filter because the distortion of P waves or QRS waves may become large depending on the waveforms.

Setting Sensitivity

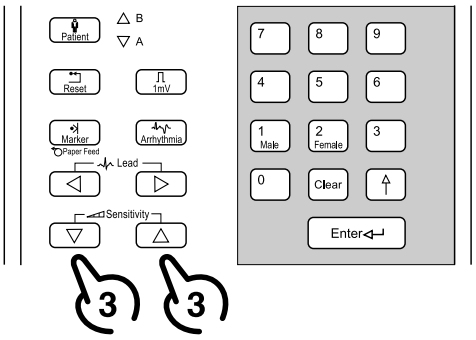
The sensitivity of the waveforms to be displayed or printed (amplitude of the waveforms) can be set as follows.

[MEMO] Select "Sensitivity/Monitor" – "Details settings" – "Specify sensitivity" of the ECG control setting to make detailed sensitivity setting.

1 **Turn on the power of the equipment. (See "Turning On/Off the Power" on page 2-19.)**
Attach the electrodes to the patient. (See "Attaching Electrodes" on page 3-2.)

2 **Check the amplitude of the waveforms (sensitivity) displayed on the screen.**
If the amplitude of the waveforms is too large/small, perform the following.

3



Press ▽ Sensitivity △ on the operation panel.

Every time △ is pressed, the switching is made from "AUTO" → "1" → "2" → "AUTO" → to (cm/mV). Every time ▽ is pressed, the switching is made from "AUTO" → "1" → "1/2" → "1/4" → "AUTO" → to (cm/mV).
If "AUTO" is selected, optimum sensitivity is automatically selected from 1 cm/mV, 1/2 cm/mV, and 1/4 cm/mV.

4 **Sensitivity is switched and the amplitude of the waveforms is changed.**

Check Carefully

To ensure the patient's safety and record stable ECG waveforms without the effect of noise, check the following once again.

- **Is the place of examination appropriate?**
  - Is there a noise source near the FX-7542 such as X-ray imaging equipment, ultrasound imaging equipment, and other electrical devices?
    If there is, select another place for examination. Ground the bed made of metal.
  - Is the temperature of the place of examination kept within 20°C to 25°C (68°F to 77°F) range?
  - Is the place of examination low in humidity?
- **Is the power cord connected properly (when the FX-7542 is used with AC power)?**
  - Isn't the insertion loose?
  - Isn't the power cord tangled with other cords?
- **Is the battery charged fully (when the FX-7542 is used with the battery)?**
- **Is the patient cable connected properly?**
  - Is the supplied patient cable (CP-104J, CP-104T, CP-104L) used?
    Be sure to use the supplied patient cable.
  - Isn't the insertion of the plug loose?
  - Isn't the patient cable near the power cord?
  - Is the chip at the tip of the patient cable connected to a correct electrode?
- **Is the state of the electrodes good?**
  - Is the grease on the patient's skin that contacts the electrode removed completely?
  - Is keratin cream applied to the patient's skin that contacts the electrode?
  - Is dirt attached to the electrodes?
    Wipe off dirt, if attached, with alcohol or soap solution. Sandpaper stubborn dirt.
  - Is the electrode attachment loose?
    Fasten loose electrodes within the range where the patient does not feel pain or feel uncomfortable.
  - Aren't new and old electrodes or different kinds of electrodes used together?
- **Is the patient state good?**
  - Is the patient nervous?
    If he/she is, make him/her feel relaxed by explaining that electrocardiography is a simple method that does no harm to human body.
  - Isn't the patient moving or talking?
  - Isn't the bed narrow?
  - Aren't the exposed body parts of the patient such as arms and legs in contact with metallic part such as the bed?
- **Is sufficient amount of recording paper provided?**

Chapter 4

Standard 12-lead Examination (Basics)

This chapter describes the basic ECG recording method.

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- Auto Mode/While Printing Is Made.....4-2
- Manual Mode (12 lead)/While Printing Is Suspended 4-2
- Manual Mode (Nehb lead)/While Printing Is Suspended 4-2
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Function Keys Used for Examination

Usable function keys vary depending on the type of operation mode or whether printing is in progress or not.

Auto Mode/While Printing Is Suspended

Freeze	Post	Filter	SelectData	Store	Manual	1/3 →
Press [1/3 →]. ↓						
Screen	Rep.Form	Result	ChestLead		Copy	2/3 →
Press [2/3 →]. ↓						
			Speed↓	Speed↑	Menu	3/3 →

Auto Mode/While Printing Is Made

Leadhold						

Manual Mode (12 lead)/While Printing Is Suspended

# channels	Post	Filter	Speed↓	Speed↑	Auto	1／2→
Press [1/2 →]. ↓ ↑ Press [2/2 →].						
Screen	Freeze	Nehb			Menu	2／2→

Manual Mode (Nehb lead)/While Printing Is Suspended

		Filter	Speed↓	Speed↑		1／2→
Press [1/2 →]. ↓ ↑ Press [2/2 →].						
		12 lead				2／2→

Manual Mode/While Printing Is Made

		Filter	Speed↓	Speed↑		

During Compressed Recording

Stop Compressed Rec	Comp. Wave	Filter				

[MEMO] [Comp. Wave] is displayed during post-exercise state. [Post] is displayed while static examination is being performed. The display changes to [Comp. Wave] once an exercise test is started.

[MEMO] "Select data" is displayed when "General" – "Serial comparison" in 12 Leads setting is set to "Yes."

Difference between Auto Recording and Manual Recording

The difference between auto recording and manual recording is as follows.

- **Auto recording**
  The ECG data is analyzed and recorded in the standard format according to the contents of the setting made beforehand. (See “Recording Data Automatically” on page 4-13.)
- **Manual recording**
  The ECG data is manually recorded while the leads, sensitivity, etc. are arbitrarily changed as required. (See “Recording Data Manually” on page 4-18.)

Printing Format for Automatic Recording

The printing format for automatic recording consists of the following data.

- Direct waveform report
- Results report
- Detail measurement report

FP-1001
- Examination guide
- Interpretation commentary

Direct waveform report	Results report	Detail measurement report	Examination guide	Interpretation commentary

Detailed settings on printing including whether printing should be performed can be made for each report.

Direct Waveform Report

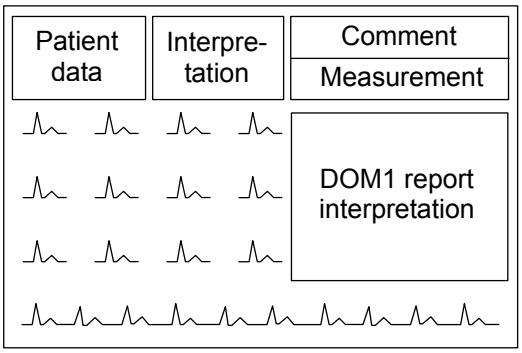
Direct waveform report including ECG recording time, number of channels for recording, waveform report format, etc. can be set in "12L Auto" – "12L Auto TYPE 1 (to 5)" – "Waveform report" in recording format setting.

Results Report

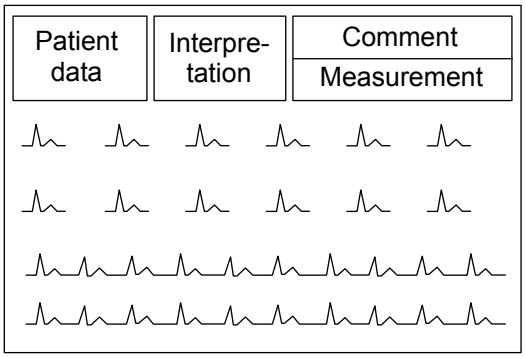
Types of Results Report

The following types are available for the results report.
The contents to be recorded can be set in "12L Auto" – "12L Auto TYPE 1 (to 5)" – "Results report" in recording format setting.
See page 4-6 and subsequent pages for the contents to be printed in the comment area of the DOM1 report, printing of detailed measurement report, etc.

- **DOM1**
  Dominant 3ch × 4

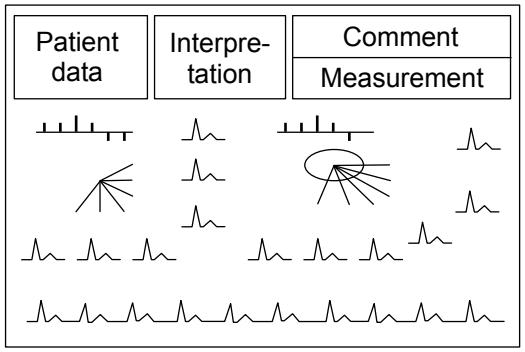


- **DOM2 (+Rhythm 1/2ch)** FP-1001
  Dominant 2ch × 6 + Rhythm 1/2ch



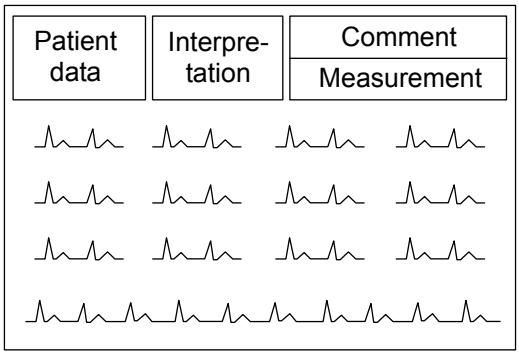
- **DOM3** FP-1001□

Dominant waveforms are laid out in three dimensions and printed.



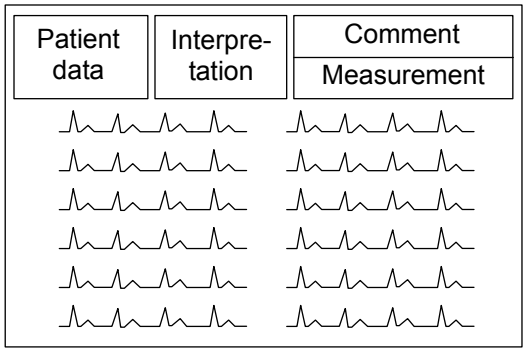
- **DOM2 (+Rhythm 1/2ch)** FP-1001□

Waveform 3ch × 4 + Rhythm 1/2ch

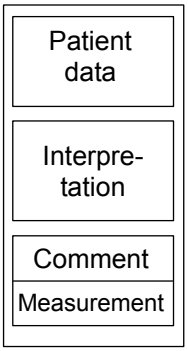


- **FULL6 (+Rhythm 1ch)** FP-1001□

Waveform 6ch × 2 (+Rhythm 1ch)

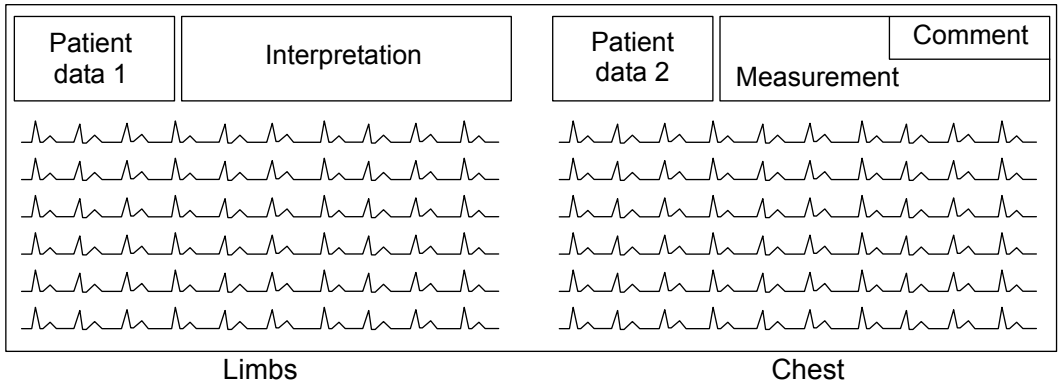


- **Cover report**



- **FULL** FP-1001□

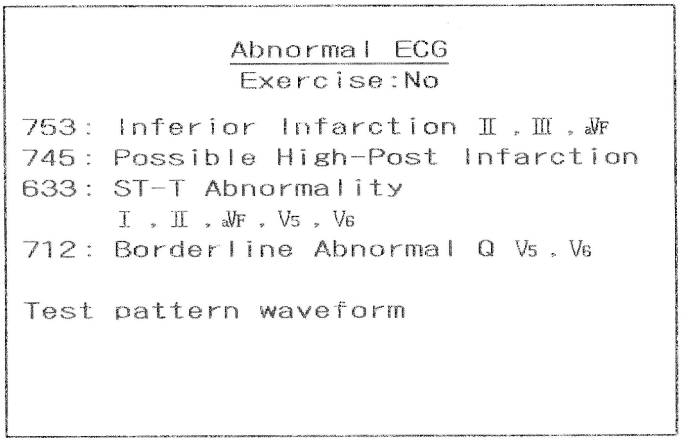
All the waveforms are printed.



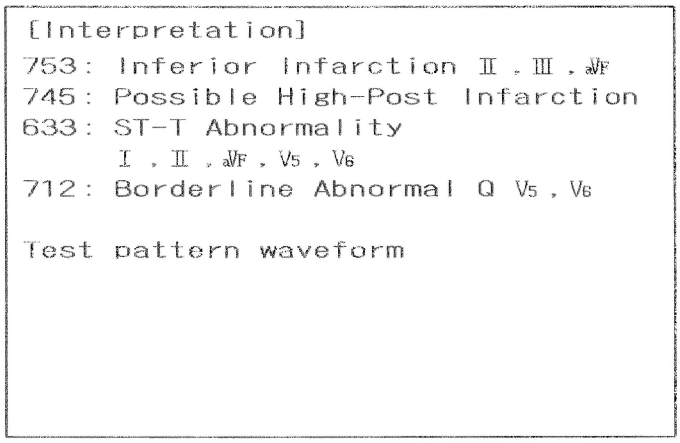
Interpretation Section

The data to be printed in the interpretation section can be set in “12L Auto” – “12L Auto TYPE 1 (to 5)” – “Result report” – “interpretation section” in the recording format setting.

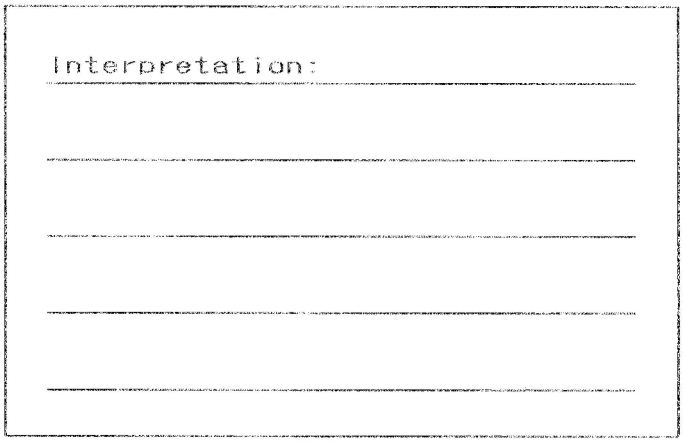
- **TYPE1 (Classification for grage judgement + interpretation)** FP-1001



- **TYPE2 (Interpretation)** FP-1001



- **TYPE3 (Free filling in column)**

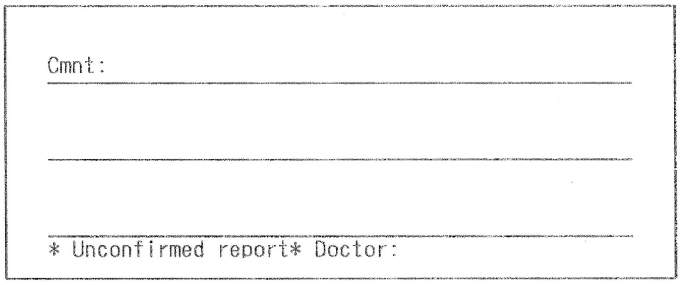


[MEMO] In TYPE1 and TYPE2, interpretations on rhythm and waveforms are displayed separately, and the names of interpretation are printed in the order from higher grade to lower grade. There may be a case where codes only are printed for the interpretations in low grade.

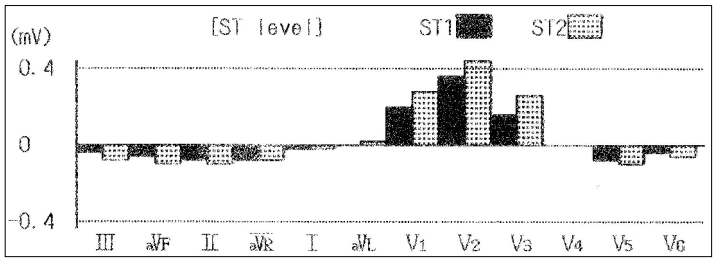
Comment Section

The data to be printed in the comment area can be set in “12L Auto” – “12L Auto TYPE 1 (to 5)” – “Results report” – “comment section” in recording format setting.

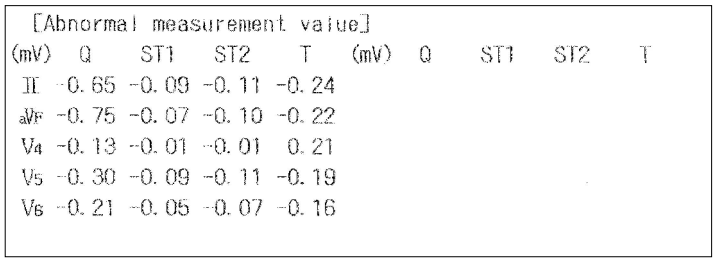
- **TYPE1 (Comment)**



- **TYPE2 (ST measurement graph)** FP-1001



- **TYPE3 (Abnormal measurement value)** FP-1001



Measurement Section

The data to be printed in the measurement area can be set in “12L Auto” – “12L Auto TYPE 1 (to 5)” – “Results report” – “measurement section” in recording format setting.

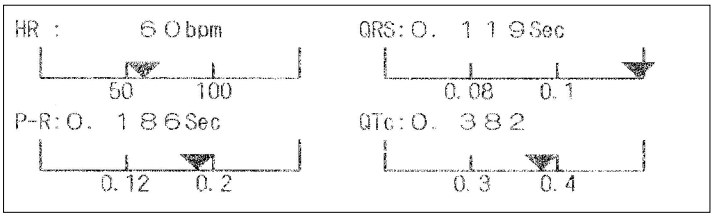
- **TYPE1 (Measurement value + Minnesota code)** FP-1001

```
HR :      60bpm                          [Minnesota Code]
R-R:1.000Sec  Axis:      30deg 1-2-2;L   1-1-1;I
P-R:0.186Sec   RV5:  1.39mV  4-2;L      4-2;I
QRS:0.119Sec   SV1:  0.86mV  5-5;A      5-2-1;L
QT :0.382Sec   R+S:  2.25mV  5-2-1;I    9-4-1
QTc:0.382                    9-5
```

- **TYPE2 (Measurement value)**

```
HR :      60bpm
R-R:1.000Sec  Axis:      30deg
P-R:0.186Sec   RV5:  1.39mV
QRS:0.119Sec   SV1:  0.86mV
QT :0.382Sec   R+S:  2.25mV
QTc:0.382
```

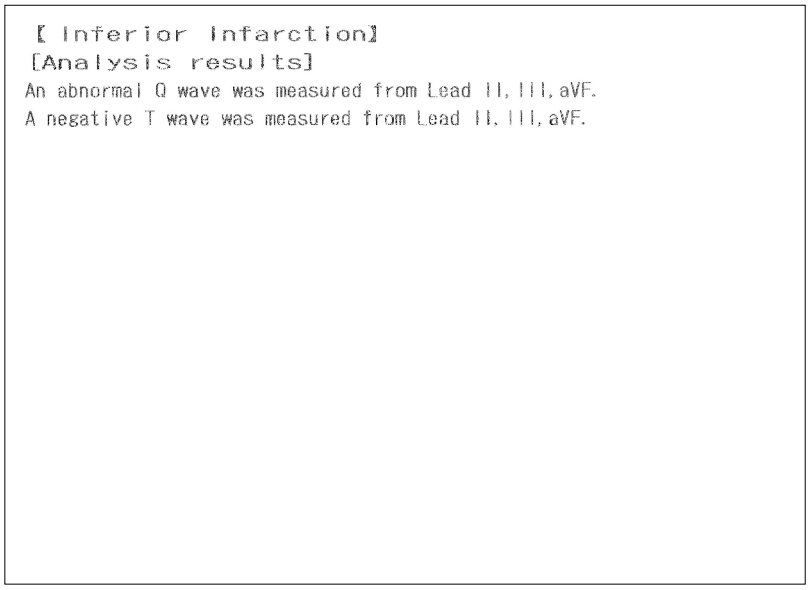
- **TYPE3 (Measurement chart)** FP-1001



DOM1 Report Interpretation

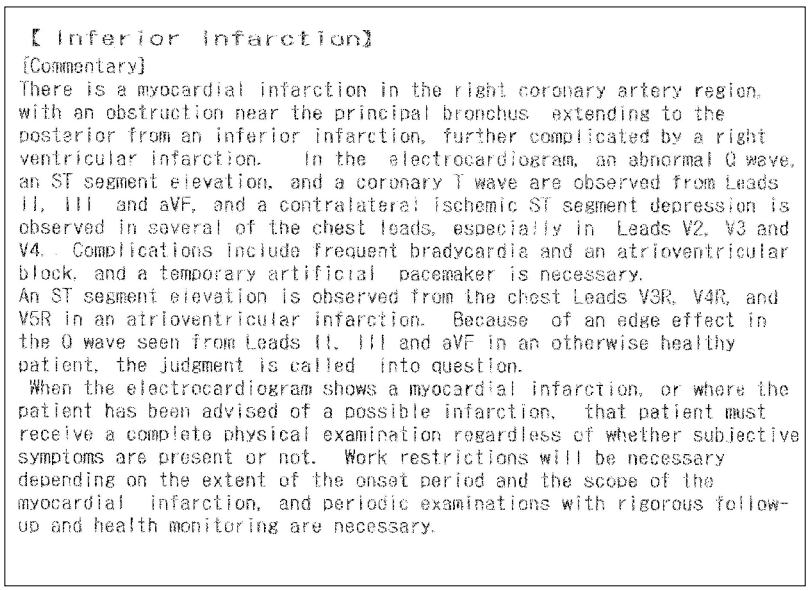
The data to be printed in the interpretation area of the report (when DOM1 is selected) can be set in "12L Auto" – "12L Auto TYPE 1 (to 5)" – "Results report" – "Eexplanation section" in recording format setting.

- **TYPE1 (Examination result)** FP-1001

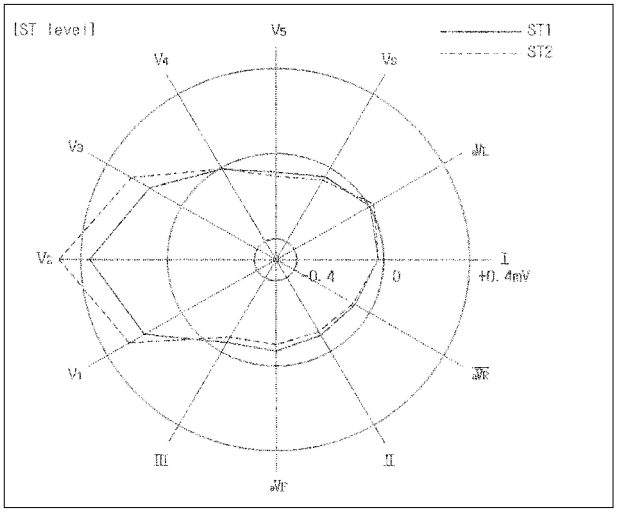


[MEMO] The interpretation to be printed in TYPE1 and TYPE2 is the one selected automatically by the equipment among the higher-grade interpretations. The name of the lead that produces the waveform to which the interpretation is to be provided is printed enclosed in a frame.

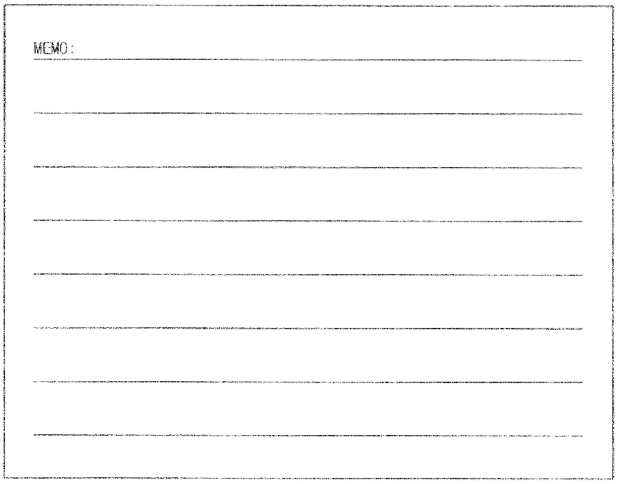
- **TYPE2 (Examination result + Commentary)** FP-1001



- **TYPE3 (ST radar)** FP-1001



- **TYPE4 (Memo)** FP-1001



- **TYPE5 (None)**

Detail Measurement Report

To print detailed measurement values, set “12L Auto” – “12L Auto TYPE 1 (to 5)” – “Results report” – “Detail measurement report” to “Yes” beforehand.

Glossary

Terms for Examination Mode Recording

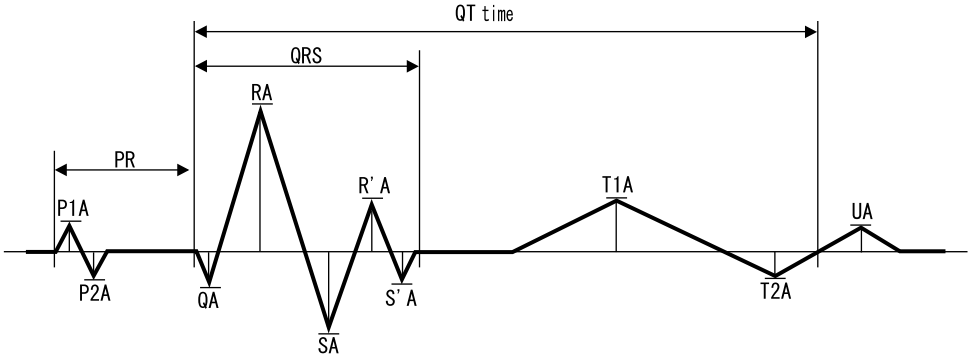
Basic waveform measurement value ..... Average of detailed waveform measurement values
Detailed waveform measurement value..... Dominant waveform measurement value of each lead
Basic arrhythmia measurement value ..... Average of detailed arrhythmia measurement values
Detailed arrhythmia measurement value ..... Measurement value of raw waveforms (I, II, V1, and V5) for each heart beat

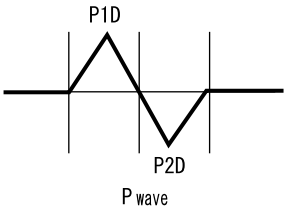
- **Basic measurement value**

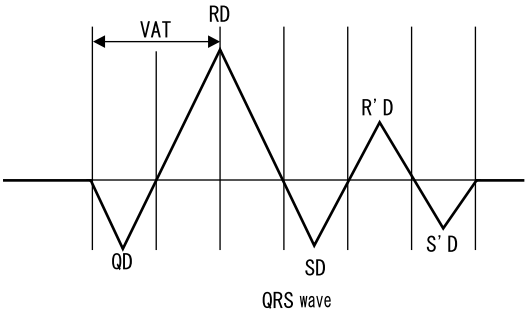
Heart rate .... Heart rate obtained by basic arrhythmia measurement
Heart rate obtained from average R-R time of detailed arrhythmia measurement
R-R..... R-R time of basic arrhythmia measurement
The average value of heart rates in which one P-wave has been found is calculated first, and then the average value is recalculated based on the R-R time within ±25% of the value calculated first.
P-R ..... P-R time of basic waveform measurement
Average value of measurements with I to V6 leads
QT ..... QT time of basic waveform measurement
Average value of measurements with I to V6 leads
QTc ..... QTc time of basic arrhythmia measurement
The value is obtained using the following expression:
QTc = Average waveform QT time / $\sqrt{(\text{Average R-R time of arrhythmia (sec.)})}$
Axis..... QRS axis of basic waveform measurement
Axis (°) = Tan^{-1} ($\sqrt{3}$(II + III)/(2 × I + II – III))
Where, I, II, and III are the sum of the maximum (signed) value of amplitude of Q, R, S, R', and S' waves
RV5/RV6..... Maximum value of R and R' wave of V5 lead or V6 lead in detailed waveform measurement
V5 lead > V6 lead: RV5
V5 lead ≤ V6 lead: RV6
SV1 ..... Maximum (absolute) value of Q, S, and S' wave of V1 lead in detailed waveform measurement
R + S ..... Sum of the amplitude of "RV5/RV6" and "SV1"

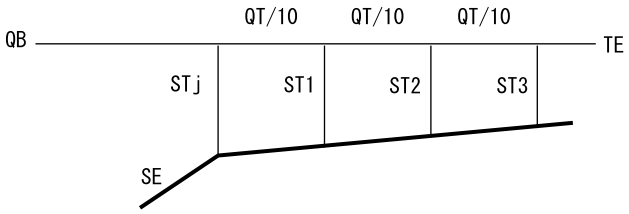
- **Detailed measurement**

P1a ..... Amplitude P1 in detailed waveform measurement
P2a ..... Amplitude P2 in detailed waveform measurement
Qa..... Amplitude Q of detailed waveform measurement
Ra..... Amplitude R of detailed waveform measurement
Sa ..... Amplitude S of detailed waveform measurement
R's..... Amplitude R' of detailed waveform measurement
ST1..... Amplitude ST1 of detailed waveform measurement
ST2..... Amplitude ST2 of detailed waveform measurement
T1a..... Amplitude T1 of detailed waveform measurement
T2a..... Amplitude T2 of detailed waveform measurement
P1d..... Time P1 of detailed waveform measurement
P2d..... Time P2 of detailed waveform measurement
Qd ..... Time Q of detailed waveform measurement
Rd..... Time R of detailed waveform measurement
Sd..... Time S of detailed waveform measurement
R's..... Time R' of detailed waveform measurement
P-R..... Time P-R of detailed waveform measurement
QRS ..... Time QRS of detailed waveform measurement
FVT..... Time FVT of detailed waveform measurement
FLG..... Notch flag, noise level, of QRS wave of detailed waveform measurement


QT time
QRS
RA
PR
R'A
T1A
P1A
UA
P2A
QA
S'A
T2A
SA


P1D
P2D
P wave


VAT
RD
R'D
QD
SD
S'D
QRS wave


QT/10
QT/10
QT/10
QB
TE
STj
ST1
ST2
ST3
SE

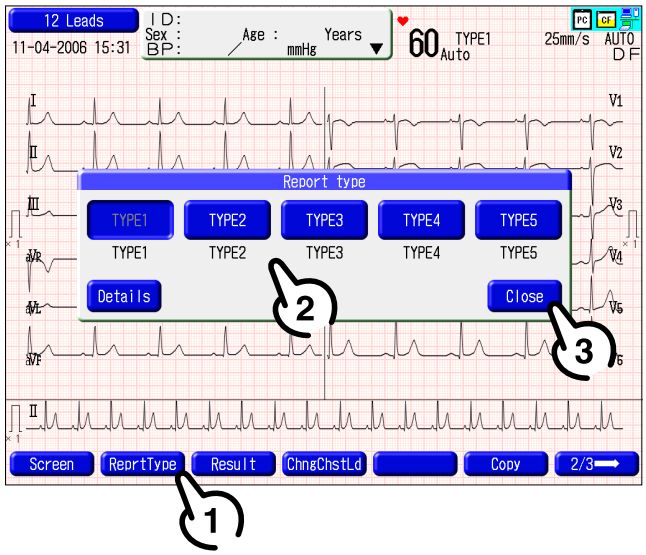
Recording Data Automatically

ECG data can be automatically recorded. ECG data is analyzed according to the setting made beforehand, and printed in typical formats.

Preparation

Make the setting for “12L Auto” beforehand in recording format setting. (See “12L Auto” on page 17-23 and “15L Auto” on page 17-27.) Also make the following settings before starting the examination.

- **Selecting screen display**
  Press “Screen” and select screen display method.
  Every time “Screen” is pressed, the display switches in the following order: “6ch × 2 + Rhythm” → “Screen 1” → “Screen 2” → “Screen 3” → “6ch × 2 + Rhythm” → …..
  In screens 1, 2, and 3, the number of channels and leads set in “Screen format” in 12 Leads setting are displayed.
- **Selecting report type**
  Press “ReportType,” and the “Report type window” appears. Select the desired report type and then press [Close], and the report format set in “12L Auto” – “12L Auto TYPE 1 (to 5)” in recording format setting is selected.

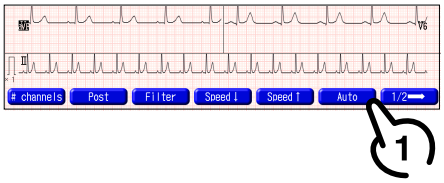


Starting Recording

1 **Turn on the power of the equipment. (See “Turning On/Off the Power” on page 2-19.)**
Attach the electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)
Enter patient information. (See “Entering Patient Information” on page 3-5.)

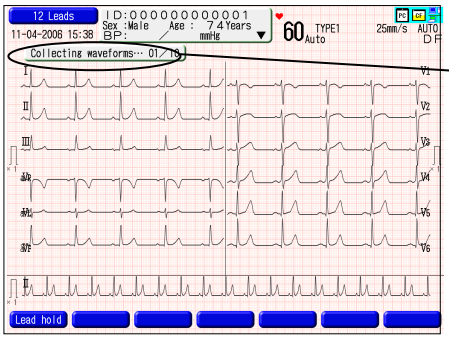
2 **If the equipment is in the manual recording mode, press [Auto] to enter the automatic recording mode.**

Check that the mode display has changed from manual to auto.



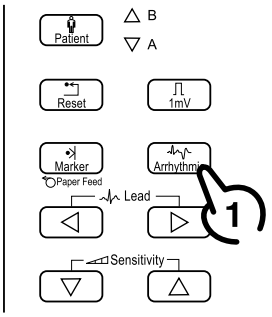
3 **Check the ECG waveform displayed on the screen, and then press the START/STOP button.**

Messages “Collecting waveforms…” → “Measuring waveforms...” or “Analyzing waveforms…”→ “Printing report…” appear in that order, and the waveforms and examination (measurement) result are printed on the recording paper.



Extending Recording

Recording can be extended by pressing Arrhythmia while ECG data is being recorded.



See Chapter 5 for details.

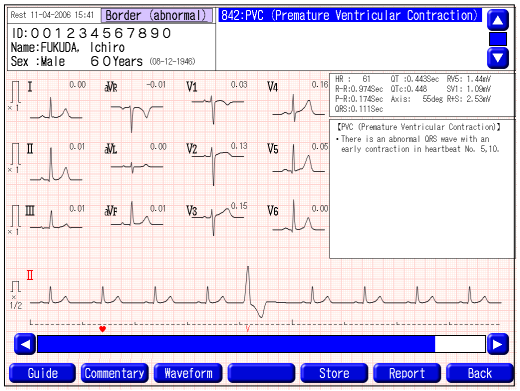
- ··Recording extension (Auto extension): Recording can be extended in the case where the grade of interpretation exceeds the specified value and other cases. (See "Extending Recording (Auto extension)" on page 5-9.)

Auto recording has now been completed.

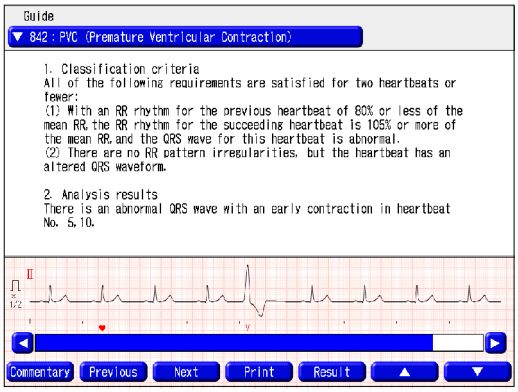
What Can Be Performed after Examination?

The following operations are allowed after examination.

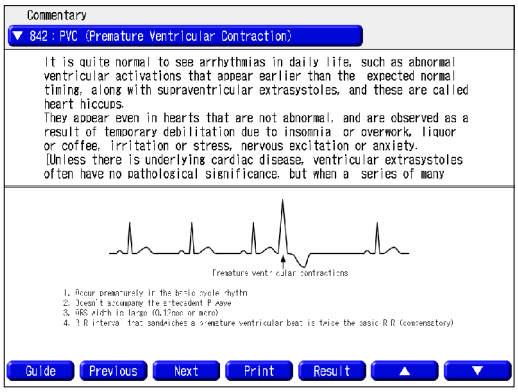
- **Displaying examination result**
  The result of examination can be displayed, following the waveform report. This operation is allowed for static examinations only.



- **Displaying guide** FP-1001□
  Press [Guide] while the examination result is being displayed, and the description of how the interpretation has been extracted from the examination result is displayed. (See “Displaying Guide” on page 6-4.)

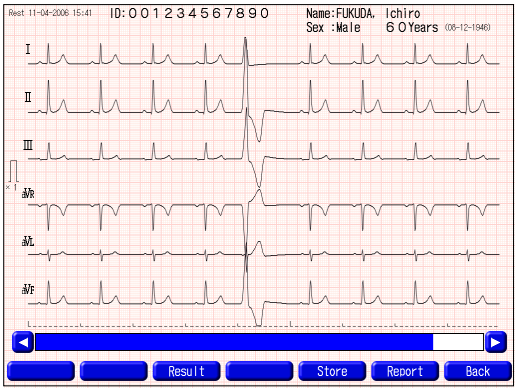


- **Displaying commentary** FP-1001□
  Press [Commentary] while the examination result or the guide is being displayed, and detailed interpretation of the interpretation is displayed. (See “Displaying Commentary” on page 6-5.)



- **Displaying examination waveforms**

  Press [Waveform] while the examination result is being displayed, and the examination waveforms are displayed.



Recording Data Manually

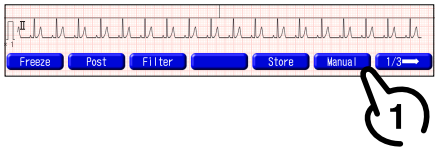
The ECG data can be recorded while leads and sensitivity are changed manually.

Starting Manual Recording

1 **Turn on the power of the equipment. (See “Turning On/Off the Power” on page 2-19.)**
Attach the electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)
Enter patient information. (See “Entering Patient Information” on page 3-5.)

2 **If the equipment is in the automatic recording mode, press [Manual] to enter the manual mode.**

Check that the auto/manual mode display has changed from Auto to Manual.



3 **Change the setting as required.**
The following settings can be changed.

- Switching of leads (See “Selecting Leads” on page 4-19.)
- Printing of calibrated waveforms (See “Printing Calibrated Waveforms” on page 4-19.)
- Switching of recording speed (See “Switching Recording Speed” on page 4-19.)
- Switching of number of channels (See “Switching Number of Channels” on page 4-19.)
- Switching of screen display (See “Switching Screen Display” on page 4-19.)
- Switching of lead mode (See “Switching Lead Mode” on page 4-19.)

4 **On completion of the setting, press the START/STOP button.**
The setting is printed on the recording paper.

Selecting Leads

Press the Lead ◁ ▷ key, and the lead block is switched from/to "Block 1" ↔ "Block 2" ↔…↔ "Block 1" according to the orientation of the key pressed. The name of lead whose waveforms are to be recorded is highlighted.

Lead mode	12-lead			Cabrera lead		
No. of channels	3ch	6ch	12ch	3ch	6ch	12ch
STD	STD	STD	STD	STD	STD	STD
Block 1	I to III	I to aVF	I to V6	aVL to aVR	aVL to III	aVL to V6
Block 2	aVR to aVF	V1 to V6	—	II to III	V1 to V6	—
Block 3	V1 to V3	Spare 1	—	V1 to V3	Spare 1	—
Block 4	V4 to V6	Spare 2	—	V4 to V6	Spare 2	—
Block 5	Spare 1	—	—	Spare 1	—	—
Block 6	Spare 2	—	—	Spare 2	—	—

Printing Calibrated Waveforms

Press 1mV, and 1mV calibrated waveforms are printed on the recording paper.

[MEMO] Details on calibrated waveforms can be set in "Common/Manual" – "Calibrated waveform" in recording format setting.

Switching Recording Speed

Press [Speed↑], and the recording speed is switched as follows: "5" → "10" → "12.5" → "25" → "50" (Unit: mm/s)
Press [Speed↓], and the recording speed is switched as follows: "50" → "25" → "12.5" → "10" → "5" (Unit: mm/s)

[MEMO] Details on the recording speed can be set in "Lead/recording" – "Recording" – "Waveform speed" in ECG control setting.

Switching Number of Channels

Press [# channels], and the number of channels for manual recording is switched as follows: "3ch" → "6ch" → "12ch" → "3ch" →…..

Switching Screen Display

Press [Screen] to switch the display between 12-lead display and recording channel display.

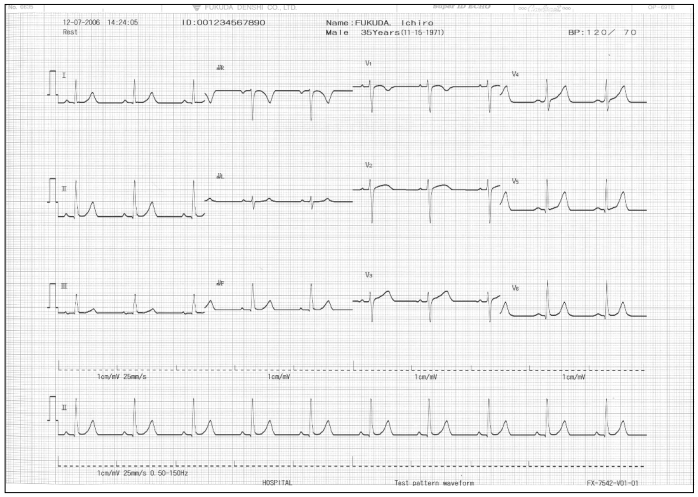
Switching Lead Mode

Press [Nehb] in 12 lead mode, the lead mode changes to Nehb lead.
Press [12 lead] in Nheb lead mode, the lead mode changes to 12 lead.

[NOTE] In Nehb lead mode , it is not possible to change to Auto recording mode.

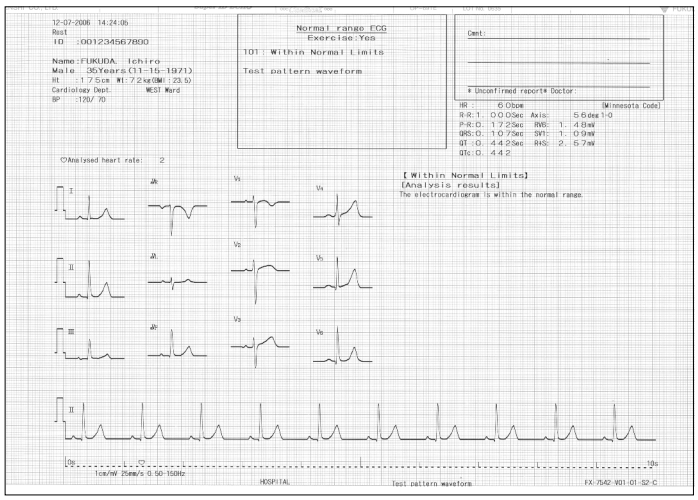
Example of Recording

- **Automatic recording (Direct-writing recording)**



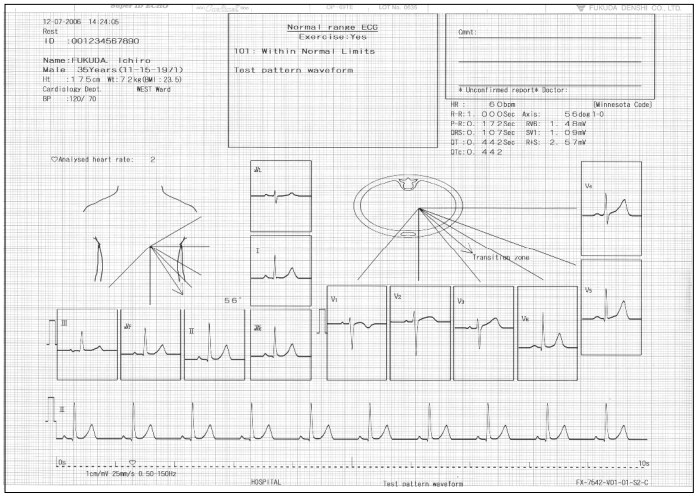
The graph at left is an example of recording for the following case.
Waveform report:
3ch × 4 + Rhythm 1ch
Waveform collection time: 10 sec.
Calibrated waveform position: Top
Rhythm lead: Lead II
Full Lead Waveforms: continuous

- **Automatic recording (Result report)**



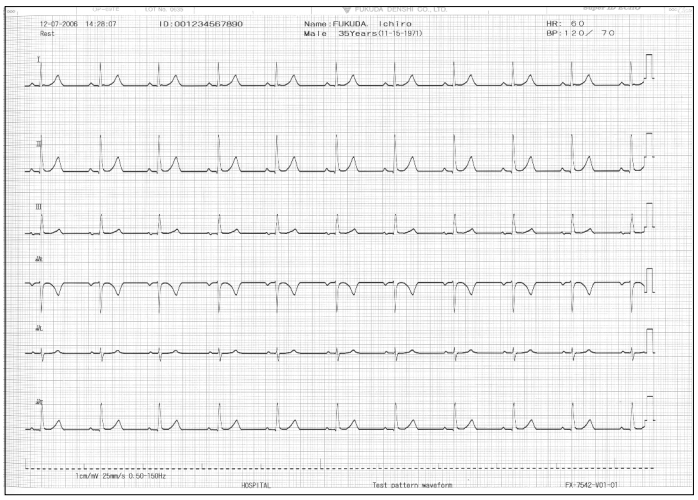
The graph at left is an example of recording for the following case (when the FP-1001 has been installed).
Result report: DOM1
Interpretation: TYPE1
Comment: TYPE1
Measurement: TYPE1
Analysis results: TYPE2

- **Automatic recording (Result report)**



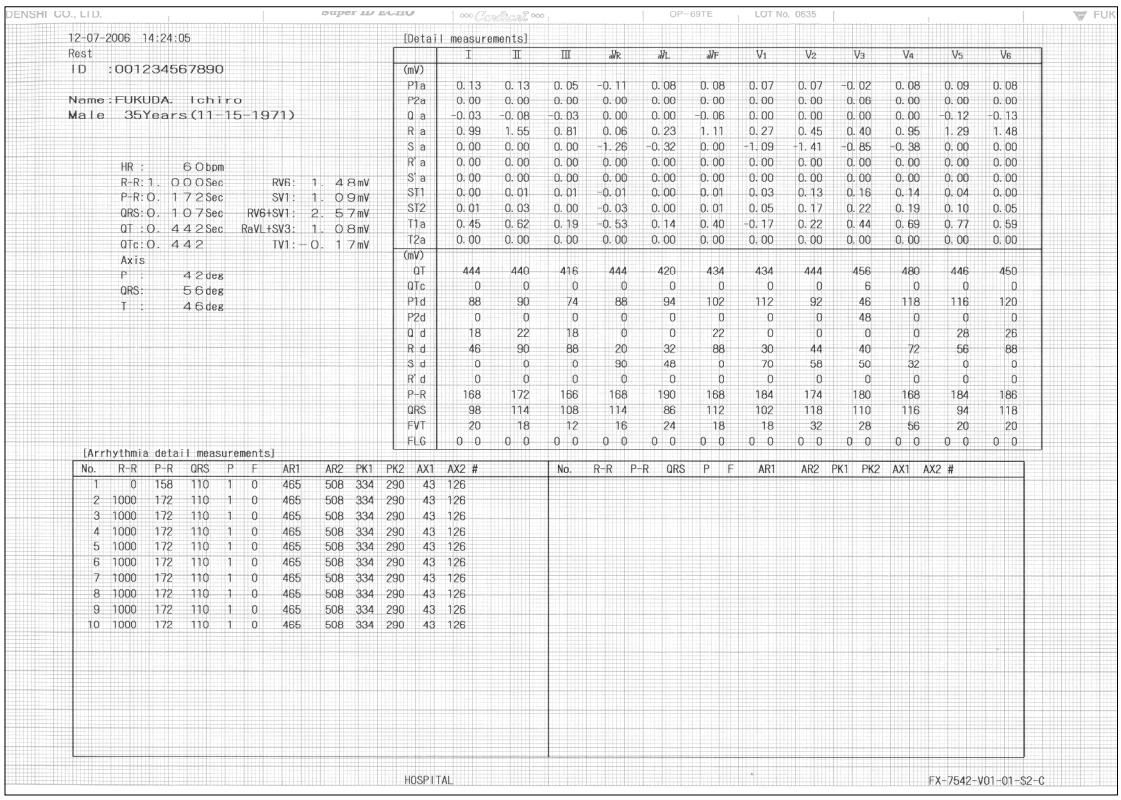
The graph at left is an example of recording for the following case (when the FP-1001 has been installed).
Result report: DOM3
Interpretation: TYPE1
Comment: TYPE1
Measurement: TYPE1

- **Manual recording**



The graph at left is an example of recording for the following case.
Lead: Limb leads only (I, II, III, aVR, aVL, and aVF)
Calibrated waveform position: Top

- **Detailed measurement report**



DENSHI CO., LTD. OP-69TE LOT No. 0635 FUK

12-07-2006 14:24:05
Rest
ID :001234567890

Name:FUKUDA. Ichiro
Male 35Years(11-15-1971)

HR : 60bpm
R-R: 1.000Sec RV6: 1.48mV
P-R: 0.172Sec SV1: 1.09mV
QRS: 0.107Sec RV6+SV1: 2.57mV
QT : 0.442Sec RaVL+SV3: 1.08mV
QTc: 0.442 TV1: -0.17mV
Axis
P : 42deg
QRS: 56deg
T : 46deg

[Detail measurements]

	I	II	III	aVR	aVL	aVF	V1	V2	V3	V4	V5	V6
(mV)												
P1a	0.13	0.13	0.05	-0.11	0.08	0.08	0.07	0.07	-0.02	0.08	0.09	0.08
P2a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Q a	-0.03	-0.08	-0.03	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	-0.12	-0.13
R a	0.99	1.55	0.81	0.06	0.23	1.11	0.27	0.45	0.40	0.95	1.29	1.48
S a	0.00	0.00	0.00	-1.26	-0.32	0.00	-1.09	-1.41	-0.85	-0.38	0.00	0.00
R'a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S'a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ST1	0.00	0.01	0.01	-0.01	0.00	0.01	0.03	0.13	0.16	0.14	0.04	0.00
ST2	0.01	0.03	0.00	-0.03	0.00	0.01	0.05	0.17	0.22	0.19	0.10	0.05
T1a	0.45	0.62	0.19	-0.53	0.14	0.40	-0.17	0.22	0.44	0.69	0.77	0.59
T2a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(mV)												
QT	444	440	416	444	420	434	434	444	456	480	446	450
QTc	0	0	0	0	0	0	0	0	6	0	0	0
P1d	88	90	74	88	94	102	112	92	46	118	116	120
P2d	0	0	0	0	0	0	0	0	48	0	0	0
Q d	18	22	18	0	0	22	0	0	0	0	28	26
R d	46	90	88	20	32	88	30	44	40	72	56	88
S d	0	0	0	90	48	0	70	58	50	32	0	0
R'd	0	0	0	0	0	0	0	0	0	0	0	0
P-R	168	172	166	168	190	168	184	174	180	168	184	186
QRS	98	114	108	114	86	112	102	118	110	116	94	118
FVT	20	18	12	16	24	18	18	32	28	56	20	20
FLG	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

[Arrhythmia detail measurements]

No.	R-R	P-R	QRS	P	F	AR1	AR2	PK1	PK2	AX1	AX2 #
1	0	158	110	1	0	465	508	334	290	43	126
2	1000	172	110	1	0	465	508	334	290	43	126
3	1000	172	110	1	0	465	508	334	290	43	126
4	1000	172	110	1	0	465	508	334	290	43	126
5	1000	172	110	1	0	465	508	334	290	43	126
6	1000	172	110	1	0	465	508	334	290	43	126
7	1000	172	110	1	0	465	508	334	290	43	126
8	1000	172	110	1	0	465	508	334	290	43	126
9	1000	172	110	1	0	465	508	334	290	43	126
10	1000	172	110	1	0	465	508	334	290	43	126

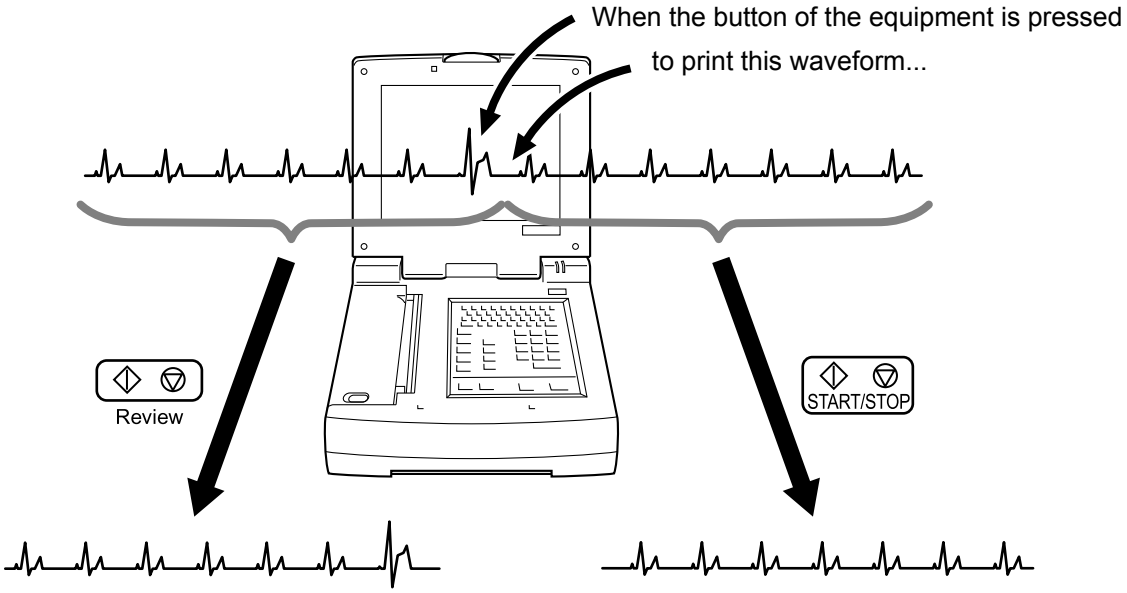
No.	R-R	P-R	QRS	P	F	AR1	AR2	PK1	PK2	AX1	AX2 #

HOSPITAL FX-7542-V01-01-S2-C

Recording Data Collected Several Seconds Earlier (Review)

Mechanism of Review Recording

Normally, if the START/STOP button is pressed, ECG data is printed for a specified period of time from the time when the button is pressed. If the Review button is pressed, the ECG data is printed for a specified period of time up to the time when the button is pressed.
When the waveform to be recorded appears while the waveforms are checked on the screen, press the Review button, and the desired waveforms can be printed.



Since the data in this range is printed when the Review button is pressed, desired waveforms can be printed.

Since the data in this range is printed when the START/STOP button is pressed, desired waveforms cannot be printed.

How to Make Review Recording

1 **Turn on the power of the equipment. (See "Turning On/Off the Power" on page 2-19.)**
Attach the electrodes to the patient. (See "Attaching Electrodes" on page 3-2.)
Enter patient information. (See "Entering Patient Information" on page 3-5.)

2 **When the waveform to be printed is displayed on the screen, press the Review button.**
The ECG data up to the time when the button is pressed is printed.

[NOTE] Review recording cannot be made in manual mode.

Chapter 5

Standard 12-lead Examination (Applications)

This chapter describes the operations that can be performed as part of standard 12-lead examination and procedure of recording post-exercise ECG data.

Freezing Waveforms on the Screen for Checking 5-2

Checking Past Waveforms 5-4
- **Performing Automatic Recording 5-5**
- **Performing Manual Recording 5-6**

Performing 12-lead Measurement and Arrhythmia Measurement at the Same Time 5-7

Extending Recording 5-9
- **Auto Extension 5-9**
- **Arbitrary Extension 5-9**
- **Example of Recording 5-10**

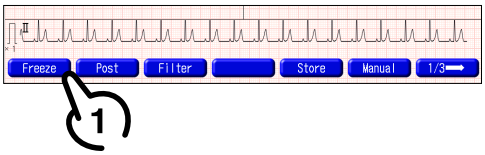
Recording ECG Data at Rest and Post-exercise 5-11
- **Contents of Examination 5-11**
- **Starting Recording 5-12**
- **Example of Recording 5-12**
- **Comparing Waveforms during Examination 5-14**

Other Functions 5-15
- **Printing a Mark 5-15**
- **Feeding the Recording Paper 5-15**
- **Changing the Report Type 5-16**
- **Resetting 5-16**
- **Recording the Data of the Same Lead Continuously 5-16**
- **Printing the Same ECG Data to 2 or More Sheets of Paper 5-17**
- **Storing Data in Other Media 5-17**
- **Switching Chest Leads 5-18**

Freezing Waveforms on the Screen for Checking

If arrhythmia appears while waveforms are checked on the screen, the waveforms can be made frozen for printing or for more detailed interpretation. The waveforms obtained for a maximum of 10 minutes can be fetched and displayed.

1

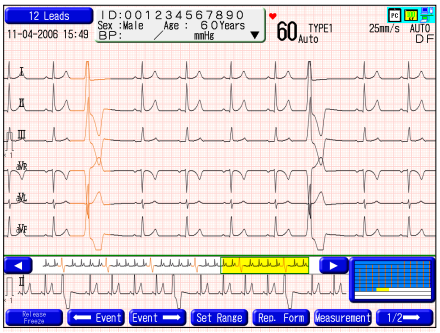


On appearance of arrhythmia, press [Freeze].

The waveforms up to the time when the [Freeze] key is pressed are fetched and displayed.

[MEMO] Waveform acquisition is started as soon as the waveforms from the limb electrodes are input.

2



Check the waveforms displayed on the screen.

The compressed waveforms in the range enclosed in the green frame that appears on the rhythm lead are recorded automatically.

In this state, the following operations can be performed.

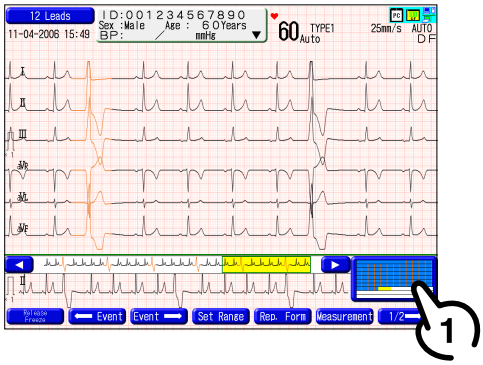
- Displaying the waveform of other leads
  Press [◁] [▷] (Lead) to display the waveform of other leads.
- Changing sensitivity
  Press [▽] [△] (Sensitivity) to change sensitivity.
- Changing examination range
  Press [Set Range] to change the range of ECG examination.
- ECG measurement
  Press [Measurement] to perform ECG measurement. It doesn't exist when FP-1001 is installed.
- ECG examination FP-1001
  Press [Analyze] to perform ECG examination.
- Changing report format
  Press [Rep. Form] to change the format of automatic recording.

[MEMO] See "12L Auto" on page 17-23 for automatic recording format setting.

Press [◀] or [▶] on both sides of the compressed waveform to change the display or the range of automatic recording.

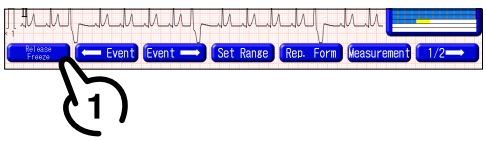
- Transfers the waveform for 1 second to the right. (Displays the waveform that is 1 second older than the one currently displayed.) Keep pressing down the key to transfer the waveform by 5 seconds.
- Transfers the waveform for 1 second to the left. (Displays the waveform that is 1 second newer than the one currently displayed.) Keep pressing down the key to transfer the waveform by 5 seconds.

- Switching display (Memory image key)
  Press the [Memory image] at the lower right-hand corner of the screen to display the data of the rhythm lead in chronological order.



- Displaying event
  Press [←Event] to display arrhythmia waveforms at the time later than the one displayed.
  Press [Event→] to display arrhythmia waveforms at the time earlier than the one displayed.
- Printing
  Press START/STOP to analyze and record the waveforms within the range of the bar currently displayed on the screen.
- Changing report format
  Press [Rep. Form], and the format of automatic recording set beforehand is selected.
- ECG measurement
  Press [Measurement] to measure the waveforms within the range of the bar and display the result. It doesn't exist when FP-1001 is installed.
- ECG examination FP-1001
  Press [Analyze] to analyze the waveforms within the range of the bar and display the result.

3



When checking of the waveforms is completed, press [Release Freeze], and the normal waveform display is restored.
Waveform display cannot be switched while frozen waveform is being printed.

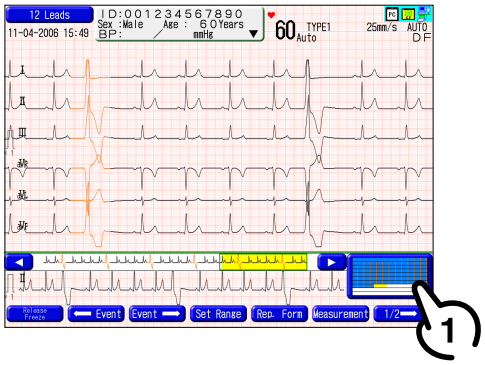
Checking Past Waveforms

In freeze mode, ECG data for a maximum of 10 minutes can be stored. What kind of waveforms were stored in the past can be checked with rhythm waveforms, and they can be recorded automatically or manually.

1 **Press [Freeze]. (See “Freezing Waveforms on the Screen for Checking” on page 5-2.)**

Check the waveforms displayed on the screen.

2



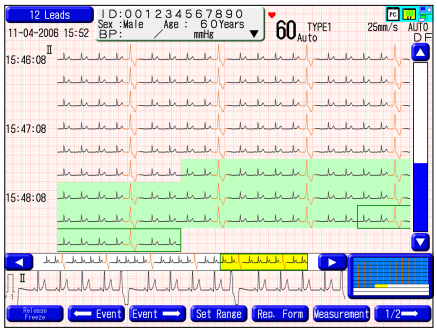
Press [Memory image].

Waveforms stored in the past within the equipment for a maximum of 10 minutes are displayed as rhythm waveforms.

[MEMO] In [Memory image], the characteristics of the waveforms stored in the equipment (for a maximum of 10 minutes) are distinguished from each other by color.

Blue: Area where waveforms are recorded
Red: Electrode off
Orange: Area where arrhythmia is suspected
Yellow: Area where waveforms are displayed on the screen
White: Area where waveforms are not recorded

3



Waveforms stored within the equipment can be displayed in rhythm waveforms in 20 seconds for a row on the screen.

The characteristics of the waveforms are distinguished from each other by color as follows.

Red: Electrode off
Orange: Area where arrhythmia is suspected
Green frame: Examination range
Pale green area: Recording range

[MEMO] The initial examination and recording range can be specified in function setting. (See “Setting Recording Format” on page 17-22.)

In this state, the following operations can be performed.

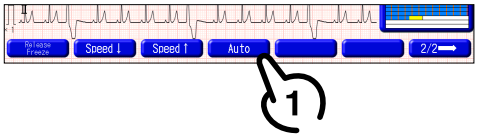
- Searching events
  The auto record position is moved within the rhythm waveform with the area where arrhythmia is suspected regarded as an event.
  [←Event] Performs event search of the past waveform data and moves the automatic recording position.
  [Event→] Performs event search of the latest waveform data and moves the automatic recording position.
- Switching screens
  Waveform display can be changed from rhythm display to 6ch or 6ch × 2 waveform display.
  [Memory image] Switches waveform displays.

Performing Automatic Recording

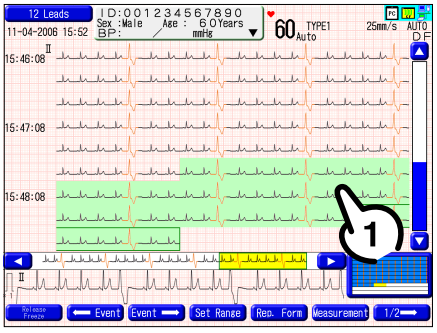
1 **Follow the procedure in “Checking Past Waveforms” on page 5-4 to display rhythm waveforms in frozen state.**

2 **If the equipment is in the manual recording mode, press [Auto] to bring it into the automatic recording mode.**

Check that the auto/manual display has changed from manual to auto.



3

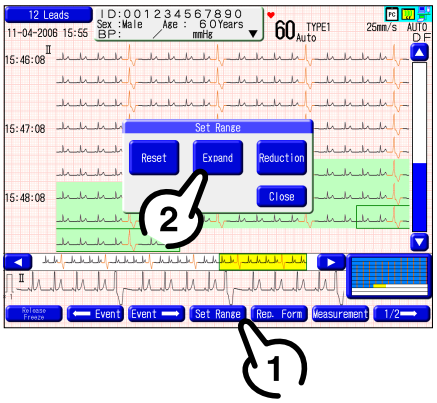


Press the rhythm waveform to determine the position where automatic recording is to be made.

The area on the rhythm waveform enclosed in green frame is the position where automatic recording is to be made.

Press the position to be recorded on the rhythm waveform to move the range of automatic recording.

4



Change the recording range.

Press [Set Range] to open the window, on which the storage time can be changed.

Reset: Recording time specified in function setting is selected.

Expand: Expands both ends of the storage time period by 1 second.

Reduction: Reduces both ends of the storage time period by 1 second.

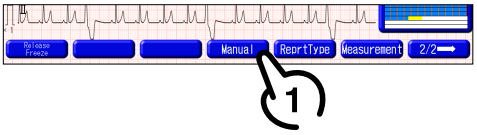
5 **Press** START/STOP **to perform auto recording of the waveforms within the range currently displayed on the screen.**

[NOTE] If the reset zone generated when the filters are switched is included in the recording range, recording cannot be made.

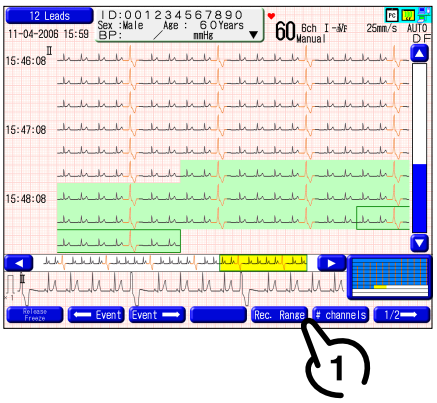
Performing Manual Recording

1 **Follow the procedure in “Checking Past Waveforms” on page 5-4 to display rhythm waveforms in frozen state.**

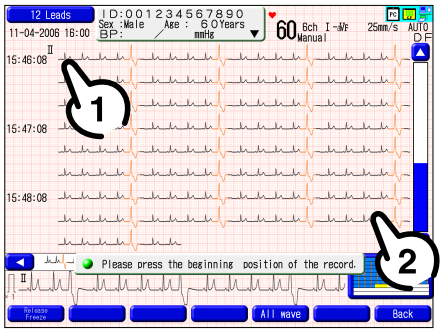
2 **If the equipment is in the automatic recording mode, press [Manual] to bring it into the manual recording mode.**



Check that the auto/manual display has changed from auto to manual.

3 

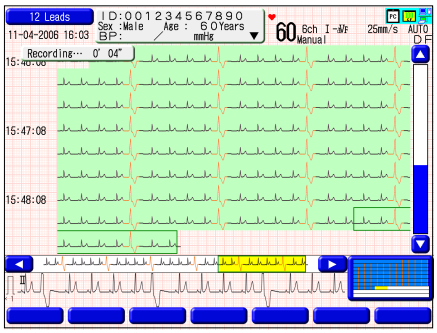
Press [Rec. Range].

4 

Specify the beginning position and end position of the manual recording by pressing the rhythm waveform, following the instructions of the message.

The color of the waveforms within the recording range is displayed distinguished.

[Beginning poisition]: Changes the starting position.
[End position]: Changes the end point.
[Back]: Exits specification of the position.

5 

Press START/STOP to manually record the waveforms within the recording range currently displayed on the screen.。

Change the following setting as required.
Switching the recording speed (See “Switching Recording Speed” on page 4-19.)
Press [End of recording] or START/STOP to exit recording.

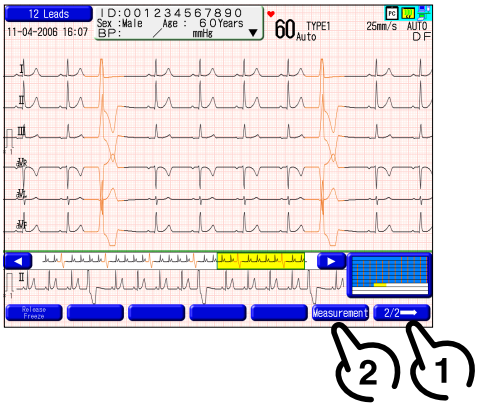
[MEMO] The recording range can be stored in a file in various media by pressing [Store].

Performing 12-lead Measurement and Arrhythmia Measurement at the Same Time

Using the frozen ECG waveforms collected, 12-lead examination and 3ch arrhythmia examination, or 12-lead examination and 1ch rhythm examination can be performed simultaneously, which eliminates the need of performing extended recording, saving the time for examination.

1 **Press [Freeze]. (See "Freezing Waveforms on the Screen for Checking" on page 5-2.)**

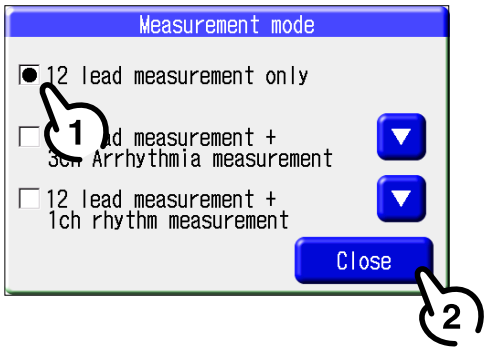
2



1 **Press [1/2→].**

2 **Press [Measurement] to display the measurement mode window.**

3



1 **Select a desired combination of examinations.**

2 **Press [Close].**

[12-lead measurement only]: Performs 12-lead measurement for the examination range enclosed in the green frame.

[12-lead measurement + 3ch arrhythmia measurement]: Performs 12-lead measurement and 3ch arrhythmia measurement for the recorded range (pale green area).

[12-lead measurement + 1ch rhythm measurement]: Performs 12-lead measurement and 1ch rhythm measurement for the recorded range (pale green area).

[NOTE] The maximum time allowed for 3ch arrhythmia examination is 3 minutes. If the range exceeding that time is specified, recording is made with 3-minute range from the latest time automatically specified.

[NOTE] When FP-1001 has been installed, 12-lead analysis can be allowed instead of 12-lead measurement, and 3ch arrythmia analysis can be allowed instead of 3ch arrythmia measurement.

4 **Press** START/STOP **to start measurement recording for the area selected.**

[MEMO] **See "What Can Be Performed after Examination?" on page 4-16 for the operations after examination recording.**

[NOTE] **If the reset zone generated when the filters are switched is included in the recording range, recording cannot be made.**

Extending Recording

Auto Extension

[MEMO] To extend recording automatically, set "12L Auto" – "12L Auto TYPE 1 (to 5)" – "Extra recording" to "Yes" in ECG control setting beforehand.

[MEMO] This function cannot be performed while recording is made in freeze mode.

Recording can be extended in the following cases.

- When an atypical heart beat is observed
- When the grade of interpretation exceeds the specified value
  When an atypical heart beat is observed
  When fluctuation of R-R intervals exceeds a specified value
  When HR is lower than 50

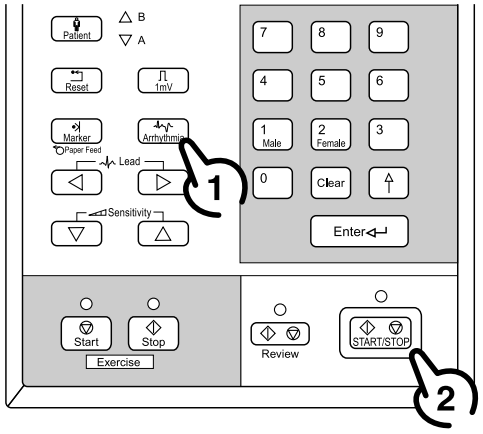
FP-1001

- When the grade of interpretation exceeds the specified value
  When the interpretation falls under one of the following categories, grade 2 or higher, grade 4 or higher, grade 6 only, the recording is automatically extended. It is also allowed to automatically extend recording when specific arrhythmia occurs. (See "Recording Extension Function" on page 17-24.)

Arbitrary Extension

The recording can be arbitrarily extended, following the procedure shown below.

1



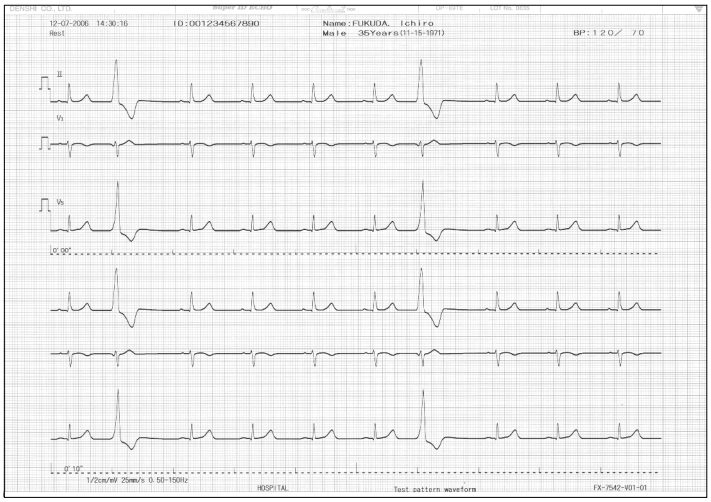
Press Arrhythmia.

Press START/STOP **to stop recording.**

[MEMO] If Arrhythmia **is pressed while auto recording is being made, the recording is extended after auto recording is completed.**

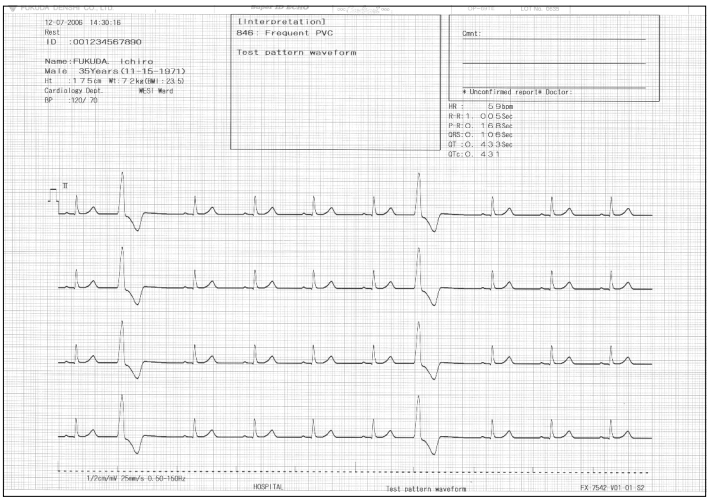
Example of Recording

- **Extended recording (Waveform report)**



The graph at left is an example of recording for the following case.
Waveform report: Standard

- **Extended report (Result report)**



The graph at left is an example of recording for the following case (when the FP-1001 has been installed).
Result report: Waveform 1ch

Recording ECG Data at Rest and Post-exercise

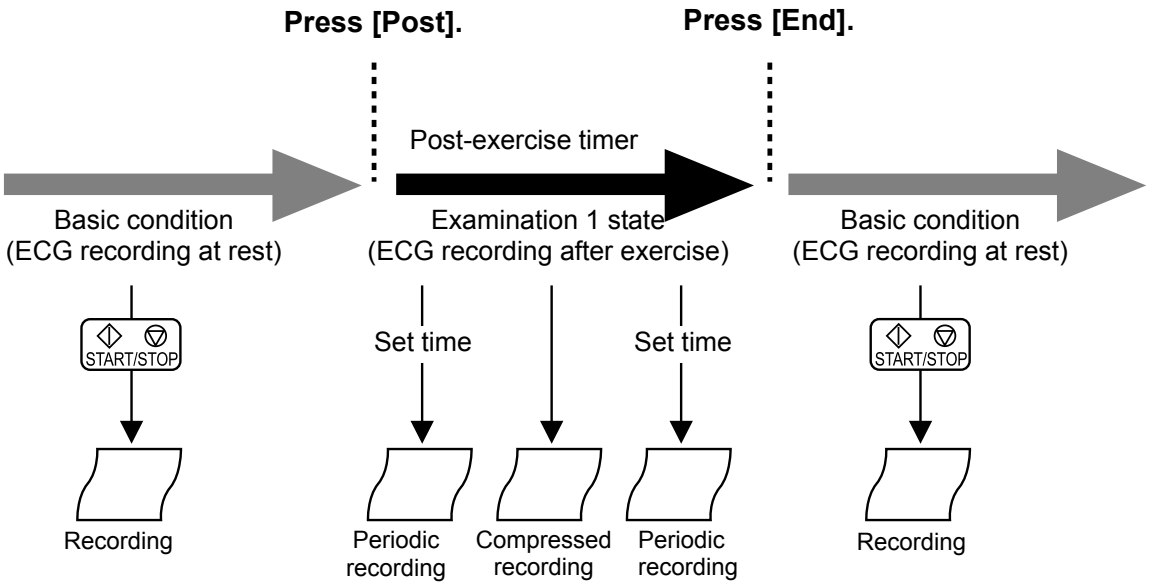
Record ECG data at rest and at post-exercise in this mode.

Contents of Examination

Examination can be made in either of the following two conditions in this mode.

Condition	Name of examination	Function
Basic condition	ECG recording at rest	Records ECG data at rest (Auto/manual/arrhythmia recording)
Examination condition	ECG recording at post-exercise	Records ECG data at post-exercise such as walking.

The flow of examination is shown below.



[MEMO] There may be a case where data is still being collected or printed when the set time has elapsed depending on the steady recording setting. In this case, steady recording is not performed.

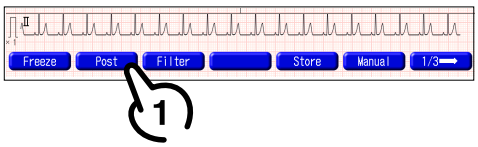
[MEMO] Recording can be made by pressing START/STOP even in a state where exercise is done.

Starting Recording

1 **Print the ECG data at rest (See “Recording Data Automatically” on page 4-13.)**

2 **Let the patient walk or do other exercise to impose stress on him/her.**

3



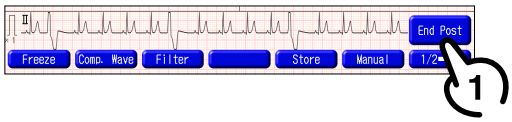
1 **Press [Post].**
The after exercise timer starts counting and elapsed time is displayed.

[MEMO] To make recording within the specified time, set “Post/display” – “Specified time recording” in the 12 Leads setting.

[MEMO] To record the data with the interval between steady recording and another steady recording compressed, set “Post/display” – “Compressed recording” in the 12 Leads setting.

4 **Press** START/STOP **to print the data on the recording paper.**

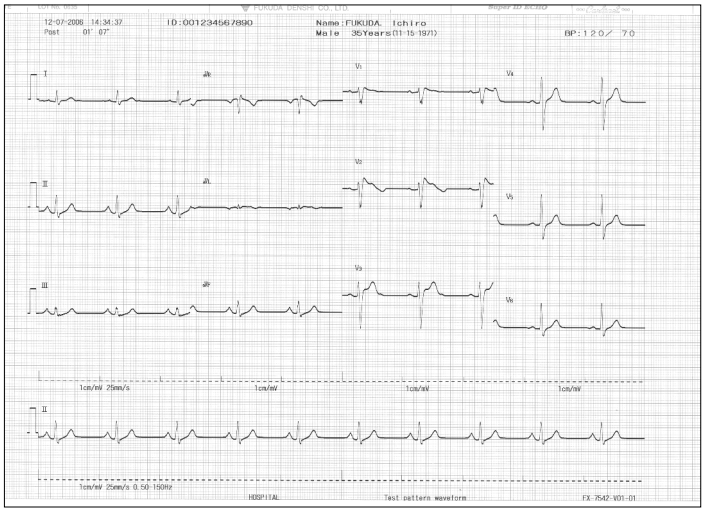
5



Press [End Post].
The equipment returns to the basic state (ECG recording at rest).

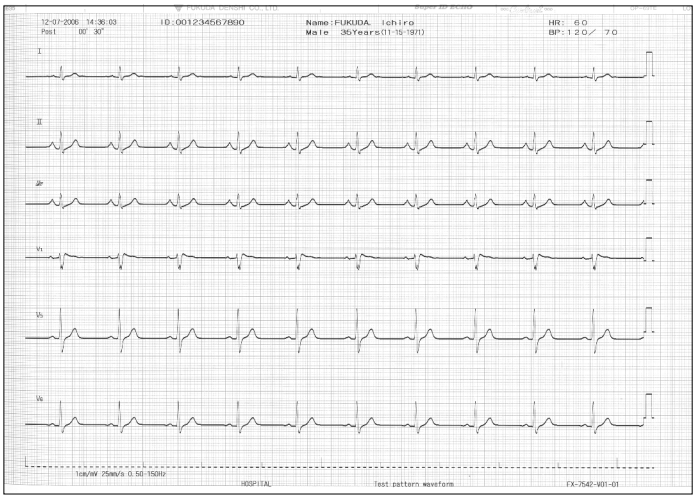
Example of Recording

- **Recording after exercise (Automatic recording)**

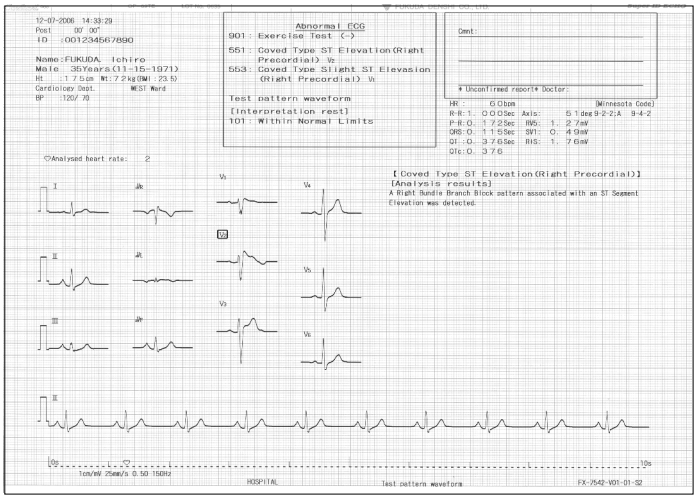


The graph at left is an example of recording for the following case.
Waveform record time:
10 seconds
Calibrated waveform position: Top
Rhythm lead: Lead II

- **Recording after exercise (Manual recording)**

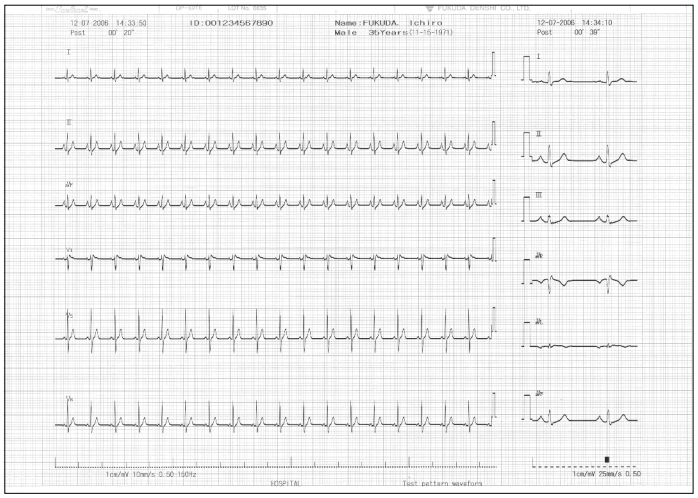


- **Recording after exercise (Result report)**



The graph at left is an example of recording for the following case (when the FP-1001 has been installed).
Result report: DOM1
Interpretation: TYPE1
Comment: TYPE1
Measurement: TYPE1
Analysis results: TYPE2

- **Steady compressed recording**

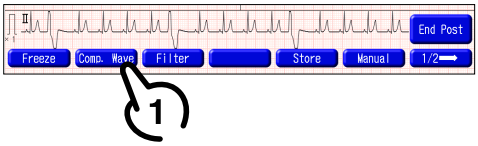


The graph at left is an example of recording for the following case.
Compressed recording: 10 mm/s
Lead: Spare lead 1 (6ch)
Lead: Limb leads only (I, II, III, aVR, aVL, and aVF)
Calibrated waveform position: Top

Comparing Waveforms during Examination

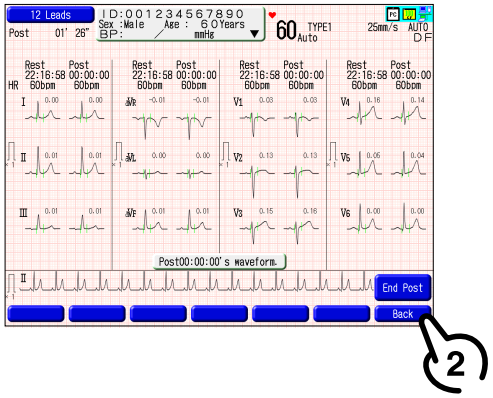
Waveforms at exercise or post-exercise can be compared with those at rest.

1



Press [Comp. Wave].
Waveforms to be compared appear.

2



1 **The latest dominant waveforms at rest and exercise or post-exercise are displayed for comparison.**
To create dominant waveforms, ECG measurement must be performed in auto or steady recording.

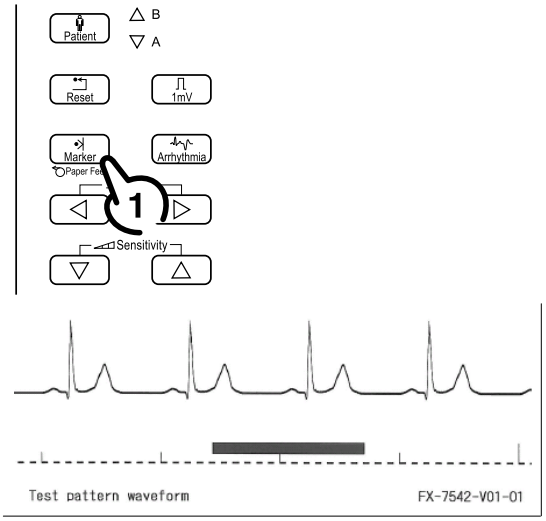
2 **Press [Back].**
The examination screen appears again.

Other Functions

Printing a Mark

Press Marker / Paper Feed while recording is being made, and the mark is recorded on the recording paper.
The mark is printed for the number of times the mark key is pressed. Keep pressing down the mark key to print the mark continuously.

1



Press Marker / Paper Feed.
The mark is printed.

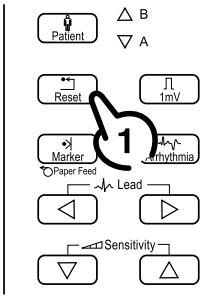
Feeding the Recording Paper

Press Marker / Paper Feed while recording is suspended, and the recording paper is fed as follows. The feeding amount varies depending on the type of the recording paper.

- Roll paper: Fed by approximately 3 cm.
- Z-fold paper: Fed until the next fold comes to the position of the cutter.

[MEMO] The roll paper or the Z-fold paper is set in "Lead/Recording" – "Recording" – "Recording paper" in ECG control setting.

1

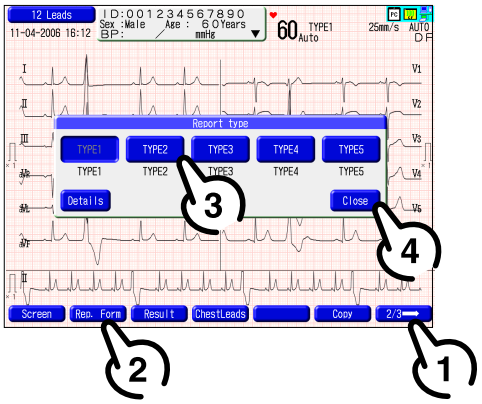


Press [Marker].
The recording paper is fed.

Changing the Report Type

The report type can be changed in automatic recording mode only.
Select a report type (TYPE1 to TYPE5). (See “Settings on Automatic Recording Type” on page 17-24.)

1



1 **Press [1/3→].**

2 **Press [ReprtType].**

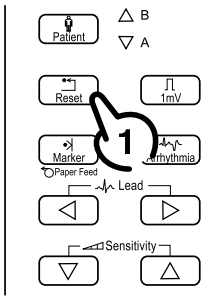
3 **Press desired report type.**

4 **Press [Close].**

Resetting

While [Reset] is pressed, the input waveforms are reset, and the base line is displayed and printed.

1

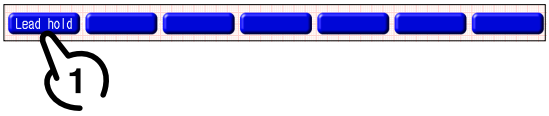


Press [Reset].

Recording the Data of the Same Lead Continuously

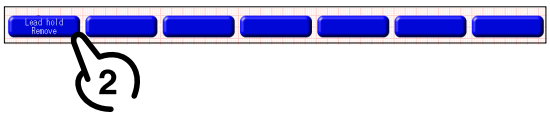
The data of the same lead can be recorded continuously in automatic recording mode.

1



Press [Lead hold] while recording is being made.
The data of the same lead can be recorded continuously in automatic recording mode.

2



Press [Lead hold Remove] to stop extension.

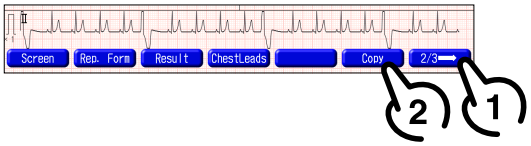
[MEMO] Even if recording is extended by lead hold, the waveforms are analyzed and stored in a file only for the period set beforehand.

Printing the Same ECG Data to 2 or More Sheets of Paper

If the ECG data recorded in automatic recording, arrhythmia recording (3ch 40 sec.), or review recording has been fetched in the electrocardiograph, the data can be printed on multiple sheets of paper.

[MEMO] The ECG data recorded manually cannot be copied.

1

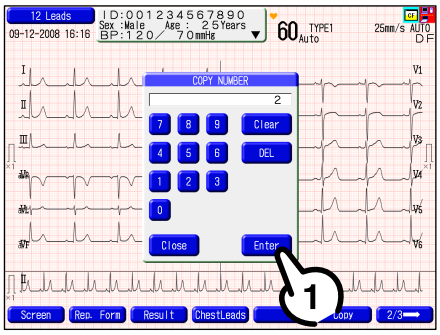


1 **Press [1/3→].**

2 **Press [Copy].**

[MEMO] If "copy" is allocated to a custom key, the ECG data can be copied by pressing the custom key.

2



Input the numbers of paper to print, and press [Enter] key.

The numbers of papers to print can be selected from 1 to 9.
The selected number will be maintained.
Press [Cancel] to stop printing.

[MEMO] If the system is restarted, the number will be reset to the setting performed for「Recording format」-「Common/Manual」-「Common」-「COPY NUMBER」.

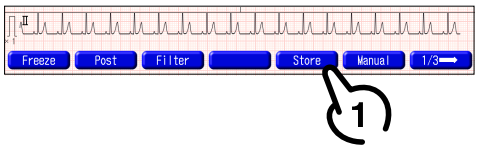
Storing Data in Other Media

The ECG data can be stored in various media (such as PC card and CF card) (See "Storing Examination Data" on page 14-8.)

[MEMO] Set "General" – "Automatic storing" in file/network setting to "Yes," and the ECG data is automatically stored in the media selected in "General" – "Storage media" after automatic recording is made.

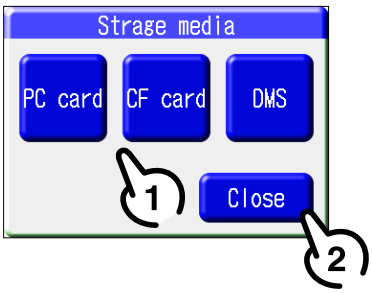
[MEMO] Select "Refer to exam settings" for "Automatic storing," and the data is stored following each examination mode setting.

1



Press [Store] to display the storage window.

2



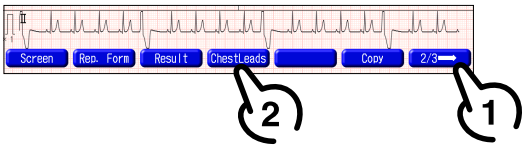
1 **Press a desired place of storage.**

2 **Press [Close].**

Switching Chest Leads

Chest leads, V3R, V4R, V5R, V6R, V7, V8, and V9, can be specified.

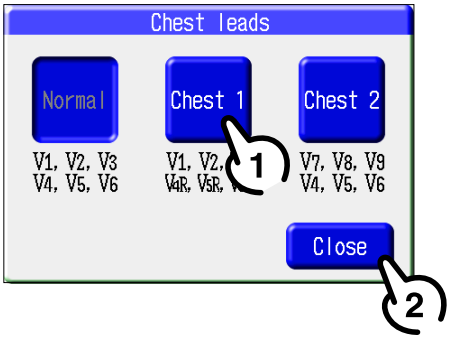
1



1 **Press [1/3→].**

2 **Press [ChestLeads].**
The chest lead switching window appears.

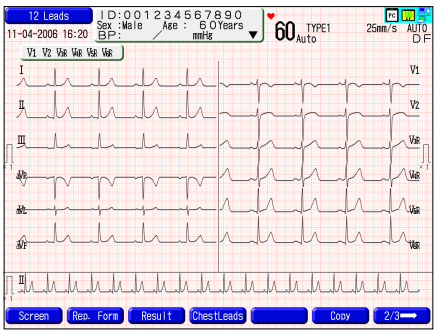
2



1 **Press the chest lead to be selected.**

2 **Press [Close].**

3



If [Chest 1] or [Chest 2] is specified, the selected chest lead is displayed on the examination screen.

Chapter 6

Commentary Function

FP-1001

This chapter describes the function of displaying detailed interpretation of the interpretation (commentary) obtained from the result of ECG examination.

What Is the Commentary? 6-2

Making the Setting to Allow Commentary to Be Displayed 6-3

Displaying Guide 6-4

Displaying Commentary 6-5

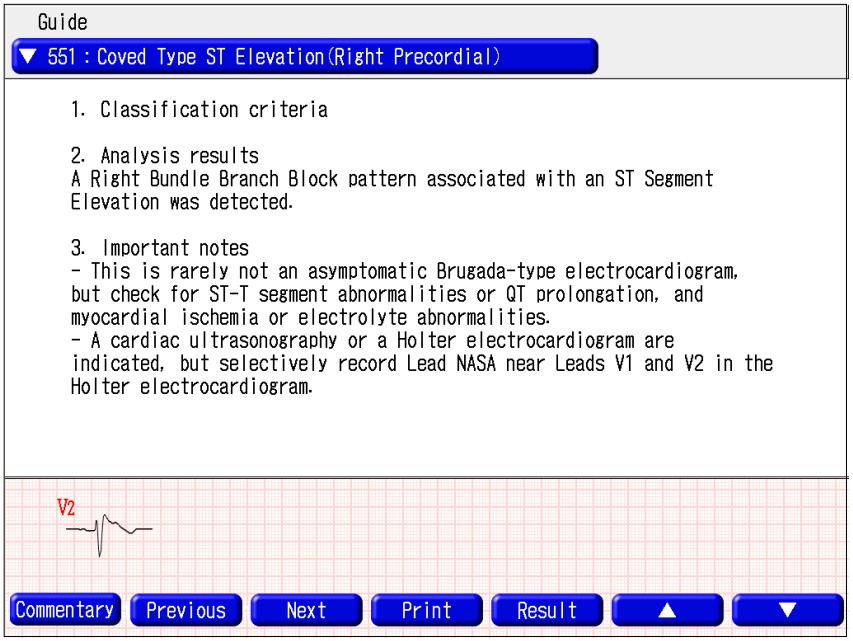
When Guide Is Displayed 6-5
When Guide Is Not Displayed 6-5
Example of Recording 6-7

This function is enabled only when the FP-1001 has been installed.

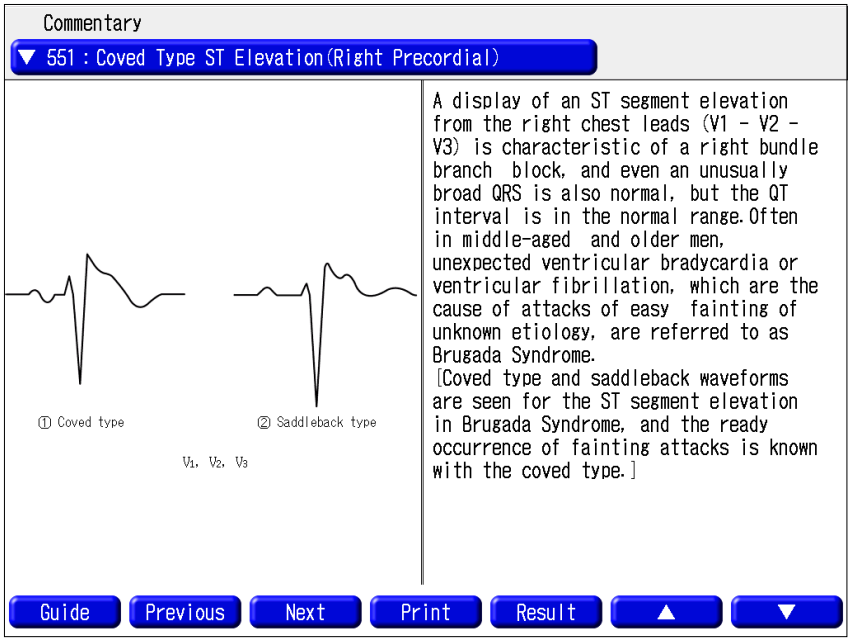
What Is the Commentary?

Two kinds of information can be displayed concerning the interpretation obtained by the examination. One is “Guide,” which describes the interpretation and the reason for the judgment, and the other is “Commentary,” which describes the details of the interpretation.

[MEMO] The commentary function cannot be used if ECG examination is to be conducted as screening or specified as the health insurance for the elderly.



Example of guide screen



Example of commentary screen

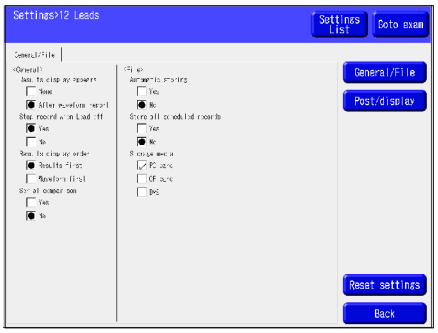
Making the Setting to Allow Commentary to Be Displayed

1 **Press the [Menu] function key.**

2 **On the menu screen that appears, press [Settings].**

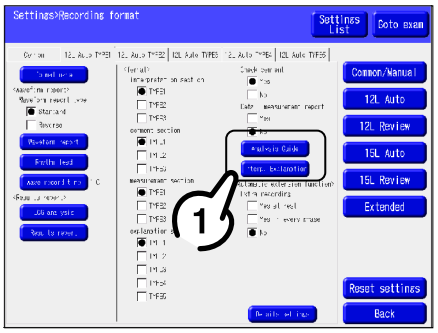
3 **Press [12 Leads].**

4 **Make the setting for the following items.**



• None..... Examination result is not displayed.
• After waveform report ... Examination result is displayed
after the waveform report is printed.
Whether guide or commentary is to be printed can be set according to the level of interpretation grade. Make the setting in “12L (15L) Auto 1 to 5, 12L (15L) Review, 12L (15L) copy extended” – “Examination Guide” and in “Interp. Explanation.”

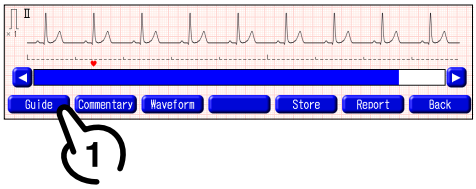
[MEMO] See “Program guide” separately supplied for the grade of interpretations.



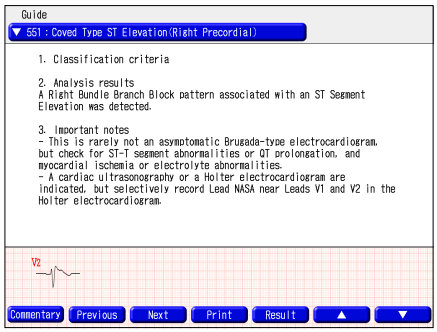
• All ..... All the interpretations are printed.
• Auto ..... Only one interpretation, which is automatically selected by the equipment among higher-grade interpretations, is printed.
• Grade 6 only ..... Interpretations of grade 6 only are printed.
• Grade 4 or higher..... Interpretations of grade 4 or higher only are printed.
• Grade 2 or higher..... Interpretations of grade 2 or higher only are printed.
• None..... Neither guide nor commentary is printed.

Displaying Guide

1 **Print the ECG data. (See Chapter 4 “Standard 12-lead Examination (Basics).”)**

2 

When the examination result is displayed, press [Guide].



Interpretation is displayed.
Of the recorded waveforms, the one that represents the characteristics of the interpretation is displayed, as well as classification criteria, result of examination, and notes.

3 **If there are two or more interpretations, press [Previous] or [Next] to switch interpretations.**

4 **Press [Print] to print the contents displayed.**

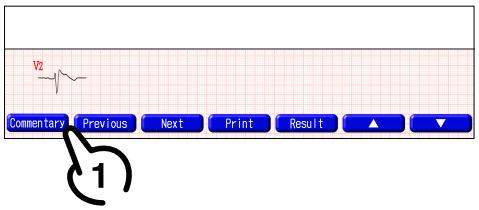
Displaying Commentary

Two methods are available to display the commentary. One is to display the interpretation, following the guide, and the other is to display the commentary only.

When Guide Is Displayed

1 **Display the guide, following the procedure in "Displaying Guide" on page 6-4.)**

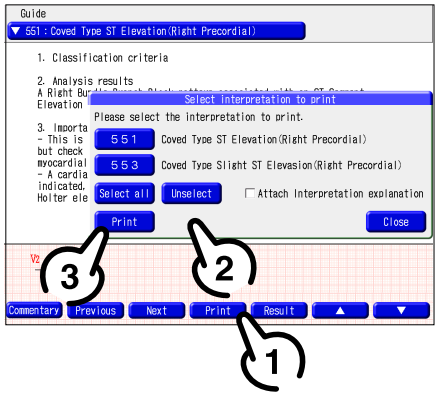
2



Press [Commentary].
The interpretation of the interpretation is displayed along with graphs.

3 **If there are two or more interpretations, press [Previous] or [Next] to switch interpretations.**

4 **Press [Print] to print the contents displayed.**



1 **Press the [Print] function key.**

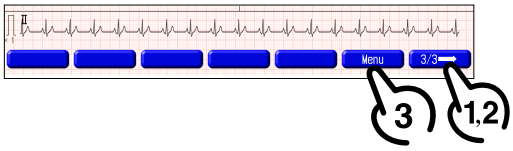
2 **Select the interpretation to be printed.**

3 **Press [Print] in the Select interpretation to print window.**

When Guide Is Not Displayed

The commentary can be displayed even if the guide is not displayed.

1



1 **Press [1/3→].**

2 **Press [2/3→].**

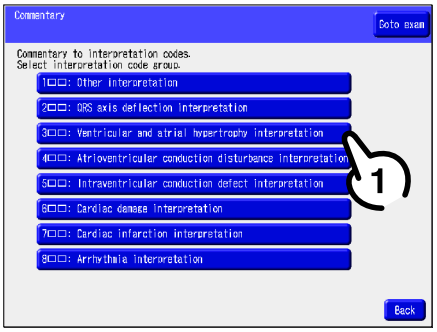
3 **Press [Menu].**

2



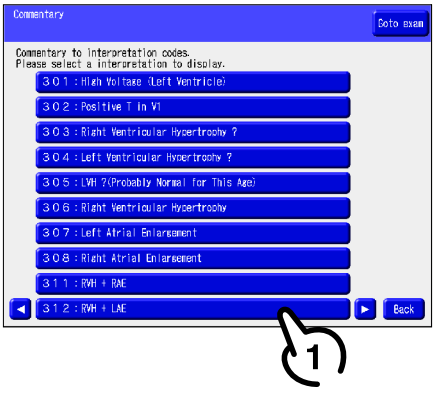
Press [Commentary].
The [Commentary] screen appears.

3

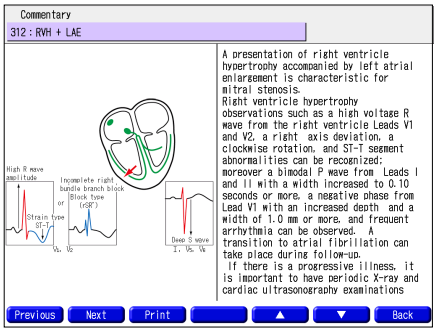


Press the most significant digit of the interpretation code group No.
Example: If the code No. is 312, press [3□□].

4



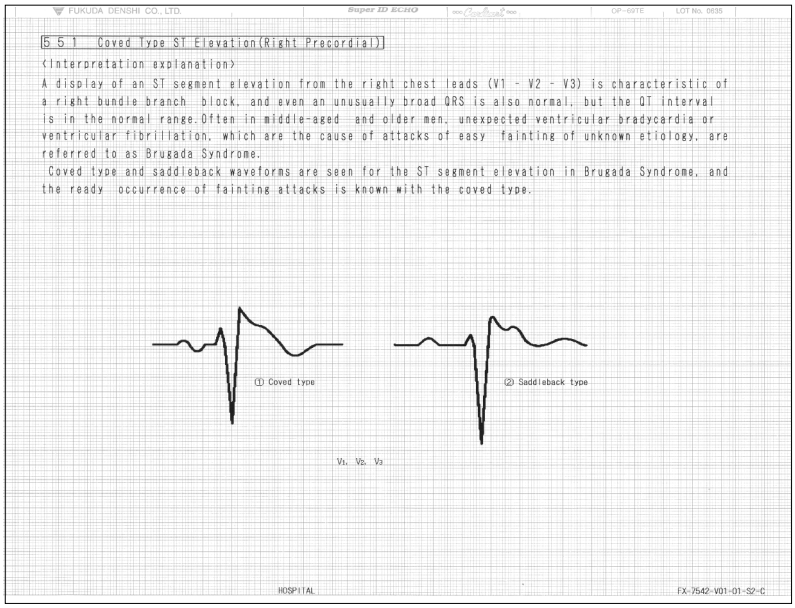
Press desired interpretation.



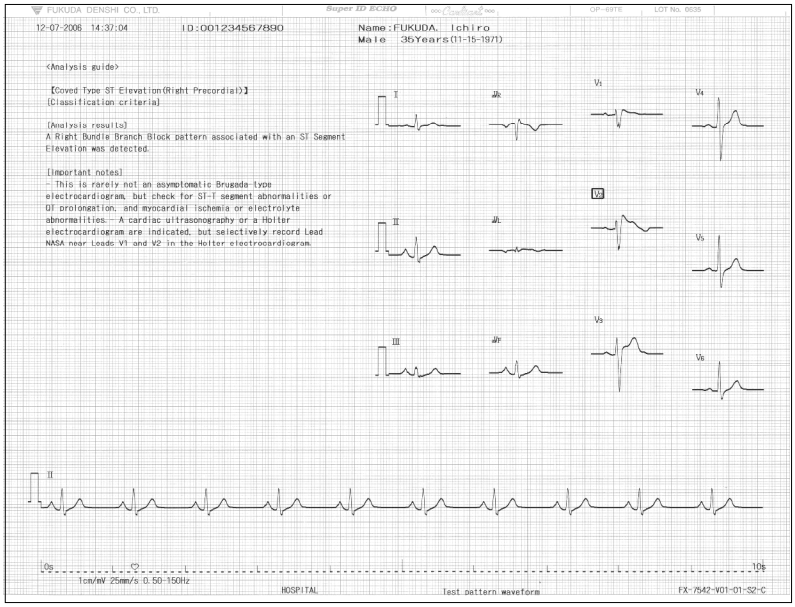
The commentary is displayed along with graphs.

Example of Recording

- **Commentary**



- **Guide**



Chapter 7

Waveform Comparison Function

This chapter describes the waveform comparison function, which allows ECG waveforms obtained at rest and after exercise to be laid out in chronological order to facilitate comparison, thus clarifying the change of waveforms due to exercise.

Printing Comparison Wave Report.....7-2

- **Printing Comparison Wave Report when Post-exercise State Is Exited.....7-2**
- **Printing Comparison Wave Report of the ECG Data Stored in the Memory 7-3**
- **Printing Comparison Wave Report of the ECG Data Stored in a Filing Medium 7-4**
- **Example of Recording.....7-6**

Printing Comparison Wave Report

Three methods are available to print comparison wave report. The first method is to print the report when post-exercise state is exited in standard 12-lead examination mode or Master's test examination mode. The second method is to print the ECG data stored in the memory within the equipment. The third method is to print the ECG data stored in a filing medium such as PC card or CF card.

Printing Comparison Wave Report when Post-exercise State Is Exited

A comparison wave report is automatically printed when post-exercise state is exited.

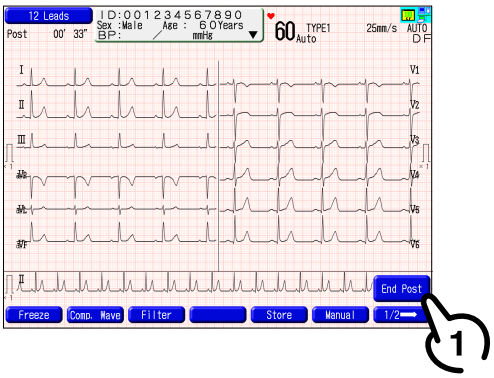
Set "Post" – "Comparison wave report" in 12 Leads setting to "Yes" beforehand.

1 **Enter patient information. (See "Entering Patient Information" on page 3-5.)**

[MEMO] Make ECG recording at rest and post-exercise using the same ID number

2 **Print the ECG data obtained at rest and post-exercise. (See "Recording ECG Data at Rest and Post-exercise" on page5-11.)**

3



Press [End Post].

After the comparison wave report is printed, the equipment returns to the basic state (ECG recording at rest).

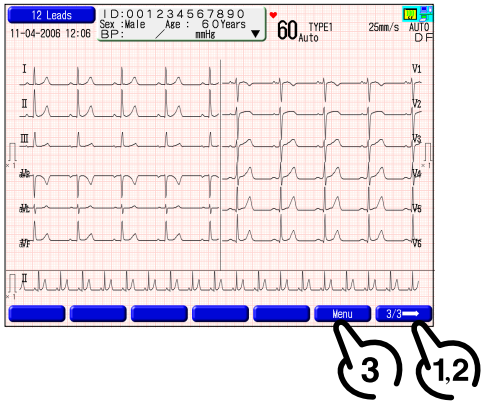
[MEMO] The data that can be printed in the comparison wave report are one piece of ECG data obtained while the patient is at rest and a maximum of 9 pieces of data obtained at post-exercise, which are to be printed in the order from the one with the shortest to the longest elapsed time since the completion of the exercise.

Printing Comparison Wave Report of the ECG Data Stored in the Memory

The ECG data for 3 patients can be stored in the memory within the equipment and the comparison wave report can be printed.

The ECG data that can be stored in the memory of the equipment are one piece of ECG data obtained when the patient is at rest and a maximum of 9 pieces of ECG data obtained after exercise per patient. If the power is turned off, the data is lost.

1

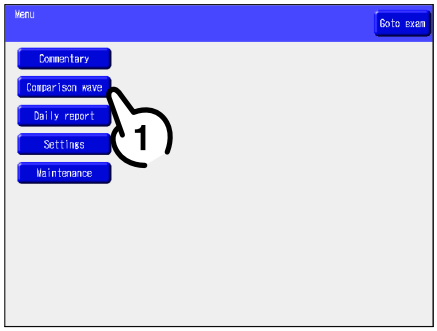


1 **Press [1/3→].**

2 **Press [2/3→].**

3 **Press [Menu].**

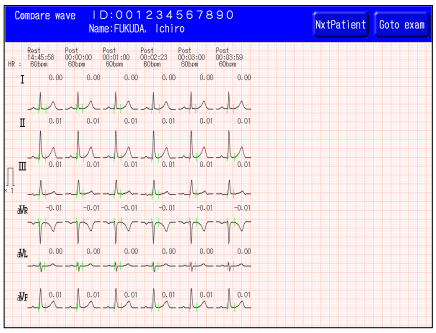
2



Press [Comparison wave].
The “compare wave” screen appears.

[MEMO] If no data is available for comparison, the “No data for comparison” message appears.

3



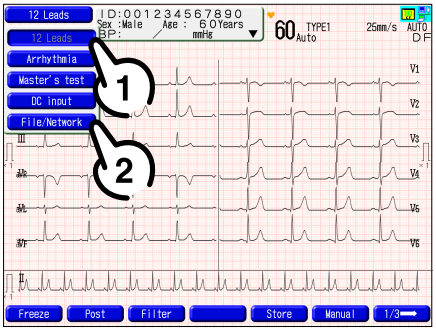
Press the START/STOP button.
The comparison wave report is printed.
Press [NxtPatient] to display the data of the next patient.

Printing Comparison Wave Report of the ECG Data Stored in a Filing Medium

Print a comparison wave report using the ECG data stored in a filing medium such as PC card or CF card

1 **Set the medium in which the desired data is stored into the equipment.**

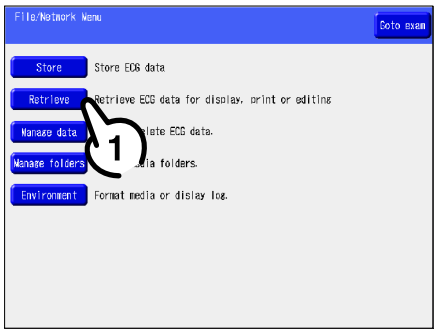
2



1 **Press the name of examination currently conducted.**

2 **Press [File/Network].**
The equipment enters the file/network mode.

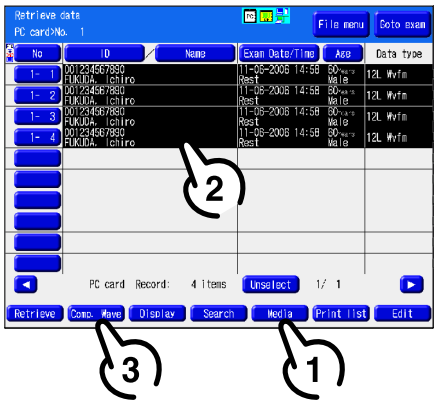
3



Press [Retrieve].
A list of data that can be reproduced is displayed.

[MEMO] The data contained in the media specified in "General" – "Load media" of file/network setting is displayed.

4



1 **Press [Media].**
The media screen appears, on which the medium containing desired data can be selected.

[MEMO] Only when you want to read data from a different medium, press [Media] to select the desired medium, and the equipment enters the file/network mode.

2 **Press the data for which comparison wave report is to be printed.**

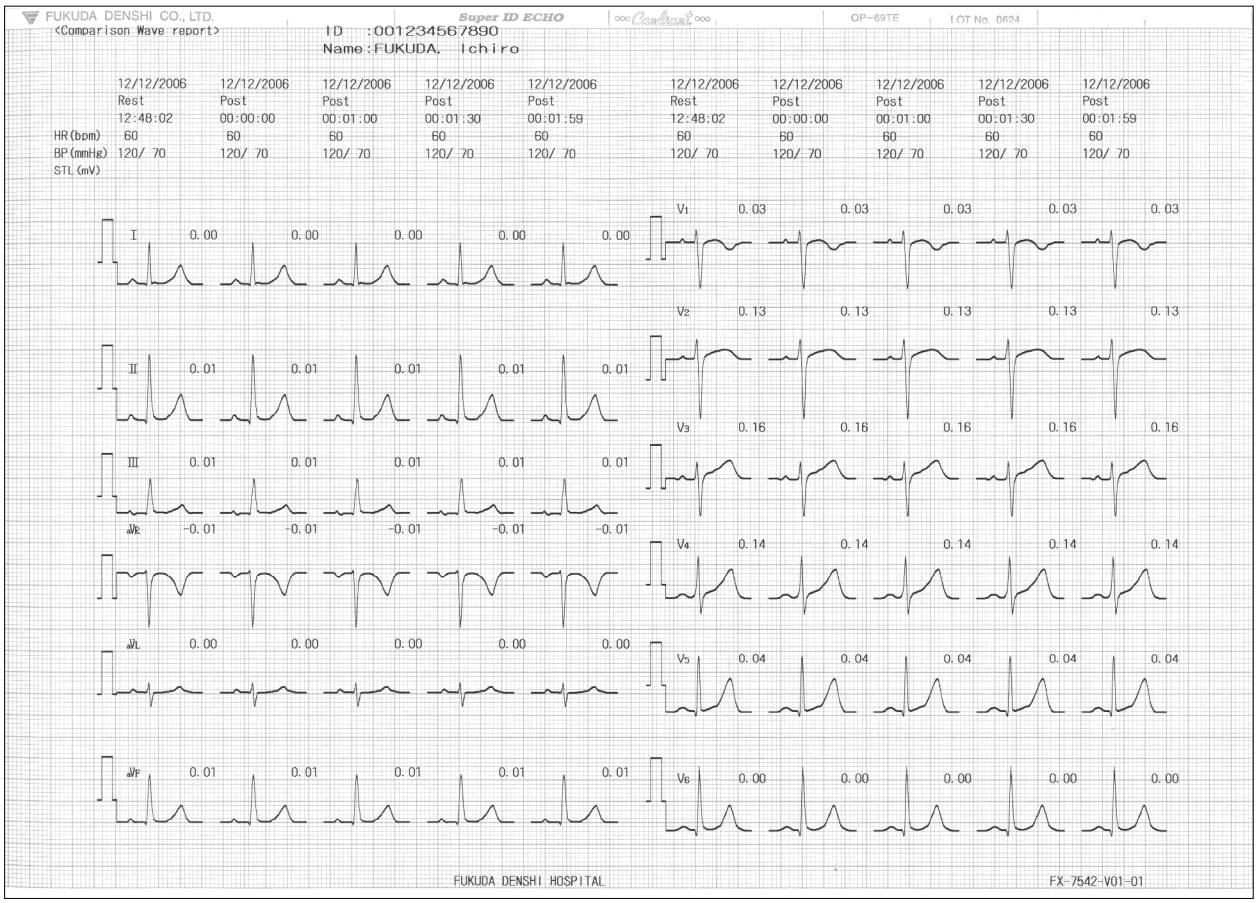
[MEMO] Select 12-lead waveform data type of the same ID number or 12-lead dominant type data.

[MEMO] The data of the same ID can be extracted by the search. (See “How to Search Data” on page 14-16.

3 **Press [Comp. Wave].**
The comparison wave report is printed.

Example of Recording

- **Comparison wave report**



Chapter 8

Serial Comparison Function

To clarify the change of waveforms between those currently displayed and those obtained previously, ECG data recorded in the past can be displayed next to the current waveforms for comparison.

Outline of Serial Comparison Wave Function 8-2

Required Setting.....8-2
Reading the Serial Comparison Screen 8-3
Searching Previous Data from Media Using an ID Number as a Key.....8-6
Selecting Previous Data from Media.....8-7

Outline of Serial Comparison Wave Function

In standard 12-lead examinations or 15-lead examinations, the 12-lead dominant waveforms recorded previously and the 12-lead real-time waveforms of the examination currently performed can be displayed next to each other.

When the result of the current ECG examination is to be displayed on the screen, the past examination result (interpretation) is also displayed next to the current result.

Required Setting

Set “General” – “Serial comparison” of 12 Leads setting to “Yes.”

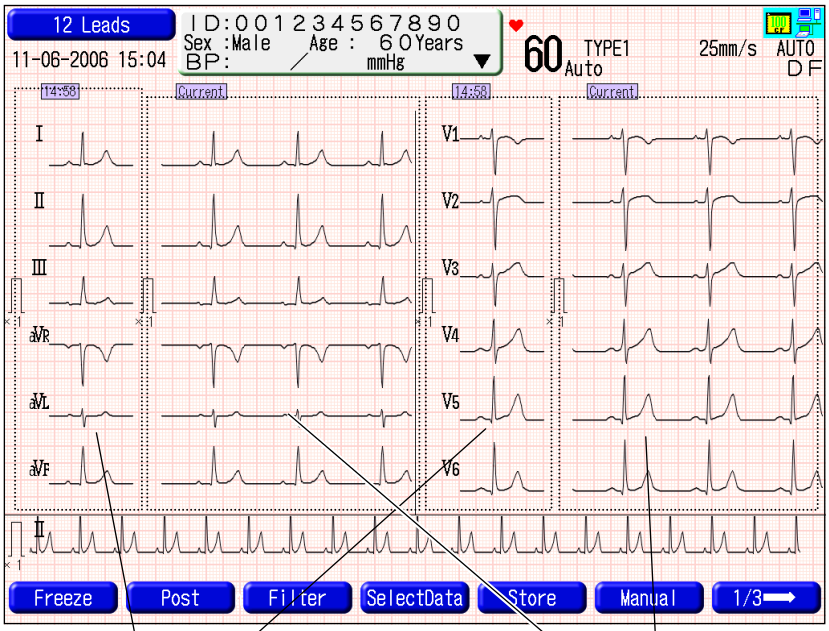
To activate the serial comparison function for 15-lead ECG examination, set “General” – “Serial comparison” of 15-lead examination to “Yes.”

[MEMO] If the serial comparison function is used for 15-lead examination, 12-lead waveforms only are displayed.

Reading the Serial Comparison Screen

The following 12-lead display appears if the serial comparison function is selected.

Real-time Waveform Screen

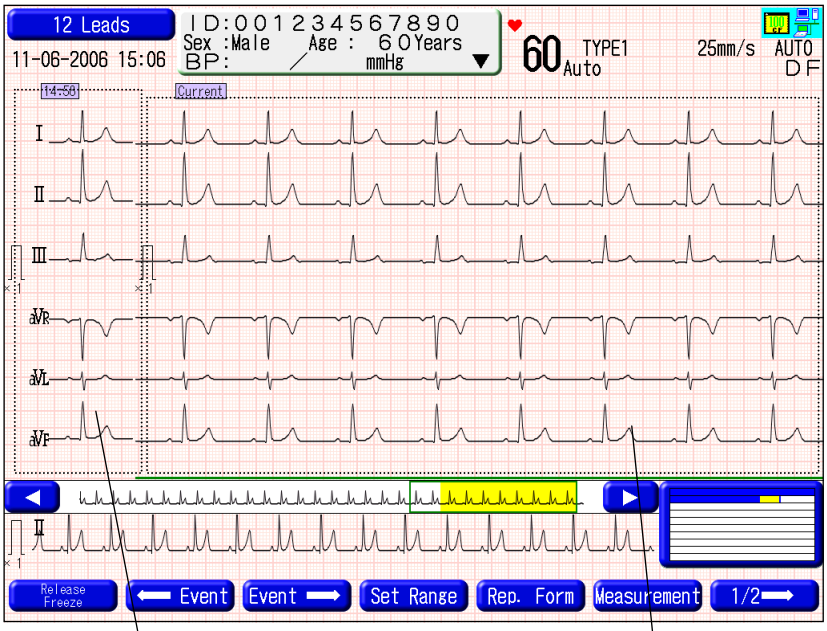


Previous dominant waveforms
The date of recording is displayed at the top.

Current real-time waveforms

The dominant waveforms in the previous data and the real-time waveforms obtained this time are displayed.
If the previous data is not available, solid lines are displayed instead of dominant waveforms of the previous data.
Other waveform display screens can be selected by pressing [Screen].
Sensitivity processing is performed separately for the previous data and the current data.

Freeze Screen



Previous dominant waveforms
The date of recording is displayed at the top.

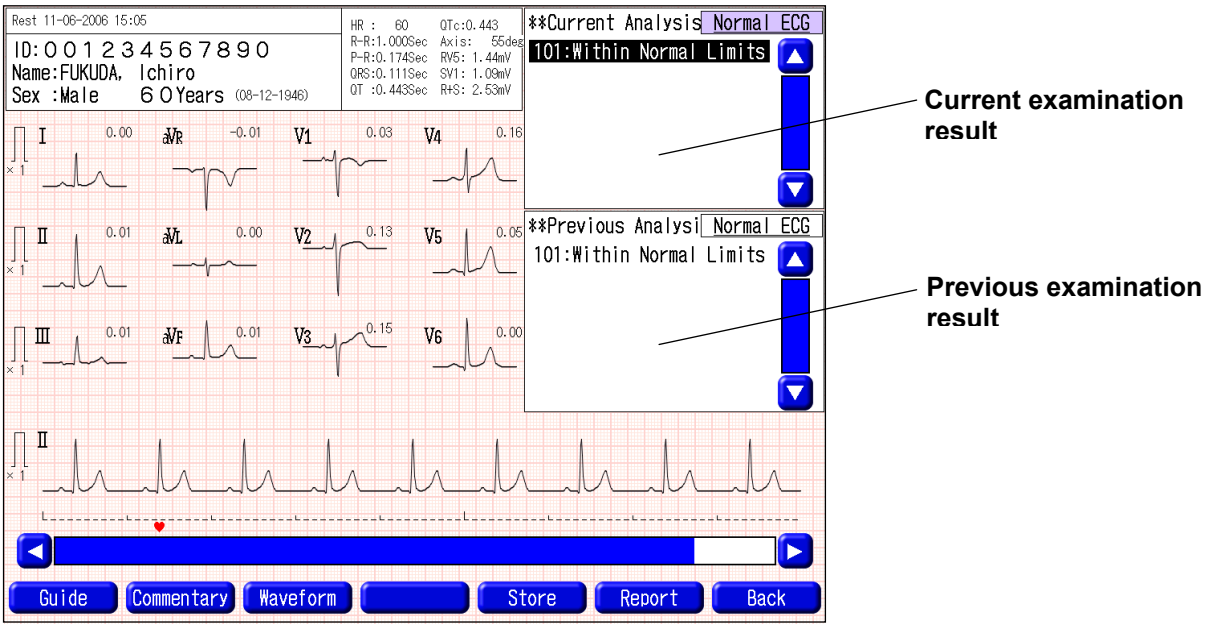
Current frozen waveforms

The dominant waveforms of the previous data and the frozen waveforms of the current data are displayed.
If the previous data is not available, solid lines are displayed instead of dominant waveforms of the previous data.

Press the Lead ◁ ▷ key to switch leads.

Sensitivity processing is performed separately for the previous data and the current data.

Examination Result Screen



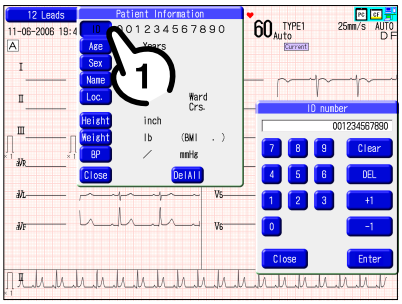
The result of current examination and that of the previous examination are displayed.
If the overall judgment of the current examination is higher in grade than the previous result, a beeping sound is produced when the display appears.

The graph above is an example of recording when the FP-1001 has been installed.

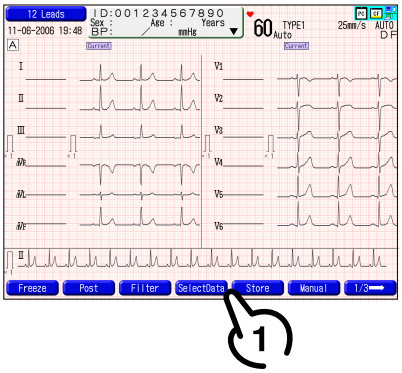
Searching Previous Data from Media Using an ID Number as a Key

The data of previous examinations can be searched and displayed with the ID number used as a key.

1 Enter the ID number and other patient information.

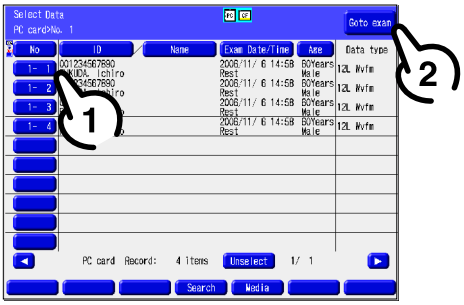


2 Search the previous data from media.



1 Press [SelectData].
The data having the same ID number is searched from the media.

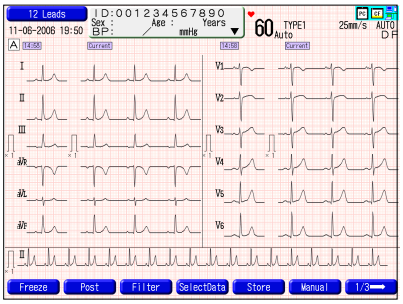
3 Select data to be used for comparison.



1 Press the data to be used for comparison.
The selected data is highlighted.

2 Press [Goto exam].
The examination screen appears again.

4 The previous data is displayed.

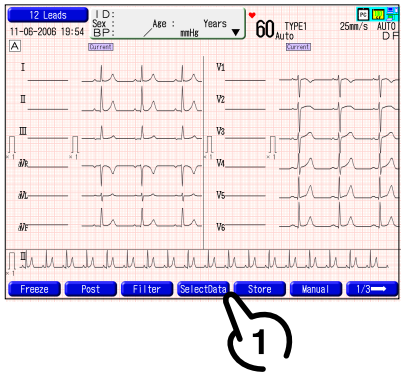


[MEMO] The previous data to be used for comparison is deleted if the ID number is reentered.

Selecting Previous Data from Media

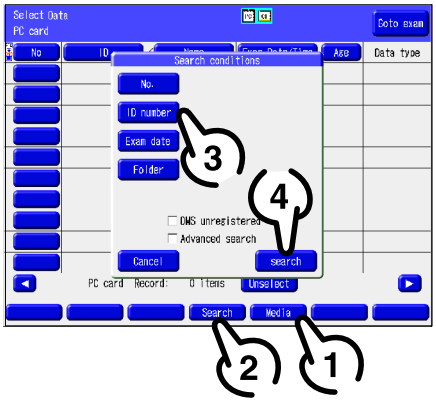
Arbitrary data can be selected as previous data from the media.

1 Search previous data from the media.



1 Press [SelectData].

2 Search data from the media.



1 Press [Media].

On the media screen that appears, select the medium in which the desired data is stored.

[MEMO] Press [Media] only when you want to change the media for data reading.

2 Press [Search].

The search window appears.

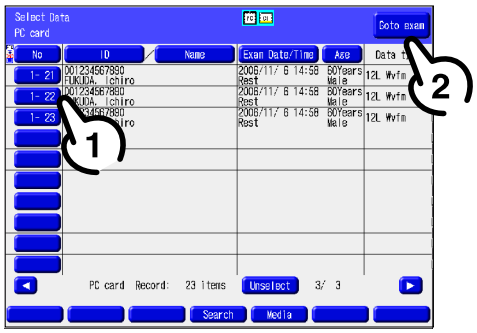
3 Enter search conditions.

[MEMO] See “How to Search Data” on page 14-16 for the searching procedure.

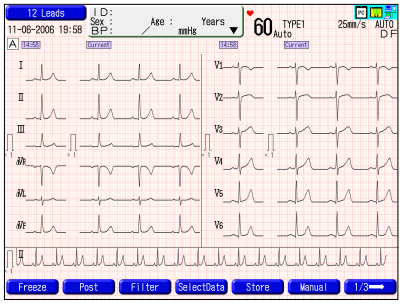
4 Press [Search].

The table listing all the data that satisfy the entered conditions appears.

3 Select the data to be used for comparison.



4 The previous data appears.



1 Press the data to be used for comparison.

The selected data is highlighted.

2 Press [Goto exam].

The examination screen appears again.

Chapter 9

Long-term Arrhythmia Examination

This chapter describes details of long-term 3-lead arrhythmia recording and 1-lead R-R measurement (rhythm-lead) recording.

Required Setting 9-2
- **Setting the Number of Leads.....9-2**
- **Setting the Exam Lead.....9-2**
- **Setting the Wave Record Time 9-2**

Recording Data While Measuring Arrhythmia 9-3
- **Starting Recording 9-3**
- **Suspending Examination.....9-4**
- **Example of Recording.....9-5**

Measuring R-R Intervals.....9-7
- **Starting Recording 9-7**
- **Example of Recording.....9-9**

Required Setting

The following items must be set to perform long-term arrhythmia examinations.

- No. leads
- Exam lead
- Wave record time

[MEMO] The above settings can be changed while examination is being carried out.

Setting the Number of Leads

Set the number of leads to be used for the examination as follows.

Set "No. leads" of "General/File" – "General" to "3ch" or "1ch." in Arrhythmia setting.

3ch..... Printing can be made while arrhythmia is measured and R-R intervals are measured.

1ch..... R-R intervals can be measured.

Setting the Exam Lead

Set the type of lead for printing as follows.

Select a desired lead in "General/File" – "Exam lead" in Arrhythmia setting.

Either 3ch or 1ch can be selected by using the "No. Leads" function key on the examination screen.

[MEMO] If "No. leads" is set to "1ch," the lead specified as 1ch in "Exam lead" is made effective.

Setting the Wave Record Time

Set the duration when waveforms are collected.

Make the setting in "Auto record" – "Wave record time" in Arrhythmia setting.

Or setting can also be made by pressing [Exam time] on the examination screen.

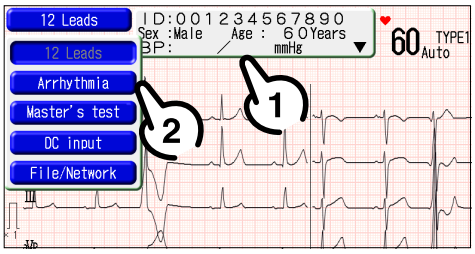
Recording Data While Measuring Arrhythmia

Collect 3-lead arrhythmia data for a period from 40 seconds to 3 minutes, and print it in a regular format.

[MEMO] Set No. leads to 3ch.

Starting Recording

1

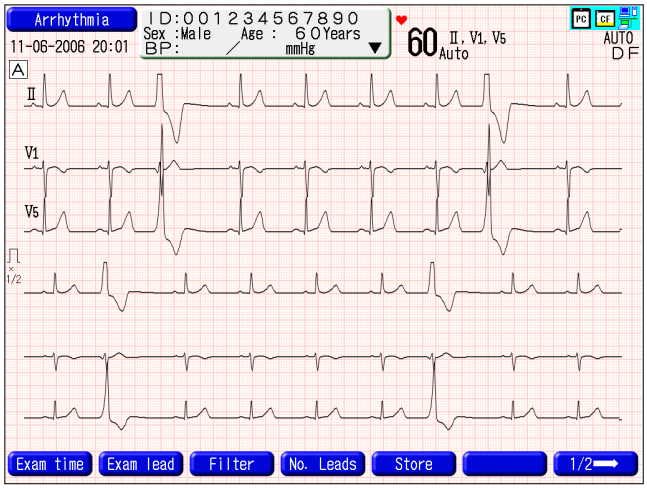


1 **Press the name of examination currently performed.**

2 **Press [Arrhythmia].**
The equipment enters the long-term arrhythmia examination mode.

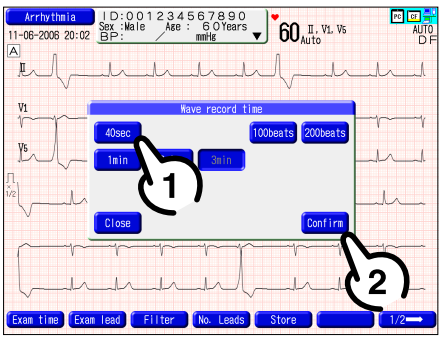
2 **Attach electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)**
Enter patient information. (See “Entering Patient Information” on page 3-5.)

3



Press [Exam time].

4



1 Select a desired duration for waveform collection by pressing the corresponding key.

2 Press [Confirm].
The duration can be selected from the following: 40 seconds, 1, 2, and 3 minutes, and heart rate of 100 and 200 beats.

[MEMO] If [Close] is pressed after a desired item is selected, the selection is canceled.

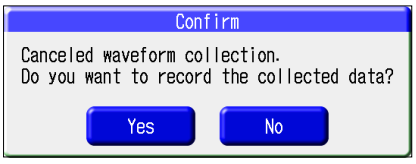
[MEMO] If heart rate of 100 or 200 beats is selected as the duration of examination, waveform collection is terminated when 3 minutes elapses at the longest.

5 **Press the START/STOP button.**
The examination is started. The "Collecting waveforms…" display appears, indicating that the counting of collection time has been started.

6 **The examination is completed when the period selected in procedure 4 above elapses, and the collected data is printed on the recording paper.**
If the START/STOP button is pressed during the examination, the examination is interrupted. (See "Suspending Examination" on page 9-4.)

Suspending Examination

If the START/STOP button is pressed or electrodes come off during examination, the examination is suspended.



If the examination is suspended, a message window appears, asking you whether you want to record the collected data or not.

[Yes]: Records the data colleted before the interruption.

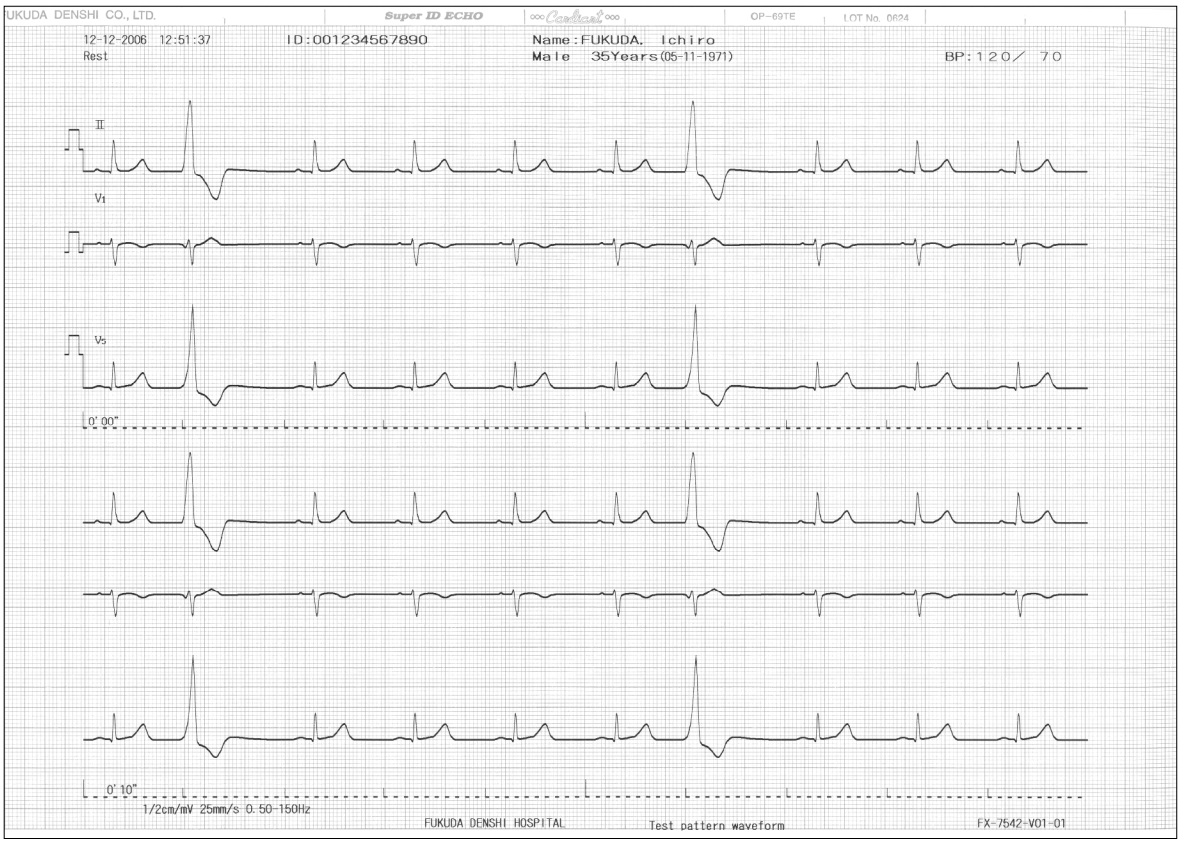
[No]: Aborts the examination, deleting the collected data.

[MEMO] If "Continue" is selected for "Auto record" – "Details settings" – "Cancel operation" in Arrhythmia setting, the confirmation window does not appear, and the data collected by the time the examination is suspended is recorded. If "Cancel" is selected, the examination is aborted unconditionally.

[MEMO] If data is collected for less than 7 seconds, the examination is made ineffective, and the collected data is discarded.

Example of Recording

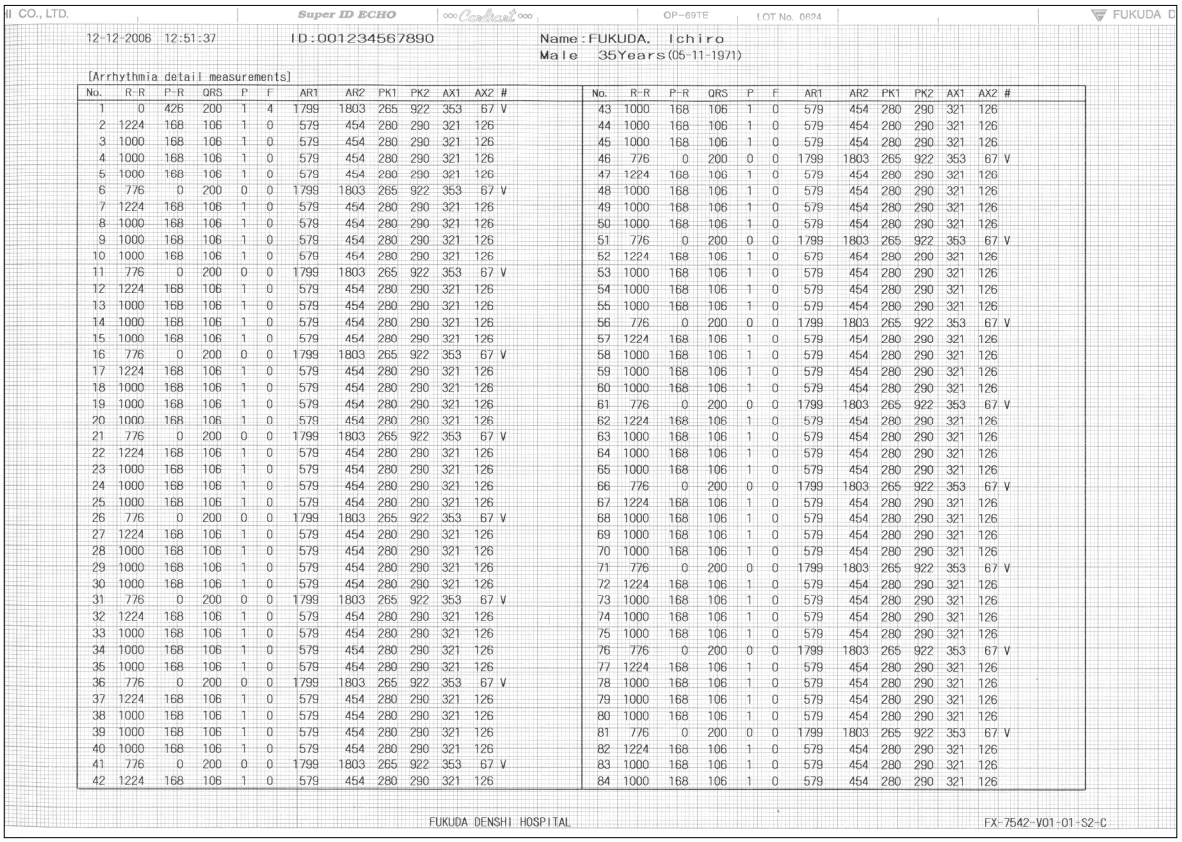
- **Arrhythmia waveform report**



- **Arrhythmia examination result report**



- **Arrhythmia measurement report**



No.	R-R	P-R	QRS	P	F	AR1	AR2	PK1	PK2	AX1	AX2	#
1	0	426	200	1	4	1799	1803	265	922	353	67	V
2	1224	168	106	1	0	579	454	280	290	321	126	
3	1000	168	106	1	0	579	454	280	290	321	126	
4	1000	168	106	1	0	579	454	280	290	321	126	
5	1000	168	106	1	0	579	454	280	290	321	126	
6	776	0	200	0	0	1799	1803	265	922	353	67	V
7	1224	168	106	1	0	579	454	280	290	321	126	
8	1000	168	106	1	0	579	454	280	290	321	126	
9	1000	168	106	1	0	579	454	280	290	321	126	
10	1000	168	106	1	0	579	454	280	290	321	126	
11	776	0	200	0	0	1799	1803	265	922	353	67	V
12	1224	168	106	1	0	579	454	280	290	321	126	
13	1000	168	106	1	0	579	454	280	290	321	126	
14	1000	168	106	1	0	579	454	280	290	321	126	
15	1000	168	106	1	0	579	454	280	290	321	126	
16	776	0	200	0	0	1799	1803	265	922	353	67	V
17	1224	168	106	1	0	579	454	280	290	321	126	
18	1000	168	106	1	0	579	454	280	290	321	126	
19	1000	168	106	1	0	579	454	280	290	321	126	
20	1000	168	106	1	0	579	454	280	290	321	126	
21	776	0	200	0	0	1799	1803	265	922	353	67	V
22	1224	168	106	1	0	579	454	280	290	321	126	
23	1000	168	106	1	0	579	454	280	290	321	126	
24	1000	168	106	1	0	579	454	280	290	321	126	
25	1000	168	106	1	0	579	454	280	290	321	126	
26	776	0	200	0	0	1799	1803	265	922	353	67	V
27	1224	168	106	1	0	579	454	280	290	321	126	
28	1000	168	106	1	0	579	454	280	290	321	126	
29	1000	168	106	1	0	579	454	280	290	321	126	
30	1000	168	106	1	0	579	454	280	290	321	126	
31	776	0	200	0	0	1799	1803	265	922	353	67	V
32	1224	168	106	1	0	579	454	280	290	321	126	
33	1000	168	106	1	0	579	454	280	290	321	126	
34	1000	168	106	1	0	579	454	280	290	321	126	
35	1000	168	106	1	0	579	454	280	290	321	126	
36	776	0	200	0	0	1799	1803	265	922	353	67	V
37	1224	168	106	1	0	579	454	280	290	321	126	
38	1000	168	106	1	0	579	454	280	290	321	126	
39	1000	168	106	1	0	579	454	280	290	321	126	
40	1000	168	106	1	0	579	454	280	290	321	126	
41	776	0	200	0	0	1799	1803	265	922	353	67	V
42	1224	168	106	1	0	579	454	280	290	321	126	

No.	R-R	P-R	QRS	P	F	AR1	AR2	PK1	PK2	AX1	AX2	#
43	1000	168	106	1	0	579	454	280	290	321	126	
44	1000	168	106	1	0	579	454	280	290	321	126	
45	1000	168	106	1	0	579	454	280	290	321	126	
46	776	0	200	0	0	1799	1803	265	922	353	67	V
47	1224	168	106	1	0	579	454	280	290	321	126	
48	1000	168	106	1	0	579	454	280	290	321	126	
49	1000	168	106	1	0	579	454	280	290	321	126	
50	1000	168	106	1	0	579	454	280	290	321	126	
51	776	0	200	0	0	1799	1803	265	922	353	67	V
52	1224	168	106	1	0	579	454	280	290	321	126	
53	1000	168	106	1	0	579	454	280	290	321	126	
54	1000	168	106	1	0	579	454	280	290	321	126	
55	1000	168	106	1	0	579	454	280	290	321	126	
56	776	0	200	0	0	1799	1803	265	922	353	67	V
57	1224	168	106	1	0	579	454	280	290	321	126	
58	1000	168	106	1	0	579	454	280	290	321	126	
59	1000	168	106	1	0	579	454	280	290	321	126	
60	1000	168	106	1	0	579	454	280	290	321	126	
61	776	0	200	0	0	1799	1803	265	922	353	67	V
62	1224	168	106	1	0	579	454	280	290	321	126	
63	1000	168	106	1	0	579	454	280	290	321	126	
64	1000	168	106	1	0	579	454	280	290	321	126	
65	1000	168	106	1	0	579	454	280	290	321	126	
66	776	0	200	0	0	1799	1803	265	922	353	67	V
67	1224	168	106	1	0	579	454	280	290	321	126	
68	1000	168	106	1	0	579	454	280	290	321	126	
69	1000	168	106	1	0	579	454	280	290	321	126	
70	1000	168	106	1	0	579	454	280	290	321	126	
71	776	0	200	0	0	1799	1803	265	922	353	67	V
72	1224	168	106	1	0	579	454	280	290	321	126	
73	1000	168	106	1	0	579	454	280	290	321	126	
74	1000	168	106	1	0	579	454	280	290	321	126	
75	1000	168	106	1	0	579	454	280	290	321	126	
76	776	0	200	0	0	1799	1803	265	922	353	67	V
77	1224	168	106	1	0	579	454	280	290	321	126	
78	1000	168	106	1	0	579	454	280	290	321	126	
79	1000	168	106	1	0	579	454	280	290	321	126	
80	1000	168	106	1	0	579	454	280	290	321	126	
81	776	0	200	0	0	1799	1803	265	922	353	67	V
82	1224	168	106	1	0	579	454	280	290	321	126	
83	1000	168	106	1	0	579	454	280	290	321	126	
84	1000	168	106	1	0	579	454	280	290	321	126	

Measuring R-R Intervals

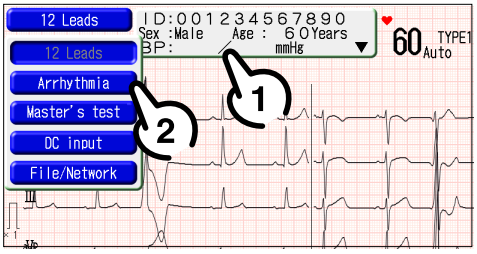
The waveforms from 1-lead R-R measurement (rhythm-lead) can be collected for the period from 40 seconds to 10 minutes, or for the heart rate of 100 and 200 beats.

[NOTE] Arrhythmia examination is not performed in this case. The R-R intervals only are measured.

[MEMO] Set No.lead to 1ch.

Starting Recording

1

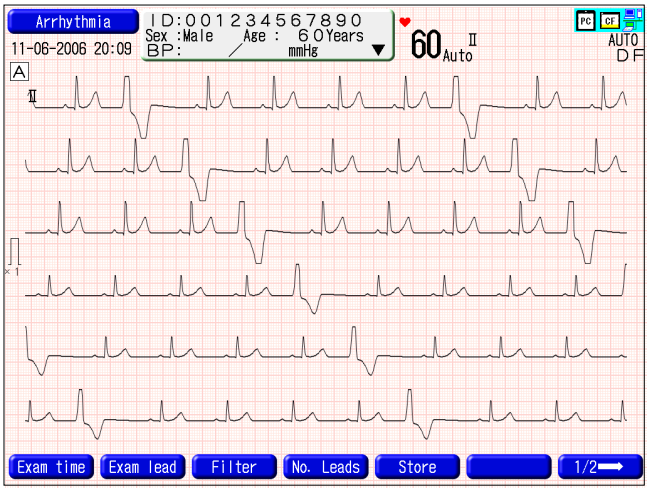


1 **Press the name of examination currently performed.**

2 **Press [Arrhythmia].**
The equipment enters the long-term arrhythmia examination mode.

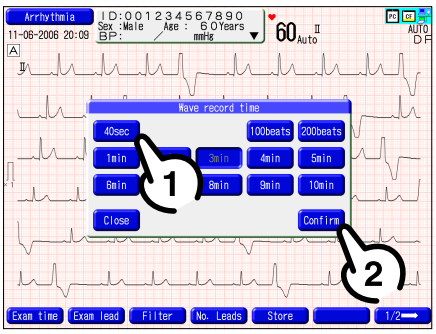
2 **Attach electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)**
Enter patient information. (See “Entering Patient Information” on page 3-5.)

3



Press [Exam time].

4



1 Select the duration of waveform collection.

2 Press [Confirm].
Select the duration from the following: 40 seconds, 1 to 10 minutes, and heart rate of 100 and 200 beats.

[MEMO] If [Close] is pressed after the duration is selected, the selection is canceled.

[MEMO] If heart rate of 100 or 200 beats is selected as the duration of examination, waveform collection is terminated when 10 minutes elapses at the longest.

5

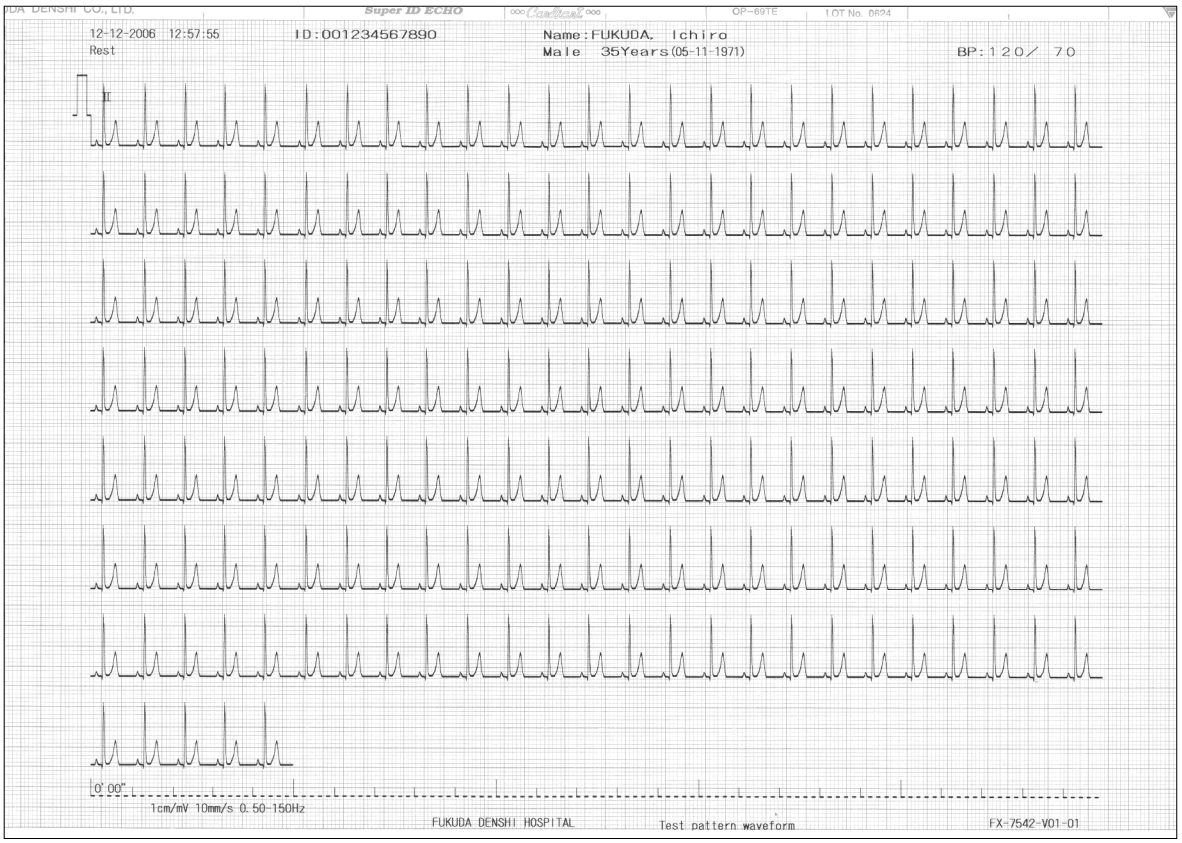
Press the START/STOP button.
The examination is started. The "Collecting waveforms…" display appears, indicating that the counting of collection time has been started.

6

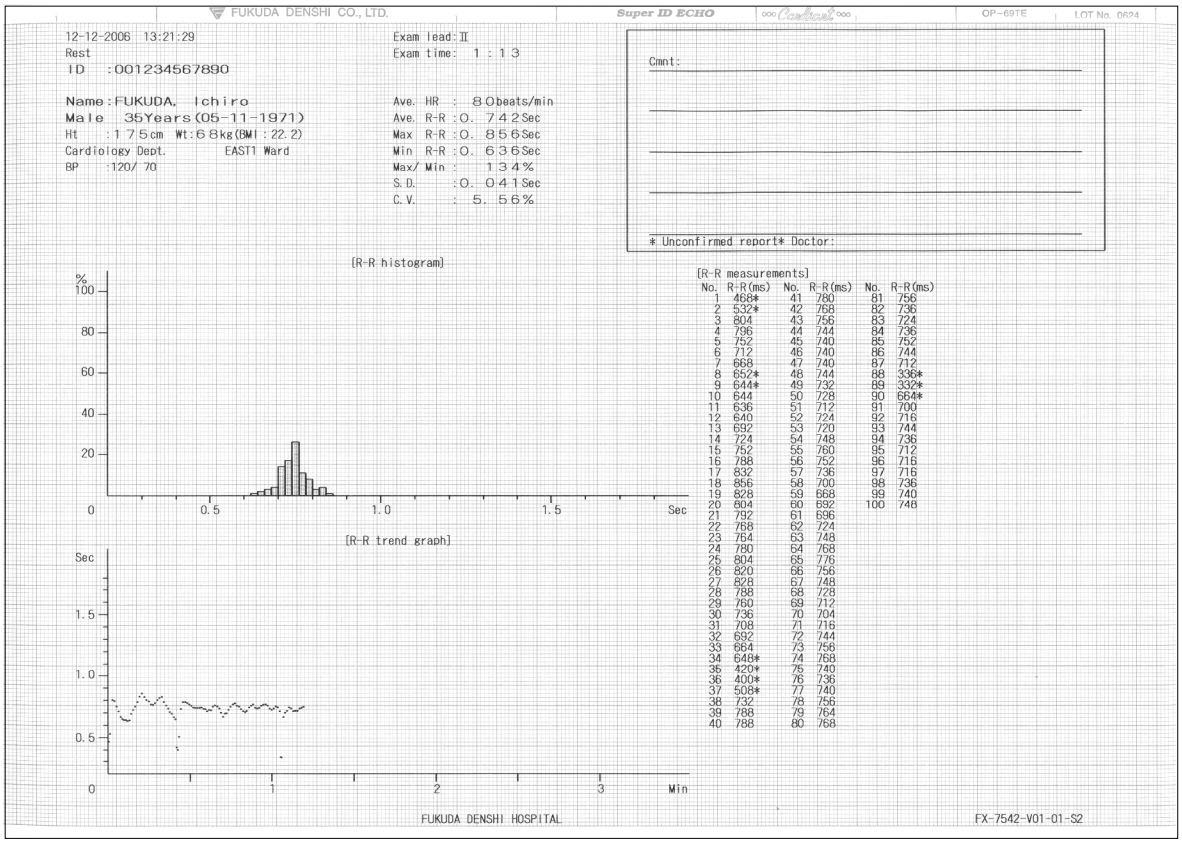
The examination is completed when the period selected in procedure 4 above elapses, and the collected data is printed on the recording paper.
If the START/STOP button is pressed during the examination, the examination is suspended. (See "Suspending Examination" on page 9-4.)

Example of Recording

- **R-R measurement report**



- **Rhythm measurement report**



[MEMO] Before or after extrasystoles, or when deviation from the average R-R value is found to be 20% or larger, the [R-R measurement] is followed by an asterisk (*), which indicates that the measurement is invalid. These invalid R-R values are not used for calculation of average R-R, standard deviation, fluctuation coefficient, etc., nor plotted for [R-R Histogram].

Chapter 10

Master's Step Test

This chapter describes how to perform a stress test by the Master's 2-step method.

Before Performing Master's Step Test 10-2
- **Contents of Master's Step Test 10-2**
- **Notes on Master's Step Test.....10-3**
- **Movement of the Patient.....10-4**

Performing Master's Step Test.....10-5

Master's Step Table.....10-7

Before Performing Master's Step Test

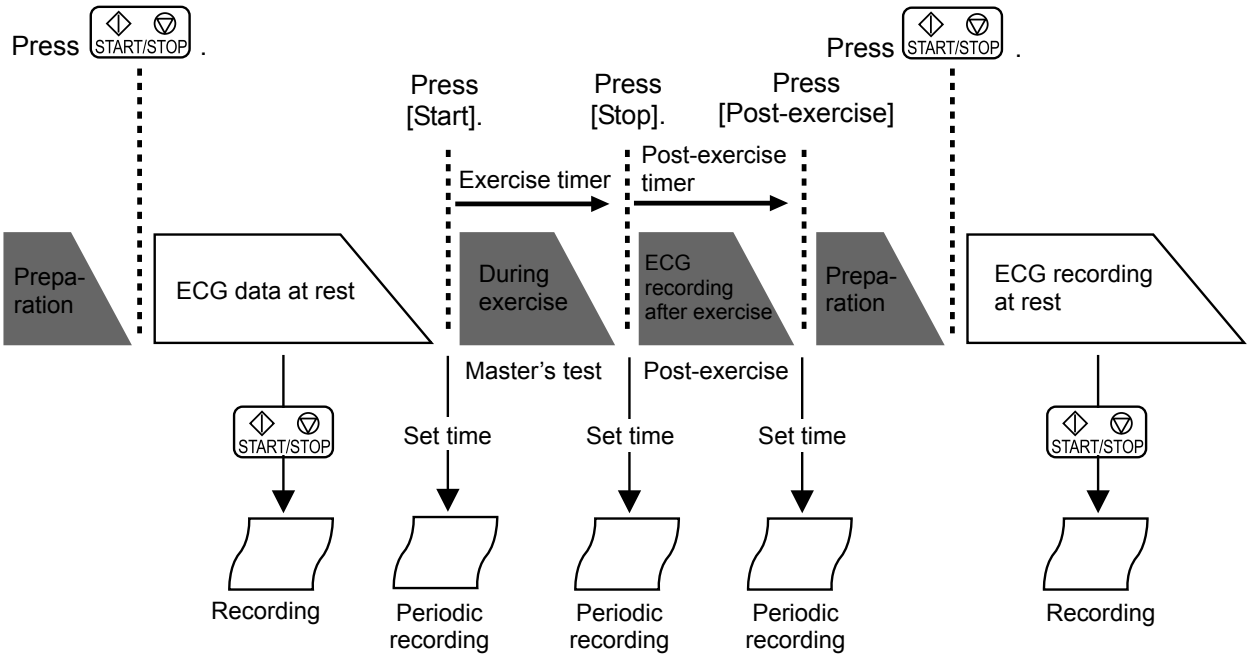
Contents of Master's Step Test

An exercise test can be performed in the following three states: At rest, during exercise, and post-exercise.

[MEMO] ST measurement cannot be performed.

State	Name of examination	Function
Basic state	ECG recording at rest	Performs ECG recording at rest (Automatic recording, manual recording, arrhythmia recording, and rhythm-lead recording).
Test state	Master's Step test	Performs a stress test by the Master's 2-step method. ECG recording can be made both during excercise and post-exercise for the period of time set beforehand.

The flow of the test is as follows.



See the description in Chapter 4 "Standard 12-lead Examination (Basics)" for the operation procedure in the basic state.

[MEMO] Waveform collection or recording may be continued even if the set time is reached depending on the periodic recording format. In this case, the set time is ignored.

[MEMO] Press START/STOP during exercise or post-exercise, and recording can be made.

Notes on Master's Step Test

Pay attention to the following when performing a Master's test.

- **Purpose of stress test**
  In a stress test, the oxygen demand of the patient's cardiac muscle is intentionally increased to create ischemic conditions (oxygen-deficiency conditions), and the possibility of occurrence of a coronary artery disease (angina cordis) is examined under the conditions. It is therefore essential to take necessary safety measures against the occurrence of a heart stroke.

Avoid performing an exercise test in the following cases.

When acute myocardial infarct is suspected

When there is a clear evidence of an organic cardiac disease even if the ECG data at rest is normal
Except when the test is conducted to evaluate the condition of the patient after implementation of cardiac surgery or during convalescence

When abnormality is found in the ECG at rest

When ventricular hypertrophy is found
Pay special attention to the patients having ventricular hypertrophy because a symptom of myocardial ischemia may appear especially strongly with such patients.

Observe the following to assure safety.

Be sure to check that appropriate safety measures have been taken before performing a stress test.

When conducting a stress test, be sure not to exceed the daily labor range of the patient in principle to assure safety.

The abnormality criteria are as follows:

When ST decrease of 0.05 mV or more is found
Note that special attention should be paid during measurement since the baseline of the recording taken immediately after an exercise test tends to pass obliquely.

When T waves that went upwards before the stress test decrease or are reversed in all the leads except for lead III

When arrhythmia appears after the stress test although one was not detected before the test

Movement of the Patient

Follow the procedure shown below to perform a Master's test.

[MEMO] Make the function setting of the Master's step before starting a Master's test. (See "Setting the Master's Step Test" on page 17-50.)

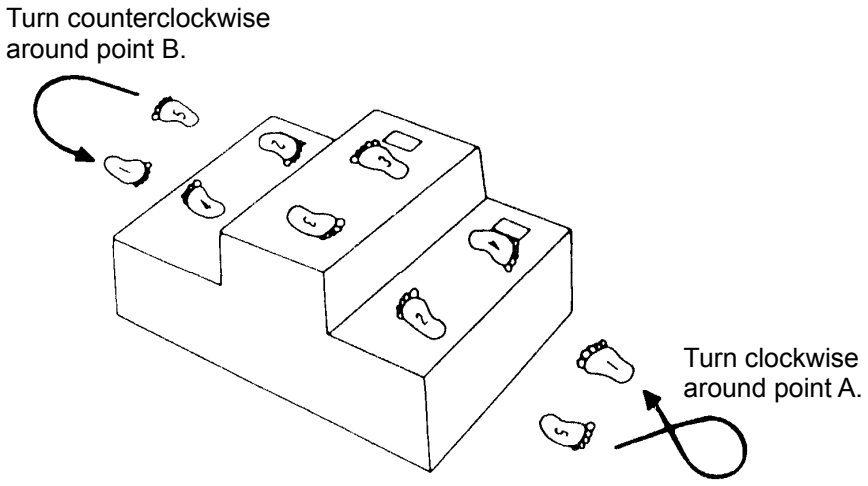
1 **Record the ECG at rest. (See Chapter 4 "Standard 12-lead Examination (Basics)."**

2 **Let the patient ascend the steps from one side and descent to the other side, which is to be counted as one movement.**

3 **Let the patient ascend and descend the steps for the number of times listed in the master table during the period of 1 minute and 30 seconds (single).**

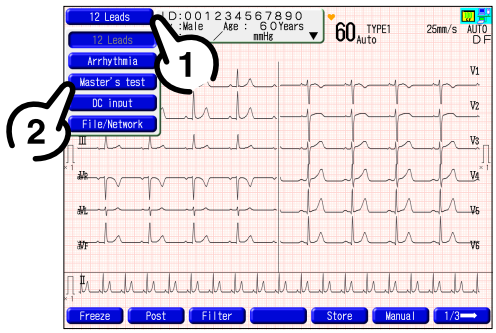
4 **To prevent the effect of stress from wearing off, record the ECG data immediately after the exercise is done.**

5 **If abnormality should be found in the ECG data, repeat recording after waiting for some time (1, 3, 5 minutes, for example) to find the duration of the abnormality.**



Performing Master's Step Test

1



1 **Press the name of examination currently being performed.**

2 **Press [Master's test].**

2

The equipment enters into the Master's test mode.
Attach the electrodes to the patient. (See "Attaching Electrodes" on page 3-2.)
Enter the patient information. (See "Entering Patient Information" on page 3-6.)
Make filter setting. (See "Setting Sensitivity" on page 3-26).)
Make sensitivity setting. (See "Setting Sensitivity" on page 3-26.)
Also set the amount of stress to be applied to the patient according to the contents of the following table.

Amount of stress	Duration of application	Target number of times
Half	45 sec.	1/2 times
Single	1 min. and 30 sec.	1 time
Double	3 min.	2 times
Double + Extra	3 min.	2 times + Extra amount (5 to 50%)
Triple	4 min. and 30 sec.	3 times

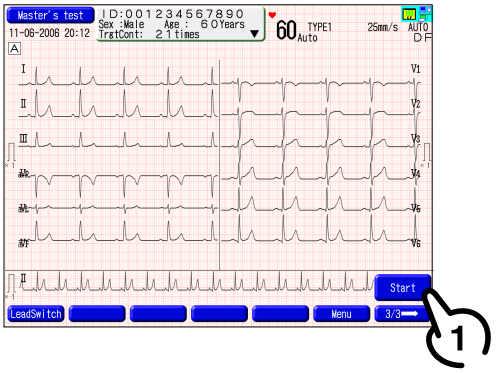
[NOTE] **The target number of times is automatically calculated based on "Age," "Sex," "Weight," and "Amount of stress." Be sure to enter these data.**

[MEMO] **The maximum number of times of exercise is 60 times when single is selected as the amount of stress.**

3

Print the ECG data at rest. (See "Recording Data Automatically" on page 4-13.)

4



Press [Start].
Timer count is started.
A Master's test is started, and "Under stress" is displayed on the screen. If a Master's step is connected, control the intensity of the lamp and the Master's buzzer sound.

[MEMO] **Press [Retry] to restart the examination.**

[MEMO] **Periodic records as well as compressed records can be printed. (See "Setting for Master's test" on page 17-50.)**

5

If the target number of times is reached, or [Cancel] is pressed during examination, the Master's test is terminated.

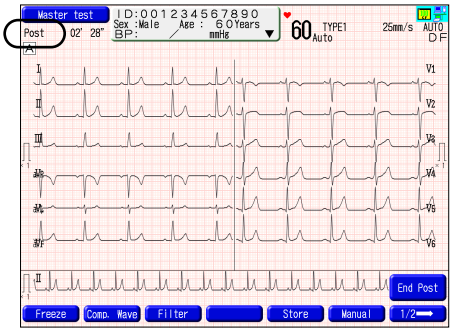
[MEMO] How the equipment transfers into the state under stress varies depending on the setting contents of "General/File" – "Detailed Setting" – "Test terminating operation" in Master's test setting.

"Auto" ..... Automatically transfers to the state under stress on completion of a Master's test.

"Pause"..... The timer count after exercise test does not start or the equipment does not enter the post-stress state until [Post] is pressed.

"Stop recording".. The equipment enters the post-stress state, but recording is not started until [Start recording] is pressed.

6



"Post" is displayed.

The post-stress timer count is started.
If recording type has been set in "Post/display" – "Periodic recording type" in 12 Leads setting, printing is made on the printing paper according to the setting.
If a compressing method has been selected in "Post/display" – "Compressed recording" of 12 Leads examination setting, the ECG data between periodic recordings is printed compressed.

7

Press [End Post].

The equipment returns to the preparation state for a Master's test.

Master's Step Table

M: Male, F: Female, Implementation time in the case of single stress (1 min. and 30 sec.)

Weight (kg) \ Age		5 | 9	10 | 14	15 | 19	20 | 24	25 | 29	30 | 34	35 | 39	40 | 44	45 | 49	50 | 54	55 | 59	60 | 64	65 | 69	70 | 74	75 | 79
18 to 22	M	35	36													
	F	35	35	33												
23 to 26	M	33	35	32												
	F	33	33	32												
27 to 31	M	31	33	31												
	F	31	32	30												
32 to 35	M	28	32	30												
	F	28	30	29												
36 to 40	M	26	30	29	29	29	28	27	27	26	25	25	24	23	23	22
	F	26	28	28	28	28	27	26	24	23	22	21	21	20	19	18
41 to 44	M	24	29	28	28	28	27	27	26	25	25	24	23	22	22	21
	F	24	27	26	27	26	25	24	23	22	22	21	20	19	19	18
45 to 49	M	22	27	27	28	28	27	26	25	25	24	23	22	22	21	20
	F	22	25	25	26	26	25	24	23	22	21	20	19	18	18	17
50 to 53	M	20	26	26	27	27	26	25	25	24	23	23	22	21	21	20
	F	20	23	23	25	25	24	23	22	21	20	19	18	18	17	16
54 to 58	M	18	24	25	26	27	26	25	24	23	23	22	21	20	20	19
	F	18	22	22	24	24	23	22	21	20	19	19	18	17	16	15
59 to 63	M	16	23	24	25	26	25	24	23	23	22	21	20	20	19	18
	F	16	20	20	23	23	22	21	20	19	19	18	17	16	15	15
64 to 67	M		21	23	24	25	24	24	23	22	21	20	20	19	18	18
	F		18	19	22	22	21	20	19	19	18	17	16	16	15	14
68 to 72	M		20	22	24	25	24	23	22	21	20	20	19	18	18	17
	F		17	17	21	20	20	19	19	18	17	16	16	15	14	13
73 to 76	M		18	21	23	24	23	22	22	21	20	19	18	18	17	17
	F		15	16	20	19	19	18	18	17	16	16	15	14	13	12
77 to 81	M			20	22	23	23	22	21	20	19	18	18	17	17	16
	F		13	14	19	18	18	17	17	16	16	15	14	13	13	12
82 to 85	M			19	21	23	22	21	20	19	19	18	17	16	16	15
	F			13	18	17	17	17	16	16	15	14	14	13	12	11
86 to 90	M			18	20	22	21	21	20	19	18	17	16	15	15	14
	F			12	17	16	16	16	15	15	14	13	13	12	12	11
91 to 94	M				19	21	21	20	19	18	17	16	16	15	14	14
	F				16	15	15	15	14	14	13	13	12	11	11	10
95 to 99	M				18	21	20	19	18	17	17	16	15	14	14	13
	F				15	14	14	14	13	13	13	12	11	11	11	10
100 to 104	M				17	20	20	19	18	17	16	15	14	13	13	12
	F				14	13	13	13	13	12	12	11	11	10	10	9

Chapter 11

15-lead Examination

By attaching an ECG amp module (EE-21) to the option slot, 15-lead examination can be performed. This chapter describes the operation and recording method of the 15-lead examination.

Preparation 11-2
- How to Attach the Electrodes 11-3

Recording Data Automatically 11-5
- Starting Recording 11-6
- What Can Be Performed after Examination? 11-7

Recording ECG Data Manually 11-8
- Starting Manual Recording 11-8
- Selecting Leads 11-9
- Printing Calibrated Waveforms 11-9
- Switching Recording Speed 11-9
- Switching Number of Channels 11-9
- Switching Screen Display 11-9
- Example of Recording 11-10

Preparation

- **Selecting the lead to be used for the examination (EXTRA lead)**
  Select “EXTRA lead 1” or “EXTRA lead 2” in 15 Leads setting. (See “Lead” on page 17-53.)
- **Selecting screen display**
  Press “1/3→” and “Select screen” to select a screen display method.
  Every time “Select screen” is pressed, the screen display is switched in the following order: “6ch × 2 + 3ch” → “6ch × 2” → “6ch (Screen 1)” → “6ch (Screen 2)” → “6ch (Screen 3)” → “6ch × 2 + 3ch” →…..
  On screens 1, 2, and 3, the number of channels and leads selected in “Screen format” of standard 12-lead examination setting are displayed.
- **Selecting report type**
  Press “Report type,” and the “Report type select window” appears. Press a desired report type to select it, and then press “Exit.” The format of each report type is the one selected in “12L Auto” – “Automatic recording 1 (-5)” of recording format setting.
- **Attaching electrodes**
  Attach the electrodes by referring to “How to Attach the Electrodes” on page 11-3.

How to Attach the Electrodes

1

Clean the patient's skin areas to which the electrodes are to be attached with alcohol to remove dirt and grease.

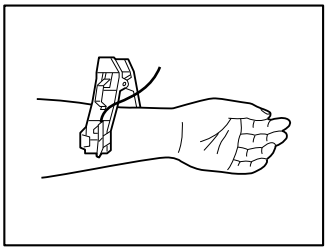
If the patient's skin or the electrode is not clean, contact resistance increases, thus causing a polarization phenomenon to occur, and consequently stable recording cannot be made. Apply keratin cream fully with your finger to the patient's skin until his/her skin become reddish.

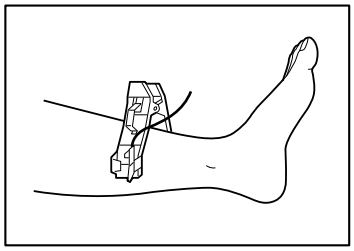
[NOTE] Be careful not to let keratin cream at each area overlap with each other in the chest lead area.

2

Attach the limb electrodes to the patient's arms and legs (4 positions).

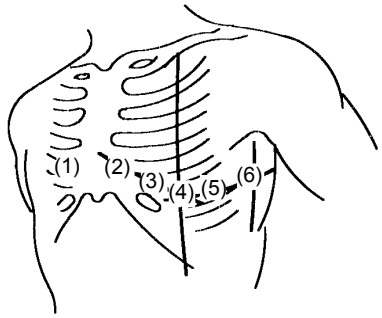
Fasten the electrodes securely at the points several centimeters above the patient's wrists and ankles.



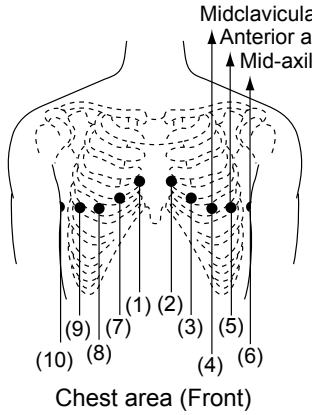


3 Attach the chest electrodes.

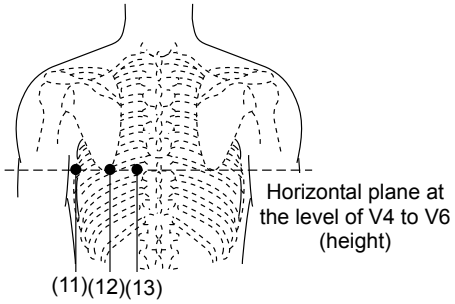
Record the chest leads from V1 to V6 and EXTRA leads (arbitrarily select three leads from V3R, V4R, V5R, V6R, V7, V8, and V9). Attach the chest electrodes along with the limb electrodes. The standard positions of chest leads are shown below.



(1): V1 Fourth intercostal space at right border of stemum
(2): V2 Fourth intercostal space at left border of stemum
(3): V3 Midway between locations (2) and (4)
(4): V4 Fifth intercostals space on the left mid-clavicular line
(5): V5 Left anterior axillary line on the same horizontal level as (4)
(6): V6 Left mid-axillary line on the same horizontal level as (4)



Chest area (Front)



Chest area (Rear)

EXTRA leads (Arbitrarily select three positions for EXTRA leads from the following.)

(7) V3R Position symmetric to V3 with respect to the sternum
(8) V4R Position symmetric to V4 with respect to the sternum
(9) V5R Position symmetric to V5 with respect to the sternum
(10) V6R Position symmetric to V6 with respect to the sternum
(11) V7 Posterior axillary line on the same horizontal level as V6
(12) V8 Scapular center line on the same horizontal level as V6
(13) V9 Right edge of thoracic spine on the same horizontal level as V6

[MEMO] The lead chips and the electrodes are color-coded and distinguished from each other with alphanumeric characters to clarify the attachment positions. Check them carefully before attaching them to the patient.

Chip color	Red	Yellow	Green	Black	White/ Red	White/ Yellow	White/ Green	White/ Brown	White/ Black	White/ Purple
Symbol	R	L	F	N	C1	C2	C3	C4	C5	C6
Electrode position	Right arm	Left arm	Left leg	Right leg	(1)	(2)	(3)	(4)	(5)	(6)

Chip color	White/White						
Symbol	A1, A2, A3 (Arbitrarily select 3 leads.)						
Electrode position	(7)	(8)	(9)	(10)	(11)	(12)	(13)

[NOTE] If the FX-7542 is to be used along with a defibrillator using electrodes other than AgAgcl electrodes, longer time may be required until ECG waveforms are restored after defibrillation discharge. Use AgAgcl electrodes when the FX-7542 is to be used along with a defibrillator.

Recording Data Automatically

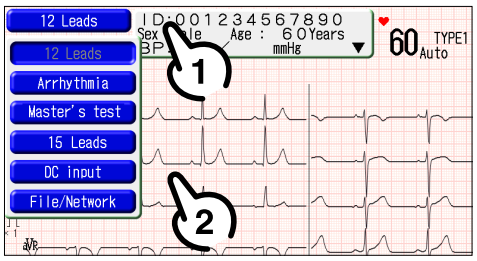
The 15-lead ECG data can be recorded automatically. The 12-lead examination can be performed with the obtained ECG data according to the contents of the setting, and the result can be printed in a standard format.

⚠ CAUTION

- **Note that 12 leads (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6) are used for 15-lead ECG examination.**

Starting Recording

1



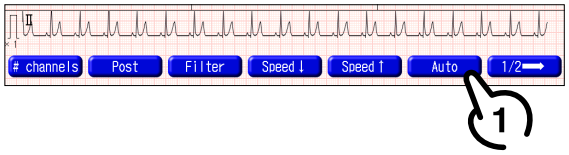
1 **Press the name of the examination currently being performed.**

2 **Press [15 Leads].**
The equipment enters the 15-lead examination mode.

[MEMO] When the equipment enters the 15-lead examination mode, channel B is selected automatically.

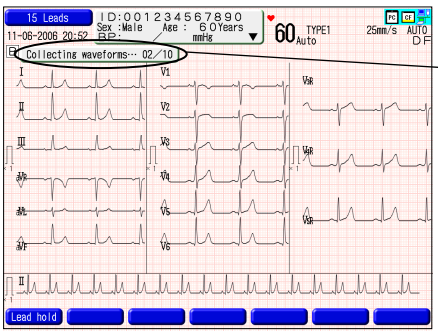
2 **Attach the electrodes to the patient. (See "Attaching Electrodes" on page 3-2.) Enter the patient information. (See "Entering Patient Information" on page 3-5.)**

3 **If the equipment is in the manual recording mode, press [Auto] to bring it into the automatic recording mode.**



Check that the Auto/Manual mode display has changed from Manual to Auto.

4 **Check the ECG waveforms displayed on the screen and then press the START/STOP button.**
The messages "Collecting waveforms…" → "Measuring waveforms..." or "Analyzing waveforms…"→ "Printing report…" are displayed in that order, and the waveforms and the result of 12-lead examination (measurement) are printed on the recording paper.



What Can Be Performed after Examination?

The following operations are allowed after examination. (See “What Can Be Performed after Examination?” on page 4-16.)

- **Displaying examination result**
  The result of examination can be displayed, following the waveform report. This operation is allowed for static examinations only.
- **Displaying guide** FP-1001
  Press [Guide] while the examination result is being displayed, and the description of how the interpretation has been extracted from the examination result is displayed. (See “Displaying Guide” on page 6-4.)
- **Displaying commentary** FP-1001
  Press [Commentary] while the examination result or the guide is being displayed, and detailed interpretation is displayed. (See “Displaying Commentary” on page 6-5.)
- **Displaying waveforms**
  Press [Waveform] while the examination result is being displayed, and the examination waveforms are displayed.

⚠ CAUTION

- **Note that 12 leads (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6) are used for 15-lead ECG examination.**

Recording ECG Data Manually

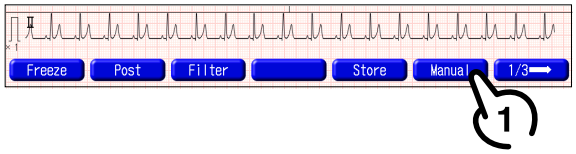
The ECG data can be recorded while leads and sensitivity are changed.

Starting Manual Recording

1 **Turn on the power of the equipment. (See “Turning On/Off the Power on page 2-19.)**
Attach the electrodes to the patient. (See “Attaching Electrodes” on page 3-2.)
Enter the patient information. (See “Entering Patient Information” on page 3-5.)

2 **If the equipment is in the automatic recording mode, press [Manual] to bring it into the manual mode.**

Check that the Auto/Manual display has changed from Auto to Manual.



3 **Change the setting as required.**
The following settings can be changed.
• Switching of leads (See “Selecting Leads” on page 11-9.)
• Printing of calibrated waveforms (See “Printing Calibrated Waveforms” on page 11-9.)
• Switching of recording speed (See “Switching Recording Speed” on page 11-9.)
• Switching of number of channels (See “Switching Number of Channels” on page 11-9.)
• Switching of screen display (See “Switching Screen Display” on page 11-9.)

4 **Press** START/STOP **on completion of the setting.**
The data is printed on the recording paper.

Selecting Leads

Press [Lead ◁] [Lead ▷], and the lead block is switched in the following order: "Block 1" ↔ "Block 2" ↔ ….. ↔ "Block 1" ….. depending on the orientation of the key pressed. The name of the lead of the waveforms to be recorded is highlighted.

Lead mode	12-lead			Cabrera lead		
Number of channels	3ch	6ch	12ch	3ch	6ch	12ch
STD	STD	STD	STD	STD	STD	STD
Block 1	I to III	I to aVF	I to V6	aVL to aVR	aVL to III	aVL to V6
Block 2	aVR to aVF	V1 to V6	EXTRA	II to III	V1 to V6	—
Block 3	V1 to V3	EXTRA	—	V1 to V3	Spare 1	—
Block 4	V4 to V6	—	—	V4 to V6	Spare 2	—
Block 5	EXTRA	—	—	Spare 1	—	—
Block 6	—	—	—	Spare 2	—	—

Printing Calibrated Waveforms

Press [1mV] and the 1mV calibrated waveforms are printed on the recording paper.

[MEMO] Details on calibrated waveforms can be set in "Common/Manual" – "Calibrated waveforms" of recording format setting.

Switching Recording Speed

Press [Speed↑], and the speed is switched in the following order: "5" → "10" → "12.5" → "25" → "50" (Unit: mm/s).
Press [Speed↓], and the speed is switched in the following order: "50" → "25" → "12.5" → "10" → "5" (Unit: mm/s).

[MEMO] Details on recording speed can be set in "Lead/Recording" – "Recording" – "Waveform speed" of ECG control setting.

Switching Number of Channels

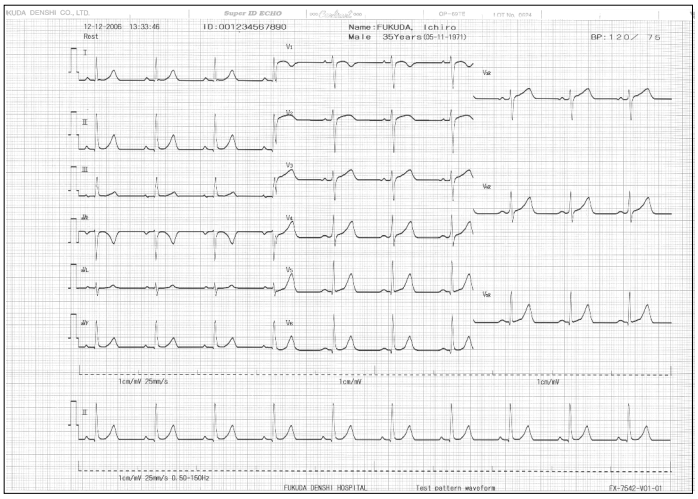
Press [# channels], and the number of channels for manual recording is switched in the following order: "3ch" → "6ch" → "12ch" → "3ch" → …..

Switching Screen Display

Press [Screen], and the screen display is switched between 15-lead display, 12-lead display, and recording channel display.

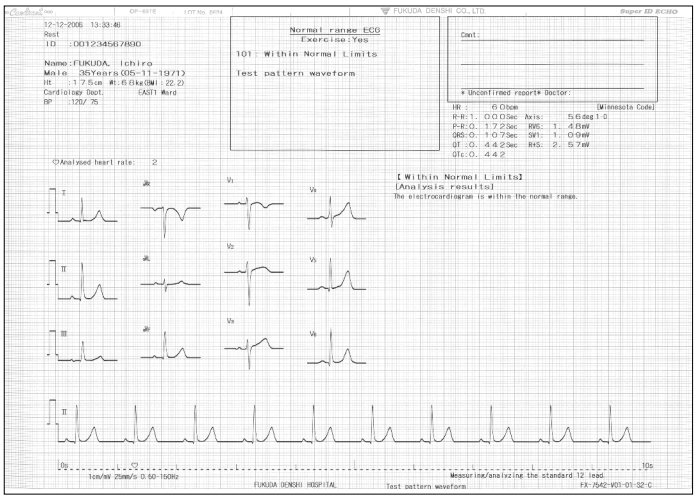
Example of Recording

- **Automatic recording (Direct recording)**



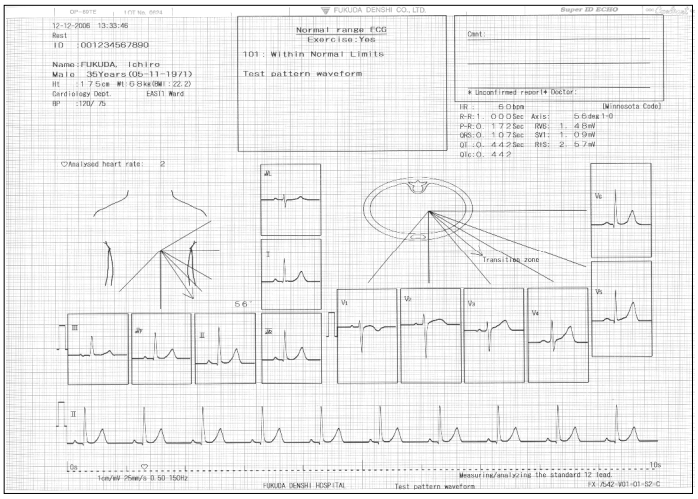
The diagram at left is an example of the following case:
Waveform report: 6ch × 2 + 3ch + Rhythm 1ch
Waveform record time: 10 sec.
Calibrated waveform position: Top
Rhythm lead: Lead II

- **Automatic recording (Result report)**



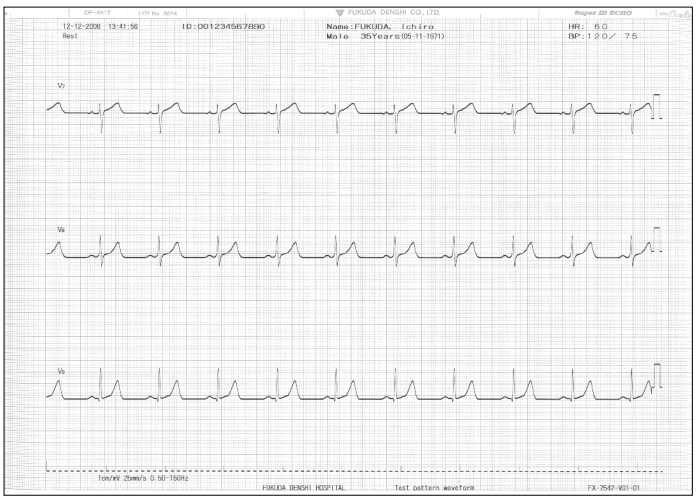
The diagram at left is an example of the following case (when the FP-1001 has been installed):
Result report: DOM1
Interpretation: TYPE1
Comment: TYPE1
Measurement: TYPE1
Analysis results: TYPE2

- **Automatic recording (Result report)**



The diagram at left is an example of the following case(when the FP-1001 has been installed):
Result report: DOM3
Interpretation section: TYPE1
Comment area: TYPE1
Measurement area: TYPE1

- **Manual recording**



The diagram at left is an example of the following case:
Lead: 3ch EXTRA (V7, V8, V9)
Calibrated waveform position: Top

Chapter 12

DC Input Examination

This chapter describes how to display and print waveforms such as biological signal input from an external device.

Contents of Examination 12-2

Connecting an External Device 12-3

Recording 12-4

Keys Used for DC Input Examination 12-4
Starting the Examination 12-4
Selecting the Leads.....12-5

Contents of Examination

The waveform input from an external device connected to the DC input terminal is displayed on the screen and printed.

Also the waveform taken from an external device and the current reference lead are displayed at the same time and printed.

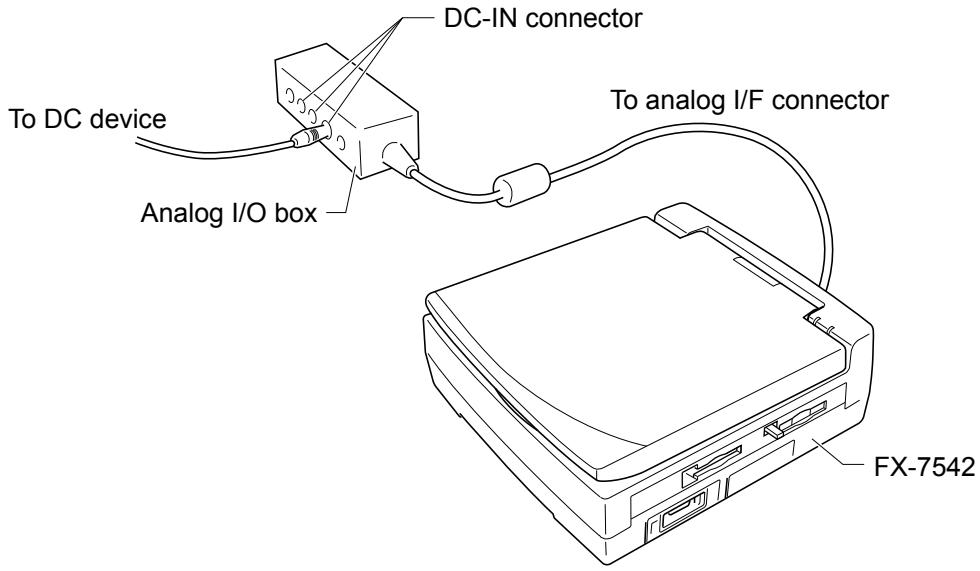
Connecting an External Device

⚠ CAUTION

- **If the power cords from multiple devices are connected to the same receptacle, the patient may be exposed to danger due to increase of leakage current from those devices.**
- **If a cardiac pacemaker or other electric stimulator is connected to the patient, the risk of potential hazard to the patient may increase.**
  Pay particular attention to assure safety when taking ECG record in such conditions. Appropriate measures should be taken to assure that the leakage current falls within the permissible range.
- **When using the FX-7542 along with other devices, make a potential equalization connection to prevent potential difference from occurring between the devices.**
  If there is potential difference between the devices, the patient or the operator may be exposed to danger.

1 **Connect the analog I/O box (CI-701) sold separately to the equipment.**

2 **Connect the DC device to the DC-IN connector of the input box.**



[NOTE] When connecting the FX-7542 to an external device, use a connecting cable installed with a clamp filter.
To decrease unwanted emissions, use cables installed with a clamp filter when connecting various external devices to the equipment.
The specified cable installed with a clamp filter is marked with “Core attached” after the cable type. Contact us for details.

Recording

Keys Used for DC Input Examination

START/STOP ..... When the exam time has been set, manual recording is conducted until the set exam time is reached. When the exam time has not been set, recoding is conducted until START/STOP is pressed once again.

［Exam time］ ..... Sets time for collecting waveforms.

［Lead］ ..... Sets reference lead.

[Filter] ..... (See “Setting Filters” on page 3-24.)

Sensitivity ▽ △ ..... (See “Setting Sensitivity” on page 3-26.)

Reset ..... (See “Resetting” on page 5-16.)

1mV ..... (See “Printing Calibrated WaveformsResetting” on page 4-19.)

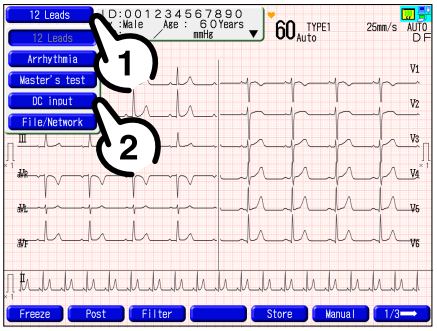
[Speed↓] [Speed↑] ..... (See “Switching Recording Speed” on page 4-19.)

Marker / Paper Feed ..... (See “Printing a Mark” “Feeding the Recording Paper”” on page 5-15.)

[MEMO] [Filter] and Sensitivity ▽ △ are effective only for reference ECG waveforms. For the DC input waveform, the filter is fixed to OFF and the sensitivity is fixed to 10 mm/0.5V.

Starting the Examination

1



1 **Press the name of examination currently being performed.**

2 **Press [DC input].**

2 **The equipment enters the DC input examination mode.**

Setting can be changed as required.

The following settings can be changed.

- Exam time
- Switching of reference lead.
- Printing of calibrated waveforms
- Switching of recording speed

3 **When setting is finished, press the START/STOP button.**

Printing is made on recording paper.

Selecting the Leads

Press [Lead], and you can select a desired reference lead from the following:

I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6

The data from the selected reference lead will be printed along with biological waveform input from a DC device.

Chapter 13

Recoding Daily Report

This chapter describes how to print recorded ECG data.

Content of Daily Report 13-2

Recording Daily Report 13-3

Deleting Recorded Daily Reports 13-5

Content of Daily Report

The recorded data can be printed as a daily report list, which allows you to check the implementation status of ECG recording made so far.

The following data is printed in a daily report list in the order in which ECG recording is made.

- Content of examination (12-lead, arrhythmia, rhythm, 15-lead, etc.)
- Patient information (ID number, name, age, sex, etc.)
- Recording time
- Number of recording



OP-69TE LOT No. 0024 FUKUDA DENSHI CO., LTD. Super ID ECHO Cardiart

<Daily report> 12-12-2006 ~ 12-12-2006

12 lead Record 14 items Extended arrhythmia 0 items 15 lead Record 1 items
12 Leads 14 items Arrhythmia 6 items Master's test 0 items 15 leads 1 items 1 / 3

No.	Exam date		Exam contents	ID number/Name/Age/Sex	Loc.	Store data
1	12-12-2006	08:13:42	12 Leads, 12 lead Record			
	Rest		Normal range ECG			
			101	Years		
2	12-12-2006	08:15:48	12 Leads, 12 lead Record			
	Rest		Normal range ECG			
			101	Years		
3	12-12-2006	08:31:59	12 Leads, 12 lead Record			
	Rest		Abnormal ECG			
			753, 745, 633, 712	Years		
4	12-12-2006	12:43:22	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Rest		Normal range ECG	FUKUDA, Ichiro	EAST1 Ward	
			101	Male 35Years		
5	12-12-2006	12:43:41	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Post	00'00"	Borderzone (normal) ECG	FUKUDA, Ichiro	EAST1 Ward	
			101, 901	Male 35Years		
6	12-12-2006	12:44:41	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Post	01'00"	Borderzone (normal) ECG	FUKUDA, Ichiro	EAST1 Ward	
			101, 901	Male 35Years		
7	12-12-2006	12:45:10	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Post	01'28"	Borderzone (normal) ECG	FUKUDA, Ichiro	EAST1 Ward	
			101, 901	Male 35Years		
8	12-12-2006	12:45:48	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Post	02'06"	Borderzone (normal) ECG	FUKUDA, Ichiro	EAST1 Ward	
			101, 901	Male 35Years		
9	12-12-2006	12:46:41	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Post	03'00"	Borderzone (normal) ECG	FUKUDA, Ichiro	EAST1 Ward	
			101, 901	Male 35Years		
10	12-12-2006	12:48:02	12 Leads, 12 lead Record	0012345678901	Cardiology Dept.	
	Rest		Normal range ECG	FUKUDA, Ichiro	EAST1 Ward	
			101	Male 35Years		

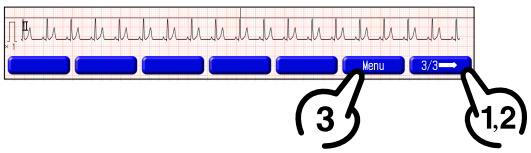
FUKUDA DENSHI HOSPITAL FX-7542-V01-01

[MEMO] The maximum number of daily reports that can be stored is 200. When 200 are exceeded, the report is automatically deleted from the oldest in succession.

[MEMO] If the maximum number of daily reports is exceeded in a day, the “Daily report data full” message appears only once after ECG recoding is completed.

Recording Daily Report

1

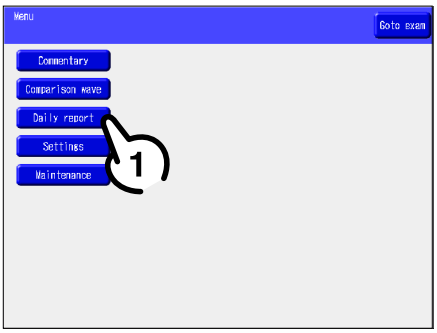


1 **Press [1/3→].**

2 **Press [2/3→].**

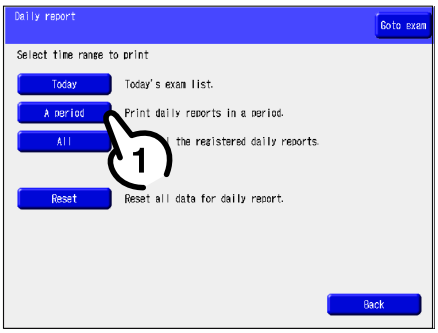
3 **Press [Menu].**

2



Press [Daily report].

3



Press the desired recording method.

The contents of each recording method are as follows.

- Today ..... Daily report of the day is printed.
- A period ..... Daily report of the specified date is printed.
- All ..... All the daily reports recorded in the equipment are printed.

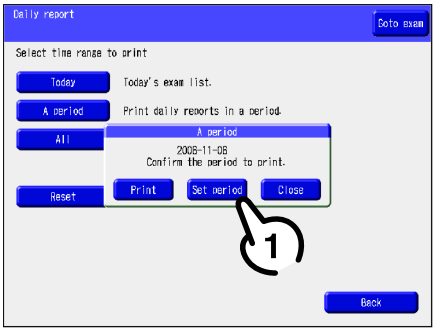
When [All] is pressed

All the registered daily reports are printed.

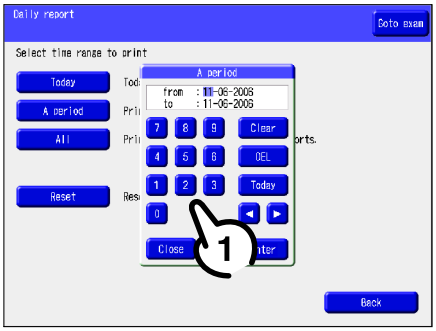
When [Today] is pressed

Daily report of the day is printed.

When [A period] is pressed

1 

Press “Set period” in the message window.

2 

Specify a desired date.

3 **Press [Print].**

Deleting Recorded Daily Reports

[NOTE] Daily reports that have been deleted cannot be restored. Check before performing the following operation that the report you are about to delete is not required.

1 **Follow the procedures 1 to 3 of "Recording Daily Report" on page 13-3.**

2 **Press [Reset].**
The initialize confirmation window appears.

3 **Press [Yes].**
All the recorded daily reports are deleted.

Chapter 14

Communicating with Examination Data Files

This chapter describes data communication with storage devices connected to the FX-7542 or via a LAN.

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- Cautions in Using the PC Card 14-3
- "File" and "Folder" 14-4

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What Can Be Performed?

ECG data and examination measurement result can be stored in a PC card or CF card. The obtained data can also be transmitted to other devices on a LAN. The stored data can be read arbitrarily for comparison, modification of contents, and copying, and unnecessary information can be deleted.

- **Data can be stored in the following media. (See "Storing Examination Data" on page 14-8.)**
  - PC card, CF card
  - Network file server (EFS-200)
- **The following data stored in other devices can be received and retrieved. (See "Reading Examination Data" on page 14-15.)**
  - 12-lead data type
  - 12-lead dominant data type
  - Arrhythmia waveform data type
  - Arrhythmia rhythm data type
  - Rhythm waveform data type
  - 15-lead data type
  - 15-lead dominant data type

How to Handling Media

This section provides precautions in handling a PC card or CF card. The description on a PC card is given, but the contents appliy to the CF card as well.

Cautions in Using the PC Card

Pay attention to the following when handling the PC card.

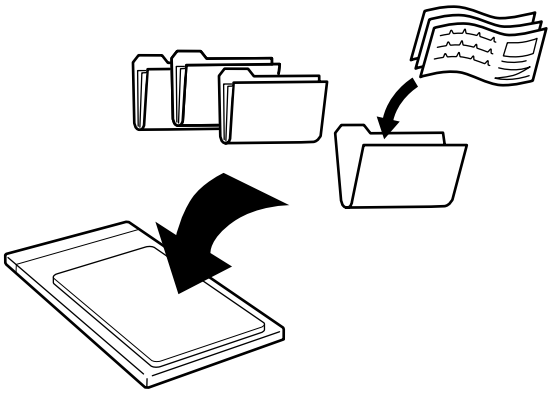
⚠ CAUTION

- **Be careful not to bend, drop, or have impact on the PC card.**
- **Do not remove the PC card or turn off the power while the PC card device is in operation. Be careful not to have impact or cause vibration to the equipment.**
  Otherwise the recorded data may be lost or the card may be damaged.
- **Be careful not to let dust enter the connector unit of the card. Do not touch the connector unit or the terminal of the PC card with your hand or with a metallic object to avoid occurrence of a failure.**
- **Place the card in the case supplied with the card, and store it in a place not subject to high temperature or humidity, dust, or magnetic force. Be careful not to have strong impact on the card while it is stored.**
- **The data contained in the PC card may be damaged depending on the handling method. Be sure to back up important data.**
- **Others (Ignoring the following precautions may result in a failure of the PC card.)**
  - Avoid storing the PC card in a place of high temperature or humidity such as near a heater or in a place subject to direct sunlight.
  - Avoid using or storing the PC card in a place subject to severe temperature change.
  - Be careful not to get the PC card wet.
  - Do not disassemble the PC card.
  - Avoid using or storing the PC card near a magnet or a device that generates a strong magnetic field.

“File” and “Folder”

PC cards having capacity of 2 MB to 85 MB and CF cards from 16MB to 128 MB (flash disk card) can be used with the FX-7542. If the number of files where data is stored increases, organizing and managing the data become increasingly difficult.

Use folders as containers for multiple files to organize a number of files efficiently.



A maximum of 300 ECG data files can be stored in a folder. Folder 1 is created first. If Folder 1 becomes full, subsequent data is stored in Folder 2. The maximum number of folders that can be created varies depending on the capacity of the medium you use.

[MEMO] A folder is created when a PC card or CF card is formatted for storing ECG data.

[MEMO] You can change folders into which the data is to be stored. (See “When PC card or CF card is selected as a destination to store the data” on page 14-14 and “Changing the Folder into Which Data Is to Be Stored” on page 14-34.)

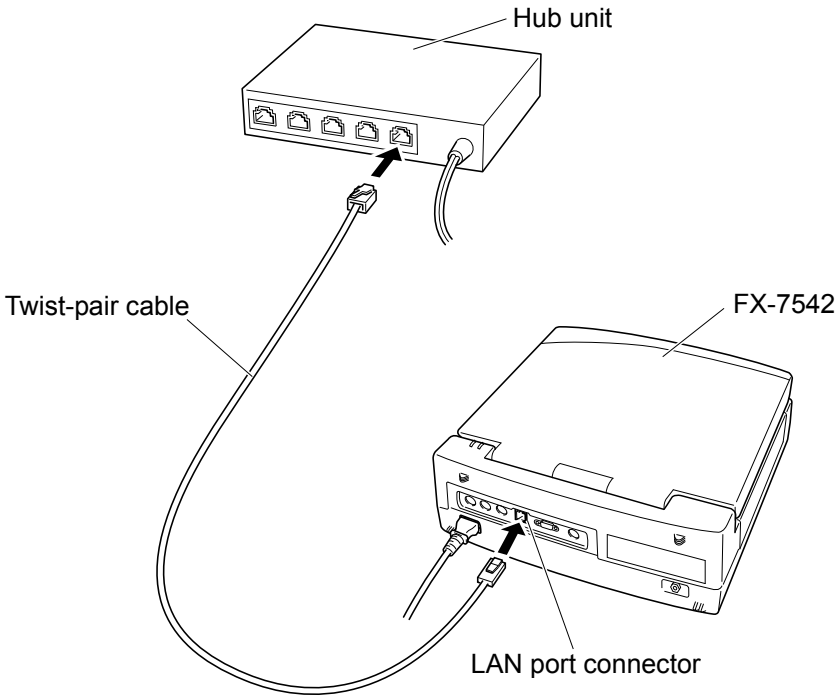
Preparing for Communication with External Devices (When Using a LAN)

Connecting a Communication Device

Connect the LAN port connector of the FX-7542 and the hub unit as shown by the following figure.

[NOTE] Contact us for the procedure of establishing a LAN.

[NOTE] Use the hub unit and twist-pair cable specified by us.



⚠ WARNING

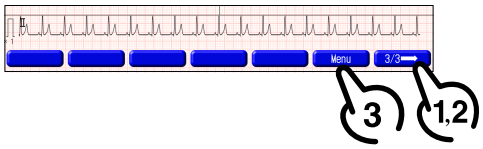
- **Be sure to ground the hub unit securely using a ground cable.**

Making Required Settings for Communication

[NOTE] Contact us for the setting on IP address, port No., etc. required for communication on a LAN.

Make the settings as follows.

1

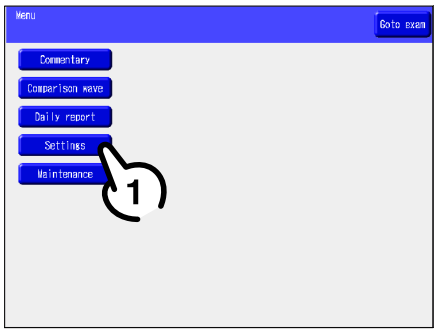


1 Press [1/3→].

2 Press [2/3→].

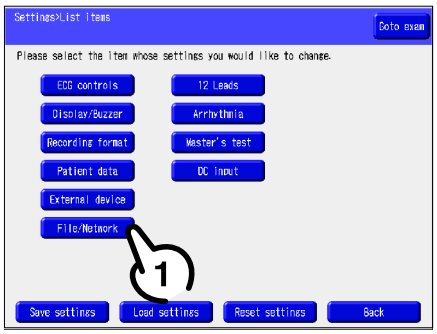
3 Press [Menu].

2



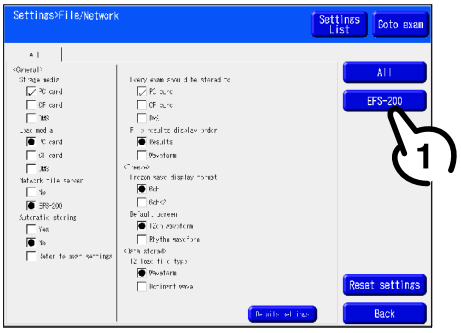
Press [Settings].

3



Press [File/Network].

4



Press [EFS-200].

5

Enter the No. of the host to which the FX-7542 is to be connected for recording/retrieving data.

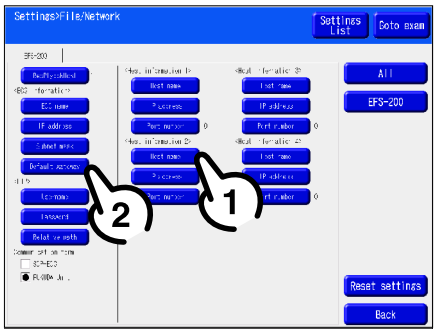
Specify the DMS that is to store the examination data.

6

Enter the No. of the host to which the FX-7542 is to be connected for retrieving data.

Specify the DMS that is to transmit the examination data received.

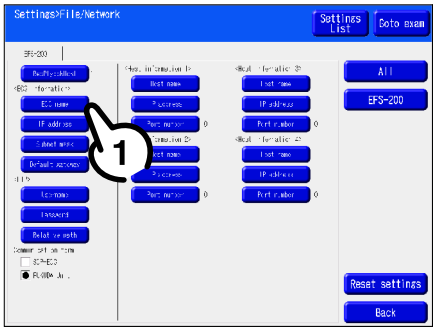
7



1 **Enter the name of the host, IP address, and port No. of the host set in [Host information X]. (X represents 1, 2, 3, and 4 specified in step 5 above.)**

2 **When using a gateway, press [Default gateway] and enter the IP address of the gateway.**

8



Set the name and IP address of the ECG in [ECG information].

Storing Examination Data

The examination data recorded with the FX-7542 can be transmitted to and stored in another device.

How to Store the Data

Follow the procedure shown below to store the data in a PC card, CF card, or Network file server (EFS-200).

- **Manually storing the data of the examination that has just been performed during examination (simple operation)**
  Store the examination data using the function keys during examination. (See "Storing Data Manually (Simple Operation)" on page 14-12.)
- **Manually storing the data of the examination that has just been performed after the examination (file utility operation)**
  Store the data of the examination that has just been performed using file utilities. (See "Storing Data Manually (File Utility Operation)" on page 14-13.)
- **Automatically storing the data of the examination that has just been performed after the examination**
  The examination data that has just been recorded can be automatically stored depending on the function setting. (See "Storing Data Automatically" on page 14-11.)

Type of Data That Can Be Stored

The following types of data can be stored in a PC card, CF card, and DMS. The examination result data of 12-lead automatic recording is output to the serial port.

Recording or examination		Type of storable data
12-lead automatic recording	12-lead waveform data type 12-lead dominant data type	(Waveform data, examination result data, measurement result data, patient information) (Dominant [dominant heart rate] waveform data, examination result data, measurement result data, patient information)
Extended recording	Arrhythmia waveform data type	(Waveform data, examination result data, measurement result data, patient information)
Long-term 3ch arrhythmia examination	Arrhythmia rhythm data type	(Waveform data, arrhythmia examination result data, arrhythmia measurement result data, rhythm measurement result data, patient information)
Long-term 1ch arrhythmia examination	Rhythm waveform data type	(Waveform data, rhythm measurement result data, patient information)
Automatic 15-lead recording	15-lead data type 15-lead dominant data type	(Waveform data, examination result data, measurement result data, patient information) (Dominant [dominant heart rate] waveform data, examination result data, measurement result data, patient information)
Automatic freeze recording	Long-term waveforms	(Extended waveform data, examination result data, measurement result data, patient information)

Usable Media

The following media can be used.

- **PC card, CF card**
  A PC card (2 MB to 85 MB in capacity) conforming to PC Card Standard (ATA flash disk card) and a CF card (16 MB to 256 MB) can be used.
- **Network file server**
  A Network file server manufactured by us such as "EFS-200" can be used.

Example of the Destination to Store the Data and the Number of Data That Can Be Stored

The following is the case of the PC card, "FMC-20."

Recording or examination	Condition	Number of data that can be stored
		FMC-20
Automatic 12-lead recording	Waveform recording length: 10 sec.	Approximately 960
	Waveform recording length: 15 sec.	Approximately 670
	Waveform recording length: 20 sec.	Approximately 510

[MEMO] The number of data listed above is a guideline. Note that the number varies greatly depending on the operating conditions and the type of data to be stored.

Preparation before Storing Data (Formatting)

Be sure to format the PC card or CF card that has just been purchased. ECG data cannot be stored in a PC card or CF card that has not been formatted.

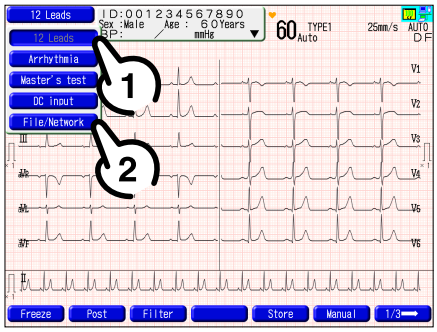
[NOTE] Network file server (EFS-200) connected via a LAN cannot be formatted.

[NOTE] All the data recorded in a medium is deleted once the medium is formatted. Be sure to check that important data is not contained in the medium before formatting it. (See "Reading Examination Data" on page 14-15.)

[NOTE] Be sure to use a PC card or CF card specified by us.

1 **Set a medium to which the data is to be stored in the FX-7542.**

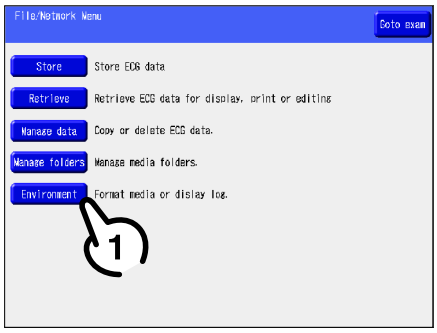
2



1 **Press the name of examination currently being performed.**

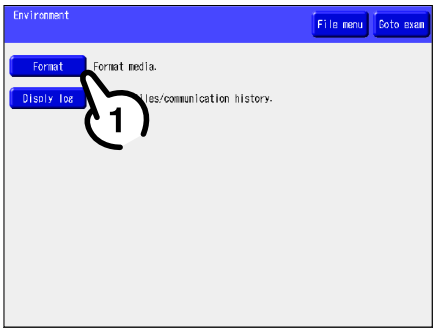
2 **Press [File/Network].**
The equipment enters the file/network mode.

3



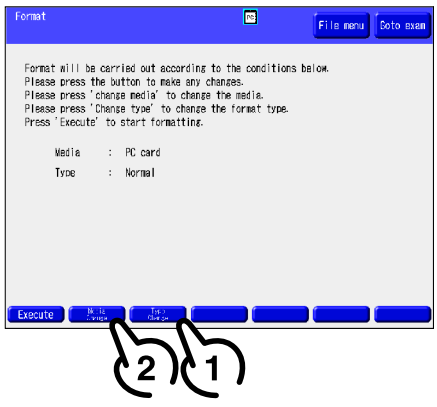
Press [Environment].

4



Press [Format].

5



1 **Check that the medium is the one you want to format and that the type of formatting is correct.**
If the type of the medium or that of formatting is not correct, press [Media Change] or [Type Change] and select a correct medium and type.

2 **Check that the type of medium and that of formatting are correct, and then press [Execute].**
Formatting is performed.

How to Store Data

The following three methods are available for storing data.

- Storing data automatically ..... ECG data can be stored automatically on completion of the examination.
- Storing data manually (simple operation)..... The data can be stored manually on completion of the examination.
- Storing data manually (file utility operation)..... Any data saved in the memory of the FX-7542 can be stored.

Storing Data Automatically

ECG data can be automatically stored in the specified medium on completion of ECG automatic examination recording, long-term arrhythmia examination, Master's test, or 15-lead examination.

[MEMO] Make the following setting beforehand.

- Set "All" – "Automatic storing" of file/network setting to "Yes" of file/network setting.
- Specify an arbitrary medium in "General" – "Storage media" of file/network setting.

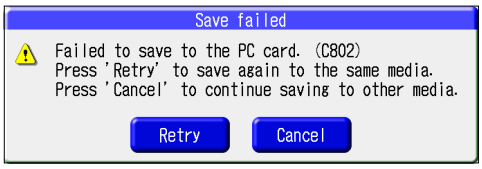
If "Refer to exam settings" is selected for "Automatic storing," make the following setting.

- Set "General/File" – "File" – "Automatic storing" of 12 Leads setting (Arrhythmia setting/Master's test setting/15 Leads setting) to "Yes."
- Specify an arbitrary medium in "General/File" – "File" – "Storage media" of 12 Leads setting (Arrhythmia setting/Master's test setting).

[NOTE] Be sure to set the medium for storing data to the FX-7542 before starting the examination.

[NOTE] The 15 Leads setting can be performed only when the ECG amp module, EE-21 (option), is mounted.

If automatic storage fails, the following storage failure confirmation message appears.



[Retry]: Retries storing data in the medium.
[Cancel]: The data is not stored in the medium. If other media are available for storage, the data is successively stored in those media.

[MEMO] The storage error message only can be displayed by the setting to omit checking operation.

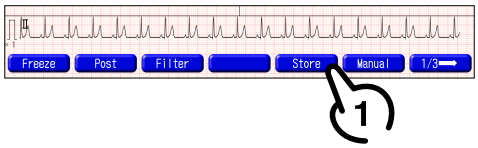
- If recording is to be made while the patient is at rest, checking operation is enabled only for the media checked in "All" – "Details settings" – "Error check at rest" of file/network setting.
- If recording is to be made after exercise, checking operation is enabled only for the media checked in "All" – "Details settings" – "Error check at continuous operation" of file/network setting.

Storing Data Manually (Simple Operation)

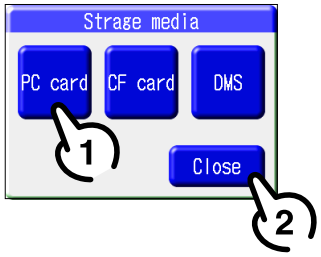
The ECG data can be stored manually in a specified medium on completion of automatic ECG examination recording, long-term arrhythmia examination, Master's test, and 15-lead examination.

1 **Perform an examination.**

2 **Set the medium for storage to the FX-7542.**
Format the medium that has not been formatted beforehand. (See "Preparation before Storing Data (Formatting) on page 14-9.)

3 

On completion of the examination, press [Store].
The storage screen appears.

4 

Select a medium into which the data is to be stored.
The data is stored in the medium selected by pressing the button.

5 **Press [Close].**
The basic state is restored.

[MEMO] If "Store" is allocated to a custom key, press the custom key, and the ECG data is stored in all the media specified in "Storage media."

[MEMO] If the data is to be stored from a frozen state, the "With extended storage" check box appears. Check the box to ON, and the waveforms in the specified range can be stored in addition to the result of the 12-lead examination.

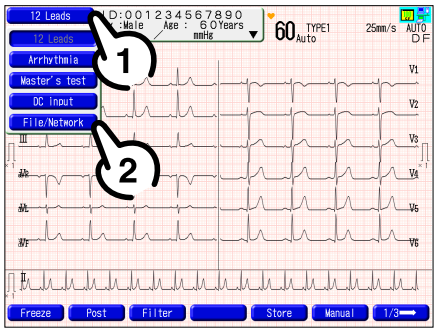
Storing Data Manually (File Utility Operation)

Arbitrary data saved in the memory of the FX-7542 can be stored in arbitrary media.

1 **Perform an examination.**

2 **Set a medium for storage into the FX-7542.**
Format the medium that has not been formatted beforehand. (See “Preparation before Storing Data (Formatting) on page 14-9.)

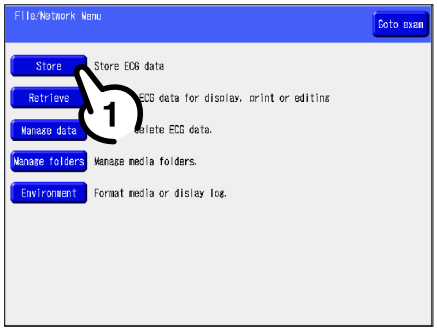
3



1 **Press the name of the examination currently being performed.**

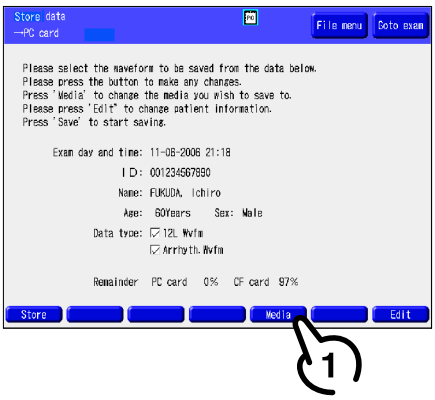
2 **Press [File/Network].**
The FX-7542 enters the file/network mode.

4



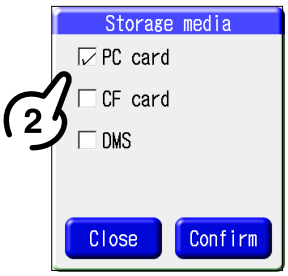
Press [Store].
The data that can be stored is displayed.

5

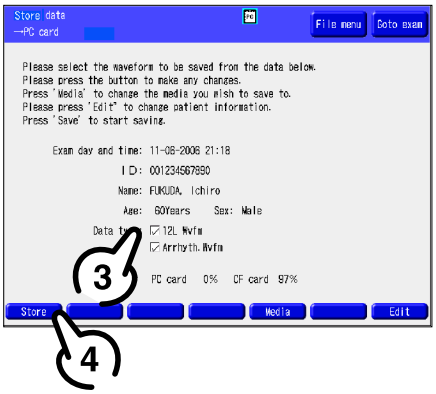


1. Press [Media].

The media screen appears, on which you can select a medium for storing data.



2. Specify a desired medium for storing data.



3. Press the data to be stored.

4. Press [Store].

To edit the data before storage, press [Edit]. (See “Editing Data” on page 14-22.)

[MEMO] The data is stored in the medium specified in “General/File” – “Storage media” of file/ network setting. Press [Media] only when you want to change the media for storing data.

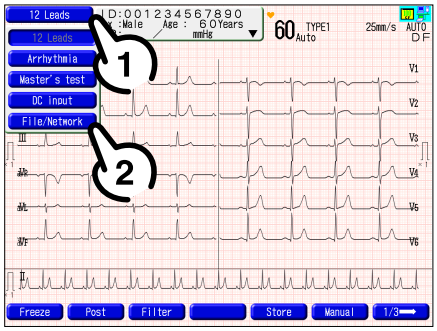
Reading Examination Data

The examination data can be read from the medium and retrieved on the FX-7542.

How to Read Data

1 **Set the medium that contains the desired data into the FX-7542.**

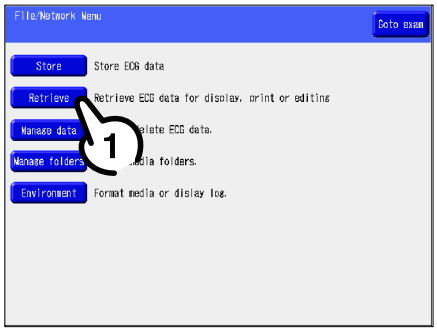
2



1 **Press the name of the examination currently being performed.**

2 **Press [File/Network].**
The equipment enters the file/network mode.

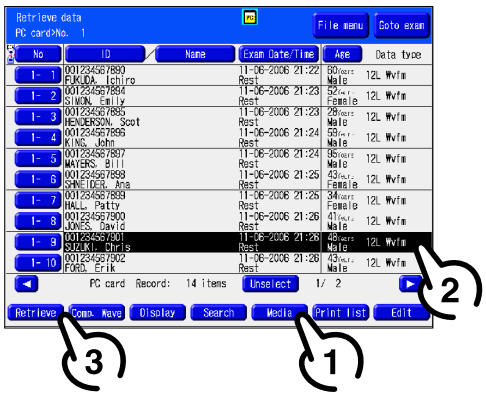
3



Press [Retrieve].
A list of data that can be retrieved is displayed.

[MEMO] The data specified in "All" – "Storage media" of file/network setting is displayed.

4



1 **Press [Media].**
The media screen appears, on which you can select the medium that contains the desired data.

[MEMO] Press [Media] only when you want to change the media from which the data is to be read.

2 **Press the data to be retrieved.**

3 **Press [Retrieve].**
The selected data is retrieved on the FX-7542. Press [Edit] to edit the data stored in the PC card or the CF card before being read. (See "Editing Data" on page 14-22.)

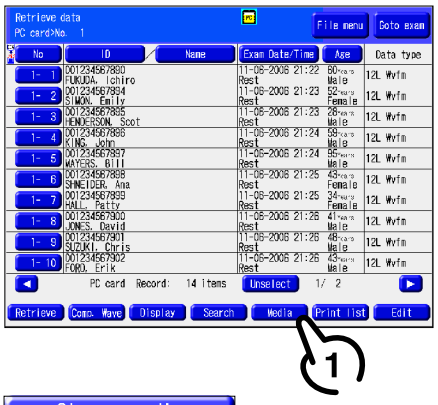
[[MEMO] The guide and commentary of data analyzed with the equipment whose version differs from that of the FX-7542 cannot be printed.

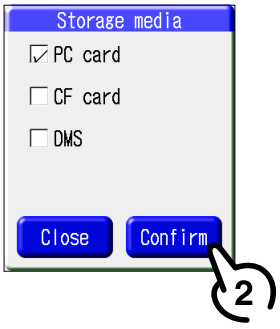
How to Search Data

If one of the following information is known of the data, the data can be found from the medium.
Data No., ID number, Date of examination

1 **Follow the procedures 1 to 3 in “How to Read Data” on page 14-15.**

2





1 **Press [Media].**

2 **Select a medium to be searched, and then press [Confirm].**

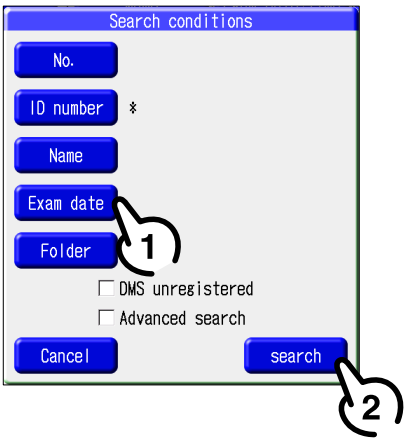
[MEMO] **Displayed buttons vary slightly depending on the medium to be searched.**

PC card..... [No.], [ID number], [Exam Date], [DMS unregistered], and [Advanced search] are displayed.

CF card..... [No.], [ID number], [Exam Date], [DMS unregistered], and [Advanced search] are displayed.

DMS ..... [No.], [ID number], [Exam Date/ Time], and [Advanced search] are displayed.

3 **Press an item to be selected as search conditions, and then [Search].**



[MEMO] **All the Nos. are targeted for search in the initial state.**

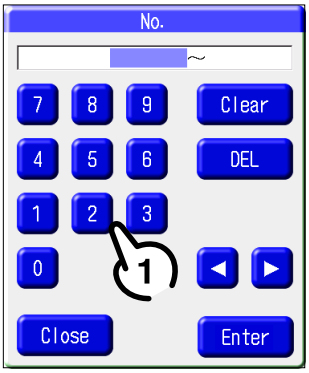
[MEMO] **Start No. and end No. can be entered. If start No. is not entered, the data from the beginning to the end No. is targeted for search, and if the end No. is not entered, the data from the start No. to the last data is targeted for search.**

[MEMO] **The Nos. within folders are targeted for search in the case of the PC card or the CF card.**

[NOTE] **The names of patients are not displayed when the data is read from the DMS.**

4 **Enter the conditions as follows depending on the item selected in step 3 above.**

<No.>



Enter the No. of the data to be searched.

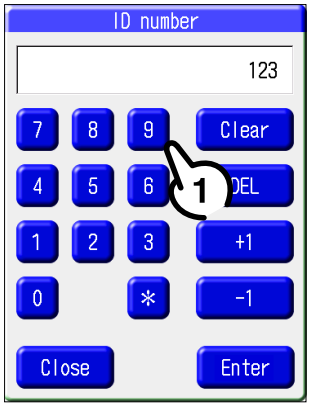
[MEMO] **All the Nos. are targeted for search in the initial state.**

[MEMO] **Start No. and end No. can be entered. If start No. is not entered., the data from the beginning to the end No. is targeted for search, and if the end No. is not entered, the data from the start No. to the last data is targeted for search.**
Note that if DMS is selected as the medium, only the data Nos. entered are targeted for search.

[MEMO] **The Nos. within folders are targeted for search in the case of the PC card or the CF card.**

[MEMO] **Search is performed with priority given to Nos. in the case of DMS.**

<ID number>

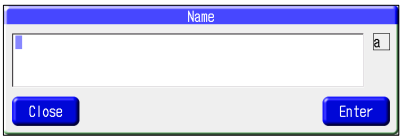


Enter the ID number of the data to be searched.

[MEMO] **All the ID Nos. are targeted for search in the initial state.**

[MEMO] **A wild card (*) can be specified.**

<name>

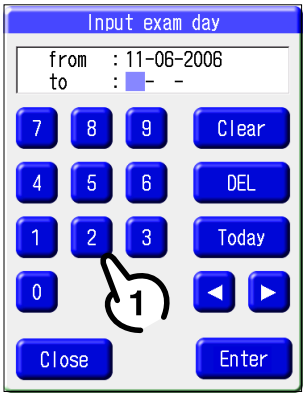


Enter the patient name of the data to be searched.

[MEMO] **All the patient name are targeted for search int the initial state.**

[MEMO] **A wild card (*) can be specified.**

<Exam day>

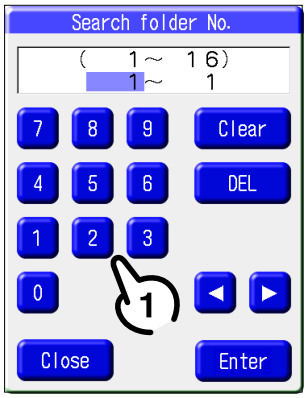


Enter the date when the data was obtained.

[MEMO] All the exam dates are targeted for search in the initial state.

[MEMO] Start date of exam and end date of exam can be entered. If start date of exam is not entered, the data from the beginning to the end date of exam is targeted for search, and if the end date of exam is not entered, the data from the start date of exam to the last data is targeted for search.

<Seach folder No.>



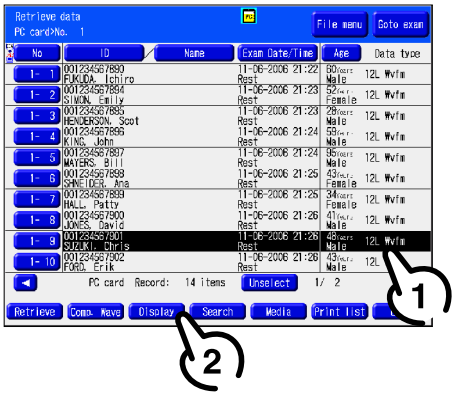
Enter the No. of the folder to be searched.

[MEMO] The folders selected in [Media] are targeted for search in the initial state.

[MEMO] Start folder and end folder can be entered. If start folder is not entered, the data from the beginning to the end folder is targeted for search, and if the end folder is not entered, the data from the start folder to the last folder is targeted for search.

5 **Press [search].**
Search is started.

Displaying Data Contents



1 **Press the data to be displayed.**

2 **Press [Display].**
The contents of the selected data are displayed.

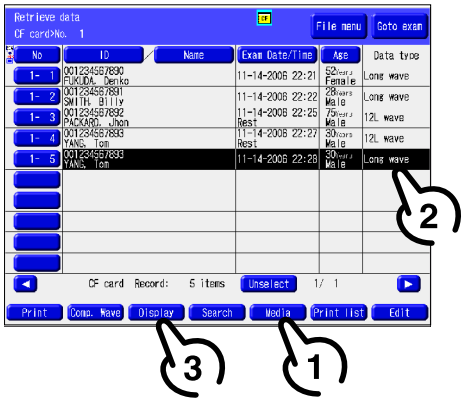
[MEMO] The guide and commentary of the data analyzed with the equipment whose version is not the same as that of the FX-7542 cannot be displayed.

Extracting and Analyzing Long-term Waveform Data

The long-term waveform data recorded in frozen state can be extracted, and 12-lead examination, 3ch arrhythmia examination, 1ch rhythm measurement can be performed. The analyzed or measured data can be stored as separate files.

1 **Follow the procedures 1 to 3 in “How to Read Data” on page 14-15.**

2



1 **Press [Media].**
The media screen appears, on which you can select a medium that contains the desired data.

[MEMO] **Press [Media] only when you want to change the media from which the data is to be read.**

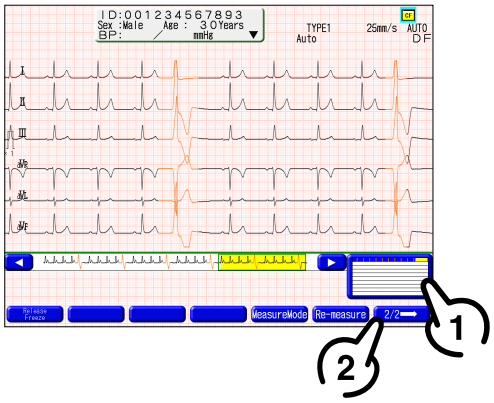
2 **Press the “long wave” data to be retrieved.**

[NOTE] **The following processing cannot be performed with the data other than long-term waveform data.**

3 **Press [Display].**
The selected data is retrieved with the FX-7542, and long-term waveforms are displayed on the screen.

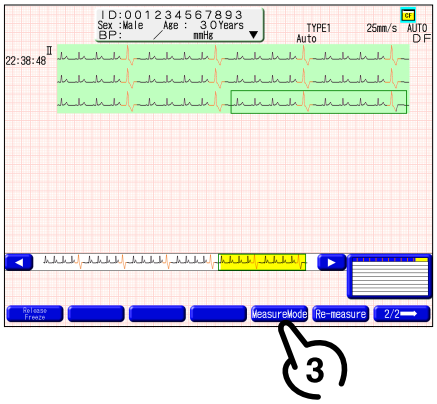
[MEMO] **See the freezing operation for examination for the details of each function key and screen transition. (See “Freezing Waveforms on the Screen for Checking” on page 5-2.)**

3



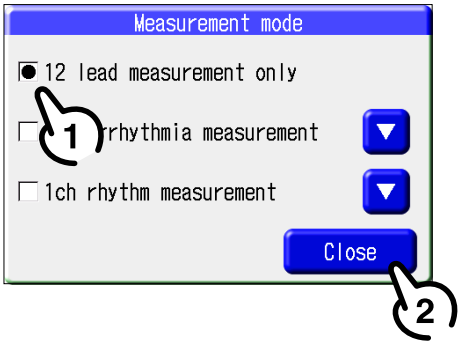
1 **Press [Memory image].**
The rhythm waveforms of each channel are displayed.

2 **Press [1/2→].**



3 **Press [Measure Mode] or [Analysis] to display the examination mode window.**

4



1 **Select an examination to be performed.**

2 **Press [Close].**

5

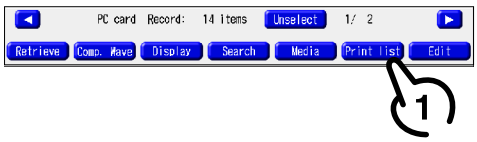
Press START/STOP**.**
Recording is started and examination is performed.
In 12-lead examination, the examination range enclosed in a green frame is recorded and analyzed.
In 3ch arrhythmia examination and 1ch rhythm measurement, the green area is analyzed and measured.

[NOTE] Recording or examination cannot be performed if a waveform reset zone is included in the waveform.

[MEMO] Press [Re-measure] or [Re-analyze] to return to the examination result screen.

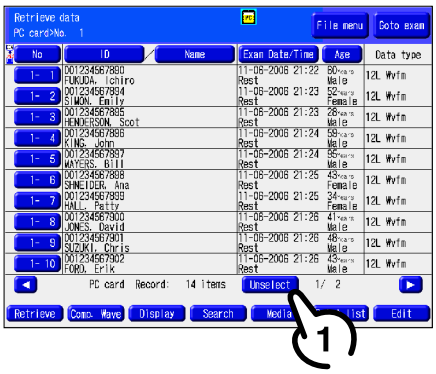
[MEMO] If automatic storage has been selected, the data in the analyzed zone is stored in the medium.

Printing Data List



Press [Print list].
The data list is printed.

Resetting All the Data Selected.



Press [Unselect].
All the selected data is reset.

Editing Data

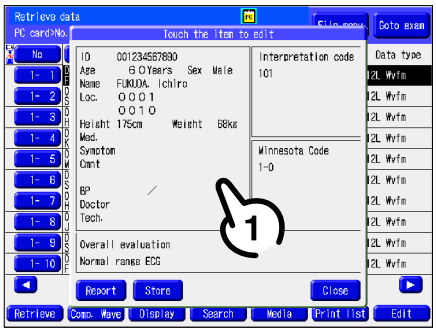
The data can be edited before storing or retrieving it by following the procedure in “How to Store Data” on page 14-11 and “How to Read Data” on page 14-15.

1



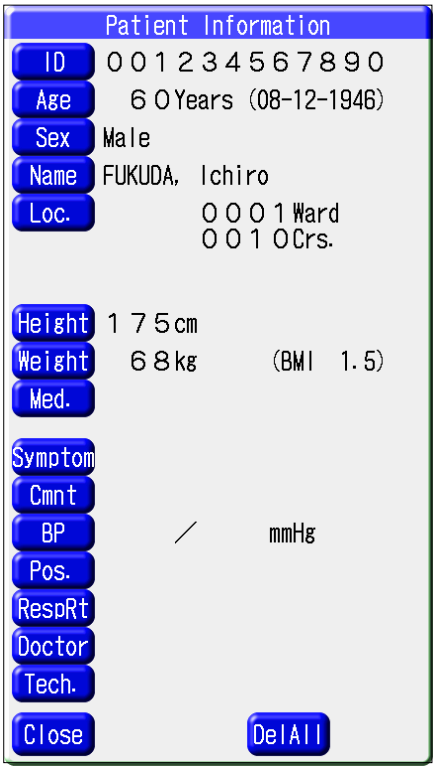
Press [Edit].
The edit item window appears.

2



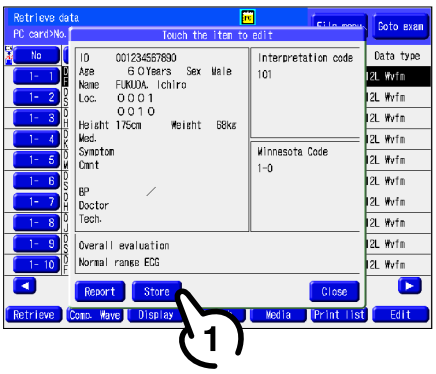
Press the ID display area.

3



Edit the patient information. See “Entering Detailed Data” on page 3-6.

4



Press [Store].

The edited contents are stored. Press [Close] without pressing [Store] to discard the edited contents. Press [Report] to print the report of the ECG data after editing.

[NOTE] Changes for individual items only can be edited here. Automatic grade change following the change of interpretation name is not performed.

Copying Data

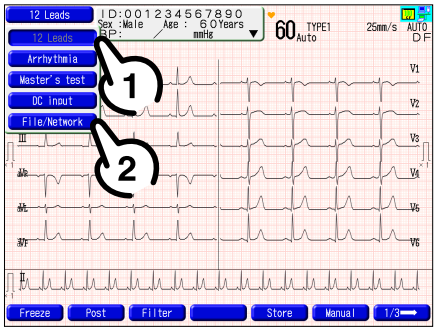
Data can be copied from different media.

[MEMO] PC card and CF card can be selected as a medium from which the data is to be copied. As a medium to which the data is to be pasted, you can select one from PC card, CF card, Network file server (EFS-200), and serial port, on condition that it is not the same as the one from which the data is copied.

How to Copy Data

1 **Set the medium that contains the data to be copied as well as the medium to which the data is to be pasted.**

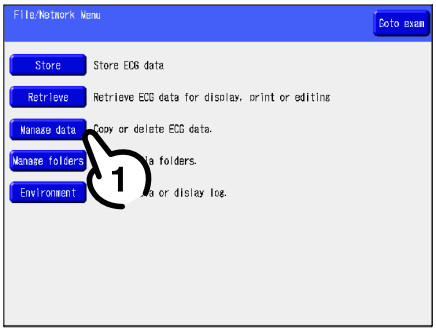
2



1 **Press the name of the examination currently being performed.**

2 **Press [File/Network].**
The equipment enters the file/network mode.

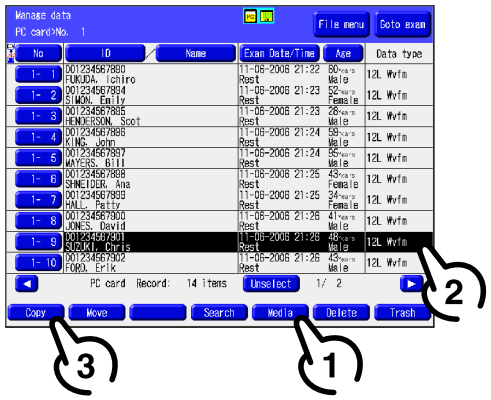
3



Press [Manage data].
The data list is displayed.

[MEMO] The data within the medium specified in "All" – "Load media" of file/network setting is displayed.

4



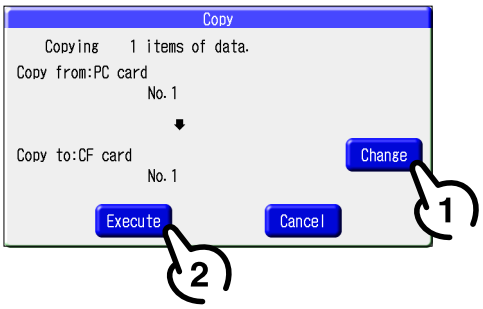
1 **Press [Media].**
The media screen appears, on which you can select the medium that contains the data to be copied.

[MEMO] Press [Media] only when you want to select a different medium that contains data to be copied.

2 **Press the data to be copied to select it. Or, press [Search] to select the data.**

3 **Press [Copy].**

5

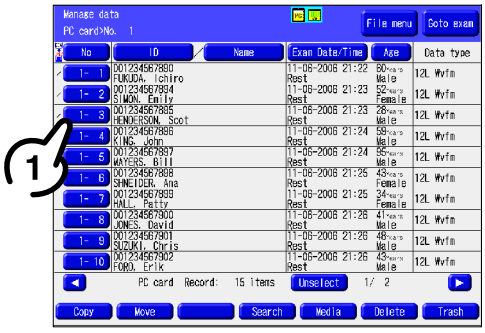


1 **Press [Change].**
The media screen appears, on which you can select the medium into which copied data is to be stored.

[MEMO] Press [Change] only when you want to select a different medium into which the copied data is to be pasted.

2 **Press [Execute].**
The data is read from the medium containing data and pasted to the medium selected.

6



Registration “Done” is displayed for the data copied from the IC card and pasted to the DMS.

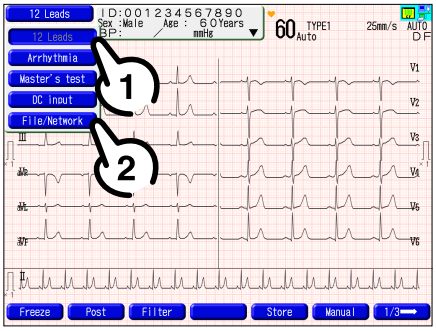
Transferring Data in a PC Card or CF Card

The data stored in a PC card or CF card can be transferred to a different folder in the same PC card or CF card.

How to Transfer Data

1 **Set the medium that contains the data to be transferred into the FX-7542.**

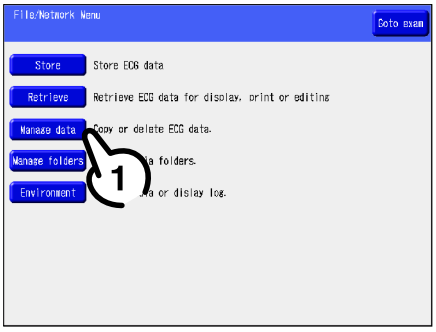
2



1 **Press the name of the examination currently being performed.**

2 **Press [File/Network].**
The equipment enters the file/network mode.

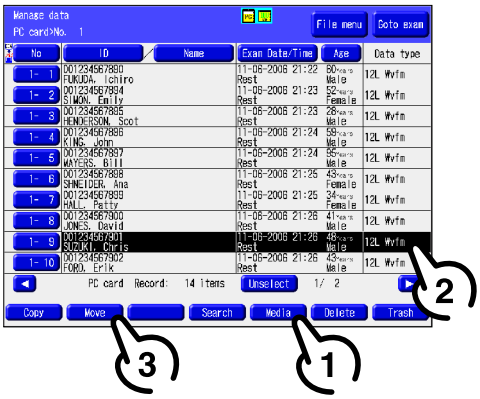
3



Press [Manage data].
The data list appears.

[MEMO] The medium specified in "All" – "Load media" of file/network setting is displayed.

4



1 **Press [Media].**
The media screen appears, on which you can select a medium that contains the data to be transferred.

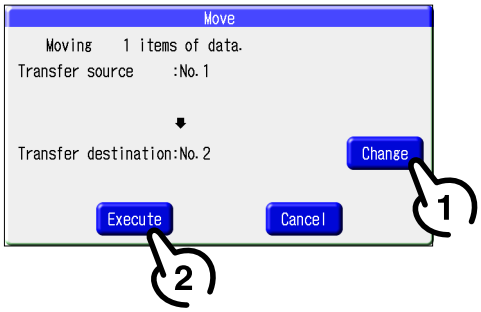
[MEMO] Press [Media] only when you want to select a different medium containing data to be transferred.

[MEMO] Select the PC card or CF card.

2 **Press the data to be transferred to select it. Or, press [Seach] to select data to be transferred.**

3 **Press [Move].**

5



1 **Press [Change].**
The folder screen appears, on which you can select a folder into which the transferred data is to be stored.

[MEMO] Press [Change] only when you want to select a different folder into which the data is to be transferred.

2 **Press [Execute].**
The data is transferred to the folder selected.

Deleting Data

Perform the following 2-step operation to delete data.

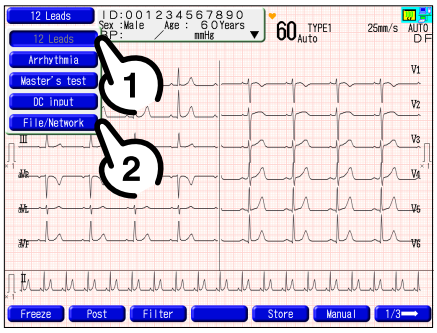
- Deleting data from the list..... Delete the data from the list first. In this stage, the data is made not to be displayed on the list, but the data entity still remains in the medium. (See “Deleting Data from the List” on page 14-28.)
- Deleting data completely..... Then delete the data entity completely from the medium. The data deleted from the medium completely can never be restored. (See “Permanently Deleting Data That Has Been Deleted from the List” on page 14-31.)

[NOTE] The data stored in the DMS cannot be deleted.

Deleting Data from the List

1 **Set the medium that contains the data to be deleted in the FX-7542.**

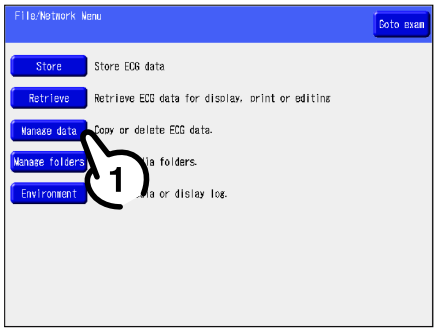
2



1 **Press the name of the examination currently being performed.**

2 **Press [File/Network].**
The equipment enters the file/network mode.

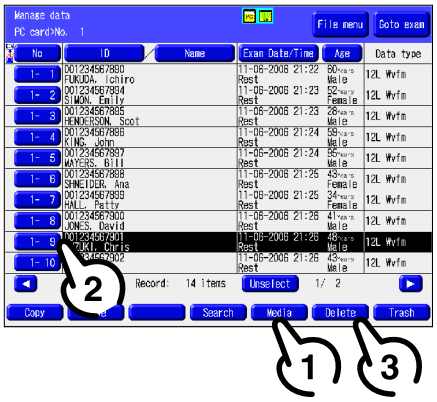
3



Press [Manage data].
The data list appears.

[MEMO] The data within the medium specified in “All” – “Load media” of file/network setting is displayed.

4



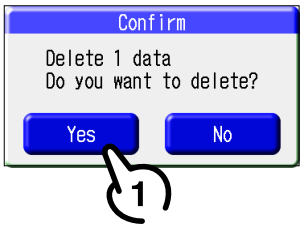
1 **Press [Media].**
The media screen appears, on which you can select the medium that contains the data to be deleted.

[MEMO] Press [Media] only when you want to select a different medium that contains the data to be deleted.

2 **Press the data to be deleted to select it. Or, press [Search] to select the data to be deleted.**

3 **Press [Delete].**

5

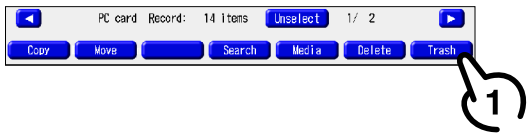


Press [Yes].
The data is deleted from the list. To restore the deleted data, follow the procedure in “Restoring Deleted Data” on page 14-30.
To delete the data completely, follow the procedure in “Permanently Deleting Data That Has Been Deleted from the List” on page 14-31.

Restoring Deleted Data

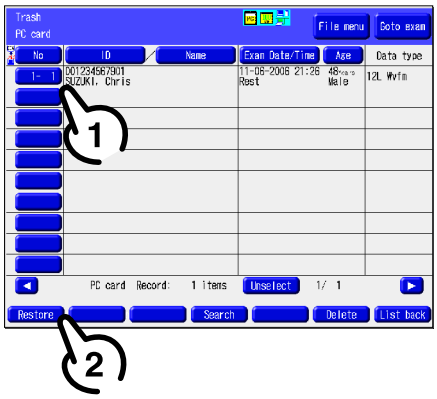
The data deleted by pressing [Delete] is transferred to the [Trash].

1



Press [Trash].

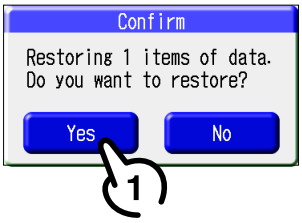
2



1 **Press the data you want to restore to select it. Or, press [Search] to select the data to be restored.**

2 **Press [Restore].**

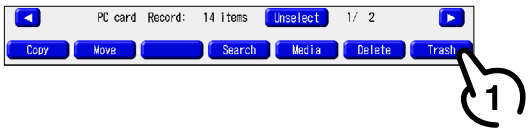
3



Press [Yes].
The data is restored.

Permanently Deleting Data That Has Been Deleted from the List

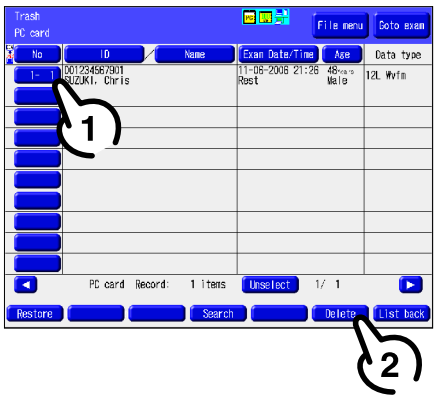
1



Press [Trash].

[NOTE] The data entity that has been deleted can never be restored. Check that the data is really unnecessary before deleting it permanently.

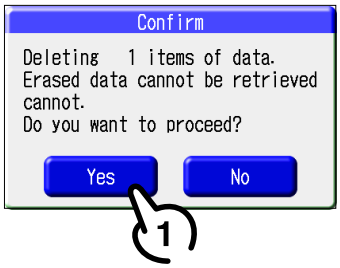
2



1 Press the data to be deleted permanently to select it. Or, press [Search] to select the data to be deleted.

2 Press [Delete].

3



Press [Yes].
The data is deleted completely.

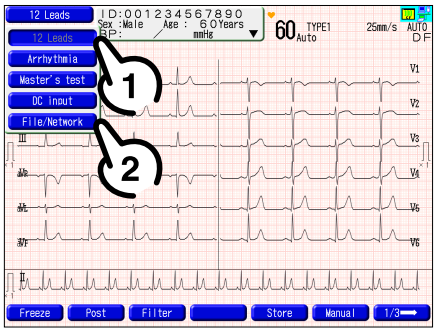
Naming Folders in the PC Card or CF Card

To identify the data stored in the folders in the PC card or the CF card, the folders can be given names.

How to Name Folders

1 **Set the PC card or the CF card that contains the folder to be named in the FX-7542.**

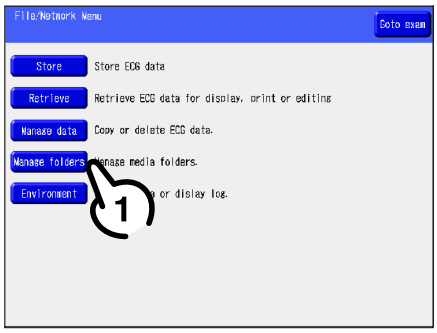
2



1 **Press the name of the examination currently being performed.**

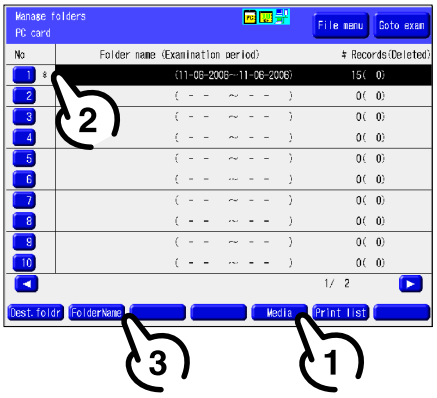
2 **Press [File/Network].**
The equipment enters the file/network mode.

3



Press [Manage folders].
The folder list appears.

4



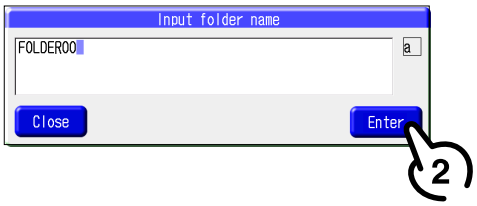
1 **Press [Media].**
The media screen appears, on which you can select the PC card or the CF card that contains the folder you want to name.

[MEMO] Press [Media] only when you want to reselect the PC card or CF card to name a folder contained in it.

2 **Press the folder to be named to select it.**

3 **Press [FolderName].**
The folder name entry screen appears.

5



1 **Enter the name of the folder by pressing desired characters.**
Follow the same procedure as the entry of the name of the patient. (See “7 Entering name” on page 3-9.)

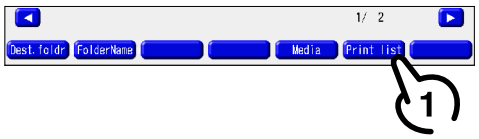
[MEMO] Alphanumeric characters and symbols only can be used to name of the folder.

2 **Press [Enter].**
The name of the folder is registered.

[MEMO] If [Close] is pressed, the name entered for the folder is not registered.

Printing the Folder List

1



Press [Print list].
The folder list is printed.

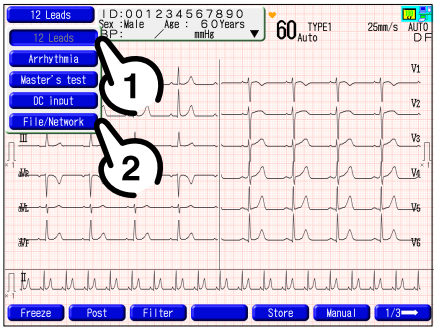
Changing the Folder into Which Data Is to Be Stored

When examination data is to be stored in a PC card or CF card, the folder into which the data is to be stored can be changed.

The folder can also be changed when the data is stored. (See “Storing Data Manually (File Utility Operation)”on page 14-13.)

How to Change Folders

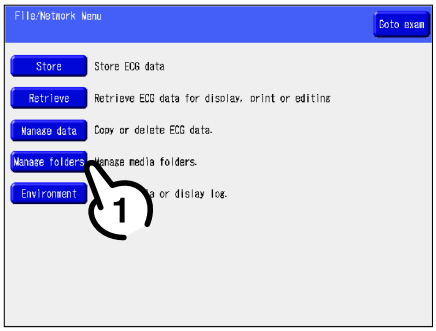
1



1 **Press the name of the examination currently being performed.**

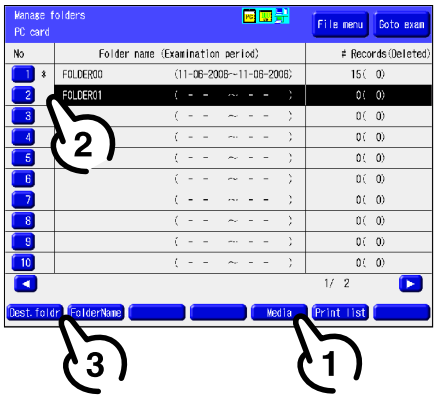
2 **Press [File/Network].**
The equipment enters the file/network mode.

2



Press [Manage folders].
The folder list is displayed.

3



1 **Press [Media].**
The media screen appears. Select a PC card or CF card from which you want to select another folder for data storage.

[MEMO] **Press [Media] only when you want to select a PC card or CF card from which you want to select another folder for data storage.**

2 **Press the folder into which the data is to be stored to select it.**

3 **Press [Dest. foldr].**
Another folder is selected for data storage.

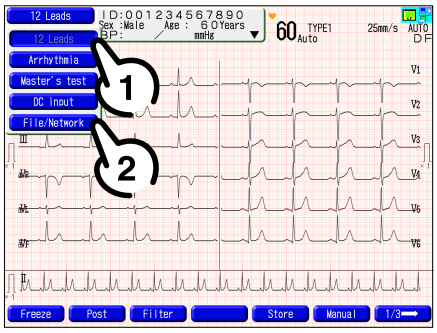
Printing Communication Log

The log of communication with DMS can be printed.

[MEMO] The equipment is capable of storing the latest 180 pieces of communication history data.

How to Print

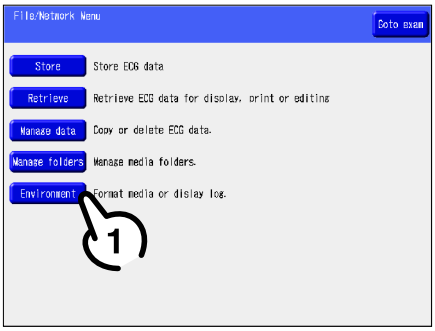
1



1 **Press the name of the examination currently being performed.**

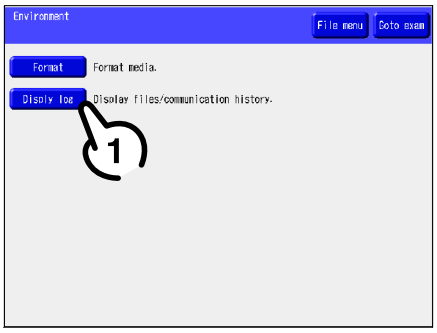
2 **Press [File/Network].**
The equipment enters the file/network mode.

2



Press [Environment].

3



Press [Display log].
The communication log appears.
Press [◀] or [▶] to switch pages.

4

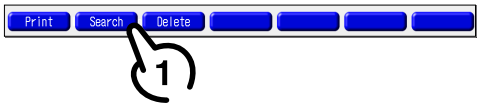


Press [Print].
The communication log is printed.

Selecting Communication Log Data

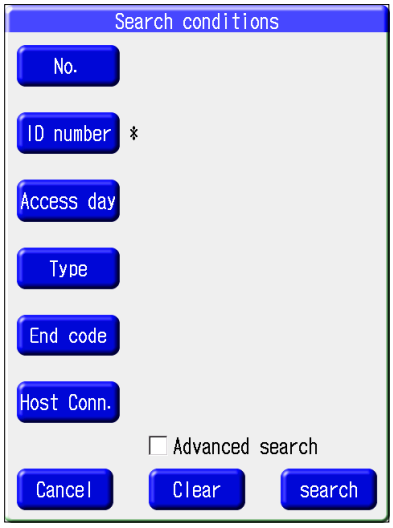
Desired communication log to be printed can be selected by specifying conditions.

1



Press [Search].

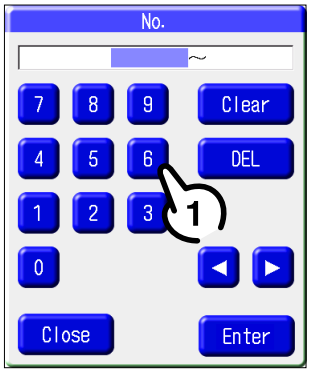
2



Press the item you want to select as search conditions.

3 **Enter conditions for the item selected in step 2 as follows.**

<No.>

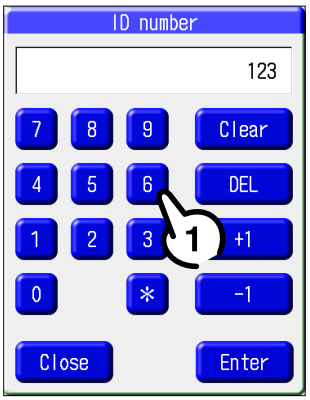


Enter the No. of the log to be selected.

[MEMO] All the Nos. are targeted for search in the initial state.

[MEMO] Start No. and end No. can be entered. If start No. is not entered., the data from the beginning to the end No. is targeted for search, and if the end No. is not entered, the data from the start No. to the last data is targeted for search.

<ID number>

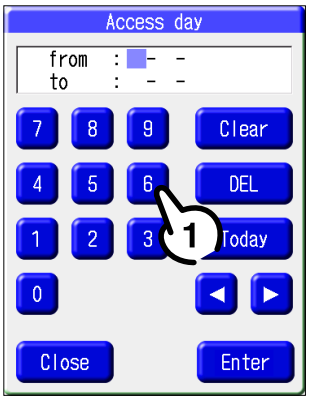


Enter the ID number of the log to be selected.

[MEMO] All the ID Nos. are targeted for search in the initial state.

[MEMO] A wild card (*) can be specified.

<Access day>

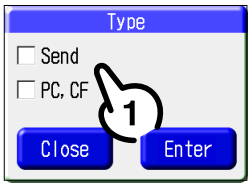


Enter the date of access to the log to be selected.

[MEMO] All the dates of access are targeted for search in the initial state.

[MEMO] Start date and end date can be entered. If start date is not entered, the data from the beginning to the end date is targeted for search, and if the end date is not entered, the data from the start date to the last data is targeted for search.

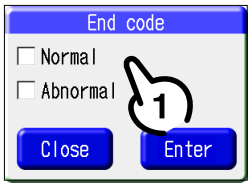
<Type>



Check the box next to the type of the log to be selected.

[MEMO] Both of the communication types are targeted for search in the initial state.

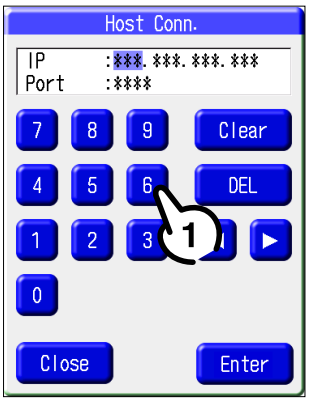
<End code>



Check the box next to the end code of the log to be selected.

[MEMO] Both of the end codes are targeted for search in the initial state.

<Host Conn.>

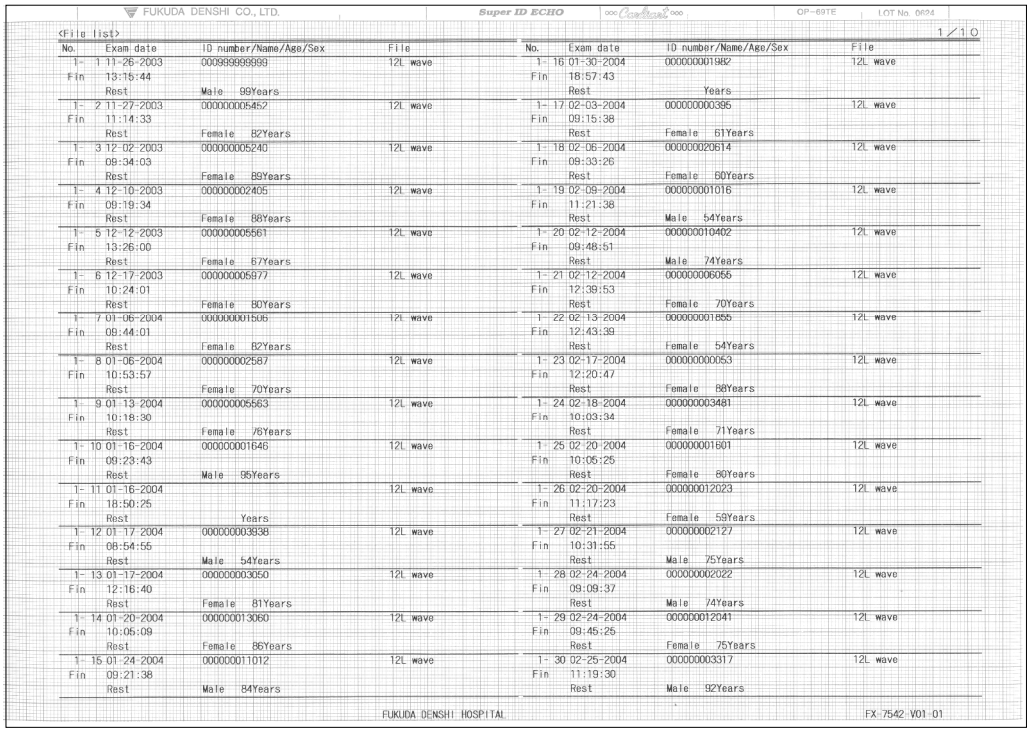


Enter the IP and port No. of the connected host in the log to be selected.

[MEMO] All the hosts are targeted for search in the initial state.

Example of Recording

- **File List**



FUKUDA DENSHI CO., LTD. Super ID ECHO ∞∞Cardiart∞∞ OP-69TE LOT No. 0694

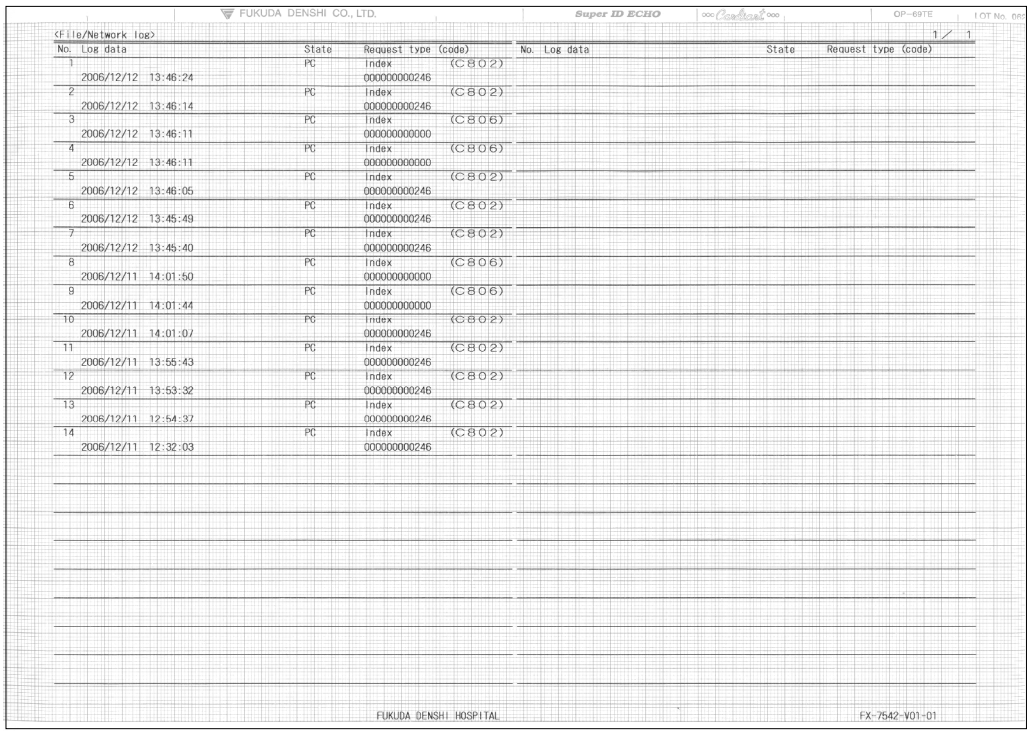
<File list> 1／10

No.	Exam date	ID number/Name/Age/Sex	File
1- 1	11-26-2003	000999999999	12L wave
Fin	13:15:44		
	Rest	Male 99Years	
1- 2	11-27-2003	000000005452	12L wave
Fin	11:14:33		
	Rest	Female 82Years	
1- 3	12-02-2003	000000005240	12L wave
Fin	08:34:03		
	Rest	Female 89Years	
1- 4	12-10-2003	000000002405	12L wave
Fin	09:19:34		
	Rest	Female 88Years	
1- 5	12-12-2003	000000005561	12L wave
Fin	13:26:00		
	Rest	Female 67Years	
1- 6	12-17-2003	000000005877	12L wave
Fin	10:24:01		
	Rest	Female 80Years	
1- 7	01-06-2004	000000001505	12L wave
Fin	08:44:01		
	Rest	Female 82Years	
1- 8	01-06-2004	000000002587	12L wave
Fin	10:53:57		
	Rest	Female 70Years	
1- 9	01-13-2004	000000005563	12L wave
Fin	10:18:30		
	Rest	Female 76Years	
1- 10	01-16-2004	000000001646	12L wave
Fin	09:23:43		
	Rest	Male 95Years	
1- 11	01-16-2004		12L wave
Fin	18:50:25		
	Rest	Years	
1- 12	01-17-2004	000000003938	12L wave
Fin	08:54:55		
	Rest	Male 54Years	
1- 13	01-17-2004	000000003050	12L wave
Fin	12:16:40		
	Rest	Female 81Years	
1- 14	01-20-2004	000000013060	12L wave
Fin	10:05:09		
	Rest	Female 86Years	
1- 15	01-24-2004	000000011012	12L wave
Fin	09:21:38		
	Rest	Male 84Years	

No.	Exam date	ID number/Name/Age/Sex	File
1- 16	01-30-2004	000000001982	12L wave
Fin	18:57:43		
	Rest	Years	
1- 17	02-03-2004	000000000395	12L wave
Fin	09:15:38		
	Rest	Female 61Years	
1- 18	02-06-2004	000000020614	12L wave
Fin	09:33:26		
	Rest	Female 60Years	
1- 19	02-09-2004	000000001016	12L wave
Fin	11:21:38		
	Rest	Male 54Years	
1- 20	02-12-2004	000000010402	12L wave
Fin	09:48:51		
	Rest	Male 74Years	
1- 21	02-12-2004	000000006055	12L wave
Fin	12:39:53		
	Rest	Female 70Years	
1- 22	02-13-2004	000000001855	12L wave
Fin	12:43:39		
	Rest	Female 54Years	
1- 23	02-17-2004	000000000053	12L wave
Fin	12:20:47		
	Rest	Female 88Years	
1- 24	02-18-2004	000000003481	12L wave
Fin	10:03:34		
	Rest	Female 71Years	
1- 25	02-20-2004	000000001601	12L wave
Fin	10:05:25		
	Rest	Female 80Years	
1- 26	02-20-2004	000000012023	12L wave
Fin	11:17:23		
	Rest	Female 59Years	
1- 27	02-21-2004	000000002127	12L wave
Fin	10:31:55		
	Rest	Male 75Years	
1- 28	02-24-2004	000000002022	12L wave
Fin	09:09:37		
	Rest	Male 74Years	
1- 29	02-24-2004	000000012041	12L wave
Fin	09:45:25		
	Rest	Female 75Years	
1- 30	02-25-2004	000000003317	12L wave
Fin	11:19:30		
	Rest	Male 82Years	

FUKUDA DENSHI HOSPITAL FX-7542-V01-01

- **Communication History**



FUKUDA DENSHI CO., LTD. Super ID ECHO ∞∞Cardiart∞∞ OP-69TE LOT No. 069

<File/Network log> 1／1

No.	Log data	State	Request type (code)
1		PC	Index (C802)
	2006/12/12 13:46:24		000000000246
2		PC	Index (C802)
	2006/12/12 13:46:14		000000000246
3		PC	Index (C806)
	2006/12/12 13:46:11		000000000000
4		PC	Index (C806)
	2006/12/12 13:46:11		000000000000
5		PC	Index (C802)
	2006/12/12 13:46:05		000000000246
6		PC	Index (C802)
	2006/12/12 13:45:49		000000000246
7		PC	Index (C802)
	2006/12/12 13:45:40		000000000246
8		PC	Index (C806)
	2006/12/11 14:01:50		000000000000
9		PC	Index (C806)
	2006/12/11 14:01:44		000000000000
10		PC	Index (C802)
	2006/12/11 14:01:07		000000000246
11		PC	Index (C802)
	2006/12/11 13:55:43		000000000246
12		PC	Index (C802)
	2006/12/11 13:53:32		000000000246
13		PC	Index (C802)
	2006/12/11 12:54:37		000000000246
14		PC	Index (C802)
	2006/12/11 12:32:03		000000000246

No.	Log data	State	Request type (code)

FUKUDA DENSHI HOSPITAL FX-7542-V01-01

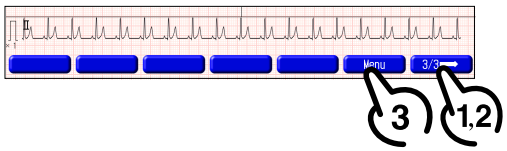
Setting Password

A password for switching to the file/network menu can be set as follows.

[MEMO] The password set here is required to initialize the ECG setting.

How to Set Password

1

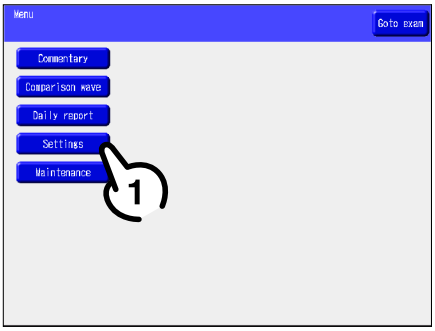


1 **Press [1/3→].**

2 **Press [2/3→].**

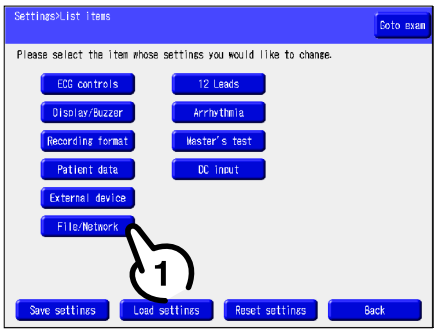
3 **Press [Menu].**

2



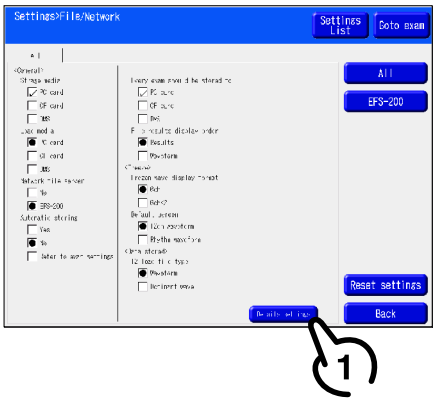
Press [Settings].

3



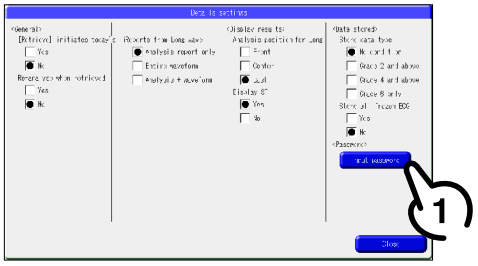
Press [File/Network].

4



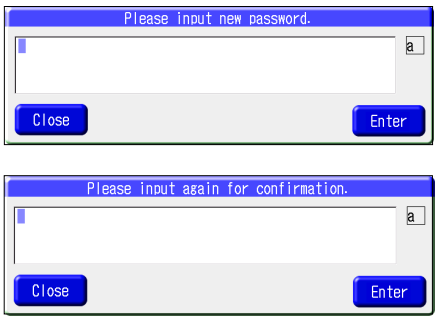
Press [Details settings].

5



Press [Input password].

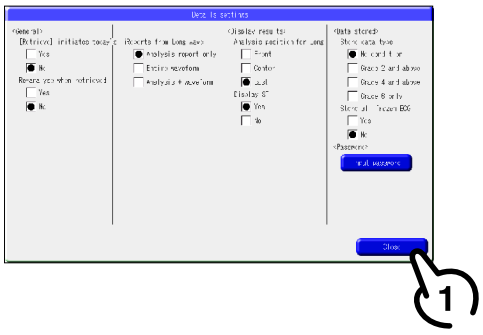
6



Enter a password on the password entry window and enter it once again for confirmation.

[MEMO] If the entered passwords do not coincide, the "Incorrect password" warning message appears and the password confirmation window is closed. Press [Input password] to enter the password again.

7

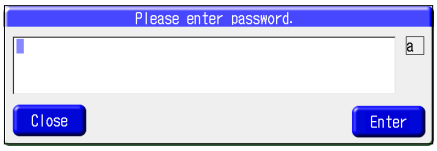


Press [Close].

How to Change Password

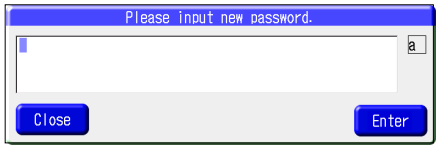
1 Follow the procedures 1 to 5 in “How to Set Password.”

2



Enter the password set on the password entry window.

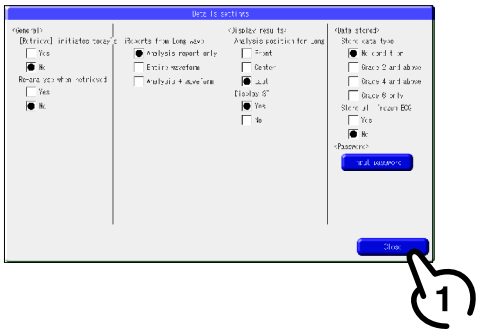
3



If the entered password coincides with the currently set password, a new password entry window appears. Enter a new password.

[MEMO] If a wrong password is entered, the “Incorrect password” warning message appears, and the password confirmation window is closed. Press [Input password] to enter the password again.

4

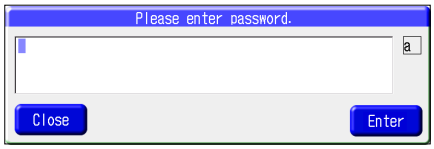


Press [Close].

How to Initialize Password

1 **Follow the procedures 1 to 5 in “How to Set Password.”**

2



In a state where the password entry window stays open, press the lead ▷, sensitivity ▽, lead ◁, sensitivity △, 1mV, 1mV, Marker / Paper Feed, Reset, Arrhythmia, and Enter keys in that order, and the initialization complete message appears.

Chapter 15

Checks and Parts Replacement

This chapter provides details of checks that should be performed periodically as well as parts replacement procedures to be followed when an operation failure should occur.

Daily Check.....15-2
Daily Check Procedure 15-2

Periodic Check 15-4
Periodic Check Procedure (1) 15-4

Replacing Built-in Battery 15-7

Resetting Time 15-8

Replacing Clock Battery.....15-10

If Printing Quality Deteriorates 15-11

Daily Check

Be sure to perform daily checks according to “Daily Check Procedure” shown below.

If any one of the judgment results is marked as “NG” in the Daily Check Procedure, the overall judgment is “NG.” Take necessary measures to correct the failure.

Do not use the equipment unless all the items are marked as “Good.”

⚠ CAUTION

⚠ ● **Do not open the case of the equipment.**
Be careful not to let liquid such as alcohol enter the equipment.

Daily Check Procedure

● **Visual check**
Visually check the equipment according to the description of the following table.

Item	Check item	Procedure	Judgment criterion
Main unit	1） Exterior of the main unit	Check for damage, cracks, deformation, and rust.	There should be no damage, cracks, deformation, or rust.
	2） Nameplate, panel	Check for peeling and attachment of dirt.	There should be no peeling or attachment of dirt.
	3） Key	Check for damage.	There should be no damage to the keys.
Accessories	1) Power cord, patient cables	Check for flaws and damage.	There should be no flaws or damage.
	2) Limb electrodes, chest electrodes	Check for dirt, rust, flaws, and damage.	There should be no dirt, rust, flaws, or damage.
	3) Recording paper	Check whether the recording paper is loaded properly.	The recording paper should be loaded properly.
	4) Operation manual	Check whether the Operation Manual is stored in the specified place.	The Operation Manual should be stored in the specified place.

- **Mechanical check**

Check the equipment for mechanical failures while actually operating the equipment.

Item	Check item	Procedure	Judgment criterion
Main unit	1) Key	Check whether the key operation is smooth.	Key operation should be smooth.
	2) Recorder	Check whether the operation of the recorder is smooth and no abnormal noise is heard.	The operation of the recorder should be smooth and no abnormal noise should be heard.
Accessories	1) Power cord, patient cables	Check whether the power cord and the patient cables can be mounted to or removed from the main unit smoothly.	The power cord and the patient cables should be mounted to or removed from the main unit smoothly.
	2) Limb electrodes, chest electrodes	Check the connection of the patient cables.	The limb electrodes and chest electrodes should be connected to the patient properly.

- **Electrical check**

Item	Check item	Procedure	Judgment criterion
Performance	1) Power supply	Turn on the power to make sure that the initial screen appears.	The initial screen should appear when the power is turned on.
	2) Display	Check whether waveforms are displayed on the waveform display screen.	Waveforms should be displayed on the waveform display screen.
	3) Printing	Check whether waveforms can be printed.	Waveforms can be printed.
	4) Recording speed (25 mm/s)	Make recording at 25 mm/s for 10 seconds and check whether the error falls within ±3% range.	The error should fall within ±3% range.

Periodic Check

Perform periodic checks according to the description in “Periodic Check Procedure (1)” shown below and “Periodic Check Procedure (2)” listed in the service manual separately provided.

Perform checks according to Periodic Check Procedure (1) once every 3 to 4 months.

Perform checks according to Periodic Check Procedure (2) once a year.

If any one of the judgment results is marked as “NG” in the Periodic Check Procedure (1), the overall judgment is “NG.” Be sure to take necessary measures to correct the failure.

Do not use the FX-7542 until all the items are marked as “Good.”

⚠ CAUTION

⚠ ● **Do not open the case of the equipment.**
Be careful not to let liquid such as alcohol enter the equipment.

Periodic Check Procedure (1)

[MEMO] Perform the following checks once every 3 to 4 months.

- **Visual check**
  Visually check the equipment according to the description of the following table.

Item	Check item	Procedure	Judgment criterion
Main unit	1) Exterior of the main unit	Check for damage, cracks, deformation, and rust.	There should be no damage, cracks, deformation, or rust.
	2) Nameplate, panel	Check for peeling and attachment of dirt.	There should be no peeling or attachment of dirt.
	3) Key	Check for damage.	There should be no damage to the keys.
Accessories	1) Power cord, patient cable	Check for flaws and damage.	There should be no flaws or damage.
	2) Limb electrode, chest electrode	Check for dirt, rust, flaws, and damage.	There should be no dirt, rust, flaws, or damage.
	3) Recording paper	Check whether the recording paper is loaded properly.	The recording paper should be loaded properly.
	4) Operation manual	Check whether the Operation Manual is stored in the specified place.	The Operation Manual should be stored in the specified place.

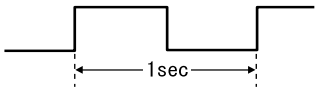
● Mechanical check

Check the equipment for mechanical failures while actually operating the equipment.

Item	Check item	Procedure	Judgment criterion
Main unit	1) Key	Check whether the key operation is smooth.	Key operation should be smooth.
	2) Recorder	Check whether the operation of the recorder is smooth and no abnormal noise is heard.	The operation of the recorder should be smooth and no abnormal noise should be heard.
Accessories	1) Power cord, patient cables	Check whether the power cord and the patient cables can be mounted to or removed from the main unit smoothly.	The power cord and the patient cables should be mounted to or removed from the main unit smoothly.
	2) Limb electrodes, chest electrodes	Check the connection of the patient cables.	The limb electrodes and chest electrodes should be connected to the patient properly.

● Maintenance test

[MEMO] Press the [Maintenance] function key to bring the equipment into the maintenance mode.

Check item	Procedure	Judgment criterion
1) Battery test	Press [Battery] on the maintenance menu screen.	Backup battery voltage should be 2.3V or higher.
2) Clock setting	Press [Set clock] on the maintenance menu screen. (See "Resetting Time" on page 15-8.)	Correct time should be displayed.
3) Recording test	1) Press [Recording test] on the maintenance menu screen. 2) Press [Transfer speed]. 3) Press the [Start/Stop] button.	• The recording paper should not zigzag. • No folding should be found with both edges of the recording paper. • No recording inconsistency or abrasion should be found. • No missing dots should be found. • Feeding rate  **Feeding rate 5 mm/s: 5 mm (Within ±3%)** **Feeding rate 10 mm/s: 10 mm (Within ±3%)** **Feeding rate 12.5 mm/s: 12.5 mm (Within ±3%)** **Feeding rate 25 mm/s: 25 mm (Within ±3%)** **Feeding rate 50 mm/s: 50 mm (Within ±3%)**
4) Display/touch panel test	1) Press [Display panel test] on the maintenance menu screen. 2) Press the [Start/Stop] button.	• All the dots should be displayed. • Characters and lines should be displayed correctly. • Color should be displayed correctly. • Correct reaction should occur at the touch point.

5) Key/LED/ sound test	1) Press [Key/LED/Sound test] on the maintenance menu screen. 2) Press the [Start/Stop] button.	• The name of the key pressed should be displayed. • The LED should flash correctly. • The ending sound should be emitted at an appropriate volume level.

● Others

Check item	Procedure	Judgment criteria
1) Power supply	Check wheter the FX-7542 can be turned on/off both with AC power and battery power.	The FX-7542 should be turned on/off both with AC power and battery power.
2) Power cord	Perform a continuity test with a tester to check whether the power cord is conducting.	The power cord should be conducting.

● Consumables

Check the following consumable parts periodically and replace them as required. The estimated service life of each part is as follows.

[NOTE] Ask Fukuda Denshi's service engineer for checks and replacement of these parts.

[MEMO] The service life of each part varies depending on the frequency of use and use conditions.

- **Battery pack ..... Approximately 300 times of charging/discharging operations**
  If the battery pack is degraded, the operation time decreases even if the battery is charged fully.
- **Built-in backup battery..... Approximately 6 years**
  The battery is used for storing the setting contents and making the clock operate. If battery power decreases, the date and time may not be displayed correctly, and the default setting may be restored. Be sure to replace the built-in backup battery whose power is used up.
- **Thermal array head..... Approximately 50 km (when printing is made continuously)**
  If the thermal array head is degraded, the density of printing may decrease or missing dots may appear.
- **Motor for feeding ..... Approximately 8,000 hours (when used continuously)**
  If the motor is degraded, feeding of the recording paper may become inconsistent or feeding rate may flucturate, causing printing result to be unstable.

Replacing Built-in Battery

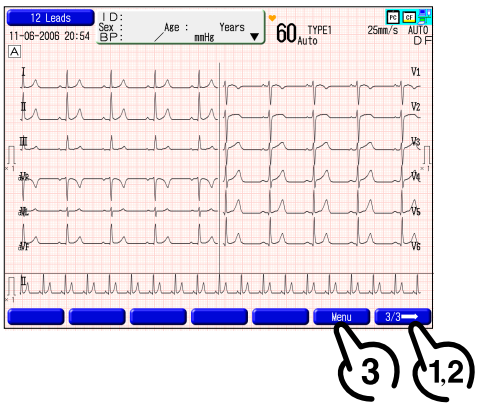
If the operable time becomes extremely short even if the battery is charged fully, replace it with a new one. See “Mounting the Battery (Option)” on page 2-5 for the battery replacement procedure.

[MEMO] Contact Fukuda Denshi’s service engineer for the purchase of the battery.

Resetting Time

If the time display is found not to be correct, make the setting again to display correct time.

1

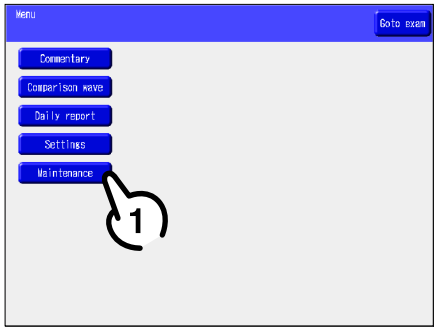


1 **Press [1/3→].**

2 **Press [2/3→].**

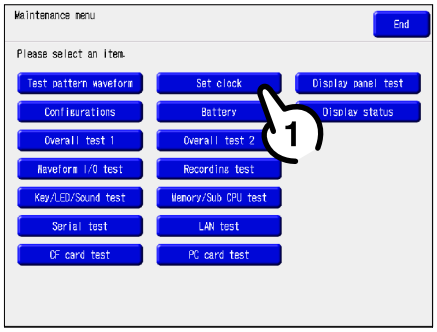
3 **Press [Menu].**

2



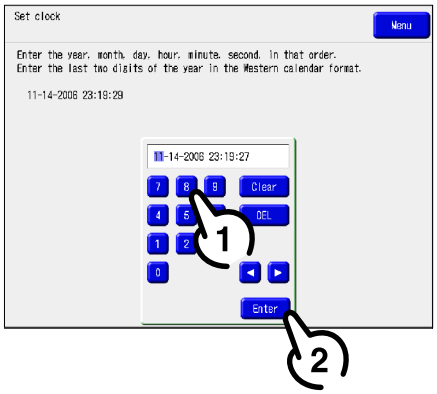
Press [Maintenance].
The maintenance menu screen appears.

3



Press [Set clock].
The set clock screen appears.

4



Enter year, month, day, hour, minute, and second in that order, and then press [Enter].

Enter the 2 least significant digits of the year.

[MEMO] If the time deviates again after some time even if the above operation is performed, the battery for the clock may be coming to the end of its service life. See “Replacing Clock Battery on page 15-10.

[MEMO] The year can be set within the range from 0 to 79.

Replacing Clock Battery

The equipment has a built-in battery for operating the clock.

If the time deviates after some time even if the time is reset, the battery for the clock may be coming to the end of its service life. Replace the battery in this case.

⚠ CAUTION

- **The equipment must be disassembled to replace the battery. Ask Fukuda Denshi's service engineer for replacement.**

If Printing Quality Deteriorates

If dirt attaches to the thermal array head as a result of printing, the quality of printing deteriorates. If printed ECG data or characters may begin to fade or become unclear, clean the thermal array head.

⚠ CAUTION

⚠ **● Ask Fukuda Denshi's service engineer for cleaning of the thermal array head.**

Chapter 16

Connecting Other Devices

This chapter describes how to connect other medical devices and external monitors, etc.

Connecting Other Medical Devices 16-2
Setting the Leads 16-3

Connecting an External Device to DC Input Terminals 16-4

Connecting External Monitor 16-5

Connecting Other Optional Devices.....16-6

Connecting Other Medical Devices

Use the optionally available analog I/O box to connect other medical devices to the equipment. Connect other medical devices to the analog I/O box using the optional monitor output connection cables.

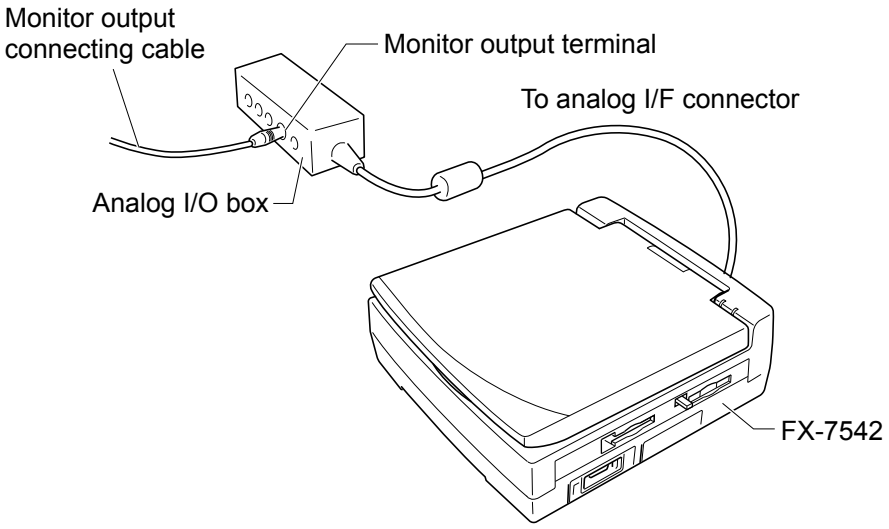
Standard 12-lead and specified leads can be output to other devices.

⚠ WARNING

- **Contact us when connecting the FX-7542 to other devices.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Connect the FX-7542 to other devices, using a connecting cable installed with a clamp filter.**
  To decrease unwanted radio emission, use cables installed with a clamp filter when connecting various external devices to the equipment.
  The specified cable installed with a clamp filter is marked with “Core attached” after the cable type.

1 **Connect the optional analog I/O box to the analog I/F connector on the rear side of the FX-7542.**

2 **Insert the monitor output connecting cable into the monitor output terminal of the analog I/O box.**



The following table shows the correspondence between the color of cables, signals, and pin Nos. of the connector.

Pin No.	Signal name	Connecting cable
1	CH1	Brown
2	CH2	Red
3	CH3	Gray
4	(NC)	White
5	(NC)	Orange

Pin No.	Signal name	Connecting cable
6	(NC)	Yellow
7	R-Synch	Purple
8	(NC)	Blue
9	GND	Green

[NOTE] There is a delay of R-Synch signal of a maximum of 20m/sec. from the input of R wave into the FX-7542.

The following 3-channel leads are output depending on examination mode, lead selection, channel setting, key status and function settings.

	Waveform display	Monitor output 1ch	Monitor output 2ch	Monitor output 3ch
3ch	I, II, III	I	II	III
	aVR, aVL, aVF	aVR	aVL	aVF
	V1, V2, V3	V1	V2	V3
	V4, V5, V6	V4	V5	V6
	aVL, I, -aVR	aVL	I	–aVR
	II, aVF, III	II	aVF	III
6ch	I to aVF	I	II	III
	V1 to V6	V1	V2	V3
	aVL to III	aVL	I	–aVR
3ch spare lead	S1, S2, S3	S1	S2	S3
6ch spare lead	S1 to S6	S1	S2	S3
DC3ch	DC1, DC2, DC3	Baseline	Baseline	Baseline
DC + R	DC1 to DC3, R	Baseline	Baseline	Baseline

Setting the Leads

Make monitor output setting in “Sensitivity/Monitor” – “Monitor output” of ECG control setting. (See “Monitor” on page 17-18.)

- **Monitor output lead**
  When lead specification is set to “Yes,” specify a desired 3ch lead from I to V6.
- **Filter processing**
  When “No” is selected, the input waveforms are output in real time. When “Yes” is selected, the time-lagged waveforms are output because they are processed in the filter before the output.

Connecting an External Device to DC Input Terminals

Connect the optional DC input plug cord to the FX-7542, using the optional analog I/O box.

Press [Lead selection] in each examination mode and then press [DC input], and the waveforms from the external device can be displayed and recorded.

⚠ WARNING

- **Contact us when connecting the FX-7542 to other devices.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Connect the FX-7542 to other devices, using a connecting cable installed with a clamp filter.**
  To decrease unwanted radio emission, use cables installed with a clamp filter when connecting various external devices to the equipment.
  The specified cable installed with a clamp filter is marked with “Core attached” after the cable type.

See Chapter 12 “DC Input Examination” for the connecting method in detail.

Connecting External Monitor

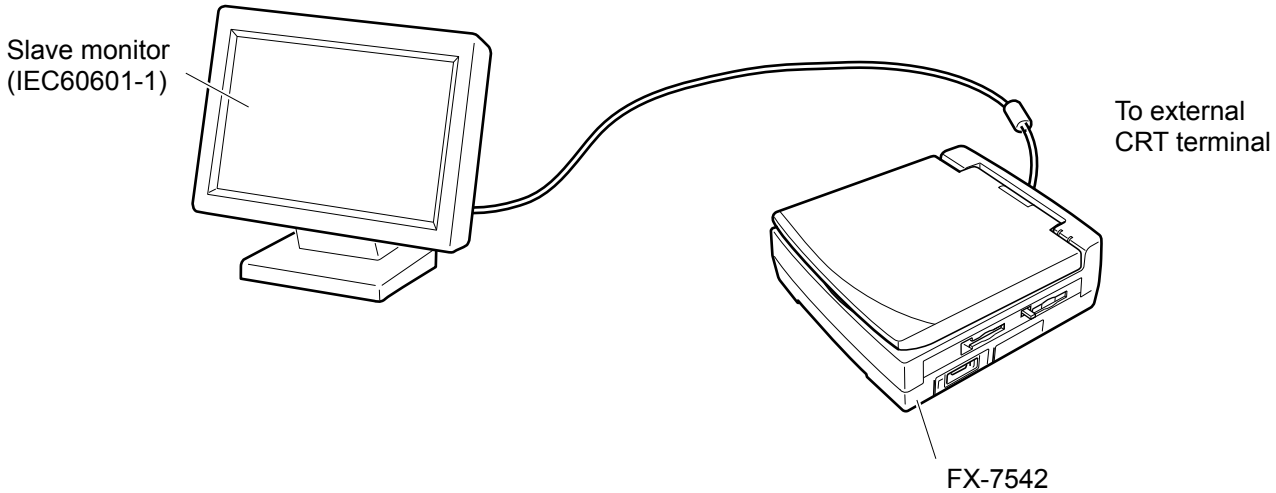
The data displayed on the liquid crystal display of the FX-7542 can also be displayed on a slave monitor, which is useful for checking waveforms of exercise test at a place away from the equipment.

⚠ WARNING

- **Contact us when connecting the FX-7542 to other devices.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Connect an external device complying with IEC60601-1 to the equipment.**
- **Connect the FX-7542 to other devices, using a connecting cable installed with a clamp filter.**
  To decrease unwanted radio emission, use cables installed with a clamp filter when connecting various external devices to the equipment.
  The specified cable installed with a clamp filter is marked with “Core attached” after the cable type.

[NOTE] Contact us for the connecting method and function settings of the slave monitor.

1 **Connect the optional slave monitor to the external CRT terminal on the rear side of the FX-7542.**



Isolation power supply

Connecting Other Optional Devices

A Master's step and ID reader can be connected to the serial port of the FX-7542.

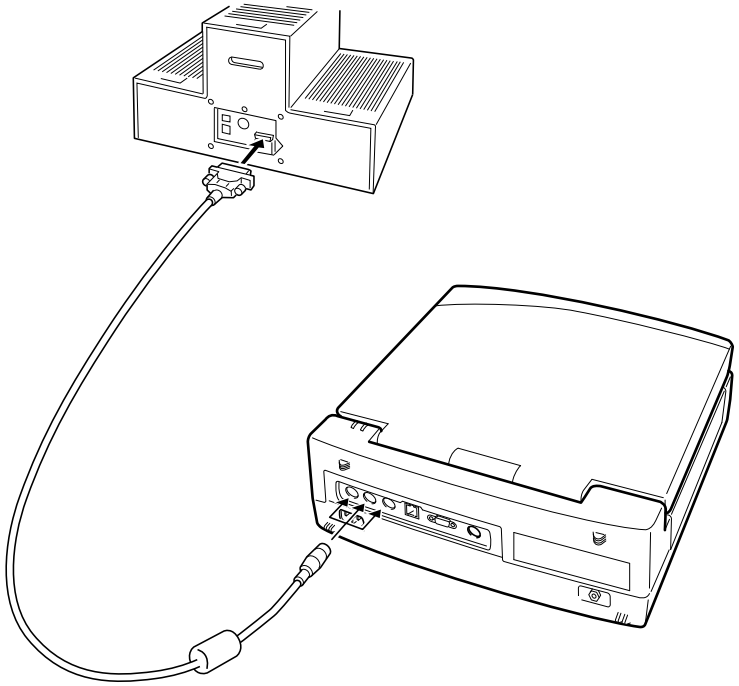
⚠ WARNING

- **Contact us when connecting the FX-7542 to other devices.**
  The patient and the operator may be exposed to a risk of electric shock and other dangerous situations.
- **Connect an external device complying with IEC60601-1 to the equipment.**
- **Connect the FX-7542 to other devices, using a connecting cable installed with a clamp filter.**
  To decrease unwanted radio emission, use cables installed with a clamp filter when connecting various external devices to the equipment.
  The specified cable installed with a clamp filter is marked with "Core attached" after the cable type.

[NOTE] The connecting cables used for connecting the FX-7542 and optional devices vary depending on the type of the optional device. Improper connection may cause a malfunction of the equipment. Be sure to contact us when connecting optional devices.

[NOTE] The load device that can be connected to the equipment is only one.

1 **Insert the cable of the optional device into one of the serial ports of the FX-7542.**
The equipment has three serial ports.



2 **Select the type of the optional devices connected to each port in "Serial port" of ECG control setting.**

Chapter 17

Setting the FX-7542

The operation of the FX-7542 can be set in detail according to intended applications. This chapter describes how to make the setting.

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Outline of the Settings

The settings on the FX-7542 that needs to be done are the operation of the FX-7542 and various examination methods, which should be made as required.

- **Setting you should make when using the FX-7542 for the first time**

Item	Setting contents	See
Name of hospital	Enter the name of the hospital to be printed on the recording paper.	Page 17-6

- **Setting the patient information**

Item	Setting contents	See
Registration of location code	Set the name of locations. A maximum of 200 codes can be registered for all the locations from 1 to 4. (*)	Page 17-8
Registration of medication data	Register medication data.	Page 17-9
How to read ID card	Set how to read the patient information registered in the ID card.	Page 17-10

* The number of items that can be registered for each location is as follows.
Example 1) Location 1: 100, Location 2: 50, Location 3: 25, Location 4: 25
Example 2) Location 1: 120, Location 2: 80, Location 3: 0, Location 4: 0

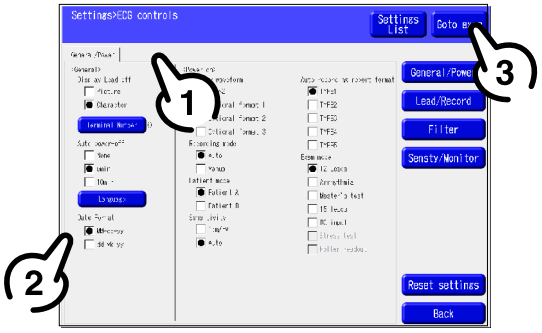
- **Setting on the operation of the FX-7542 and various examination methods**

Item	Setting contents	See
ECG control	Setting of the overall operation of the ECG	Page 17-14
Display/buzzer control	Setting of the display and generation of buzzer sound	Page 17-19
Recording format	Setting of the recording of ECG data	Page 17-22
Patient data	Setting of the presence/absence of items to be entered as patient data	Page 17-33
File/network	Setting of the method of storing or reading ECG data and communication method with other devices	Page 17-41
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Arrhythmia	Setting of the examination method and recording contents of arrhythmia examination	Page 17-48
15 Leads	Setting of the examination method and recording contents of 15-lead examination	Page 17-53
Master's test	Setting of the examination method and recording contents of Master's test	Page 17-50
DC input	Setting of the number of DC input channels and reference leads	Page 17-52

Setting Operation

Settings can be made by selecting set values, entering characters or numeric values, and using the slider bar.

How to Operate on the Setting Screen



1 **Select the item to be set by pressing it.**

2 **Press desired items to select them (change the setting).**

3 **Press [Goto exam] to return to the examination screen.**

Repeat the above operations to set other items successively.

［Goto exam］ ..... Returns to the examination screen. If the settings have been changed, a confirmation window appears, asking you whether you want to save the contents of the change.

［Reset settings］ . Restores the default settings.

［Details settings］ Allows you to make more detailed settings.

［Back］ ..... Returns to the previous screen. If the settings have been changed, a confirmation window appears, asking you whether you want to save the contents of the change.

START/STOP ..... Prints the list of the contents of current settings.

Selecting Settings

Multiple settings are displayed, and you can select one or more items from them.

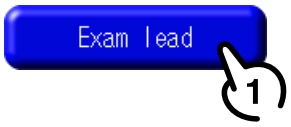
1 **Press a desired setting.**
The screen display changes as follows.

	Not selected	Selected
When only one item can be selected	Grid paper roll	Grid paper roll
When multiple items can be selected	12.5mm/s	12.5mm/s

Selecting Desired Items by Pressing Buttons

You can select desired items by pressing applicable buttons from those displayed.

1

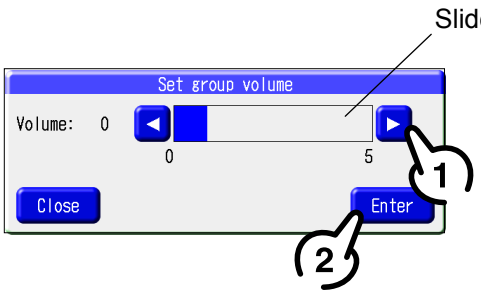


Press a desired item.
More detailed set items are displayed.

Specifying Using the Slider Bar

The color of the palette, volume and the tone of the buzzer sound can be specified using slider bar.

2



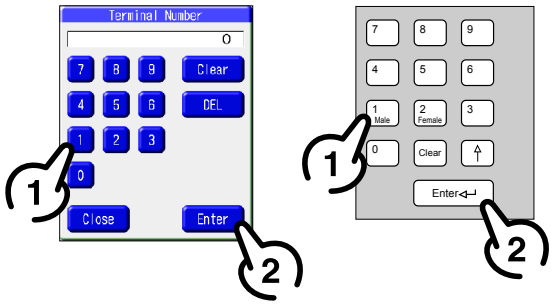
1 **Move the slider bar by pressing [◀] or [▶] to obtain a desired level.**

2 **Press [Enter]**

Entering Numeric Values

You can enter the patient's height, weight, etc. by pressing numeric keys. [Clear]

1



1 **Enter desired values by pressing [1 – 9], [1 Male] to [9].**

2 **Press [Enter], [Enter].**

Press [DEL], [BS], to delete only one digit of the numeric value that has been entered.

Press [Clear], [Clear], to delete all the digits of the numeric value that has been entered.

Press [Close] to close the entry screen, discarding the entered value.

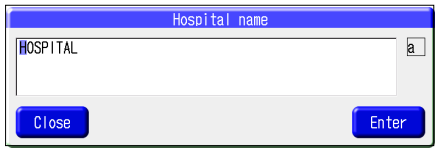
Entering Characters

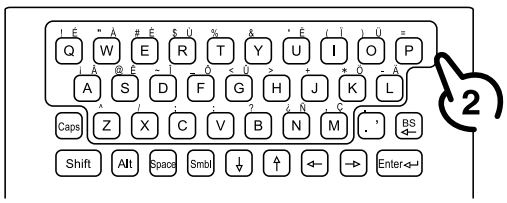
You can enter the name of the hospital, doctors, and technicians, their locations, medication status and symptoms of the patient, and comments using the key board. Follow the same procedure as the entry of the patient's name in the patient information. (See "7 Entering name" on page 3-9.)

1

Enter alphabetical characters.

Alphabetical characters can be entered as follows.





1 **Check that the cursor is at the position you want to enter data.**

2 **Enter data by pressing [A] to [Z].**

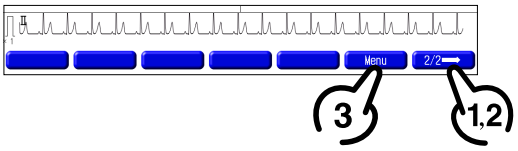
The entered characters are displayed in lower-case characters.

Enter upper-case characters by pressing desired characters while pressing down the [Shift] key.

Registering Hospital Name

[MEMO] The name of doctors and technicians can also be entered, following the same procedure. Display the list by pressing [Patient Data] – [Med.-Tech Name] – [Details settings] – [Code Registration] and select the list, and the doctor/technician name entry window appears. Enter the name, following the procedure in step 5.

1

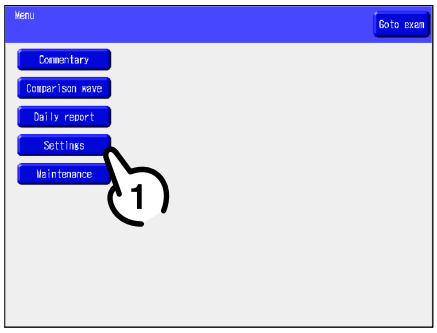


1 Press [1/3→].

2 Press [2/3→].

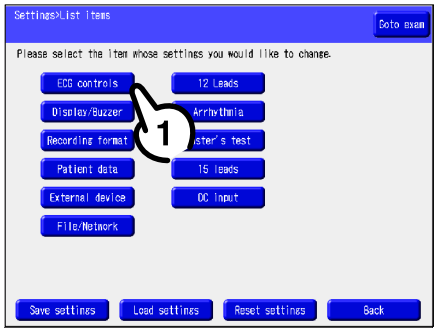
3 Press [Menu].

2



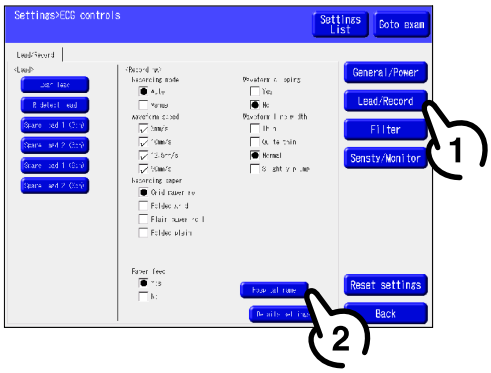
Press [Settings].

3



Press [ECG controls].

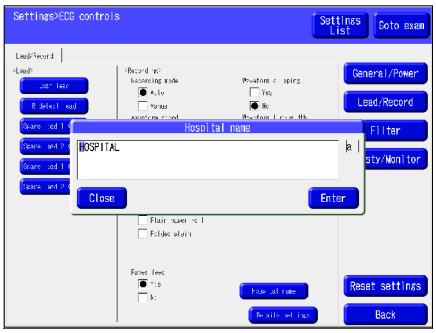
4



1 **Press [Lead/Record].**

2 **Press [Hospital name].**

5



Enter the name of the hospital, following the procedure in “Entering Characters” on page 17-5.

→.....Moves the cursor one character to right.

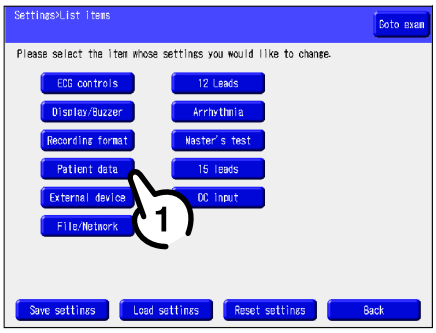
←.....Moves the cursor one character to left.

BS.....Deletes the character on which the cursor is placed.

Registering Location Code

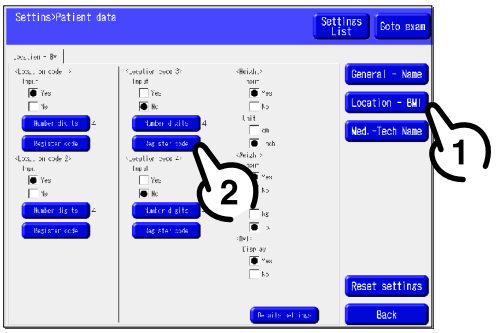
1 Follow the procedures 1 and 2 of “Registering Hospital Name” on page 17-6.

2



Press [Patient data].

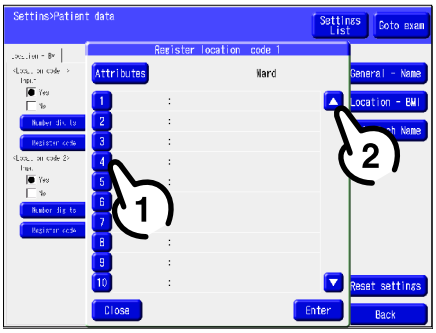
3



1 Press [Location-BMI].

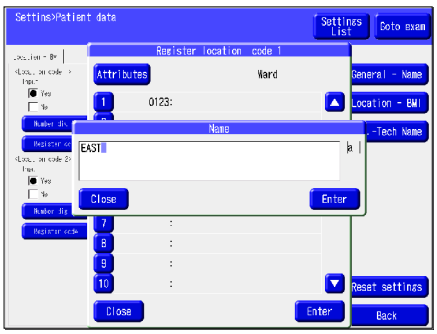
2 Press [Register code] in [Location code 1-4].

4



Press the name of location.

5

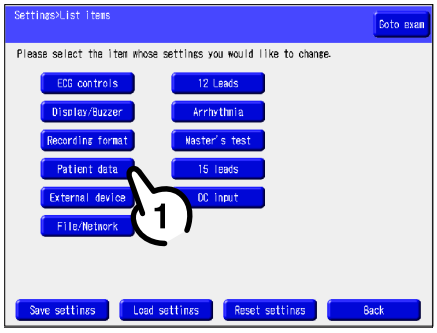


1 Enter codes and character strings, following the procedure in “Entering Characters” on page 17-5.

Registering Medication Data

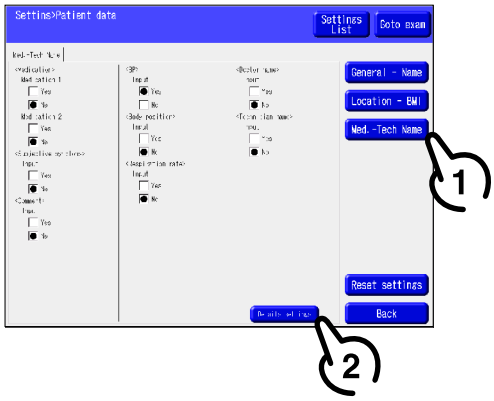
1 Follow the procedures 1 and 2 in “Registering Hospital Name” on page 17-6.

2



Press [Patient data].

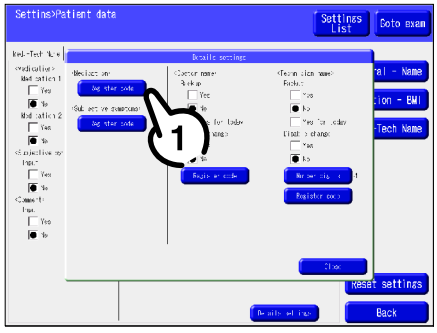
3



1 Press [Med.-Tech Name].

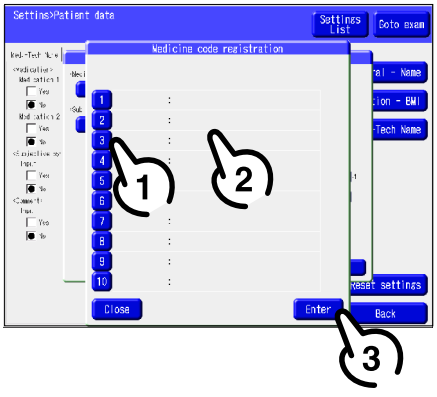
2 Press [Details settings].

4



Press [Register code] in <Medication>.

5



1 Press either one of [1] to [10].

2 Enter codes and character strings, following the procedure 5 on page 17-7.

3 Press [Enter].

Setting How to Read ID Card

Connect an ID reader to the FX-7542, and the following patient information recorded in the ID card or the bar code can be read.

ID, name, date of birth, sex, age, weight, height, location, etc.

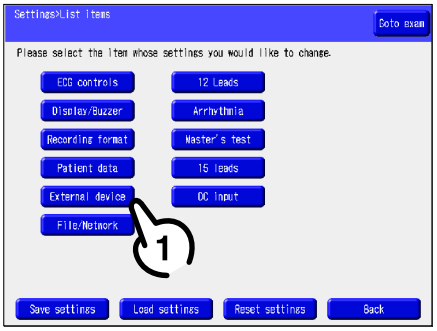
Setting ID Reader Connection Port

Set the serial port to which the ID reader is to be connected, and also set the ID data format.

[NOTE] Contact us for the connection and setting method of the ID reader.

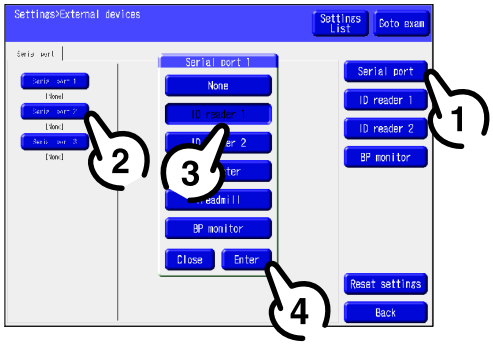
1 **Follow the procedures 1 and 2 in “Registering Hospital Name” on page 17-6.**

2



1 **Press [External device].**

3



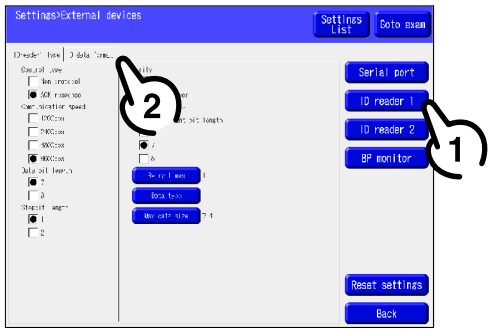
1 **Press [Serial port].**

2 **Press the serial port to which the ID reader is to be connected.**

3 **Press [ID reader].**

4 **Press [Enter].**

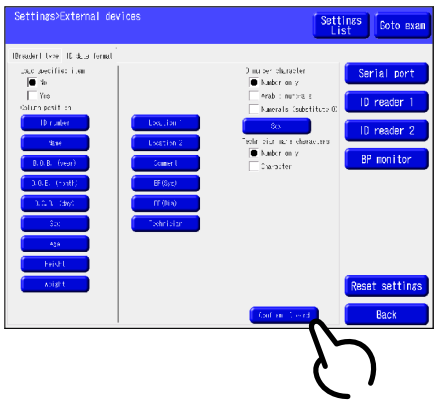
4



1 **Press [ID reader 1] or [ID reader 2].**

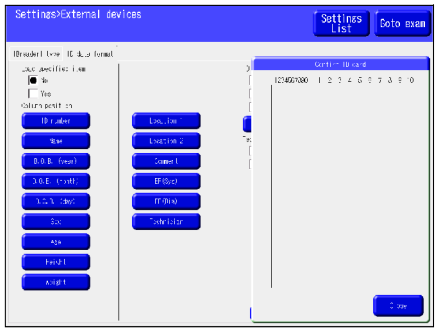
2 **Press [ID data format].**

5



Press [Confirm ID card].

6



Press [Confirm ID card] and let the FX-7542 read the ID card, and the data sent from the card reader can be displayed.
Set the reading position based on the displayed data.
See “ID Reader 1, 2” on page 17-39 for the setting contents of each item.

[MEMO] You need not set unnecessary items.

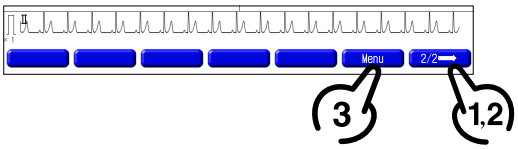
7

When setting is completed, press [Goto exam].
The data format of the ID card is registered based on the set contents.

[MEMO] Contact us for details of ID card data format.

Flow of Examination Method Setting

1

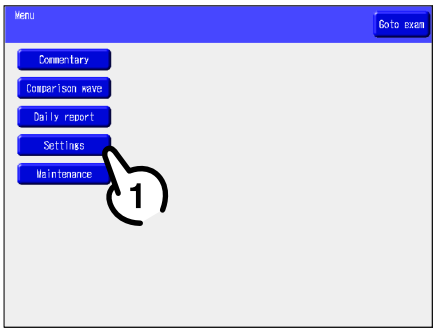


1 **Press [1/3→].**

2 **Press [2/3→].**

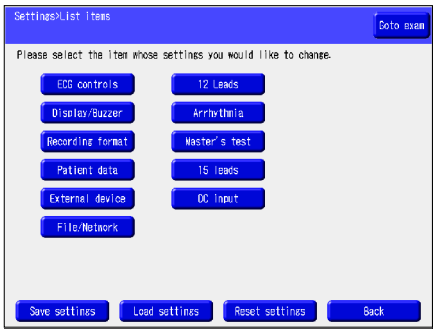
3 **Press [Menu].**

2



Press [Settings].

3



Press a desired item.

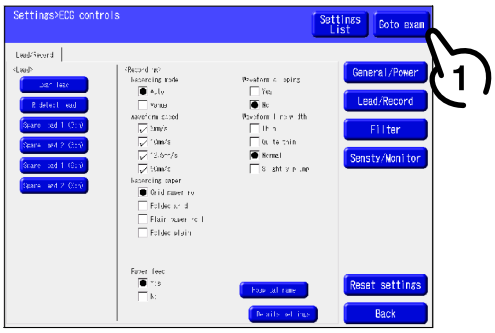
4

Change the setting.

See the pages shown below for the setting contents and set values of each item.

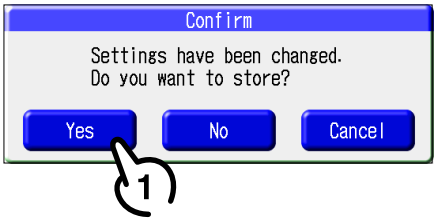
- ECG controls Page 17-14
- Display/buzzer control Page 17-19
- Recording format Page 17-22
- Patient data Page 17-33
- File/network Page 17-41
- External device Page 17-38
- 12 leads Page 17-44
- Arrhythmia Page 17-48
- Master's test Page 17-50
- 15 Leads (When EE-21 is mounted only) Page 17-53
- DC input Page 17-52

5



When the setting is completed, press [Goto exam].

6



Press [Yes].
Press [No] to return to the examination screen, discarding the contents of the change.
Press [Cancel] to return to the setting screen.

The setting change has now been completed.

Setting the ECG Controls

[MEMO] Default settings are enclosed in square brackets, [ ].

General/Power

General

General settings of the operation of the ECG are as follows.

Item	Description	Setting range
Display Lead off	Picture: Displays the position of lead off by the picture of human body. Character: Display the electrode name of lead off. Electrode condition: Display the position of lead off by the picture of human body. And electrode conditions are indicated by colors, while is good, yellow is high-impedance but usable, and red is bad.	Picture [Character] Electrode condition
Terminal number	Specify the terminal number of this equipment. This is useful for system configuration.	[0] to 255
Auto power-off	Turns off the power of this equipment automatically when no operation is made for a specified period of time in battery operation mode.	None [5min] 10min
Language	Specify the language	[English] German, French Spanish, Italian
Date format	MM-dd-yy: Month-day-year. dd-MM-yy: Day-month-year.	[MM-dd-yy] dd-MM-yy
Decimal point Charactor	Specify the expression of decimal point	[.] ,
Administration Password	A password can be set to enter [Setting].	Master password is "FUKUDADENSHI".

Power On

Set the state and operation when the power is turned on.

Item	Description	Setting range
Display waveform	Specify how to display the real time waveform when the power is turned on.	[6ch×2] Optional format 1 Optional format 2 Optional format 3
Recording mode	Specify the recording mode at the time of power on.	[Auto] Manual
Patient mode	Specify the patient to be displayed at the time of power on.	[Patient A] Patient B
Sensitivity	Specify the sensitivity at the time of power on.	1cm/mV [Auto]
Auto recording report format	Specify the auto recording report format at the time of power on.	[TYPE1] TYPE2 TYPE3 TYPE4 TYPE5
Auto Recording Speed	Specify recording speed of the auto recording waveform report at the time of power on.	[25mm/s] 50mm/s

Exam mode	Specify the exam mode at the time of power on. *You cannot specify the exam mode of the optional software that is not installed.	[12 leads] Arrhythmia Master's test 15 leads DC input Stress test Holter ECG

Lead/Record

Set up of the leads and recording

Lead

Item	Description	Setting range
Exam lead	Specify the lead to be used for examination.	[Standard 12 leads] Cabrera lead
R detect lead	Specify the lead to detect R wave.	[II], III V1, V2, V3, V4, V5, V6
Spare lead 1 (3ch)	Specify the spare lead for manual 3ch recording.	STD, I, [II], III aVR, aVL, [AVF], –aVR V1, V2, V3, V4, [V5], V6 V3R, V4R, V5R, V6R V7, V8, V9
Spare lead 2 (3ch)	Specify the spare lead for manual 3ch recording.	STD, I, II, III aVR, aVL, AVF, –aVR [V1], V2, V3, V4, [V5], [V6] V3R, V4R, V5R, V6R V7, V8, V9
Spare lead 1 (6ch)	Specify the spare lead for manual 6ch recording.	STD, [I], [II], III aVR, aVL, [AVF], –aVR [V1], V2, V3, V4, [V5], [V6] V3R, V4R, V5R, V6R V7, V8, V9
Spare lead 2 (6ch)	Specify the spare lead for manual 6ch recording.	STD, [I], [II], III aVR, aVL, [AVF], –aVR [V1], V2, V3, V4, [V5], [V6] V3R, V4R, V5R, V6R V7, V8, V9
Assign 12L chest electrode		
V3R electrode	Specify the V3R electrode.	C1, C2, [C3], C4, C5, C6
V4R electrode	Specify the V4R electrode.	C1, C2, C3, [C4], C5, C6
V5R electrode	Specify the V5R electrode.	C1, C2, C3, C4, [C5], C6
V6R electrode	Specify the V6R electrode.	C1, C2, C3, C4, C5, [C6]
V7R electrode	Specify the V7R electrode.	[C1], C2, C3, C4, C5, C6
V8R electrode	Specify the V8R electrode.	C1, [C2], C3, C4, C5, C6
V9R electrode	Specify the V9R electrode.	C1, C2, [C3], C4, C5, C6
Assign 15L chest electrode		
V3R electrode	Specify the V3R electrode.	C1, C2, C3, C4, C5, C6 [A1], A2, A3
V4R electrode	Specify the V4R electrode.	C1, C2, C3, C4, C5, C6 A1, [A2], A3
V5R electrode	Specify the V5R electrode.	C1, C2, C3, C4, C5, C6 A1, A2, [A3]
V6R electrode	Specify the V6R electrode.	C1, C2, C3, C4, C5, C6 A1, A2, [A3]

V7R electrode	Specify the V7R electrode.	C1, C2, C3, C4, C5, C6 [A1], A2, A3
V8R electrode	Specify the V8R electrode.	C1, C2, C3, C4, C5, C6 A2, A2, A3
V9R electrode	Specify the V9R electrode.	C1, C2, [C3], C4, C5, C6 A1, A2, [A3]

Recording

Item	Description	Setting range
Recording mode	Specify the recording mode at the time of power on.	[Auto] Manual
Waveform speed	Specify the sweep speed for manual recording. Several speeds can be selected. You can select 25 mm/s and all the sweep speed specified here when you pressed on the function key, [Speed].	[5 mm/s], [10 mm/s], [12.5 mm/s], [50 mm/s]
Recording paper	Specify the type of recording paper to be used. When plain recording paper is specified, grid is also printed.	[Grid paper roll] Grid paper Z-fold Plain paper roll Plain paper Z-fold
Paper feed	Specify whether or not to feed the margin of recording paper after completing the recording when using roll paper.	[Yes] No
Waveform clipping	Specify whether or not to clip so that the waveforms may not overlap.	Yes [No]
Waveform line width	Specify the width of waveform line to be printed.	Thin Quite thin [Normal] Slightly thick
Hospital name	Register the hospital name to be printed on the recording paper.	—
Time table	Specify the time table of the measurement to be printed on the recording paper. The unit used for detailed measurement and arrhythmia measurement is ms at all times.	[sec] ms
P wave start	Waveforms immediately start before the P wave is recorded in automatic recording.	[Yes] No
Adjust recording	Adjust the distance to feed the recording paper.	+5, +4, +3, +2, +1, [0], –1, –2, –3, –4, -5

Filter

Set the characteristics of the filter.

Item	Description	Setting range
Power supply frequency	Specify the frequency of AC power supply.	50Hz [60Hz]

Filter 1

Set the characteristics of the filter at rest.

Item	Description	Setting range
High frequency	Specify the high frequency response.	75Hz, 100Hz, [150Hz]
Drift filter	Specify the characteristics of drift filter.	OFF [ON, (0.25Hz)] ON, (0.5Hz)
Muscle filter	Specify the characteristics of muscle filter.	[OFF] ON (25Hz) ON (35Hz)
Hum filter	Specify the power on/off of AC filter.	[OFF] ON

Filter 2

Set the characteristics of the filter under exercise/stress.

Item	Description	Setting range
High frequency	Specify the high frequency response.	75Hz, 100Hz, [150Hz]
Drift filter	Specify the characteristics of drift filter.	OFF [ON (0.25Hz) ON (0.5Hz)
Muscle filter	Specify the characteristics of muscle filter.	[OFF] ON (25Hz) ON (35Hz)
Hum filter	Specify the power on/off of AC filter.	[OFF] ON

Sensitivity/Monitor

Change the settings of the sensitivity of ECG waveforms and the lead for monitor output.

Sensitivity

Item	Description	Setting range
Sensitivity	Specify the sensitivity of waveforms at the time of power on.	1 cm/mV [Auto]
Auto sensitivity applied lead	Specify the lead to apply auto sensitivity with 12 lead recording.	All leads [Chest lead]
UNIT	Specify the unit of sensitivity.	mm/mV [cm/mV]
Available sensitivity	Specify the available waveform sensitivity. Several sensitivities can be registered. You can select 1cm/mV and the sensitivity specified here when you pressed on [←Sensitivity→] on the operation panel.	[2 cm/mV] [1/2 cm/mV] [1/4 cm/mV]

Monitor

Item	Description	Setting range
Exam lead	Specify the lead for output. Yes: This is the lead specified with the monitor output lead. No: This is the lead in the case where you pressed on [←Lead→] on the operation panel.	[Yes] No
Monitor output lead	Specify the 3ch lead to conduct monitor output when 'Yes' is specified as the exam lead.	[I, II, aVF, V5] I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6
Filter processing	Yes: Output the waveform after completing filter processing. Delay occurs to the time of output by the duration of processing. No: Output the input signal in real time.	Yes [No]

R wave Synchronous Sign

Item	Description	Setting range
Polarity	Specify the polarity of pulse.	Positive [Negative]
Pulse width	Specify the pulse width.	[100 ms] 10 to 300 ms

Setting Display/Buzzer Controls

Make the settings on the display and the buzzer.

Display

Make the settings on the display.

Item	Description	Setting range
Background of the wave display area	Specify the background colour of wave display area.	[White] Black Blue
Grid	Specify the grid of wave display area.	None [TYPE 1] TYPE 2
Wave STD Colour	Specify the Wave STD Colour	Colour 1 – Colour 12 [Colour 1]
Wave I Colour	Specify the wave I colour.	Colour 1 – Colour 12 [Colour 1]
Wave II Colour	Specify the wave II colour.	Colour 1 – Colour 12 [Colour 1]
Wave III Colour	Specify the wave III colour.	Colour 1 – Colour 12 [Colour 1]
Wave aVR Colour	Specify the wave aVR colour.	Colour 1 – Colour 12 [Colour 1]
Wave aVF Colour	Specify the wave aVF colour.	Colour 1 – Colour 12 [Colour 1]
Wave VF Colour	Specify the wave VF colour.	Colour 1 – Colour 12 [Colour 1]
Wave V1 Colour	Specify the wave V1 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V2 Colour	Specify the wave V2 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V3 Colour	Specify the wave V3 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V4 Colour	Specify the wave V4 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V5 Colour	Specify the wave V5 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V6 Colour	Specify the wave V6 colour.	Colour 1 – Colour 12 [Colour 1]
Wave V7 (V3R) Colour	Specify the wave V7 (V3R) colour.	Colour 1 – Colour 12 [Colour 1]
Wave V8 (V4R) Colour	Specify the wave V8 (V4R) colour.	Colour 1 – Colour 12 [Colour 1]
Wave V9 (V5R) Colour	Specify the wave V9 (V5R) colour.	Colour 1 – Colour 12 [Colour 1]
Wave V6R Colour	Specify the wave V6R colour.	Colour 1 – Colour 12 [Colour 1]
Wave DC1 Colour	Specify the wave DC1 colour.	Colour 1 – Colour 12 [Colour 1]
Wave DC2 Colour	Specify the wave DC2 colour.	Colour 1 – Colour 12 [Colour 1]
Wave DC3 Colour	Specify the wave DC3 colour.	Colour 1 – Colour 12 [Colour 1]
Colour palette 1	Create colour 1.	Create an arbitrary color.
Colour palette 2	Create colour 2.	Create an arbitrary color.
Colour palette 3	Create colour 3.	Create an arbitrary color.
Colour palette 4	Create colour 4.	Create an arbitrary color.
Colour palette 5	Create colour 5.	Create an arbitrary color.
Colour palette 6	Create colour 6.	Create an arbitrary color.
Colour palette 7	Create colour 7.	Create an arbitrary color.
Colour palette 8	Create colour 8.	Create an arbitrary color.
Colour palette 9	Create colour 9.	Create an arbitrary color.
Colour palette 10	Create colour10.	Create an arbitrary color.
Colour palette 11	Create colour 11.	Create an arbitrary color.
Colour palette 12	Create colour 12.	Create an arbitrary color.

Buzzer

Make the settings on the buzzer.

Item	Description	Setting range
Set volume	Multiple items: Set all volumes collectively. Individual: Set the volume individually.	[Multiple items] Individual
Set group volume	0: No sound is produced. 1 – 5: The volume becomes higher as numerical value becomes larger.	0,1,2,[3],4,5

Key Touch Sound

Change the setting of the sound emitted when the functions keys are pressed.

Item	Description	Setting range
Volume	0: No sound is emitted. 1 – 5: The volume becomes higher as numerical value becomes larger.	0, 1, 2, [3], 4, 5

Heart Beat Sound

Change the setting of the sound emitted when R wave is detected.

Item	Description	Setting range
Tone	Set the tone.	[1], 2, 3
Volume	0: No sound is emitted. 1 – 5: The volume becomes higher as numerical value becomes larger.	0, 1, 2, [3], 4, 5

Processing End Sound

Change the setting of the sound emitted when the processing such as automatic recording is completed.

Item	Description	Setting range
Volume	0: No sound is emitted. 1 – 5: The volume becomes higher as numerical value becomes larger.	0, 1, 2, [3], 4, 5

Alarm Sound

Change the setting of the sound emitted when alarms such as waveform error occurs.

Item	Description	Setting range
Tone	Set the tone.	[1], 2, 3

Warning Alarm

Change the setting of the sound emitted when warning is occurring.

Item	Description	Setting range
Volume	1 – 5: The volume becomes higher as numerical value becomes larger.	1, 2, [3], 4, 5

Error Alarm

Change the setting of the sound emitted when device failure occurs.

Item	Description	Setting range
Volume	1 – 5: The volume becomes higher as numerical value becomes larger.	1, 2, [3], 4, 5

Prohibit Operation Sound

Change the setting of the sound emitted when the key operation is prohibited.

Item	Description	Setting range
Volume	1 – 5: The volume becomes higher as numerical value becomes larger.	1, 2, [3], 4, 5

Lead Off Sound

Change the setting of the sound emitted when the lead comes off.

Item	Description	Setting range
Volume	0: No sound is emitted. 1 – 5: The volume becomes higher as numerical value becomes larger.	1, 2, [3], 4, 5

Master's Step Sound

Change the setting of the buzzer sound emitted to the steps in the Master's test.

Item	Description	Setting range
Tone	Set the tone.	[1], 2, 3
Volume	0: No sound is emitted. 1 – 5: The volume becomes higher as numerical value becomes larger.	1, 2, [3], 4, 5

Setting Recording Format

Make the settings on recording.

Common/Manual

Manual Recording

Item	Description	Setting range
Recording channel number	Specify the number of channels for manual 12-lead reording.	3ch [6ch] 12ch
Adjust wave position	Specify how to adjust the position of waveform recording for printing. None: Printing is performed without adjusting the position. Centring baseline: Printing is performed after adjustments such as making the recording width of each channel equal and placing the baseline of wave at the center are made. Proportional: Printing is performed after adjustment is made to make the space of waveform of each channel equal.	None Centring baseline [Proportional]
CAL automatic insert	Specify the position to print the calibration wave. None: Printing is not performed. Waveform head: Prints the calibration wave at the top of the waveform. Waveform tail: Prints the calibration wave at the end of the waveform.	None Waveform head [Waveform tail]

Calibration Wave

Item	Description	Setting range
Shape	STD: Prints the calibration waveforms on the base line. Superimpose: Calibration waves are printed superimposed.	STD [Superimpose]

Recording Common

Change the settings of the common items for manual recording, automatic recording, review recording, extended recording, and copy recording.

Item	Description	Setting range
Long wave storage time	Set the initial value of long wave storage time when freeze is used.	[1min], 1 to 10min
Copy number	Specify the number of copy report printing.	[1] to 9
No. of Records	Specify the number of papers to output for automatic recording.	[1] to 9
Filter expression	Specify the method of filter expression. On/Off: Print “ON” and “OFF.” Filter name: Print the type of filter that is set to ON like “DF, MF, AC.” Frequency: Print the characteristics of frequency such as “0.05 to 150Hz.”	On/Off Filter name [Frequency]
Lead switch line	Specify whether or not to print solid line vertically when leads are switched in waveform recording.	Yes [No]
Anonymous record	Print the name and the birth year/month/day as “******" when printing the checked report.	Realtime record Copied record Printed from file

12L Auto

Change the settings of the automatic recording.

Common

Change the settings of common items for automatic recording and review recording.

Item	Description	Setting range
Automatic sensitivity report	Auto: Sensitivity is set automatically. Auto + 1: The lead block recorded with low sensitivity is recorded again with the sensitivity of 1cm/mV. 1 + Auto: When a large wave occurred during the recording with the sensitivity of 1cm/mV, that lead block is recorded again with automatic sensitivity.	[Auto] Auto + 1 1 + Auto
Auto recording report format	Specify the auto recording report format at the time of power on.	[TYPE1], TYPE2 TYPE3, TYPE4, TYPE5
Results display rec.	Set the report output type of results display.	[Auto record] Copied record
Chest leads 1	Specify the chest lead for auto recording.	[V1, V2, V3R, V4R, V5R, V6R] V1, V2, V3, V4, V5, V6, V3R, V4R, V5R, V6R, V7, V8, V9
Chest leads 2	Specify the chest lead for auto recording.	[V7, V8, V9, V4, V5, V6] V1, V2, V3, V4, V5, V6, V3R, V4R, V5R, V6R, V7, V8, V9
Adjust wave position	Specify how to adjust the position of waveform recording for printing. None: Printing is performed without adjusting the position. Centring baseline: Printing is performed after adjustments such as making the recording width of each channel equal and placing the baseline of wave at the center are made. Proportional: Printing is performed after adjustment is made to make the space of waveform of each channel equal.	None Centring baseline [Proportional]
Insert CAL	Set the printing conditions of calibration wave. Every new lead: Prints the calibration waves for all leads. None: Prints the calibration wave only for the top of waveform block. When sensitivity changes: Prints the calibration wave when leads other than the one with the sensitivity of 1cm/mV are used.	Every new lead None [When sensitivity changes]
CAL position	Specify the position to print the calibration wave. Waveform head: Prints the calibration wave at the top of the waveform. Waveform tail: Prints the calibration wave at the end of the waveform.	[Waveform head] Waveform tail
Print HR	Print the HR (heart rate) in the waveform report. *The HR to be printed in the waveform report is average HR for five seconds just before printing. Therefore, it may be different from the HR printed on the result report.	Yes [No]
Record waveform when using Z-fold paper	Specify how to print the report when using z-fold paper. Continuous: Prints four limbs and chest continuously. Per page: Print four limbs and chest per page.	[Continuous] Per page

Warm against to mistake of electrode	Displays a warning message after analysis when improper electrode attachment is suspected.	[Yes] No

Recording Extension Function

Item	Description	Setting range
★ Extension conditions	Specify the conditions for auto extension.	[Predefined]
	Predefined: Extended automatically when registered auto interpretation (*) is applicable.	Grade 2 and above Grade 4 and above
	Grade 2 and above: Extended automatically when the analysis judgment grade is 2 (boundary zone normal) or more.	Grade 6 only
	Grade 4 and above: Extended automatically when the analysis judgment grade is 4 (boundary zone normal) or more.	
	Grade 6 only: Extend automatically when the analysis judgment grade is 6.	

* Interpretantions for auto extension:

412: A-V Block 2 (Wenckeback)	413: A-V Block 2 (Mobitz)	414: 2:1 A-V Block
415: Complete A-V Block	803: A-V Junctional Rhythm	804: A-V Dissociation
816: Extreme Bradycardia	831: Escape Beat Premature Beat	841: Supraventricular
842: Ventricular Premature Beat	843: PAC Trigeminy	844: PVC Trigeminy
845: Frequent PAC	846: Frequent PVC	847: PAC Bigeminy
848: PVC Bigeminy	851: S-A Block or Marked Sinus arrhythmia	862: Runs of PAC
864: Runs of PVC	865: Ventricular Rhythm	866: Couplet PAC
867: Couplet PVC	871: Atrial Flutter	872: Atrial Flutter
881: Undefined Arrhythmia		

★: This item can be selected when FP-1001 is installed

Settings on Automatic Recording Type

Changee the settings of the automatic recording types 1 to 4.

Item	Description	Setting range
12L Auto TYPE1		
12L Auto TYPE2		
12L Auto TYPE3		
12L Auto TYPE4		
12L Auto TYPE5		
Rep. format name	Give a name for the format (setting) of auto recording report.	

Waveform Report

Item	Description	Setting range
Waveform report type	Specify the order of recording of ECG waveform. Standard: Recording is made from limb leads. Reverse: Recording is made from the chest lead.	[Standard] Reverse
Waveform report	Specify the type of ECG waveform recording report.	3ch×4 3ch×4+Rhythm 1ch 3ch×4+Rhythm 2ch [6ch×2] 6ch×2+Rhythm 1 12ch None
Rhythm lead	Specify the rhythm lead of waveform report and the rhythm lead of result report.	I, [II], III, aVR, aVL, aVF, V1, V2, V3, V4, [V5], V6
Wave record time	Specify the wave record time. Specify 10 sec. (1 page), 20 sec. (2 pages) or 22 sec. (2 pages) for Z-fold paper.	8 to 24 sec. [10]
Full lead waveform	Specify the waveform report format.	[Continuous] Coherent Coherent all

Result Report

Item	Description	Setting range
ECG measurement	Specify whether or not to conduct ECG measurement.	[Yes] No
★ ECG analysis	Specify the ECG analysis.	None [Clinical analysis]
Result report	Specify the type of result report. None: Does not print the result report. Cover: Print the patient data and the basic measurement value. DOM: Print the dominant waveform (3ch×4).	None Cover [DOM]
★ Result report	Specify the type of result report. None: Does not print the result report. Cover: Print the patient data and the interpretation name. DOM1: Print the dominant waveform (3ch×4) and the explanation section. DOM2+*: Print the dominant waveform (2ch×6). DOM3: Print by arranging the dominant waveform in three dimensions. FULL3+*: Print the waveform (3ch×4). FULL6+*: Print the waveform (6ch×2). FULL: Print the same phase of waveform for ten seconds. Waveform + cover: Print the cover report continuously on the same page with the waveform report. The lead marked with an asterisk (*) is a rhythm lead.	None Copver [DOM1] DOM2+Rhythm1ch DOM2+Rhythm2ch DOM3 FULL3+Rhythm1ch FULL3+Rhythm2ch FULL6 FULL6+Rhythm1ch FULL Waveform+Cover
Measurement wave	Specify the waveform type for the measurement	[Dominant] Average
★ Interpretation section	Specify how to edit the interpretation section. TYPE1: General judgment + interpretation name TYPE2: Interpretation name TYPE3: Interpretation title only	[TYPE1] TYPE2 TYPE3

★: This item can be selected when FP-1001 is installed

★Comment section	Specify the contents to print in the comment section. TYPE1: Comment TYPE2: ST measurement graph TYPE3: Abnormal measurement value	[TYPE1] TYPE2 TYPE3 TYPE4
★ Measurement section	Specify the contents to print in the measurement section. TYPE1: Measurement value + Minnesota code TYPE2: Measurement value TYPE3: Graph of measurement value	[TYPE1] TYPE2 TYPE3
★ Explanation section	Specify the contents to print in the explanation section of result report DOM1. TYPE1: Analysis guide TYPE2: Analysis guide + Explanation for interpretation TYPE3: ST measurement rader chart TYPE4: MEMO TYPE5: None	[TYPE1] TYPE2 TYPE3 TYPE4 TYPE5
★ Check comment	Specify whether or not to print the check comment.	[Yes] No
★ Full lead waveform	Specify how to print the waveform when FULL3 or FULL6 is selected in the result report. Continuous: Waveforms are printed as the time elapses in the order of waveform block. Coherent: All the waveforms are printed from the same time.	[Continuous] Coherent
★ Print negligible interpretation	Specify whether or not to print the name of negligible interpretation.	[Yes] No
★ Print warning comment	Specify whether or not to print warning comment.	Yes [No]
★ Order of abnormal wave	Specify how to print the waveform abnormality due to improper attachment of electrodes or improper recording. Top priority: Print in the top priority. Standard: Print in the order of grade of interpretation.	Top priority [Derault place]
Print ST	Print the ST measurement at the time of dominant waveform.	Yes [No]
★ PAC, PVC mark	Specify whether or not to mark PAC waveform and PVC waveform in the result report.	[Yes] No
Plot measurement point	Plot the measurement point in the dominant waveform and rhythm waveform of result report.	Yes [No]
Auto sensitivity applied lead	Specify the auto sensitivity for the dominant waveform of result report. None: Print by 1 cm/mV. Chest lead: Print the chest lead only by auto sensitivity. All leads: Print all the leads by auto sensitivity.	None [Chest lead] All leads
Detail measurement report	Specify whether or not to print the detail measurement report.	Yes [No]
★ Analysis guide	Specify the conditions to print the report of analysis guide. : Print all the interpretations judged. Auto: Select the highest grade of interpretation only one automatically and print it. Grade 6 only: Print the grade 6 (abnormal) of interpretation only. Grade 4 and above: Print the grade 4 (boundary zone abnormal) or more of interpretation. Grade 2 and above: Print the grade 2 (boundary zone normal) or more of interpretation. None: Does not print.	All interpretations [Auto] Grade 6 only Grade 4 and above Grade 2 and above None

★: This item can be selected when FP-1001 is installed

★ Commentary report	Specify the conditions to print the commentary. All interpretations: Print all the interpretations judged. Auto: Select the highest grade of interpretation only one automatically and print it. Grade 6 only: Print the grade 6 (abnormal) of interpretation only. Grade 4 and above: Print the grade 4 (boundary zone abnormal) or more of interpretation. Grade 2 and above: Print the grade 2 (boundary zone normal) or more of interpretation. None: Does not print.	All interpretations [Auto] Grade 6 only Grade 4 and above Grade 2 and above None

★: This item can be selected when FP-1001 is installed

Recording Extension Function

Item	Description	Description
Extra recording	Specify whether or not to conduct arrhythmia recording automatically when abnormality is found in the waveform. When installing FP-1001, conform to the conditions for extension of common setting. Yes rest: Conduct the extension of auto recording only for the test at rest. Yes in every phase: Conduct the extension of auto recording both for the test at rest and for the stress test. None: Does not conduct the extension of auto recording.	Yes rest Yes in every phase [None]

12L Review

Item	Description	Description
Review recording format	Specify the recording format when conducting review recording. Yes: Conform to the format specified by the setting of review recording. No: Conform to the auto recording format being selected.	Yes [No]
Rec. delay time	Record the waveform from the given time before.	8 to 24 sec [10 sec]

15L Auto

Item	Description	Setting range
Waveform report	Specify the type of 15 Lead of ECG waveform recording report.	3ch×5 3ch×5+rhythm1ch 6ch×2+3ch [6ch×2+3ch] None

15L Review

Item	Description	Setting range
Review recording format	Specify the recording format when conducting the review recording. Yes: Conform to the format specified by the setting of review recording. No: Conform to the auto recording format being selected.	Yes [No]
Rec. delay time	Record the waveform from the given time before.	8 to 24 sec [10 sec]
Waveform report	Specify the type of 15 Lead of ECG waveform recording report	3ch×5 3ch×5+rhythm1ch [6ch×2+3ch] 6ch×2+3ch+rhythm1ch None

Extend

Item	Description	Setting range
Arrhythmia lead	Specify the 3ch of recording lead (arrhythmia lead).	I, [II], III, aVR, aVL, aVF, [V1], V2, V3, V4, [V5], V6, V3R, V4R, V5R, V6R, V7, V8, V9
Waveform report	Specify the format of waveform report to report after recording waveform. None: Does not record. Standard: Record the waveform by 25mm/s. (A4 size, 2 sheets) Compressed: Record the waveform by 12.5mm/s. (A4 size, 1 sheet)	None [Standard] Compressed
Result report	None: Does not print the result report. Cover: Print the patient data and the measurement. Measurement: Print the detail measurement value. Waveform 1ch: The measurement and the 1ch waveform are printed. Waveform 3ch: The measurement and the 3ch waveform are printed.	None Cover Measurement [Waveform 1ch] Waveform 3ch
★ Iterpretation section	Specify how to edit the interpretation section. TYPE1: General judgment + interpretation name TYPE2: Interpretation name TYPE3: Interpretation title only	[TYPE1] TYPE2 TYPE3
ECG measurement	Specify whether or not to conduct ECG measurement.	Yes [No]
★ ECG analysis	Specify the ECG analysis.	None [Cliical analysis]
★ Print warning comment	Specify whether or not to print warning comment.	Yes [No]
★ Order of abnormal wave	Specify how to print the waveform abnormality by mistake of electrode to put on or bad recording. Top priority: Print in the top priority. Default place: Print in the order of grade of interpretation.	Top priority [Default place]
★ PAC, PVC mark	Specify whether or not to mark PAC waveform and PVC waveform in the result report.	[Yes] No
Arrhythmia measurement report	Specify whether of not to print the arrhythmia measurement report.	Yes [No]

★: This item can be selected when FP-1001 is installed

★ Analysis Guide	Specify the conditions to print the report of analysis guide. All interpretation: Print all the interpretations judged. Auto: Select the highest grade of interpretation only one automatically and print it. Grade 6 only: Print the grade 6 (abnormal) of interpretation only. Grade 4 and above: Print the grade 4 (boundary zone abnormal) or more of interpretation. Grade 2 and above: Print the grade 2 (boundary zone normal) or more of interpretation. None: Does not print.	All interpretation [Auto] Grade 6 only Grade 4 and above Grade 2 and above None
★ Commentary report	Specify the conditions to print the commentary report. All interpretation: Print all the interpretations judged. Auto: Select the highest grade of interpretation only one automatically and print it. Grade 6 only: Print the grade 6 (abnormal) of interpretation only. Grade 4 and above: Print the grade 4 (boundary zone abnormal) or more of interpretation. Grade 2 and above: Print the grade 2 (boundary zone normal) or more of interpretation. None: Does not print.	All interpretation [Auto] Grade 6 only Grade 4 and above Grade 2 and above None

★: This item can be selected when FP-1001 is installed

Default Settings of 12 Lead Auto

The default settings of 12 L Auto are as follows.

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Rep. foramt name	TYPE1	TYPE2	TYPE3	TYPE4	TYPE5	REVIEW

Waveform Report

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Waveform report type	Standard	Reverse	Standard	Reverse	Standard	Standard
Waveform report	6ch×2	6ch×2	3ch×4+ rhythm 2ch	3ch×4+ rhythm 2ch	None	6ch×2
Rhythm lead	II V5	II V5	II V5	II V5	II V5	II V5
Wave record time	10 sec	10 sec	10 sec	10 sec	10 sec	10 sec
Full lead waveform	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous

Result Report (When Not Installing FP-1001)

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
ECG measurement	Yes	Yes	Yes	Yes	Yes	Yes
Result report	DOM	DOM	DOM	DOM	DOM	DOM
Measurement wave	Dominant	Dominant	Dominant	Dominant	Dominant	Dominant
Print ST	No	No	No	No	No	No
Plot measurement point	No	No	No	No	No	No
Auto sensitivity applied lead	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads
Detail measurement report	No	No	No	No	No	No

Result Report (When Instaling FP-1001)

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
ECG analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis
Result report	DOM1	DOM1	DOM3	DOM3	FULL	DOM1
Measurement wave	Dominant	Dominant	Dominant	Dominant	Dominant	Dominant
Iterpretation section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Comment section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Measurement section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Explanation section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Check comment	Yes	Yes	Yes	Yes	Yes	Yes
Full lead waveform	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Print negligible iterpretation	Yes	Yes	Yes	Yes	Yes	Yes
Print warning comment	No	No	No	No	No	No
Order of abnormal wave	Default place	Default place	Default place	Default place	Default place	Default place
Print ST	No	No	No	No	No	No
PAC, PVC mark	Yes	Yes	Yes	Yes	Yes	Yes
Plot measurement point	No	No	No	No	No	No
Auto sensitivity applied lead	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads
Detail measurement report	No	No	No	No	No	No
Analysis Guide	Auto	Auto	Auto	Auto	Auto	Auto
Commentary report	Auto	Auto	Auto	Auto	Auto	Auto

Extend

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Extra recording	No	No	No	No	No	No

Default Settings of 15 Lead Auto

The default settings of 15 L Auto are as follows.

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Rep. foramt name	TYPE1	TYPE2	TYPE3	TYPE4	TYPE5	REVIEW

Waveform Report

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Waveform report	6ch×2+3ch+rhythm1ch	6ch×2+3ch+rhythm1ch	3ch×5+rhythm 1ch	3ch×5+rhythm 1ch	None	6ch×2+3ch+rhythm1ch ×2+3ch+rhythm1ch
Rhythm lead	II V5	II V5	II V5	II V5	II V5	II V5
Wave record time	10Sec	10Sec	10Sec	10Sec	10Sec	10Sec

Result Report (When Not Installing FP-1001)

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
ECG measurement	Yes	Yes	Yes	Yes	Yes	Yes
Result report	DOM	DOM	DOM	DOM	DOM	DOM
Measurement wave	Dominant	Dominant	Dominant	Dominant	Dominant	Dominant
Print ST	No	No	No	No	No	No
Plot measurement point	No	No	No	No	No	No
Auto sensitivity applied lead	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads
Detail measurement report	No	No	No	No	No	No

Result Report (When Installing FP-1001)

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
ECG analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis	Clinical analysis
Result report	DOM1	DOM1	DOM3	DOM3	FULL	DOM1
Measurement wave	Dominant	Dominant	Dominant	Dominant	Dominant	Dominant
Iterpretation section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Comment section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Measurement section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Explanation section	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1	TYPE1
Check comment	Yes	Yes	Yes	Yes	Yes	Yes
Full lead waveform	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Print negligible iterpretation	Yes	Yes	Yes	Yes	Yes	Yes
Print warning comment	No	No	No	No	No	No
Order of abnormal wave	Default place	Default place	Default place	Default place	Default place	Default place
Print ST	No	No	No	No	No	No
PAC, PVC mark	Yes	Yes	Yes	Yes	Yes	Yes
Plot measurement point	No	No	No	No	No	No
Auto sensitivity applied lead	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads	Chest leads
Detail measurement report	No	No	No	No	No	No
Analysis Guide	Auto	Auto	Auto	Auto	Auto	Auto
Commentary report	Auto	Auto	Auto	Auto	Auto	Auto

Extend

Item	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO 5	REVIEW
Extra recording	No	No	No	No	No	No

Setting the Patient Data

General – Name

Set general patient data as follows.

General

Item	Description	Setting range
Patient data file	Analyzed patient data can be stored in a PC/CF card, and the data stored in a PC/CF card can be retrieved for the next analysis.	Yes [No]
Display ID/Name	Specify which is to be displayed on the screen at all times, ID number or Name.	[ID number] Name
Item for 3rd line	Specify the item to be displayed for the 3rd line of the patient data display area on the analysis screen.	[BP/Trips] Name Location 1 Location 2 Location 3 Location 4 Technician
Initial focus	Specify the patient data item to be entered first.	[ID number] Age Sex Name Location Height Weight Medication Symptoms Comment BP Doctor Technician
Erase items whe ID in	The previous patient data is deleted when an ID number is entered.	Yes [No]
Alert duplicated ID	An ID confirmation message is displayed when automatic recording is performed without changing the ID number.	[Yes] No

ID Number

Item	Description	Setting range
Input	Specify whether to enter, display, and print the ID number.	[Yes] No
Digits	Specify the number of digits of the ID number.	3 to 20 [12]
Automatically increment ID	Adds 1 to the ID number after automatic recording is made.	Yes [No]
Fix top digits	Arbitrary alphanumeric characters can be selected for the top digits of the ID number.	Arbitrary alphanumeric characters
Hyphen position	Specify where to place hyphen (-) by the number of digit from right. A maximum of 3 positions can be specified.	
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for today
ID number character	Number only: Numeric character entry by ten keys only is allowed. Arabic numerals: Alpha-numeric character entry by ten keys and full keys is allowed.	Number only Arabic numerals

Age

Item	Description	Setting range
Input method	D.O.B.: Enter the date of birth, and the patient's age is automatically calculated.	[D.O.B] Age
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for today

Sex

Item	Description	Setting range
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for tody

Name

Item	Description	Setting range
Input	Specify whether to enter, display, and print the name of the patient.	[Yes] No
Backup	Yes: Calls up the contents of the time before the power was turned off next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for today

Location - BMI

Change the settings of the location, height, weight, and BMI entries as follows.

Location Code 1 - 4

Item	Description	Setting range
Input	Specify whether to enter, display, and print the location code.	[Yes] No 4 to 8
Number digits	Specify the number of digits of the location code.	4 to 8 digits [4 digits]
Register code	Register the location code and corresponding character strings. A maximum of 200 items can be registered.	
Number items	Specify the number of location codes to be registered. A maximum of 200 codes can be registered for locations 1 to 4 in total.	Location 1 Location 2 Location 3 Location 4
Disable change	Fixes the entered contents.	Yes [No]
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for today

Height

Item	Description	Setting range
Input	Specify whether to enter, display, and print the height of the patient.	[Yes] No
Unit	Specify the unit to be used.	[cm] inch

Weight

Item	Description	Setting range
Input	Specify whether to enter, display, and print the weight of the patient.	[Yes] No
Unit	Specify the unit to be used.	[kg] lb.

BMI

Item	Description	Setting range
Display	Specify whether to calculate, display, and printthe BMI.	[Yes] No

Med. – Tech Name

Change the settings of medication, subjective symptom, comment, blood pressure, body position, respiration rate, doctor's name, and technician's name entries as follows.

Medication

Item	Description	Setting range
Medication 1	Specify whether to enter medication information.	Yes [No]
Medication 2	Specify whether to enter medication information.	Yes [No]
Register code	Register the medication code. A maximum of 10 codes can be registered.	

Subjective Symptoms

Item	Description	Setting range
Input	Specify whether to enter, display, and print subjective symptoms.	Yes [No]
Register code	Register subjective symptom codes. A maximum of 10 codes can be registered.	

Comment

Item	Description	Setting range
Input	Specify whether to enter, display, and print the comment.	Yes [No]

BP

Item	Description	Setting range
Input	Specify whether to enter, display, and print the BP.	[Yes] No

Body Position

Item	Description	Setting range
Input	Specify whether to enter, display, and print the body position.	Yes [No]

Respiration Rate

Item	Description	Setting range
Input	Specify whether to enter, display, and print the respiration rate.	Yes [No]

Doctor's Name

Item	Description	Setting range
Input	Specify whether to enter, display, and print the doctor's name.	Yes [No]
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the date is changed.	Yes [No] Yes for today
Disable change	Protect changes of doctor's name.	Yes [No]
Register code	Register doctor's name. A maximum of 20 names can be registered.	

Technician's Name

Item	Description	Setting range
Input	Specify whether to enter, display, and print the technician's name.	Yes [No]
Backup	Yes: Calls up the contents of the time before the power was turned off the next time the power is turned on. No: The contents are deleted when the power is turned off. Yes for today: The stored contents are deleted when the dateis changed.	Yes [No] Yes for today
Disable change	Protect changes of technician's name.	Yes [No]
Number digits	Specify the number of digits of the technician code.	[No] 4 to 12
Register code	Register technician's name. A maximum of 20 names can be registered.	

Settings on External Devices

Make the settings on the connection of external devices as follows.

Serial Port

Select external devices to be connected to the serial ports.

Item	Description	Setting range
Serial port 1	Specify the external device to be connected to serial port 1.	[None] ID reader 1 ID reader 2 Ergometer Treadmill BP monitor
Serial port 2	Specify the external device to be connected to serial port 2.	[None] ID reader 1 ID reader 2 Ergometer Treadmill BP monitor
Serial port 3	Specify the external device to be connected to serial port 3.	[None] ID reader 1 ID reader 2 Ergometer Treadmill BP monitor

ID Reader 1, 2

Change the settings of the type and operation of the ID readers and data format.

ID Reader Type

Specify the type of the ID reader.

Item	Description	Setting range
Control type	Specify the control type of the ID reader.	No control [ACK response]
Communication speed	Specify the communication speed.	1200 2400 4800 [9600]
Data bit length	Specify the data bit length.	[7] 8
Stop bit length	Specify the stop bit length.	[1] 2
Parity	Specify the parity bit.	None [Even] Odd
Data significant bit length	Specify the significant bit length of the ID data received.	6 [7] 8
Retry times	Specify the number of times of retries in case where “Yes” is selected for the data retry procedure.	1 to 9 [1]
Data type	Specify the type of the ID data.	TYPE (Fixed length) TYPE1 (CR, LF) TYPE2 (STX-ETX) [TYPE3 (STX-ETX、BCC)]
Max data size	Specify the maximum size of receivable ID data.	1 to 256 [74]

ID Data Format

Specify the format of each item of the ID card as follows.

Item	Description	Setting range
Load specified item	Select “Yes” to retrieve the read data into the ID item on which the cursor is placed.	
Column position	Specify the position of the following items on the ID data: ID number / Name / D.O.B (Y/M/D) / Sex / Age / Height / Weight / Location 1 / Location 2 / Comment / BP (SYS/DIA) / Technician’s name	—
ID number character	Specify the characters to be used as the ID number.	[Name only] Arabic numerals Numerals (substitute 0)
Man character	Specify the character that represents man.	[M]
Technician’s name character	Specify the characters to be entered as the technician’s name.	[Number only] Character

BP Monitor

Change the setting of the operation of the BP monitor.

Item	Description	Setting range
BP monitor type	Specify the BP monitor to be connected.	[FUKUDA protocol] Ergoline (BP) Tango
BP measurement start time	Specify the time to start BP measurement using the scheduled examination protocol.	0 sec before 30 sec before [45 sec before] 60 sec before 90 sec before

Settings of File and Network

General

General

Change the settings of data storage/read and communication method with other devices.

Item	Description	Setting range
Storage media	Specify the media in which the data is to be stored in. Two or more media can be specified.	[PC card] CF card DMS
Load media	Specify the medium into which the data is to be loaded from.	[PC card] CF card
Network file server	Specify the type name of DMS to be connected.	[None] EFS-200
Automatic storing	Specify whether the data is to be stored automatically. Yes: All the storable data is stored. No: Automatic storage is not performed. Refer to exam settings: Each examination mode setting is followed.	Yes [No] Refer to exam settings
Every exam should be stored to	Storage of previous exam result data is checked when a new examination is started. A message is displayed if the data is not stored. Specify the medium in which the exam result data is to be stored.	PC card CF card DMS
★ Re-analyze when retrieve	Re-analyis is performed when the file is retrieved for display.	Yes [No]
Reports from long wave	Specify the report type for file retrieval.	[Analysis report only] All waveform Analysis+waveform

★: This item can be selected when FP-1001 is installed

Display Result

Change the settings of the display method in automatic analysis.

Item	Description	Setting range
File result display order	Specify whether the waveforms or the results are to be displayed first in the inspection result display obtained by data retrieval.	[Result first] Waveform first
Display ST	ST measurement value is displayed on the analysis result screen.	Yes [No]

Freeze

Item	Description	Setting range
Wave display format	Specify waveform display format to be displayed on the frozen waveform screen in long-term waveform reading.	[6ch] 6ch×2
Default screen	Specify the first screen to be displayed on the frozen waveform screen in long-term waveform reading.	[12ch waveform] Rythm waveform
Freeze measurement position	Specify the first screen to be displayed on the frozen waveform screen in long-term waveform reading.	Front Center [Last]
★Freeze analysis position	Specify the analysis position on the frozen waveform screen in long-term waveform reading.	Front Center [Last]

★: This item can be selected when FP-1001 is installed

Data Stored

Change the settings of ECG data storage method in standard automatic 12-lead analysis.

Item	Description	Setting range
★Data stored	Specify the conditions of storage of 12-lead analysis data. No condition: Stores the data for all the abservations. Grade 2 and above: Stores data when observation grade is 2 and above. Grade 4 and above: Storese data when observation above. Grade 6 only: Stores data when observation grade is 6.	[No condition] Grade 2 and above Grade 4 and above Grade 6 only
Store all frozen ECG	Specify whether the waveforms in the specified range are to be stored in addition to those in range of the 12 leads examination.	Yes [No]

★: This item can be selected when FP-1001 is installed

Password

Set the password.

Item	Description	Setting range
Password	Set the password to be used to open the [File/Net] menu and initialize the ECG settings.	

Rec Retrieve Host	Specify the host for recording/retrieval.	1 to 4

ECG Information

Set the information on this equipment.

Item	Description	Setting range
ECG name	Specify ECG name.	
IP address	Specify the IP address of the ECG.	
Subnet mask	Specify subnet mask.	
Default gateway	Specify the IP address of the gateway.	

FTP

Item	Description	Setting range
User name	Specify the user name to log in to the FTP host.	
Password	Specify the password to be used to log in to the FTP host.	
Relative path	Log in to the FTP host and specify the relative path of the destination of data transmission.	
Data format	Specify the format of the data to be transmitted.	[FUKUDA proprietary (unit)]

Host Information 1 to 4

Set the information of hosts 1 to 4.

Item	Description	Setting range
Host name	Specify the host name.	[ECG]
IP address	Specify the IP address of the host.	[0.0.0.0]
Port number	Specify the port number. *Normally 21 in the case of FTP	

Setting 12 Leads Examination

General/File

General

Change the general settings of 12 leads examination.

Item	Description	Setting range
Results display appears	Specify whether analysis result and interpretation of observation are to be displayed on the screen or not. Effective only for analyses at rest. None: Analysis result is not displayed. After waveform report: Analysis result is displayed after the waveform report is printed.	None [After waveform report]
Stop record when lead off	Recording is stopped if the lead comes off during recording.	[Yes] No
Display order of result	Specify whether waveforms or results are to be displayed first as the analysis result.	[Results first] Waveform first
Serial comparison	Calls and displays the previus analysis data.	Yes [No]

File

Item	Description	Setting range
Automatic storing	Specify whether ECG data is to be stored automatically after automatic recording is performed.	Yes [No]
Store all scheduled records	Specify whether ECG data is to be stored automatically during interval recording.	Yes [No]
Storage media	Specify the media in which the ECG data is to be stored. Two or more media can be specified. **[MEMO] Refer to"Settings of File and Network"on page 17-41 for the settings on storage.** **[MEMO] The settings on the file of 12-lead ECG examination are effective only when "Refer to exam settings" is selected in "General" – "Automatic storing" of the File/Network setting.**	[PC card] CF card DMS

Post/Display

Post

Change the settings of the post exercise analysis function.

Item	Description	Setting range
Auro recording report format	Specify the format of arbitrary automatic recording after exercise. The format specified in 12L Auto.	[TYPE1] TYPE2 TYPE3 TYPE4 TYPE5
Scheduled record format	Specify the format of scheduled recording. The format specified in 12L Auto.	[TYPE1] TYPE2 TYPE3 TYPE4 TYPE5
Compressed recording	Recording is made at low speed between scheduled recording periods. None: Compressed recording is not made. 5 mm/s: Compressed recording is printed at 5mm/s. 10 mm/s: Compressed recording is printed at 10mm/s. 12.5 mm/s: Compressed recording is printed at 12.5mm/s.	[None] 5 mm/s 10 mm/s 12.5 mm/s
Waveform comparison report	Waveform comparison report is printed when post-exercise state is completed.	Yes [No]
Skip recording if lead off	Specify whether lead off state is to be checked when scheduled recording is started after exercise.	[Yes] No

Recording Schedule

Item	Description	Setting range
Periodic record	Recording is made automatically at specified intervals.	None 30sec 1min 2min [3min] 4min. 5min 10min 15min 30min 60min
Record timetable	Recording is made automatically at specified times. A maximum of 10 times can be specified.	0 to 59 min [0], [1]

BP Schedule

Item	Description	Setting range
Periodic measure	Recording is made automatically at specified intervals.	None 30 sec 1 min 2 min [3 min] 4 min 5 min 10 min 15 min 30 min 60 min.
Measure timetable	Measurement is made at specified times. A maximum of 10 times can be specified.	0 to 59 min

Display Format

Item	Description	Setting range
Display waveform	Specify the waveform display that appears when the power is turned on.	[6ch×2] Optional format 1 Optional format 2 Optional format 3
Rhythm lead	Specify the lead of rhythm waveforms to be displayed on the screen.	I, [II], III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6
Waveform display phase	Continuous: Waveforms are displayed with time elapsed the order of waveform blocks. Coherent: All the waveforms are displayed at the same time.	Continuous [Coherent]
Optional format 1	Specify the waveforms to be displayed on the optional format 1.	[I, II, III, aVR, aVL, aVF] V1, V2, V3, V4, V5, V6
Optional format 2	Specify the waveforms to be displayed on the optional format 2.	I, II, III, aVR, aVL, aVF [V1, V2, V3, V4, V5, V6]
Optional format 3	Specify the waveforms to be displayed on the optional format 3.	[I, II], III, aVR, aVL, [aVF] [V] , V2, V3, V4, [V5, V6]

Freeze

Item	Description	Setting range
Wave display format	Specify the waveform display format in frozen state.	[6ch] 6ch×2
Default screen	Specify the screen to be displayed first when the waveforms are made frozen.	[12ch waveform] Rhythm waveform
Freeze measurement position	Specify what part of the recorded waveforms is to be measured when the waveforms are made frozen. *This item is not available when the FP-1001 is installed.	Front Center [Last]
★ Freeze analysis position	Specify what part of the recorded waveforms is to be analyzed when the waveforms are made frozen.	Front Center [Last]

★: This item can be selected when FP-1001 is installed

Display Results

Item	Description	Setting range
Wave display format	Specify the waveform display format in result display.	[6ch] 6ch×2
Display ST	ST measurement value is displayed on the result screen.	Yes [No]

Settings of Arrhythmia Examination

General/File

General

Specify the number of leads and the exam lead for arrhythmia examination.

Item	Description	Setting range
No. leads	Specify the number of leads to be used for examination.	1ch [3ch]
Exam lead	Specify the record lead. Specify "1ch" as the number of leads, and the lead specified as 1ch of the exam lead is made effective.	I, [II], III, aVR, aVL, aVF, [V1], V2, V3, V4, [V5], V6, V3R, V4R, V5R, V6R, V7, V8, V9

File

Change the settings of automatic storage of ECG data and the media for storage.

Item	Description	Setting range
Automatic storing	Specify whether the ECG data is to be stored automatically after automatic recording is made.	Yes [No]
Storage media	Specify the media into which the ECG data is to be stored. Two or more media can be specified. **[MEMO] Refer to"Settings of File and Network"on page 17-41 for the settings on storage.** **[MEMO: The settings on the file of arrhythmia examination are effective only when "Refer to exam settings" is selected in "General" – "Automatic storing" of the File/Network setting.**	[PC card] CF card DMS

Auto Record

Change the settings of automatic recording.

Item	Description	Setting range
Wave record time	Specify the waveform recording time. If 3ch is selected as the number of leads, the record time can be specified within the range from 40 sec to 3 min, and 100 and 200 beats only.	40sec 1 to 10min (in steps of 1 min) [3 min] 100 beats 200 beats
Measurement channel	Specify the channel to be used for rhythm measurement when 3ch is selected as the number of leads.	[CH1] CH2 CH3
Waveform report	Specify the waveform report recording type. None: Waveforms are not recorded. Standard: Waveforms are recorded at 25 mm/s. Compressed (5 mm/s): Waveforms are recorded at 5 mm/s. Compressed (10 mm/s): Waveforms are recorded at 10 mm/s.	None [Standard] Compressed (5 mm/s) Compressed (10 mm/s)
Number of channels in a page (1 lead)	Specify the maximum number of channels to be printed on one page when 1ch is selected as the number of channels.	6ch [8ch]
Result report	Specify whether the report with edited interpretations and event waveforms are to be printed.	[Yes] No
Rhythm measurement report	Specify whether the rhythm measurement report is to be printed.	[Yes] No
Detail measurement report	Specify whether detail measurement report is to be printed.	Yes [No]
★Print interpretation	Specify whether the name of interpretation is to be printed.	Yes No
★Print warning comment	Specify whether warning comment is to be printed on the result report.	Yes [No]

★: This item can be selected when FP-1001 is installed

Setting the Master's Step Test

General/File

General

Change the settings of the Master's step test as follows.

Item	Description	Setting range
Load	Specify the load to be applied.	Half [Single] Double Double+15% Triple
Additional load	If "Double+15%" is selected in "Load" shown above, additional load can be changed in steps of 5%.	5 to 50%
Number of steps	Specify the number of steps for one trip.	[5] 6
Step sound	Tone: Specify the tone. Volume: Specify the volume.	[1], 2, 3 0, 1, 2, [3], 4, 5
Display window	Specify whether the implementation status of the Master's test is to be displayed on the window.	Yes [No]
End test	Specify the method of transition after the Master's test is completed. Auto: Automatically transferred to post-exercise state. Pause: The timer stays off until "Post exercise" is pressed. Not transferred to post-exercise state automatically. Stop recording: The post-exercise timer is started, but recording is not started unless "Start record" is pressed.	[Auto] Pause Stop recording
Start delay	Select "Yes," and the step sound is started approximately 1.5 seconds after the exercise start chime sounds.	Yes [No]
Guide prior to ending	Notifies that the Master's test is to be completed soon 2 trips prior to the end of the test.	Yes [No]
Default lead	Specify the analysis method when switching is made to the Master's test while 15-lead option is used.	12 lead [15 lead]

File

Change the settings of automatic storage of ECG data and the media for storage.

Item	Description	Setting range
Automatic storing	Specify whether the ECG data is to be automatically stored after automatic recording is completed in the Master's test mode.	Yes [No]
Storage media	Specify the media for ECG data storage. Two or more media can bespecified. **[MEMO] Refer to"Settings of File and Network"on page 17-41 for the settings on storage.** **[MEMO: The settings on the file of the Master's test are effective only when "Refer to exam settings" is selected in "General" – "Automatic storing" of the File/Network setting.**	[PC card] CF card DMS

Exercise

Change the settings of the exercise function of the Master's step test.

Item	Description	Setting range
Scheduled record format	Specify the scheduled record format. The format is specified in 12L Auto	[TYPE1] TYPE2 TYPE3 TYPE4 TYPE5
Compressed recording	Recording is made at low speed between the scheduled recordings. None: Compressed recording is not made. 5 mm/s: Compressed recording is printed at 5mm/s. 10 mm/s: Compressed recording is printed at 10mm/s. 12.5 mm/s: Compressed recording is printed at 12.5mm/s.	[None] 5 mm/s 10 mm/s 12.5 mm/s
Periodic record	Recording is automatically made at specified intervals.	[None] 30 sec 1 min 2 min 3 min 4 min 5 min 10 min 15 min 30 min 60 min
Record timetable	Recording is made automatically at specified times. A maximum of 10 times can be specified.	0 to 59 sec

Post

Change the settings of post-exercise function of the Master's test.
Refer to "Post/Display" in 12 Leads for the post-exercise settings.

Settings of DC Input

General

Specify the number of channels and the reference lead as follows.

Item	Description	Setting range
# channels	Specify the number of channels for DC input to be displayed or recorded.	1ch 2ch [3ch]
Reference lead	Specify the refence ECG lead.	None I, [II], III, aVR, aVL, aVF V1, V2, V3, V4, V5, V6
Recording time	Specify the waveform recording time. Recording is automatically stopped when the time specified here elapses. If 0sec is selectetd, recording is continued until the “Start/Stop” buttin is pressed again.	[0 sec] 0 to 999 sec

Settings of 15 Leads Examination

General/File

Change general settings of 15 leads examination as follows.

Lead

Item	Description	Setting range
EXTRA lead	Specify the EXTRA lead to be used for 15 leads examination.	[EXTRA lead 1] EXTRA lead 2
EXTRA lead 1	Specify EXTRA lead 1.	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6, [V3R], [V4R], [V5R], V6R, V7, V8, V9
EXTRA lead 2	Specify EXTRA lead 2.	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6, [V3R], [V4R], [V5R], V6R, V7, V8, V9

[MEMO] Refer to "Setting 12 Leads Examination" on page 17-44 for these other settings.

Printing Setting Contents

The contents of the current setting can be printed on recording paper.

1 **Press the START/STOP button while setting of the equipment is being made.**

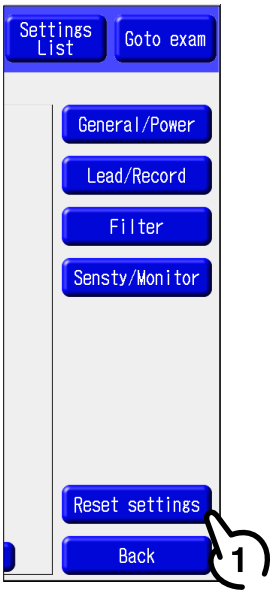
2 **Press the START/STOP button again while printing is being made to stop printing.**

Restoring Initial Setting

The default settings can be restored for each item.

1 **Follow the procedures 1 and 2 in “Flow of Examination Method Setting” on page 17-12.**

2



Press [Reset settings].

The setting is initialized.

If [Reset settings] is pressed on the [Settings>List items] screen, the entire setting contents are initialized.

If [Reset settings] is pressed on the [ECG controls] or [Patient data] screen, the setting contents in that category are initialized.

Chapter 18

Appendix

This chapter provides the specifications of the equipment, details of accessories, etc.

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Daily Check List 18-11

Periodic Check List (1) 18-12

Specifications

The specifications of the equipment are as follows.

[MEMO] The specifications are subject to change without prior notice for quality improvement.

ECG Unit

Sensitivity	1/4, 1/2, 1, 2, or automatic
Differential and synchronous offset voltage (Voltage between electrode and patient's skin)	±550 mV or higher
Sine-wave characteristics	Within –3 dB at 0.05 to 150 Hz
Low-frequency response (time constant)	3.2 seconds or larger
Common mode rejection	103 dB or more (2 mm [p-p] or lower at sensitivity level 1)
Recording speed	Less than ±3% at 5, 10, 12.5, 25, 50 mm/sec.
Leads	12 leads (Standard), Nehb lead (Standard),15 leads (Option)
Internal noise	30 μB (p-p) or lower (Input conversion)
Filters	Hum filter: –20 dB or less at 50 Hz or 60 Hz Muscle filter: –3 dB (–6 dB/oct) at 35 Hz or 25 Hz Drift filter: –3 dB or less at 0.25 Hz or 0.5 Hz
Recording system	Thermal array head (Waveform/printing)
Display	Color Liquid Crystal Display (LCD), 1024 × 768 dots, with backlighting
A/D conversion	18 bits
Sampling rate	8000 samples/sec.
DC input	10 mm/0.5 V, Imbalance type, 100 kΩ or higher (3ch)
Monitor output	0.5 V/mV, Imbalance type, Lower than 100 Ω (3ch)
Serial port	Conforms to RS-232C, 3ch
LAN port	Conforms to IEEE802.3 10BASE-T
Heart rate display	20 to 300, Error: ±2 or less

Analyzer Unit

Patient information	ID number, age, sex, height, weight, etc.
Basic measurement	Heart rate, RR, PR, QRS, QT time, QTc, electric axis, SV1, RV5 (6)
★ Interpretation and code	Approximately 120 types
★ Minnesota code	Approximately 130 types
★ Grade judgment	4 levels
★ Exercise test judgment	3 levels (At rest only)

★: When FP-1001 is installed.

Entire Equipment

Safety	Class I and internal power supply equipment
	CF type equipment
Power supply	AC power: 100V AC, 50/60 Hz
	DC power: 9.6V DC (Battery pack)
Power consumption	At AC operation: 95 VA
	At DC operation: 80 W
Outside dimensions (when LCD is closed)	335 mm (W) × 346 mm (D) × 116 mm (H)
(When LCD is open)	335 mm (W) × 346 mm (D) × 410 mm (H)
Mass	Approximately 8 kg (Excluding battery pack)

Operation Environment

Temperature	10°C to 40°C (50°F to 104°F)
Humidity	25 to 95% (No condensation allowed.)
Atmospheric pressure	70 to 106 kPa (700 to 1060 mbar)

Transportation and Storage Environment (FX-7542 Main Unit)

Temperature	–10°C to +50°C (14°F to 122°F)
Humidity	10 to 95% (No condensation allowed.)
Atmospheric pressure	70 to 106 kPa (700 to 1060 mbar)

Accessories

Accessories vary depending on the destination of export. Check that appropriate accessories are supplied by referring to the following.

- For general export
- For export to Europe
- For export to the U.S.A.

[NOTE] To satisfy intended performance of the product, use consumables specified by us.

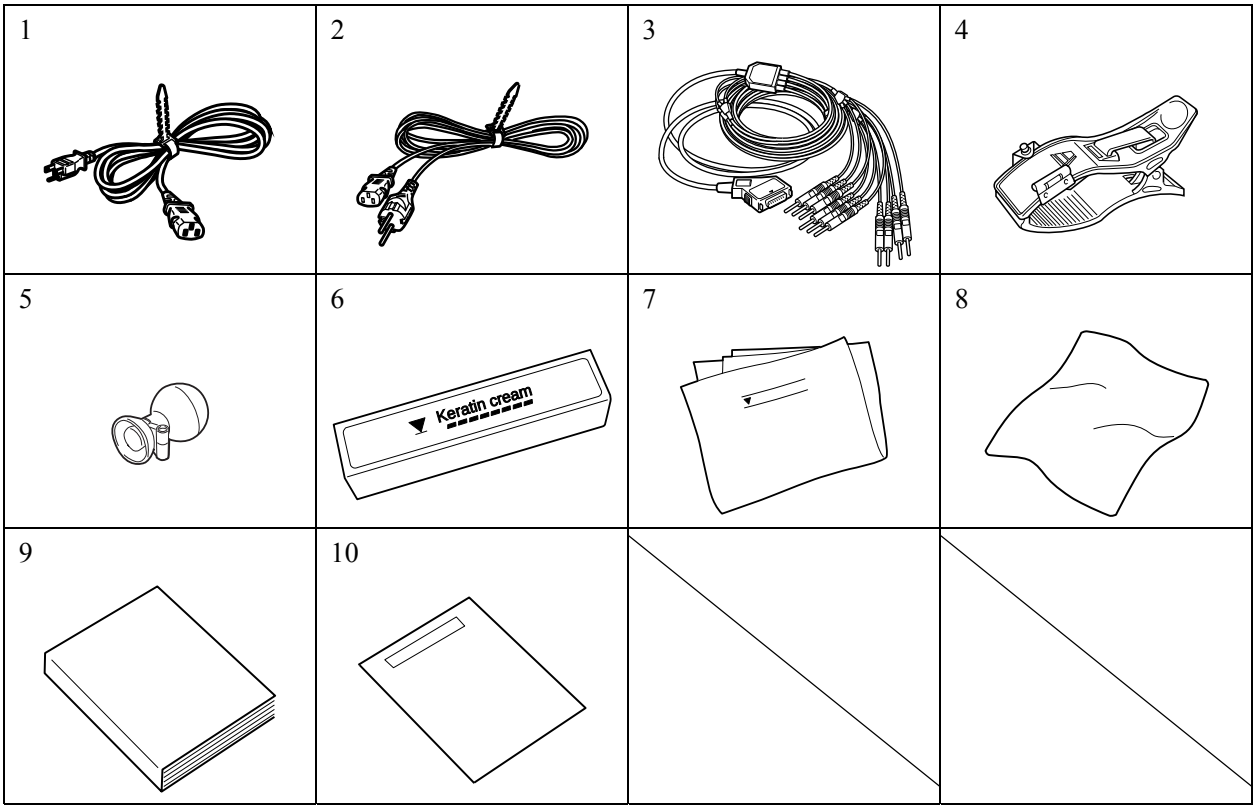
[NOTE] Place an order for spare parts, informing us of the type name.

[MEMO] Note that accessories are subject to change without prior notice for improvement.

For General Export

The following table lists the accessories for general export (9D6010).

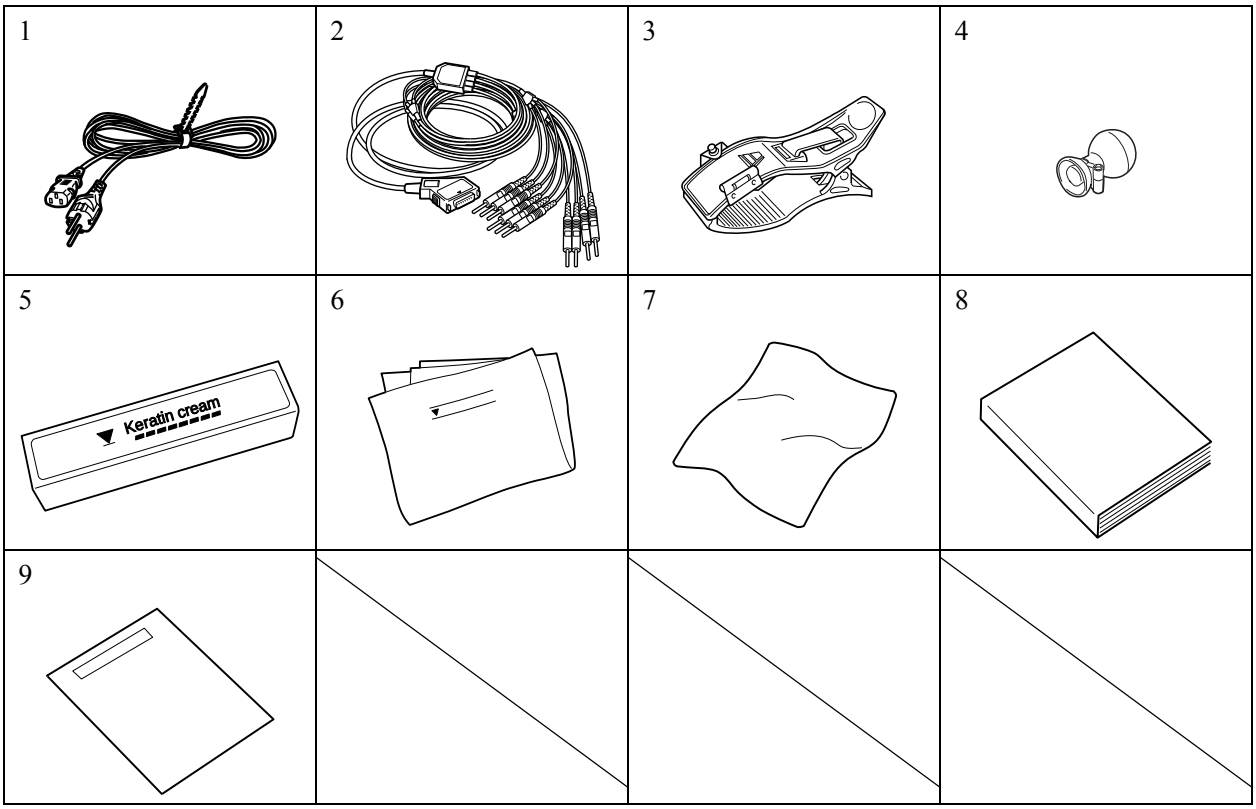
No.	Name	Type	Quantity	Note
1	Power cord	CS-20	1	ASE-02G
2	Power cord	CS-18	1	ASE-02G
3	Patient cable	CP-104J	1	ASE-02G
4	Limb electrode	TE-43 (For general export)	1 set	ASE-02G
5	Chest electrode	TE-01	6	ASE-02G
6	Keratin cream	OJ-02	1	ASE-02G
7	Cover	Cover	1	
8	Cloth	Savina Minimax (Dark blue)	1	
9	Operation manual	Operation Manual (English)	1	
10	Technical note	4L3986	1	



For Export to Europe

The following table lists the accessories for export to Europe (9D6012).

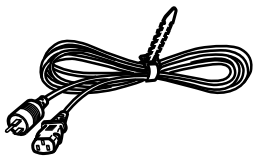
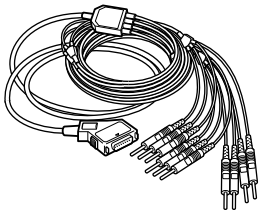
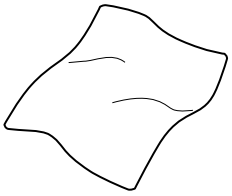
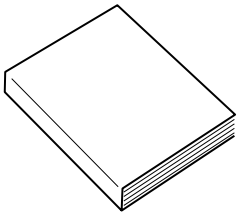
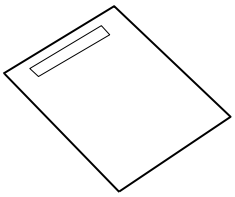
No.	Name	Type	Quantity	Note
1	Power cord	CS-18	1	ASE-02E
2	Patient cable	CP-104T	1	ASE-02E
3	Limb electrode	TEE-43RG	1 set	ASE-02E
4	Chest electrode	TEE-01RA	6	ASE-02E
5	Keratin cream	OJ-02	1	
6	Cover	Cover	1	
7	Cloth	Savina Minimax (Dark blue)	1	
8	Operation manual	Operation Manual (English)	1	
9	Technical note	4L3986	1	



For Export to the U.S.A.

The following table lists the accessories for export to the U.S.A. (9D6011).

No.	Name	Type	Quantity	Note
1	Power cord	CS-24	1	ASE-02A
2	Patient cable	CP-104L	1	ASE-02A
3	Cloth	Savina Minimax (Dark blue)	1	
4	Operation manual	Operation Manual (English)	1	
5	Technical note	4L3986	1	

1 	2 	3 	4 
5 			

Optional Items

The following optional items are available in addition to standard items. Place an order for optional items for your desired applications.

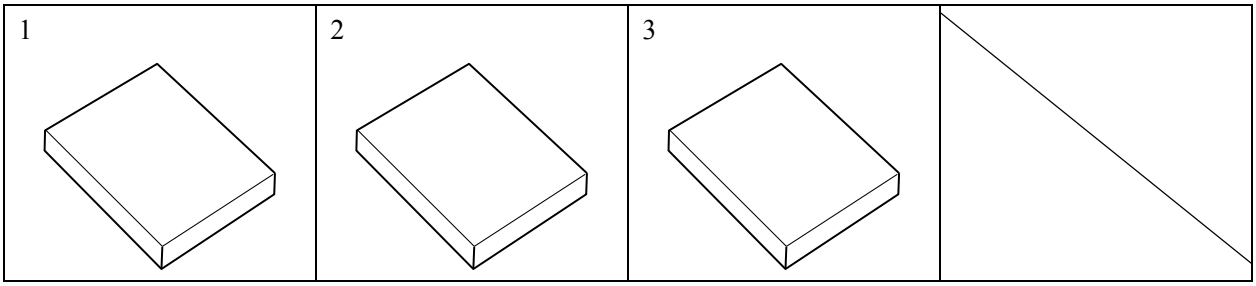
[NOTE] The optional items are not supplied as accessories. Place an order separately.

[MEMO] Note that the optional items are subject to change without prior notice for quality improvement.

- Software package
- Option module
- Recording paper
- Electrode, patient cable, and other cables
- Others

Software Package

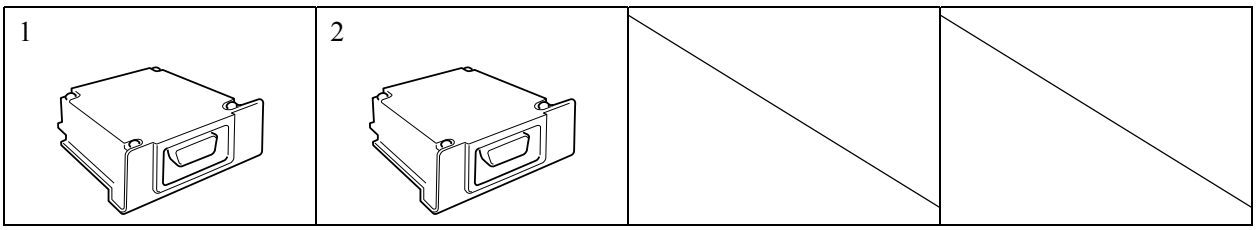
No.	Name	Type	Quantity	Note
1	ECG interpretation software (Option)	FP-1001	1	
2	Holter ECG software (Option)	FP-1002	1	
3	Stress test software (Option)	FP-1003	1	



[MEMO] Note that the above items are subject to change without prior notice for quality improvement.

Option Module

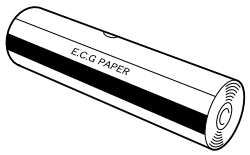
No.	Name	Type	Quantity	Note
1	B-input ECG amp module	EE-20	1	
2	15-lead amp module	EE-21	1	



[MEMO] Note that the above option modules are subject to change without prior notice for quality improvement.

Recording Paper

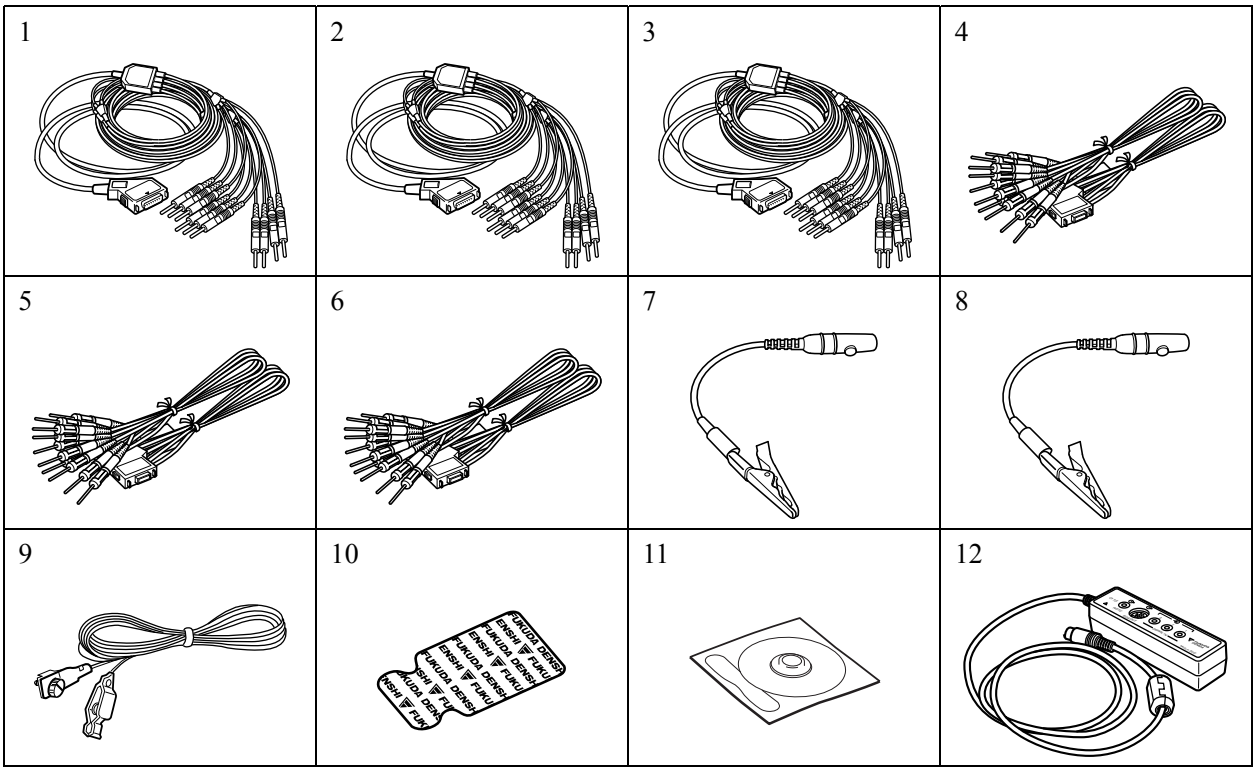
No.	Name	Type	Quantity	Note
1	Recording paper	OP-69TE	1	Roll paper (210 mm, Standard item)
2	Recording paper	OP-621TE	1	Z-fold paper (210 mm, Standard item)
3	Z-fold paper	OP-623TE	1	Z-fold paper (210 mm, Plain)

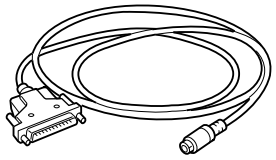
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[MEMO] Note that the above recording paper is subject to change without prior notice for quality improvement.

Electrode, Patient Cable, and Other Cables

No.	Name	Type	Quantity	Note
1	Patient cable (12 leads)	CP-104J	1	For general export (Compatible with defibrillator)
2	Patient cable (12 leads)	CP-104T	1	For export to Europe (Compatible with defibrillator)
3	Patient cable (12 leads)	CP-104L	1	For export to the U.S.A. (Compatible with defibrillator)
4	Patient cable (15 leads)	OPE-01AKP	1	For general export (Compatible with defibrillator)
5	Patient cable (15 leads)	OPE-01BKPE	1	For export to Europe (Compatible with defibrillator)
6	Patient cable (15 leads)	OPE-01NKPA	1	For export to the U.S.A. (Compatible with defibrillator)
7	Nip lead A	CM-89	1	For 12 leads
8	Nip lead A (Set of 3)	CM-89	1 set	For 15 leads (Used in addition to CM-89 for 12 leads)
9	Ground cable	CE-12	1	
10	Disposable electrode (for limbs)	Niprode II	1	Compatible with defibrillator (Ag-AgCl)
11	Magnerode	TE-18	1	
12	Analog I/O box	CI-701	1	With DC input, monitor output, R-Sync output connection box (with core)
13	Serial cable	CJ-325E8-170J-642	1	Cross cable



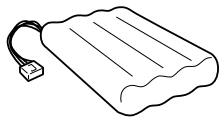
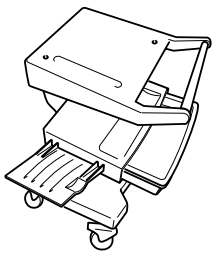
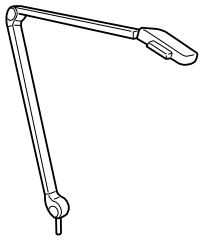
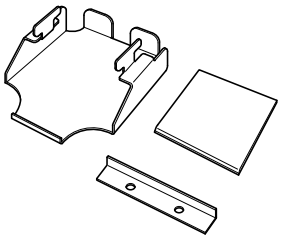
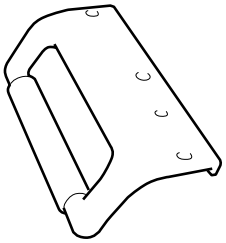
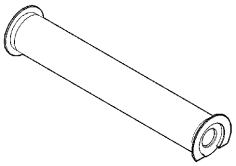
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[MEMO] Note that the above items are subject to change without prior notice for quality improvement.

Others

The following table lists the accessories for export to the U.S.A.

No.	Name	Type	Quantity	Note
1	Battery pack	T8HR4/3FAUC-5887	1	Ni-MH battery Not recycle mark-compliant (Export to Netherlands, Taiwan, and Brazil prohibited.)
2	Trolley	OTE-01	1	
3	Cord hanger	OA-300		
4	15-lead cord hanger attachment	OAE-01		
5	Handle	OA-301		
6	Adaptor for Z-fold paper	OA-483	1	

1 	2 	3 	4 
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[MEMO] Note that the above items are subject to change without prior notice for quality improvement.

Daily Check List

Item			Check item	Procedure and measurement/ judgment criterion	Judgment	Note (Repair required)
Visual check	Appearance	1	Exterior flaws, cracks, deformation, rust	Check that flaws, cracks, deformation, and rust are not found on the main unit.	Good/ NG	
		2	Peeling and dirt on nameplate and panel	Check that peeling or dirt is not found on the nameplate or the panel.	Good/ NG	
		3	Key	Check that the keys are not damaged.	Good/ NG	
	Accessories	1	Power cord, patient cable	Check that flaws and damage are not found.	Good/ NG	
		2	Limb electrode, chest electrode	Check that dirt or rust is not attached and that flaws and damage are not found.	Good/ NG	
		3	Recording paper	Check that flaws and damage are not found.	Good/ NG	
		4	Operation manual	Check that the manual is stored in the specified storage place.	Good/ NG	
Mechanical check	Main unit	1	Key	Check that the key operation is smooth.	Good/ NG	
		2	Recorder	Check that the operation is smooth and that abnormal sound is not heard.	Good/ NG	
	Accesso-ries	1	Power cord, patient cable	Check that the operation is smooth without rattling.	Good/ NG	
		2	Limb electrode, chest electrode	Check that no problem is found with the connection.	Good/ NG	
Electrical check	Performance	1	Power supply	Check that the screen display appears when the power is turned on.	Good/ NG	
		2	Display	Check that waveforms are displayed on the waveform display screen.	Good/ NG	
		3	Recording test	Check that waveforms can be printed.	Good/ NG	
		4	Recording speed (25 mm/s)	Check that the error for 10 seconds falls within ±3% range.	Good/ NG	
Overall judgment					Good/ NG	

Name of equipment		Installation site	
Model	FX-7542	Date of check	
Serial No.		Inspected by	
Date of purchase		Approved by	

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Periodic Check List (1)

Item		Check item		Procedure and measurement/ judgment criterion	Judgment	Note (Repair required)
Visual check	Appearance	1	Exterior flaws, cracks, deformation, rust	Check that flaws, cracks, deformation and rust are not found on the main unit.	Good/ NG	
		2	Peeling and dirt on nameplate and panel	Check that peeling or dirt is not found on the nameplate or the panel.	Good/ NG	
		3	Key	Check that the keys are not damaged.	Good/ NG	
	Accessories	1	Power cord, patient cable	Check that flaws and damage are not found.	Good/ NG	
		2	Limb electrode, chest electrode	Check that dirt or rust is not attached and that flaws and damage are not found.	Good/ NG	
		3	Recording paper	Check that flaws and damage are not found.	Good/ NG	
		4	Operation manual	Check that the manual is stored in the specified storage place.	Good/ NG	
Mechanical check	Main unit	1	Key	Check that the key operation is smooth.	Good/ NG	
		2	Recorder	Check that the operation is smooth and that abnormal sound is not heard.	Good/ NG	
	Accesso-ries	1	Power cord, patient cable	Check that the operation is smooth without rattling.	Good/ NG	
		2	Limb electrode, chest electrode	Check that no problem is found with the connection.	Good/ NG	
Maintenance		1	Battery test	Check that backup battery is voltage: 2.3 V or higher	Good/ NG	
		2	Clock setting	Check that correct time is displayed.	Good/ NG	
		3	Recording test	Check that recording paper is not fed zigzagging, the edge of the recording paper are not folded, recording inconsistency or fading is not occurring, missing dots are not found, and that the error falls within ±3% range at each of the following feeding speed: 5, 10, 25, and 50 mm/s.	Good/ NG	
		4	Display/Touch panel test	Check that all the dots stay lit to display characters correctly and in proper color and that correct reaction occurs at the touch point.		
		5	KEY/LED sound test	Check that the key pressed is displayed, the LED comes on, and that the buzzer sounds.		
Others		1	Power supply	Check that both AC power and battery power can be turned on/off.		
		2	Power cord	Perform a continuity test using a tester and check that the equipment is conducting.	Good/ NG	
Overall judgment					Good/ NG	

Name of equipment		Installation site	
Model	FX-7542	Date of check	
Serial No.		Inspected by	
Date of purchase		Approved by	

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